

END MILLING CUTTERS WITH FIXED CUTTING EDGES

Milling cutter for almost all applications and workpiece materials.



PRODUCT OVERVIEW

End milling cutter with fixed cutting edges

The powerful OptiMill end milling cutter range from MAPAL ensures excellent and process-reliable results for all machining tasks. Cost-effectiveness and product quality are particularly important in meeting customer requirements.

Application-based

The end milling cutter range from MAPAL includes shoulder milling cutters for universal applications, for roughing, finishing and trochoidal milling as well as milling cutters for high-feed milling, profile milling and chamfering.

Leading through flexibility

The CPMill replaceable milling cutter range also saves set-up costs. Due to the easy, safe handling, the milling heads can be directly replaced in the machine tool.

Always the right choice

Regardless of whether an economical milling cutter is required for universal machining or an expert for a complex machining task – MAPAL offers the right tool.



Basic
LINE

Basic Line:
Universal tools, broad field of application, low procurement costs

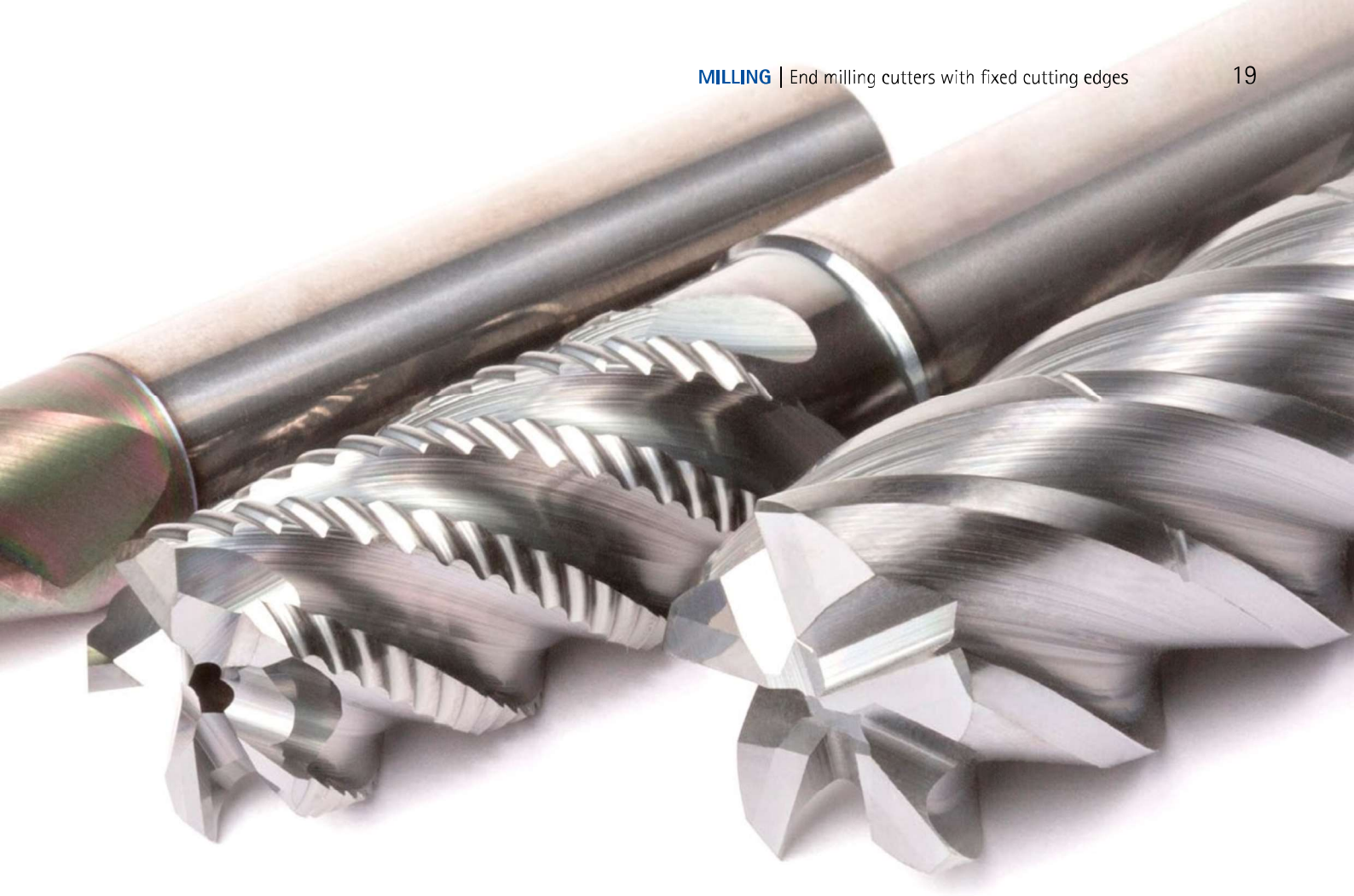
Performance
LINE




Performance Line:
High-performance tools, broad field of application, high productivity in series production

Expert
LINE

Expert Line:
Specialist tools for selected applications, maximum precision and productivity

Shoulder milling cutter			
<p>Universal application</p> <p>Shoulder milling cutter for universal application. Cutting width a_e up to $1 \times D$.</p> <ul style="list-style-type: none"> - OptiMill-Uni-HPC-Plus for highly economical universal machining of steel, stainless steel and cast iron - OptiMill-HPC-Pocket: Face geometry with integrated drill tip. Perfect for inclined plunging up to 45°, in helix milling and grooving - OptiMill-SPM for machining structural parts made of aluminium - OptiMill-Diamond: PCD-tipped milling cutters for extremely long tool life in non-metallic workpiece materials <p>Ø area: 1.00 – 63.00 mm</p> <p>P M K N C H</p>	<p>Roughing</p> <p>For achieving maximum cutting volumes. Ideal for pre-machining with large stock removal. Large material removal rate ($a_e \sim 0.6 \times D$).</p> <ul style="list-style-type: none"> - OptiMill-Uni-HPC-Rough: Knurled profile for optimised force distribution on the cutting edges and therefore better chip formation - OptiMill-Uni-Wave: Ideal for roughing with high feed rates. Low radial forces due to newly developed roughing profile - OptiMill-SPM-Rough: High infeed depths and maximum feed rates for roughing in aluminium - ECU-Mill-Rough&Finish: Roughing-finishing milling in one machining step <p>Ø area: 4.00 – 25.00 mm</p> <p>P M K N</p>	<p>Finishing</p> <p>Ideal for producing the top-quality surface finishes. Fine machining with low stock removal. Low material removal rate ($a_e \leq 0.1 \times D$).</p> <ul style="list-style-type: none"> - OptiMill-Uni-HPC-Finish with seven cutting edges for the highest surface quality in the shortest possible time - OptiMill-Hardened-Finish for finishing components with a hardness of 45 HRC and above - OptiMill-SPM-Finish for finishing deep pockets and delicate component structures in aluminium even with large wrappings <p>Ø area: 4.00 – 25.00 mm</p> <p>P M K N H</p>	<p>Trochoidal milling</p> <p>Maximum material removal rate while providing an excellent surface finish at the same time. Cutting depth up to $5 \times D$.</p> <p>OptiMill-Tro:</p> <ul style="list-style-type: none"> - Pre-machining and fine machining with one tool - Extra long cutting area - Optimised unequal spacing and finely balanced cutting tool for protecting the machine spindle and a longer tool life - Chip breaker for optimum chip control <p>Ø area: 4.00 – 25.00 mm</p> <p>P M K S H</p>
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

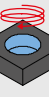
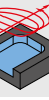





High-feed milling cutter	Ball nose and corner radius milling cutter	Chamfering, deburring, drill milling cutters
		
<p>Milling at high feed rates</p> <p>Perfect for high-feed machining with a high material removal rate, offering great process reliability. Low cutting depth ($a_p = 0.05 \times D$).</p> <p>OptiMill-3D-HF:</p> <ul style="list-style-type: none"> - Extremely quiet running - Hard and soft machining of steel - High feed rates with up to 1.35 mm per tooth with diameter 20.00 mm - Angled entry and pocket milling with long projection lengths <p>∅ area: 2.00 - 25.00 mm</p> <p>P M K H</p>	<p>High precision machining of 3D contours</p> <p>Contour and copy milling with high shape accuracy.</p> <ul style="list-style-type: none"> - OptiMill-3D-BN: High-precision milling cutters with high radius accuracy for hard and soft machining of steel - OptiMill-Diamond-Radius and -Torus: PCD cutting edges for long tool lives in aluminium - OptiMill-Composite-Speed-Radius for repair work on CFRP structures <p>∅ area: 1.00 - 25.00 mm</p> <p>P M K N C H</p>	<p>Chamfering, deburring and drill milling</p> <ul style="list-style-type: none"> - OptiMill-Chamfer: Cost-effective chamfering and deburring of pre-machined parts - OptiMill-DrillMill: Drill milling cutter for combination machining in one machining step, especially for sheet metal and thin-walled parts - CPD-Spot-Drill for tapping and centring - Designs with a replaceable head system for maximum flexibility and economic efficiency <p>∅ area: 3.00 - 20.00 mm</p> <p>P M K N</p>
<p>Page 169</p>	<p>Page 181</p>	<p>Page 205</p>

SELECTING A MILLING CUTTER

Step-by-step guide to selecting the right milling cutter

For example, are you looking for a shoulder milling cutter for universal use in steel with which you can also ramp?
This selection guide explains how to choose the right milling cutter step by step.

1	Type of milling cutter	Select the type of milling cutter you need.	➤		Shoulder milling cutter – universal application		Shoulder milling cutter – roughing
2	Design	Select your preferred design.	➤		Monolithic		Modular
3	Product category	Choose a product category.	➤	 Basic Line: Universal tools, broad field of application, low procurement costs			
4	Material suitability	Select your workpiece according to the MAPAL machining groups (MMG). You'll find the MMG chart on the fold-out page at the end of the catalogue.	➤		Steel		Stainless steel
5	Application	Select your preferred application.	➤		Shoulder milling		Groove milling
					Helix milling		Trochoidal milling
6	Design	Check that the geometric features meet your requirements.	➤		45° chamfer		Sharp-edged
7	Product	Select the milling cutter you need. Products of the preferred series are in stock and available at short notice, while products with configurable features can be freely configured within predefined limits.	➤	 Preferred series in stock			



Shoulder milling cutter – finishing



Shoulder milling cutter – trochoidal milling



High-feed milling cutter



Ball nose and corner radius milling cutter



Chamfering, deburring and drill milling cutters



Performance Line:
High-performance tools, broad field of application, high productivity in series production



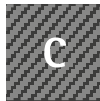
Expert Line:
Specialist tools for selected applications, maximum precision and productivity



Cast iron



Non-ferrous metals and plastics



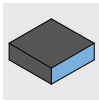
Composite materials



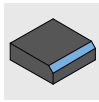
Super alloy and titanium



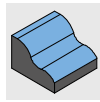
Hardened steel and cast steel



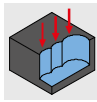
Trimming



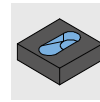
Chamfering and deburring



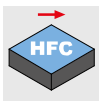
Profile milling



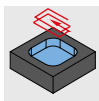
Plunge milling / Groove milling



Ramps



High-feed milling



Pocket milling



Corner radius

Diameter range

Number of teeth

Cutting material

Coolant supply

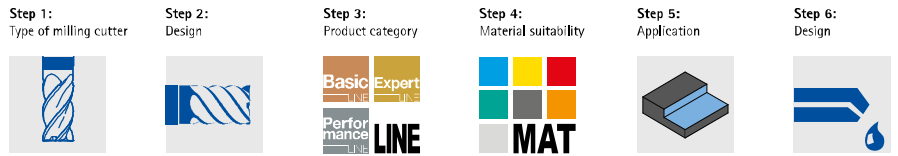


Product with configurable features

Shoulder milling cutter – universal application (1/2)

Design	Product category	Material suitability														Application																		
		P						M		K		N				C		S		H														
		1-3	4	5	6	1-3	1-3	1	2	3	4	1	2	3	4	1-5	1	2	3	1	2	3												
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★ 1. choice ■ highly suitable ■ suitable in some situations



Edge design			Design				Product			
45°	90°	CR	φ [mm]	z	Mat.		Product name	Specification		Page
✓		✓	2,5-25	4	HP		OptiMill-Uni-HPC-Plus	SCM720,740,760,770		36
✓			1-20	2	HP		OptiMill-Uni-HPC-Plus	SCM772		43
✓	✓		1-20	3	HP		OptiMill-Uni-HPC-Slot	SCM250		45
		✓	3,8-20	3	HP		OptiMill-Uni-HPC-Pocket	SCM800,810,840		47
✓			6-25	5	HP		OptiMill-Uni-HPC-Silent	SCM570		51
		✓	4-20	4	HP		OptiMill-Hardened	SCM102,103		54
✓			3-20	4	HP		OptiMill-Inox-HPC	SCM108		56
✓			3-20	3	HU		OptiMill-Alu-HPC	SCM270		57
		✓	5-20	3	HP		OptiMill-Alu-HPC-Pocket	SCM850		58
		✓	5-20	4	HP		OptiMill-Alu-HPC-Pocket	SCM854		59
✓			4-5	1	PU		OptiMill-Diamond-Typ 50	SHM500		63
✓			3-12	2	PU	✓	OptiMill-Diamond-Typ 51	SHM511,611,711		64
		✓	6-20	2-3	PU	✓	OptiMill-Diamond-Typ 53	SHM531		65
✓			16-63	3-4	PU	✓	OptiMill-Diamond-Typ 57	SHM571		66
✓			6-20	4	HC		OptiMill-Thermoplastic-FR	SCM610		76
✓			4-20	8	HU		OptiMill-Composite-Speed-Plus	SCM982, 992		70
	✓		1-3	MT	HC		OptiMill-Composite-Micro	SCM560		74
	✓		4-20	2	HU		OptiMill-Composite-TwinCut	SCM490		75
		✓	12-32	3	HU	✓	OptiMill-SPM	SCM681,691		60
		✓	6-50	3	PU	✓	OptiMill-Diamond-SPM	SHM101,110,111,121		61
✓			4-20	8	HC		OptiMill-Composite-Speed-Plus	SCM980, 990		72
✓			3-20	4	HP		ECU-Mill-Uni-LV	SCM780,790		52
	✓	✓	2-10	1	HU		OptiMill-Mono-Alu	SCM280		68
	✓		2-12	1	HU		OptiMill-Mono-Plastic	SCM330		77

Additional shoulder milling cutters for universal application on the next page.



Shoulder milling cutter- universal application (2/2)

Design	Product category	Material suitability																Application											
		P						M	K	N				C	S	H			Application icons										
		1-3	4	5	6	1-3	1-3	1	2	3	4	1-5	1	2	3	11 icons													
	Performance LINE	■	■	■	■	■									■	■	■					■	■	■		■			
		■	■	■	■	■									■	■	■					■	■	■		■			



Shoulder milling cutter – roughing

Design	Product category	Material suitability																Application											
		P						M	K	N				C	S	H			Application icons										
		1-3	4	5	6	1-3	1-3	1	2	3	4	1-5	1	2	3	11 icons													
	Performance LINE	■	■	■	■	■									★	■	■					■	■	■		■			
		■	■	■	■	■									★	■	■					■	■	★		■			
	Expert LINE									■					★	■	■					■	■	■	■	■			
	Basic LINE	■	■	■	■	■				■					■	■	■					■	■	■		■			
	Basic LINE	■	■	■	■	■				■					■	■	■					■	■	■		■			

★ 1. choice ■ highly suitable ■ suitable in some situations



Edge design		Design				Product				
45°	90°	CR	ø [mm]	z	Mat.		Product name	Specification		Page
✓			8-20	4	HP		CPMill-Uni-HPC	CPM100		44
✓			8-25	3	HP		CPMill-Uni-HPC-Slot	CPM110		46

Edge design		Design				Product				
45°	90°	CR	ø [mm]	z	Mat.		Product name	Specification		Page
✓			4-25	3-5	HP		OptiMill-Uni-HPC-Rough	SCM700, 710		108
✓			4-25	5	HP	✓	OptiMill-Uni-Wave	SCM880,881, 890,900,910		110
		✓	12-25	3	HU	✓	OptiMill-SPM-Rough	SCM951,961		118
✓	✓		6-20	3-4	HP		ECU-Mill-Uni-Rough&Finish	SCM220		120
✓			8-25	4-6	HP		CPMill-Uni-Rough&Finish	CPM140		121



Shoulder milling cutter – finishing

Design	Product category	Material suitability													Application																																																		
		P						M		K				N				C		S			H			Application icons																																							
		1-3	4	5	6	1-3	1-3	1	2	3	4	1	2	3	4	1-5	1	2	3	Application icons																																													
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	Performance LINE	■	■	■	■	■	■																																																										
	Performance LINE	■	■	■	■	■	■																																																										



Shoulder milling cutter – trochoidal milling

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		1-3	4	5	6	1-3	1-3	1	2	3	4	1	2	3	4	1-5	1	2	3	Application icons																																																			
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High-feed milling cutter

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Edge design			Design				Product			
45°	90°	CR	φ [mm]	z	Mat.		Product name	Specification		Page
✓	✓		4-25	7	HP		OptiMill-Uni-HPC-Finish	SCM830		134
	✓		6-20	6	HP		OptiMill-Uni-HPC-Finish	SCM370		138
	✓	✓	4-25	6	HP		OptiMill-Hardened-Finish	SCM104,124		140
		✓	12-25	4	HU		OptiMill-SPM-Finish	SCM970		145
	✓		8-25	6	HP		CPMill-Uni-HPC-Finish	CPM130		139

Edge design			Design				Product			
45°	90°	CR	φ [mm]	z	Mat.		Product name	Specification		Page
✓			4-20	5	HP		OptiMill-Tro-Uni	SCM580, 940		152
✓			4-25	5	HP		OptiMill-Tro-PM	SCM590		155
✓			4-25	7	HP		OptiMill-Tro-PM	SCM820, 930		156
		✓	6-25	5	HP		OptiMill-Tro-Titan	SCM630		162
		✓	6-25	5	HP		OptiMill-Tro-S	SCM600		161
		✓	6-25	5	HP		OptiMill-Tro-H	SCM920		160

Edge design			Design				Product			
45°	90°	CR	φ [mm]	z	Mat.		Product name	Specification		Page
			3-16	4	HP		OptiMill-3D-HF	MHF101		170
			2-16	4	HP		OptiMill-3D-HF-Hardened	MHF102		171
			8-25	6		✓	CPMill-Uni-FeedPlus	CPM171		172

Step 1:
Type of milling cutter



Step 2:
Design



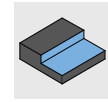
Step 3:
Product category



Step 4:
Material suitability



Step 5:
Application



Step 6:
Design

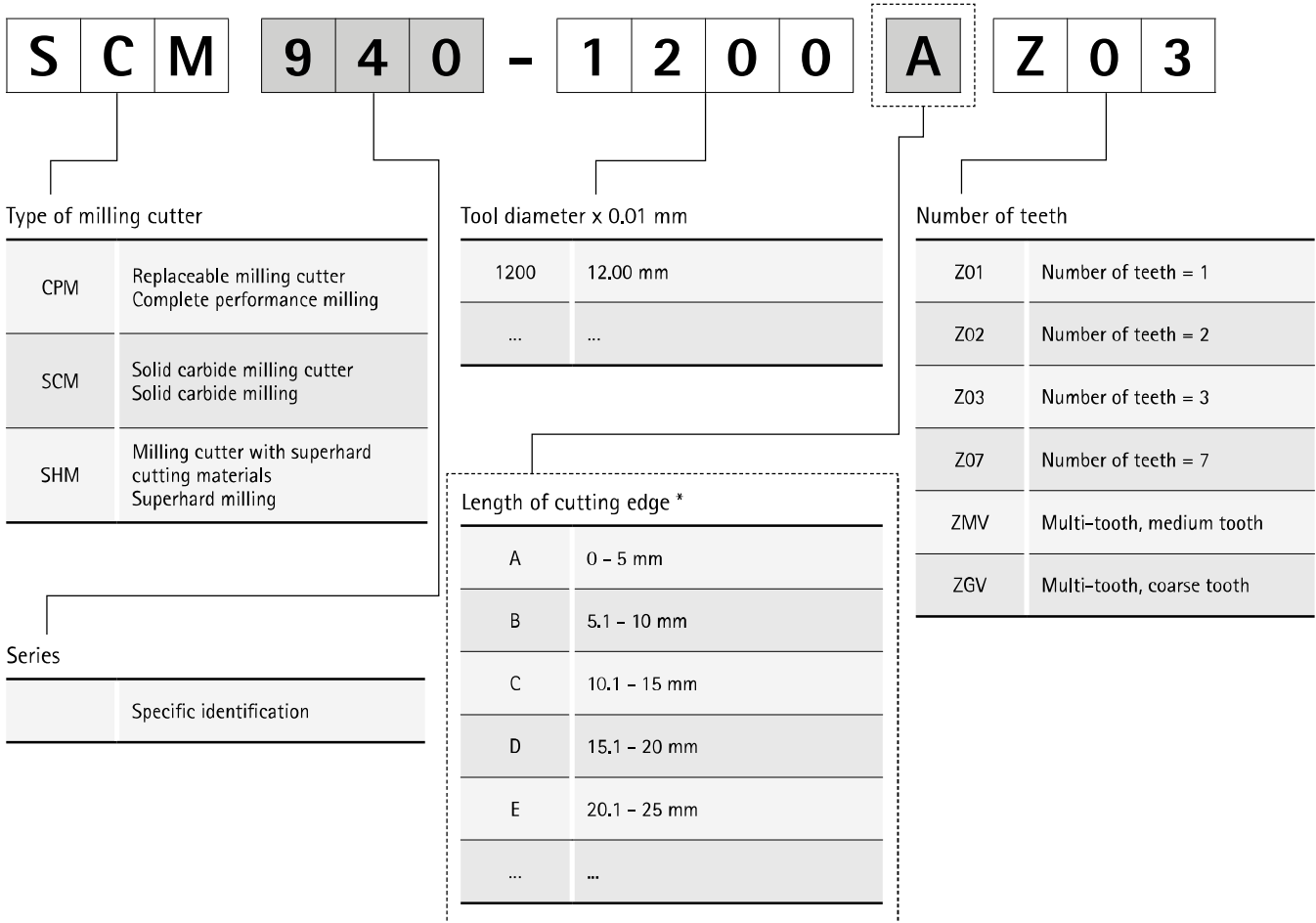


Edge design			Design				Product			
45°	90°	CR	φ [mm]	z	Mat.		Product name	Specification		Page
			1-12	2	HP		OptiMill-3D-BN	MBN101		182
			3-12	2	HP		OptiMill-3D-BN-Hardened	MBN107		183
			4-20	8	HC		OptiMill-Composite-Speed-Radius	SCM870		188
			3-16	2	PU	✓	OptiMill-Diamond-Radius	SHM521		186
		✓	3-12	2	PU	✓	OptiMill-Diamond-Torus	SHM551		187
			8-25	4	HP		CPMill-Uni-Radius	CPM150		184
		✓	8-25	4	HP		CPMill-Uni-Torus	CPM160		185

Edge design			Design				Product			
45°	90°	CR	φ [mm]	z	Mat.		Product name	Specification		Page
			4-20	4	HP		OptiMill-Chamfer	SCM340		206
			3-16	2	HU		OptiMill-DrillMill	SCM350		209
			8-20	4/6	HP		CPMill-Chamfer	CPM180		207
	✓		10-20	3+3	HP		CPMill-Chamfer-Twin	CPM190		208

Product ID codes

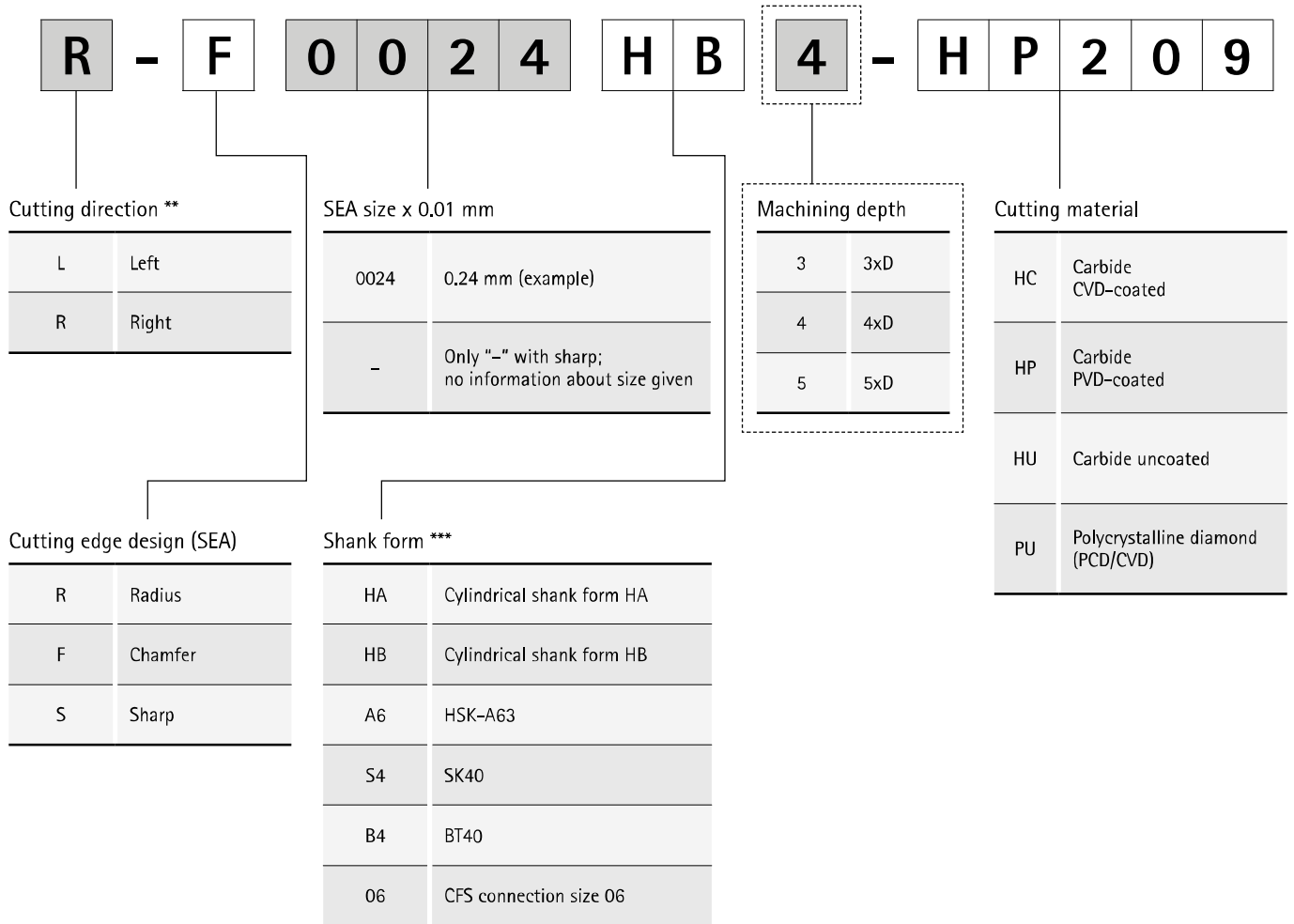
Solid carbide and PCD end milling cutter



* Only with milling cutter type SHM

** Not applicable for milling cutter type CPM

*** For milling cutter type CPM, the shank form corresponds to the CFS connection size



Product ID codes

End milling cutter with fixed cutting edges



Type of milling cutter

MBN	Ball nose cutter Die Et Mould – Ball Nose
MCR	Corner radius milling cutter Die Et Mould – corner radius
MCS	Shoulder radius milling cutter Die Et Mould – circle segment
MHF	High-feed milling cutter Die Et Mould – high feed

Tool diameter x 0.1 mm

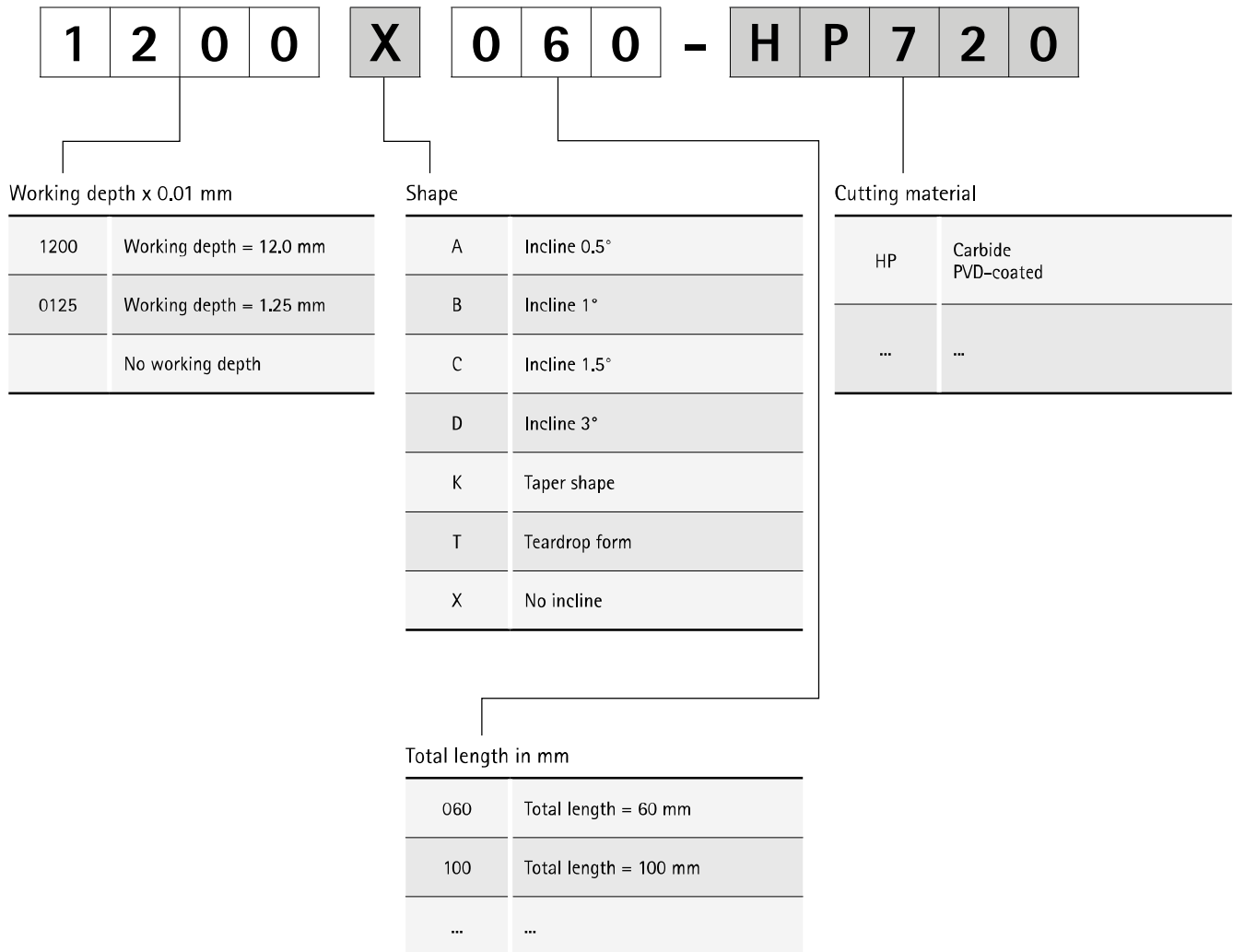
040	Milling cutter $\varnothing = 4.0$ mm
...	...

Radius x 0.01 mm

0050	Radius = 0.5 mm
	R ₁ for milling cutter type "MHF"

Series

100	Continuous
101	
...	
999	





SHOULDER MILLING CUTTERS – UNIVERSAL MACHINING



Universal application

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Technical appendix

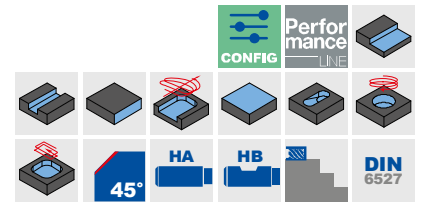
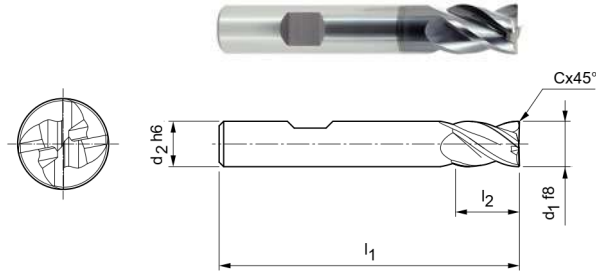
Cutting data recommendations	78
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OptiMill®-Uni-HPC-Plus

Shoulder milling cutter, short design
SCM760

Design:


Diameter of milling cutter: 3.00 – 20.00 mm
Cutting material: HP920
Number of cutting edges: 4
Helix angle: 36°/38°
Special features: Unequal spacing, rounding the cutting edge




Preferred series in stock

Dimensions					z	Specification	Order no.
d1 f8	d2 h6	l1	l2	Cx45°			
3,00	6	50	6	0,06	4	SCM760-0300Z04R-F0006HB-HP920	30787363
4,00	6	54	8	0,08	4	SCM760-0400Z04R-F0008HB-HP920	30787364
5,00	6	54	9	0,10	4	SCM760-0500Z04R-F0010HB-HP920	30787365
6,00	6	54	10	0,12	4	SCM760-0600Z04R-F0012HB-HP920	30787366
8,00	8	58	12	0,16	4	SCM760-0800Z04R-F0016HB-HP920	30787367
10,00	10	66	14	0,20	4	SCM760-1000Z04R-F0020HB-HP920	30787368
12,00	12	73	16	0,24	4	SCM760-1200Z04R-F0024HB-HP920	30787369
14,00	14	73	16	0,28	4	SCM760-1400Z04R-F0028HB-HP920	30787370
16,00	16	82	22	0,32	4	SCM760-1600Z04R-F0032HB-HP920	30787371
18,00	18	82	22	0,36	4	SCM760-1800Z04R-F0036HB-HP920	30787372
20,00	20	92	26	0,40	4	SCM760-2000Z04R-F0040HB-HP920	30787373

Configurable features



Shank form:
Shank form: HA



Specification:
SCM760-0300Z04R-F0006[shank form]-HP920

Example:

SCM760-0300Z04R-F0006HA-HP920

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

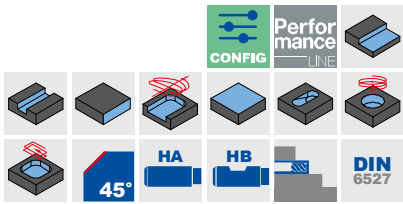
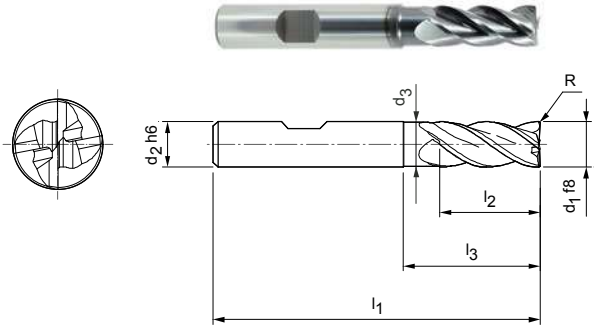
Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Plus

Shoulder milling cutter, long design with neck, design with chamfer / small chamfer
SCM770

Design:

Diameter of milling cutter: 2,50 – 25,00 mm
Cutting material: HP920
Number of cutting edges: 4
Helix angle: 36°/38°
Special features: Unequal spacing, rounding the cutting edge




Design with chamfer | Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f8	d2 h6	d3	l1	l2	l3	Cx45°			
2,50*	6	-	57	8	-	0,05	4	SCM770-0250Z04R-F0005HB-HP920	30787374
3,00*	6	-	57	8	-	0,06	4	SCM770-0300Z04R-F0006HB-HP920	30787375
4,00*	6	-	57	11	-	0,08	4	SCM770-0400Z04R-F0008HB-HP920	30787376
5,00*	6	-	57	13	-	0,10	4	SCM770-0500Z04R-F0010HB-HP920	30787377
6,00	6	5,8	57	13	20	0,12	4	SCM770-0600Z04R-F0012HB-HP920	30787378
7,00	8	6,8	63	16	25	0,14	4	SCM770-0700Z04R-F0014HB-HP920	30787379
8,00	8	7,8	63	21	25	0,16	4	SCM770-0800Z04R-F0016HB-HP920	30787380
9,00	10	8,8	72	22	30	0,18	4	SCM770-0900Z04R-F0018HB-HP920	30787381
10,00	10	9,8	72	22	30	0,20	4	SCM770-1000Z04R-F0020HB-HP920	30787382
12,00	12	11,8	83	26	36	0,24	4	SCM770-1200Z04R-F0024HB-HP920	30787383
14,00	14	13,8	83	26	36	0,28	4	SCM770-1400Z04R-F0028HB-HP920	30787390
16,00	16	15,8	92	36	42	0,32	4	SCM770-1600Z04R-F0032HB-HP920	30787391
18,00	18	17,8	92	36	47	0,36	4	SCM770-1800Z04R-F0036HB-HP920	30787392
20,00	20	19,8	104	41	55	0,40	4	SCM770-2000Z04R-F0040HB-HP920	30787393
25,00	25	24,5	136	68	80	0,50	4	SCM770-2500Z04R-F0050HB-HP920	30787394


Design with small chamfer | Preferred series in stock

6,00	6	5,8	57	13	20	0,10	4	SCM770-0600Z04R-F0010HB-HP920	31243605
8,00	8	7,8	63	21	25	0,10	4	SCM770-0800Z04R-F0010HB-HP920	31243606
10,00	10	9,8	72	22	30	0,10	4	SCM770-1000Z04R-F0010HB-HP920	31243608
12,00	12	11,8	83	26	36	0,10	4	SCM770-1200Z04R-F0010HB-HP920	31243609
14,00	14	13,8	83	26	36	0,10	4	SCM770-1400Z04R-F0010HB-HP920	31243610
16,00	16	15,8	92	36	42	0,10	4	SCM770-1600Z04R-F0010HB-HP920	31243611
20,00	20	19,8	104	41	55	0,10	4	SCM770-2000Z04R-F0010HB-HP920	31243612

Configurable features



Shank form:
Shank form: HA



Specification:
SCM770-0250Z04R-F0005[shank form]-HP920

Example:

SCM770-0250Z04R-F0005HA-HP920



Shank form HA

Dimensions in mm.

* Design without neck.

For cutting data recommendations, see end of chapter.

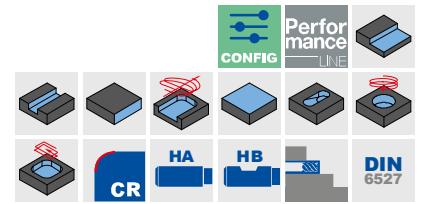
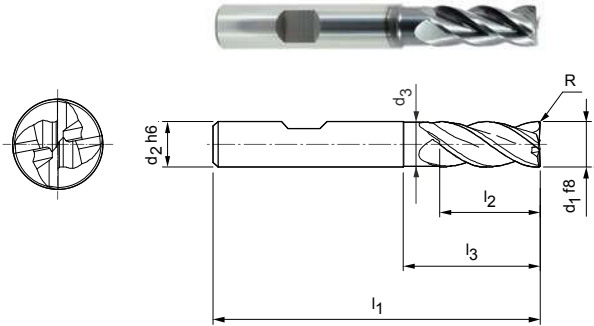
Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Plus

Shoulder milling cutter, long design with neck, design with corner radius
SCM770

Design:

Diameter of milling cutter: 2.50 – 25.00 mm
Cutting material: HP920
Number of cutting edges: 4
Helix angle: 36°/38°
Special features: Unequal spacing, rounding the cutting edge




Design with radius | Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f8	d2 h6	d3	l1	l2	l3	R			
4,00*	6	-	57	11	-	0,4	4	SCM770-0400Z04R-R0040HB-HP920	30787434
4,00*	6	-	57	11	-	0,5	4	SCM770-0400Z04R-R0050HB-HP920	30787435
4,00*	6	-	57	11	-	1	4	SCM770-0400Z04R-R0100HB-HP920	30787436
5,00*	6	-	57	13	-	0,5	4	SCM770-0500Z04R-R0050HB-HP920	30787437
5,00*	6	-	57	13	-	1	4	SCM770-0500Z04R-R0100HB-HP920	30787438
6,00	6	5,8	57	13	20	0,5	4	SCM770-0600Z04R-R0050HB-HP920	30787439
6,00	6	5,8	57	13	20	1	4	SCM770-0600Z04R-R0100HB-HP920	30787440
6,00	6	5,8	57	13	20	1,5	4	SCM770-0600Z04R-R0150HB-HP920	30787441
6,00	6	5,8	57	13	20	2	4	SCM770-0600Z04R-R0200HB-HP920	30787442
8,00	8	7,8	63	21	25	0,5	4	SCM770-0800Z04R-R0050HB-HP920	30787443
8,00	8	7,8	63	21	25	1	4	SCM770-0800Z04R-R0100HB-HP920	30787444
8,00	8	7,8	63	21	25	1,5	4	SCM770-0800Z04R-R0150HB-HP920	30787445
8,00	8	7,8	63	21	25	2	4	SCM770-0800Z04R-R0200HB-HP920	30787446
8,00	8	7,8	63	21	25	2,5	4	SCM770-0800Z04R-R0250HB-HP920	30787447
8,00	8	7,8	63	21	25	3	4	SCM770-0800Z04R-R0300HB-HP920	30787448
10,00	10	9,8	72	22	30	0,5	4	SCM770-1000Z04R-R0050HB-HP920	30787449
10,00	10	9,8	72	22	30	1	4	SCM770-1000Z04R-R0100HB-HP920	30787450
10,00	10	9,8	72	22	30	1,5	4	SCM770-1000Z04R-R0150HB-HP920	30787451
10,00	10	9,8	72	22	30	2	4	SCM770-1000Z04R-R0200HB-HP920	30787452
10,00	10	9,8	72	22	30	2,5	4	SCM770-1000Z04R-R0250HB-HP920	30787453
10,00	10	9,8	72	22	30	3	4	SCM770-1000Z04R-R0300HB-HP920	30787454
12,00	12	11,8	83	26	36	0,5	4	SCM770-1200Z04R-R0050HB-HP920	30787455
12,00	12	11,8	83	26	36	1	4	SCM770-1200Z04R-R0100HB-HP920	30787456
12,00	12	11,8	83	26	36	1,5	4	SCM770-1200Z04R-R0150HB-HP920	30787457
12,00	12	11,8	83	26	36	2	4	SCM770-1200Z04R-R0200HB-HP920	30787458
12,00	12	11,8	83	26	36	2,5	4	SCM770-1200Z04R-R0250HB-HP920	30787459
12,00	12	11,8	83	26	36	3	4	SCM770-1200Z04R-R0300HB-HP920	30787460
12,00	12	11,8	83	26	36	4	4	SCM770-1200Z04R-R0400HB-HP920	30787461
16,00	16	15,8	92	36	42	0,5	4	SCM770-1600Z04R-R0050HB-HP920	30787462
16,00	16	15,8	92	36	42	1	4	SCM770-1600Z04R-R0100HB-HP920	30787463
16,00	16	15,8	92	36	42	2	4	SCM770-1600Z04R-R0200HB-HP920	30787464
16,00	16	15,8	92	36	42	2,5	4	SCM770-1600Z04R-R0250HB-HP920	30787465
16,00	16	15,8	92	36	42	3	4	SCM770-1600Z04R-R0300HB-HP920	30787466
16,00	16	15,8	92	36	42	4	4	SCM770-1600Z04R-R0400HB-HP920	30787467
20,00	20	19,8	104	41	52	1	4	SCM770-2000Z04R-R0100HB-HP920	30787468


Design with radius | Preferred series in stock

Dimensions							z	Specification	Order no.
d ₁ f8	d ₂ h6	d ₃	l ₁	l ₂	l ₃	R			
20,00	20	19,8	104	41	52	2	4	SCM770-2000Z04R-R0200HB-HP920	30787469
20,00	20	19,8	104	41	52	3	4	SCM770-2000Z04R-R0300HB-HP920	30787470
20,00	20	19,8	104	41	52	4	4	SCM770-2000Z04R-R0400HB-HP920	30787471

Configurable features



Shank form:
Shank form: HA



Specification:
SCM770-0400Z04R-R0040[shank form]-HP920

Example:

SCM770-0400Z04R-R0040HA-HP920

Shank form HA

Dimensions in mm.

* Design without neck.

For cutting data recommendations, see end of chapter.

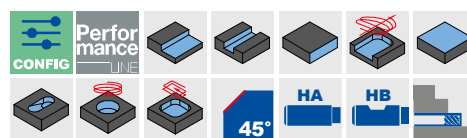
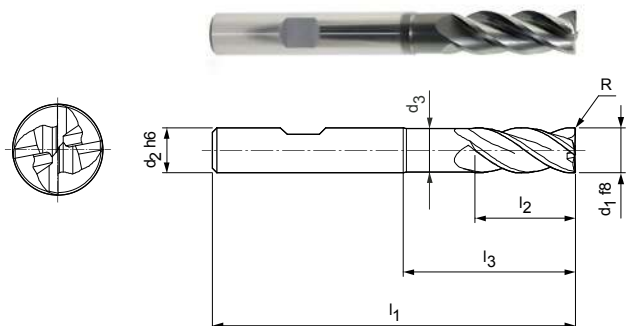
Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Plus

Shoulder milling cutter, overlong design with neck, design with chamfer
SCM720

Design:

Diameter of milling cutter: 5.00 – 25.00 mm
Cutting material: HP920
Number of cutting edges: 4
Helix angle: 36°/38°
Special features: Unequal spacing, rounding the cutting edge




Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f8	d2 h6	d3	l1	l2	l3	Cx45°			
6,00	6	5,8	62	13	25	0,12	4	SCM720-0600Z04R-F0012HB-HP920	30652409
8,00	8	7,7	68	21	30	0,16	4	SCM720-0800Z04R-F0016HB-HP920	30652410
10,00	10	9,7	80	22	38	0,20	4	SCM720-1000Z04R-F0020HB-HP920	30652411
12,00	12	11,6	93	26	46	0,24	4	SCM720-1200Z04R-F0024HB-HP920	30652412
14,00	14	13,6	99	26	52	0,28	4	SCM720-1400Z04R-F0028HB-HP920	30652413
16,00	16	15,5	108	36	58	0,32	4	SCM720-1600Z04R-F0032HB-HP920	30652414
18,00	18	17,5	117	36	67	0,36	4	SCM720-1800Z04R-F0036HB-HP920	30652415
20,00	20	19,5	126	41	74	0,40	4	SCM720-2000Z04R-F0040HB-HP920	30652416
25,00	25	24	150	50	92	0,50	4	SCM720-2500Z04R-F0050HB-HP920	30652417


Available on request

5,00	6	4,8	62	13	24	0,10	4	SCM720-0500Z04R-F0010HB-HP920	30652408
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Configurable features



Shank form:
Shank form: HA



Specification:
SCM720-0600Z04R-F0012[shank form]-HP920

Example:

SCM720-0600Z04R-F0012HA-HP920



Dimensions in mm.

For cutting data recommendations, see end of chapter.

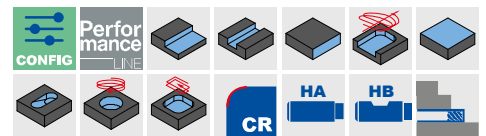
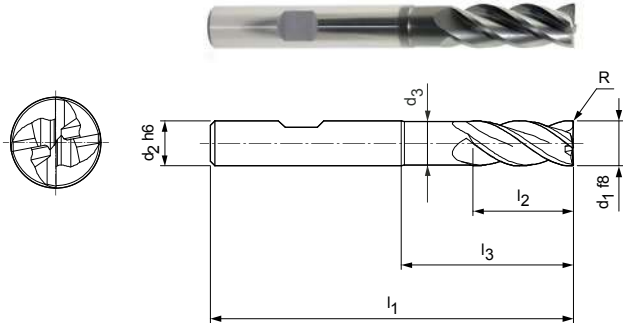
Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Plus

Shoulder milling cutter, overlong design with neck, design with corner radius
SCM720

Design:

Diameter of milling cutter: 4.00 – 25.00 mm
Cutting material: HP920
Number of cutting edges: 4
Helix angle: 36°/38°
Special features: Unequal spacing, rounding the cutting edge



Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f8	d2 h6	d3	l1	l2	l3	R			
4,00	6	3,8	62	11	22	0,5	4	SCM720-0400Z04R-R0050HB-HP920	31046163
4,00	6	3,8	62	11	22	1	4	SCM720-0400Z04R-R0100HB-HP920	31046164
5,00	6	4,8	62	13	24	0,5	4	SCM720-0500Z04R-R0050HB-HP920	31046165
5,00	6	4,8	62	13	24	1	4	SCM720-0500Z04R-R0100HB-HP920	31046166
6,00	6	5,8	62	13	25	0,5	4	SCM720-0600Z04R-R0050HB-HP920	31046167
6,00	6	5,8	62	13	25	1	4	SCM720-0600Z04R-R0100HB-HP920	31046168
6,00	6	5,8	62	13	25	2	4	SCM720-0600Z04R-R0200HB-HP920	31046169
8,00	8	7,7	68	21	30	1	4	SCM720-0800Z04R-R0100HB-HP920	31046170
8,00	8	7,7	68	21	30	2	4	SCM720-0800Z04R-R0200HB-HP920	31046171
10,00	10	9,7	80	22	38	0,5	4	SCM720-1000Z04R-R0050HB-HP920	31046172
10,00	10	9,7	80	22	38	1	4	SCM720-1000Z04R-R0100HB-HP920	31046173
10,00	10	9,7	80	22	38	1,5	4	SCM720-1000Z04R-R0150HB-HP920	31046174
10,00	10	9,7	80	22	38	2	4	SCM720-1000Z04R-R0200HB-HP920	31046175
10,00	10	9,7	80	22	38	3	4	SCM720-1000Z04R-R0300HB-HP920	31046176
12,00	12	11,6	93	26	46	0,5	4	SCM720-1200Z04R-R0050HB-HP920	31046177
12,00	12	11,6	93	26	46	1	4	SCM720-1200Z04R-R0100HB-HP920	31046178
12,00	12	11,6	93	26	46	1,5	4	SCM720-1200Z04R-R0150HB-HP920	31046179
12,00	12	11,6	93	26	46	2	4	SCM720-1200Z04R-R0200HB-HP920	31046180
12,00	12	11,6	93	26	46	3	4	SCM720-1200Z04R-R0300HB-HP920	31046181
16,00	16	15,5	108	36	58	0,5	4	SCM720-1600Z04R-R0050HB-HP920	31046182
16,00	16	15,5	108	36	58	1	4	SCM720-1600Z04R-R0100HB-HP920	31046183
16,00	16	15,5	108	36	58	2	4	SCM720-1600Z04R-R0200HB-HP920	31046184
16,00	16	15,5	108	36	58	4	4	SCM720-1600Z04R-R0400HB-HP920	31046185
20,00	20	19,5	126	41	74	1	4	SCM720-2000Z04R-R0100HB-HP920	31046186
20,00	20	19,5	126	41	74	2	4	SCM720-2000Z04R-R0200HB-HP920	31046187
20,00	20	19,5	126	41	74	4	4	SCM720-2000Z04R-R0400HB-HP920	31046188

Configurable features

Shank form:
Shank form: HA

Specification:
SCM720-0400Z04R-R0050[shank form]-HP920

Example:

SCM720-0400Z04R-R0050HA-HP920

Shank form HA

Dimensions in mm.

* Design without neck.

For cutting data recommendations, see end of chapter.

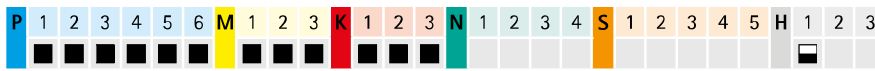
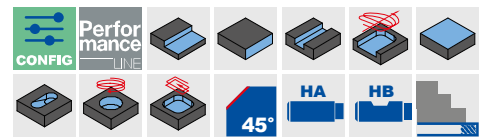
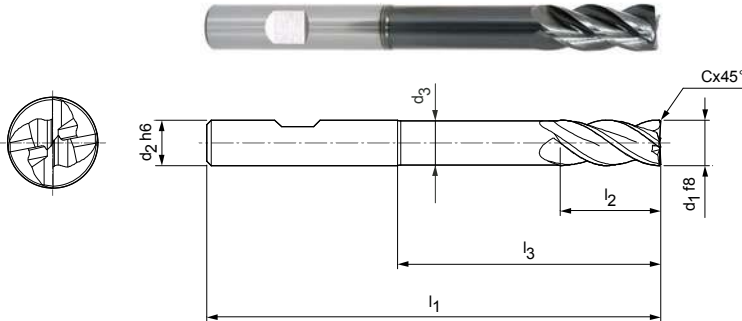
Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Plus

Shoulder milling cutter, extra long design with neck
SCM740

Design:

Diameter of milling cutter: 5.00 – 25.00 mm
Cutting material: HP920
Number of cutting edges: 4
Helix angle: 36°/38°
Special features: Unequal spacing, rounding the cutting edge




Preferred series in stock

Dimensions							z	Specification	Order no.
d ₁ f8	d ₂ h6	d ₃	l ₁	l ₂	l ₃	Cx45°			
5,00	6	4,8	80	13	41	0,10	4	SCM740-0500Z04R-F0010HB-HP920	30652418
6,00	6	5,8	80	13	42	0,12	4	SCM740-0600Z04R-F0012HB-HP920	30652419
8,00	8	7,7	100	21	62	0,16	4	SCM740-0800Z04R-F0016HB-HP920	30652420
10,00	10	9,7	100	22	58	0,20	4	SCM740-1000Z04R-F0020HB-HP920	30652421
12,00	12	11,6	120	26	73	0,24	4	SCM740-1200Z04R-F0024HB-HP920	30652422
14,00	14	13,6	120	26	73	0,28	4	SCM740-1400Z04R-F0028HB-HP920	30652423
16,00	16	15,5	150	36	100	0,32	4	SCM740-1600Z04R-F0032HB-HP920	30652424
20,00	20	19,5	150	41	98	0,40	4	SCM740-2000Z04R-F0040HB-HP920	30652426


Available on request

18,00	18	17,5	150	36	100	0,36	4	SCM740-1800Z04R-F0036HB-HP920	30652425
25,00	25	24	175	50	117	0,50	4	SCM740-2500Z04R-F0050HB-HP920	30652427

Configurable features



Shank form:
Shank form: HA



Specification:
SCM740-0500Z04R-F0010[shank form]-HP920

Example:

SCM740-0500Z04R-F0010HA-HP920

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

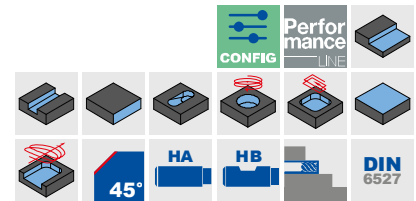
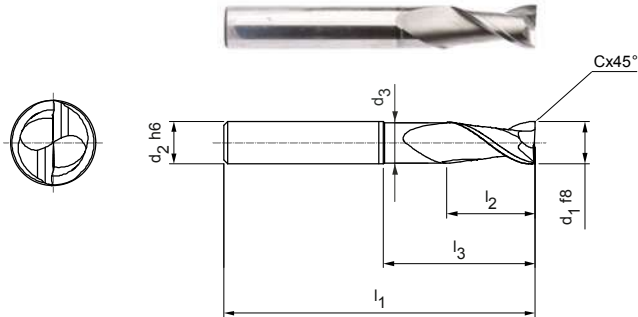
Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Plus

Shoulder milling cutter, long design with neck
SCM772

Design:

Diameter of milling cutter: 1.00 – 20.00 mm
Cutting material: HP213/HP723
Number of cutting edges: 2
Helix angle: 36°/38°
Special features: Unequal spacing, rounding the cutting edge




Preferred series in stock

Dimensions							z	Specification	Order no.
d ₁ f8	d ₂ h6	d ₃	l ₁	l ₂	l ₃	Cx45°			
1,00	3	0,97	38	3	5	0,025	2	SCM772-0100Z02R-F0005HA-HP213	31205147
2,00	3	1,9	38	4	8	0,05	2	SCM772-0200Z02R-F0005HA-HP213	31205148
3,00	6	2,8	57	7	13	0,10	2	SCM772-0300Z02R-F0010HA-HP723	31205149
4,00	6	3,8	57	8	14	0,10	2	SCM772-0400Z02R-F0010HA-HP723	31205180
5,00	6	4,8	57	10	15,5	0,10	2	SCM772-0500Z02R-F0010HA-HP723	31205181
6,00	6	5,8	57	10	20	0,10	2	SCM772-0600Z02R-F0010HA-HP723	31205182
8,00	8	7,8	63	16	25	0,10	2	SCM772-0800Z02R-F0010HA-HP723	31205183
10,00	10	9,8	72	19	30	0,10	2	SCM772-1000Z02R-F0010HA-HP723	31205184
12,00	12	11,8	83	22	36	0,10	2	SCM772-1200Z02R-F0010HA-HP723	31205185
16,00	16	15,8	92	26	42	0,10	2	SCM772-1600Z02R-F0010HA-HP723	31205186


Available on request

20,00	20	19,8	104	32	52	0,10	2	SCM772-2000Z02R-F0010HA-HP723	31205187
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Configurable features*



Shank form:
Shank form: HB



Specification:
SCM772-0100Z02R-F0005[shank form]-HP213

Example:

SCM772-0100Z02R-F0005HB-HP213

Shank form HB

Dimensions in mm.

* Configurable features valid from d₁ = 3 mm.

For cutting data recommendations, see end of chapter.

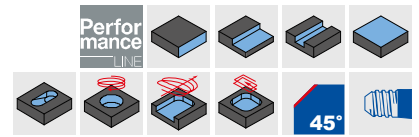
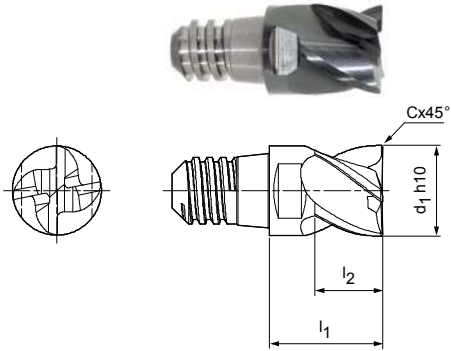
Special designs and other coatings available upon request.

CPMill®-Uni-HPC

Design with CFS connection
CPM100

Design:


Diameter of milling cutter: 8.00 – 20.00 mm
Cutting material: HP383
Number of cutting edges: 4
Helix angle: 37°
Special features: Unequal spacing



Preferred series in stock

Dimensions					z	ap max.	SW	Specification	Order no.
d1 h10	CFS size	l1	l2	Cx45°					
8,00	6	11	6	0,16	4	4,5	SW 6	CPM100-0800Z04-F0016-06-HP383	30371373
10,00	8	13	7,5	0,20	4	5,6	SW 8	CPM100-1000Z04-F0020-08-HP383	30371374
12,00	10	16	9	0,24	4	6,8	SW 10	CPM100-1200Z04-F0024-10-HP383	30371375
16,00	12	20	12	0,32	4	9	SW 13	CPM100-1600Z04-F0032-12-HP383	30371376
20,00	16	25	15	0,40	4	11,3	SW 16	CPM100-2000Z04-F0040-16-HP383	30371378

Accessories

	CFS replaceable head holders CFS201	Page 218
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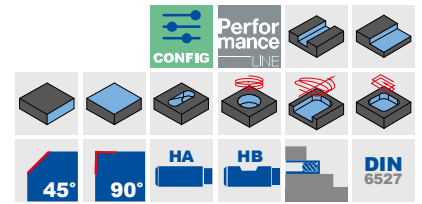
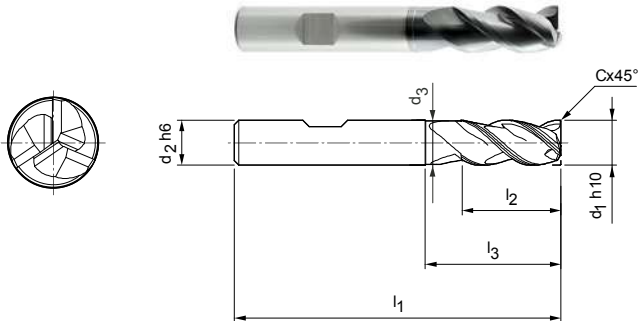
Dimensions in mm.
For cutting data recommendations, see end of chapter.
Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Slot

Shoulder milling cutter, long design with neck
SCM250

Design:

Diameter of milling cutter: 1.00 – 20.00 mm
Cutting material: HP213/HP922
Number of cutting edges: 3
Helix angle: 42° – 43°
Special features: Unequal spacing




Preferred series in stock

Dimensions							z	Specification	Order no.
d1 h10	d2 h6	d3	l1	l2	l3	Cx45°			
1,00	6	0,9	54	2,5	4	–	3	SCM250-0100Z03R-S-HB-HP922	30595972
1,50	6	1,4	54	4	6	–	3	SCM250-0150Z03R-S-HB-HP922	30504879
2,00	6	1,9	54	5	8	–	3	SCM250-0200Z03R-S-HB-HP922	30504885
2,50	6	2,4	54	6,5	10	–	3	SCM250-0250Z03R-S-HB-HP922	30596272
3,00	6	2,8	57	8	12,5	0,06	3	SCM250-0300Z03R-F0006HB-HP213	30393565
4,00	6	3,8	57	11	15	0,08	3	SCM250-0400Z03R-F0008HB-HP213	30393566
5,00	6	4,8	57	13	16	0,10	3	SCM250-0500Z03R-F0010HB-HP213	30393567
6,00	6	5,8	57	13	20	0,12	3	SCM250-0600Z03R-F0012HB-HP213	30393568
8,00	8	7,8	63	21	27	0,16	3	SCM250-0800Z03R-F0016HB-HP213	30393569
10,00	10	9,8	72	22	30	0,20	3	SCM250-1000Z03R-F0020HB-HP213	30393570
12,00	12	11,8	83	26	36	0,24	3	SCM250-1200Z03R-F0024HB-HP213	30393571
16,00	16	15,8	92	36	44	0,32	3	SCM250-1600Z03R-F0032HB-HP213	30393573
18,00	18	17,8	92	36	44	0,36	3	SCM250-1800Z03R-F0036HB-HP213	30393574
20,00	20	19,8	104	41	55	0,40	3	SCM250-2000Z03R-F0040HB-HP213	30393575


Available on request

14,00	14	13,8	83	26	36	0,28	3	SCM250-1400Z03R-F0028HB-HP213	30393572
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Configurable features



Shank form:
Shank form: HA



Specification:
SCM250-0300Z03R-F0006[shank form]-HP213

Example:

SCM250-0300Z03R-F0006HA-HP213

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

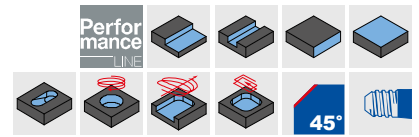
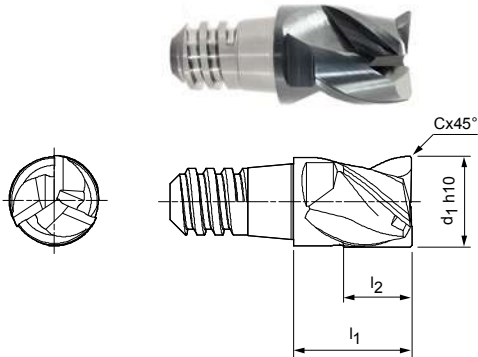
Special designs and other coatings available upon request.

CPMill®-Uni-HPC-Slot

Design with CFS connection
CPM110

Design:


Diameter of milling cutter: 8.00 – 25.00 mm
Cutting material: HP383
Number of cutting edges: 3
Helix angle: 41°
Special features: Unequal spacing



Preferred series in stock

Dimensions					z	a _p max.	SW	Specification	Order no.
d ₁ h10	CFS size	l ₁	l ₂	Cx45°					
8,00	6	11	6	0,16	3	4,5	SW 6	CPM110-0800Z03-F0016-06-HP383	30371366
10,00	8	13	7,5	0,20	3	5,6	SW 8	CPM110-1000Z03-F0020-08-HP383	30371367
12,00	10	16	9	0,24	3	6,8	SW 10	CPM110-1200Z03-F0024-10-HP383	30371368
16,00	12	20	12	0,32	3	9	SW 13	CPM110-1600Z03-F0032-12-HP383	30371369
20,00	16	25	15	0,40	3	11,3	SW 16	CPM110-2000Z03-F0040-16-HP383	30371371
25,00	20	32	19	0,50	3	14	SW 21	CPM110-2500Z03-F0050-20-HP383	30371372

Accessories

	CFS replaceable head holders CFS201	Page 218
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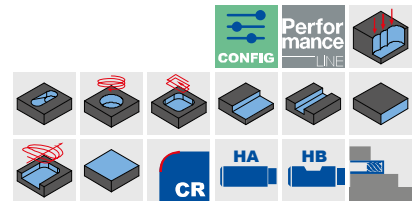
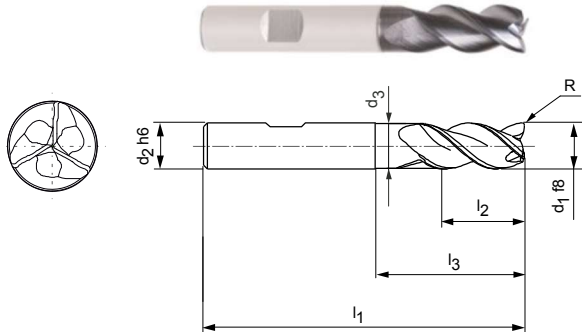
Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Pocket

Shoulder milling cutter, long design with neck
SCM810



Design:
 Diameter of milling cutter: 3.80 – 20.00 mm
 Cutting material: HP920
 Number of cutting edges: 3
 Helix angle: ~ 42°
 Special features: Face geometry with integrated drill tip

Application:
 Perfect for inclined plunging up to 45°, in helix milling and grooving.

Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f8	d2 h6	d3	l1	l2	l3	R			
3,80	6	3,6	57	10	13	0,19	3	SCM810-0380Z03R-R0019HB-HP920	31031147
4,00	6	3,8	57	11	13	0,2	3	SCM810-0400Z03R-R0020HB-HP920	31031148
4,80	6	4,6	57	11	15,5	0,24	3	SCM810-0480Z03R-R0024HB-HP920	31031149
5,00	6	4,8	57	13	15,5	0,25	3	SCM810-0500Z03R-R0025HB-HP920	31031150
5,70	6	5,5	57	13	19	0,29	3	SCM810-0570Z03R-R0029HB-HP920	30788023
6,00	6	5,8	57	13	19	0,3	3	SCM810-0600Z03R-R0030HB-HP920	30788024
6,70	8	6,5	63	16	25	0,34	3	SCM810-0670Z03R-R0034HB-HP920	30788025
7,00	8	6,8	63	16	25	0,35	3	SCM810-0700Z03R-R0035HB-HP920	30788026
7,70	8	7,5	63	19	25	0,39	3	SCM810-0770Z03R-R0039HB-HP920	30788027
8,00	8	7,8	63	19	25	0,4	3	SCM810-0800Z03R-R0040HB-HP920	30788028
8,70	10	8,5	72	22	30	0,44	3	SCM810-0870Z03R-R0044HB-HP920	30788029
9,00	10	8,8	72	22	30	0,45	3	SCM810-0900Z03R-R0045HB-HP920	30788030
9,70	10	9,5	72	22	30	0,49	3	SCM810-0970Z03R-R0049HB-HP920	30788031
10,00	10	9,8	72	22	30	0,5	3	SCM810-1000Z03R-R0050HB-HP920	30788032
11,70	12	11,5	83	26	36	0,59	3	SCM810-1170Z03R-R0059HB-HP920	30788033
12,00	12	11,8	83	26	36	0,6	3	SCM810-1200Z03R-R0060HB-HP920	30788034
13,70	14	13,5	83	26	36	0,69	3	SCM810-1370Z03R-R0069HB-HP920	30788035
14,00	14	13,8	83	26	36	0,7	3	SCM810-1400Z03R-R0070HB-HP920	30788036
15,50	16	15,3	92	31	42	0,78	3	SCM810-1550Z03R-R0078HB-HP920	30788037
16,00	16	15,8	92	31	42	0,8	3	SCM810-1600Z03R-R0080HB-HP920	30788038
17,50	18	17,3	92	31	42	0,88	3	SCM810-1750Z03R-R0088HB-HP920	30788039
18,00	18	17,8	92	31	42	0,9	3	SCM810-1800Z03R-R0090HB-HP920	30788040
19,50	20	19,3	104	41	52	0,98	3	SCM810-1950Z03R-R0098HB-HP920	30788041
20,00	20	19,8	104	41	52	1	3	SCM810-2000Z03R-R0100HB-HP920	30788042

Configurable features

Shank form:
Shank form: HA

Specification:
SCM810-0380Z03R-R0019[shank form]-HP920

Example:
SCM810-0380Z03R-R0019HA-HP920



Dimensions in mm.
 For cutting data recommendations, see end of chapter.
 Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Pocket

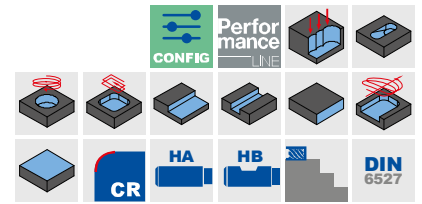
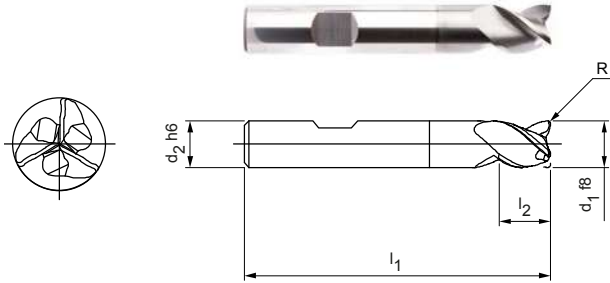
Shoulder milling cutter, short design
SCM840

Design:

Diameter of milling cutter: 3.80 – 20.00 mm
Cutting material: HP920
Number of cutting edges: 3
Helix angle: ~ 42°
Special features: Face geometry with integrated drill tip

Application:

Perfect for inclined plunging up to 45°, in helix milling and grooving.



Preferred series in stock

Dimensions						z	Specification	Order no.
d ₁ f8	d ₂ h6	l ₁	l ₂	l ₅	R*			
3,80	6	54	5	10,5	0,12	3	SCM840-0380Z03R-R0012HB-HP920	31031129
4,00	6	54	5	10,5	0,12	3	SCM840-0400Z03R-R0012HB-HP920	31031140
4,80	6	54	6	12,5	0,2	3	SCM840-0480Z03R-R0020HB-HP920	31031141
5,00	6	54	6	12,5	0,2	3	SCM840-0500Z03R-R0020HB-HP920	31031142
5,70	6	54	7	14,5	0,2	3	SCM840-0570Z03R-R0020HB-HP920	30965832
6,00	6	54	7	-	0,2	3	SCM840-0600Z03R-R0020HB-HP920	30965833
6,70	8	58	8	16,5	0,2	3	SCM840-0670Z03R-R0020HB-HP920	30965834
7,00	8	58	8	17	0,2	3	SCM840-0700Z03R-R0020HB-HP920	30965835
7,70	8	58	9	18,5	0,2	3	SCM840-0770Z03R-R0020HB-HP920	30965836
8,00	8	58	9	-	0,2	3	SCM840-0800Z03R-R0020HB-HP920	30965837
8,70	10	66	10	20,5	0,32	3	SCM840-0870Z03R-R0032HB-HP920	30965838
9,00	10	66	10	21	0,32	3	SCM840-0900Z03R-R0032HB-HP920	30965839
9,70	10	66	11	22,5	0,32	3	SCM840-0970Z03R-R0032HB-HP920	30965840
10,00	10	66	11	-	0,32	3	SCM840-1000Z03R-R0032HB-HP920	30953712
11,70	12	73	12	24,5	0,32	3	SCM840-1170Z03R-R0032HB-HP920	30965841
12,00	12	73	12	-	0,32	3	SCM840-1200Z03R-R0032HB-HP920	30948678
13,70	14	75	14	26,5	0,32	3	SCM840-1370Z03R-R0032HB-HP920	30965842
14,00	14	75	14	-	0,32	3	SCM840-1400Z03R-R0032HB-HP920	30965843
15,50	16	82	16	30	0,32	3	SCM840-1550Z03R-R0032HB-HP920	30965844
16,00	16	82	16	-	0,32	3	SCM840-1600Z03R-R0032HB-HP920	30965845
17,50	18	84	18	32	0,32	3	SCM840-1750Z03R-R0032HB-HP920	30965846
19,50	20	92	20	38	0,5	3	SCM840-1950Z03R-R0050HB-HP920	30965848
20,00	20	92	20	-	0,5	3	SCM840-2000Z03R-R0050HB-HP920	30965849

* Corner radius especially for feather key milling according to DIN 6885.

Available on request

18,00	18	84	18	-	0,32	3	SCM840-1800Z03R-R0032HB-HP920	30965847
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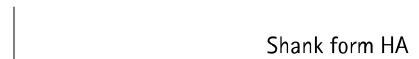
Configurable features

Shank form:
Shank form: HA

Specification:
SCM840-0380Z03R-R0012[shank form]-HP920

Example:

SCM840-0380Z03R-R0012HA-HP920



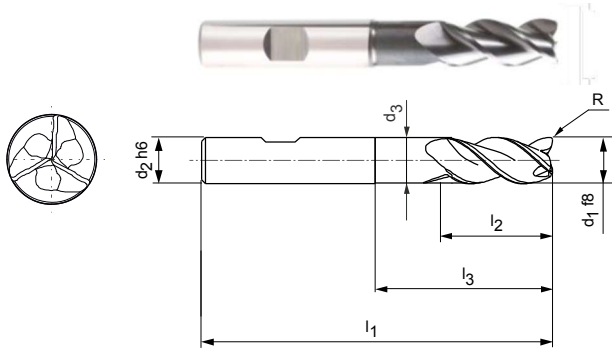
Dimensions in mm.

For cutting data recommendations, see end of chapter.
Special designs and other coatings available upon request.



OptiMill®-Uni-HPC-Pocket

Shoulder milling cutter, overlong design with neck
SCM800

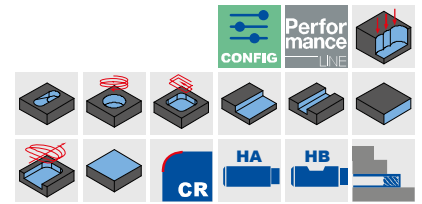


Design:

Diameter of milling cutter: 5.00 – 20.00 mm
Cutting material: HP920
Number of cutting edges: 3
Helix angle: ~ 42°
Special features: Face geometry with integrated drill tip

Application:

Perfect for inclined plunging up to 45°, in helix milling and grooving.



Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f8	d2 h6	d3	l1	l2	l3	R			
5,00	6	4,8	62	13	24	0,25	3	SCM800-0500Z03R-R0025HB-HP920	31031146
5,70	6	5,5	62	13	24	0,29	3	SCM800-0570Z03R-R0029HB-HP920	30787957
6,00	6	5,8	62	13	24	0,3	3	SCM800-0600Z03R-R0030HB-HP920	30787958
6,70	8	6,4	68	16	30	0,34	3	SCM800-0670Z03R-R0034HB-HP920	30787959
7,00	8	6,7	68	16	30	0,35	3	SCM800-0700Z03R-R0035HB-HP920	30787960
7,70	8	7,4	68	21	30	0,39	3	SCM800-0770Z03R-R0039HB-HP920	30787961
8,00	8	7,7	68	21	30	0,4	3	SCM800-0800Z03R-R0040HB-HP920	30787962
8,70	10	8,4	80	22	38	0,44	3	SCM800-0870Z03R-R0044HB-HP920	30787963
9,00	10	8,7	80	22	38	0,45	3	SCM800-0900Z03R-R0045HB-HP920	30787964
9,70	10	9,4	80	22	38	0,49	3	SCM800-0970Z03R-R0049HB-HP920	30787965
10,00	10	9,7	80	22	38	0,5	3	SCM800-1000Z03R-R0050HB-HP920	30787966
11,70	12	11,3	93	26	46	0,59	3	SCM800-1170Z03R-R0059HB-HP920	30787967
12,00	12	11,6	93	26	46	0,6	3	SCM800-1200Z03R-R0060HB-HP920	30787968
13,70	14	13,3	99	26	52	0,69	3	SCM800-1370Z03R-R0069HB-HP920	30787969
14,00	14	13,6	99	26	52	0,7	3	SCM800-1400Z03R-R0070HB-HP920	30787970
15,50	16	15	108	36	58	0,78	3	SCM800-1550Z03R-R0078HB-HP920	30787971
16,00	16	15,5	108	36	58	0,8	3	SCM800-1600Z03R-R0080HB-HP920	30787972
17,50	18	17	117	36	67	0,88	3	SCM800-1750Z03R-R0088HB-HP920	30787973
18,00	18	17,5	117	36	67	0,9	3	SCM800-1800Z03R-R0090HB-HP920	30787974
19,50	20	19	126	41	74	0,98	3	SCM800-1950Z03R-R0098HB-HP920	30787975
20,00	20	19,5	126	41	74	1	3	SCM800-2000Z03R-R0100HB-HP920	30787976

Configurable features

Shank form:
Shank form: HA

Specification:
SCM800-0500Z03R-R0025[shank form]-HP920

Example:

SCM800-0500Z03R-R0025HA-HP920

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

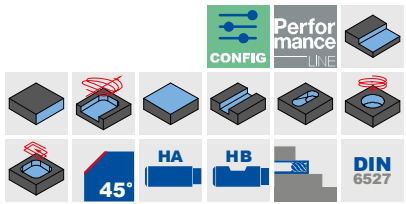
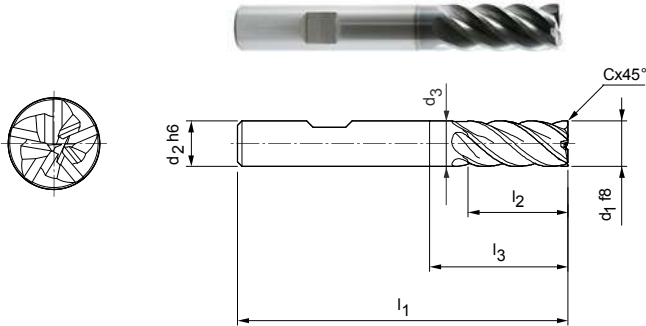
Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Silent

Shoulder milling cutter, long design with neck
SCM570

Design:

Diameter of milling cutter: 6.00 – 25.00 mm
Cutting material: HP723
Number of cutting edges: 5
Helix angle: 41° – 42°
Special features: Unequal spacing




Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f8	d2 h6	d3	l1	l2	l3	Cx45°			
6,00	6	5,8	57	13	19	0,12	5	SCM570-0600Z05R-F0012HB-HP723	30510329
8,00	8	7,8	63	19	25	0,16	5	SCM570-0800Z05R-F0016HB-HP723	30510343
10,00	10	9,8	72	22	30	0,20	5	SCM570-1000Z05R-F0020HB-HP723	30510345
12,00	12	11,8	83	26	36	0,24	5	SCM570-1200Z05R-F0024HB-HP723	30510347
16,00	16	15,8	92	32	42	0,32	5	SCM570-1600Z05R-F0032HB-HP723	30510348
20,00	20	19,8	104	41	52	0,40	5	SCM570-2000Z05R-F0040HB-HP723	30510349
25,00	25	24,5	125	50	65	0,50	5	SCM570-2500Z05R-F0050HB-HP723	30510350


Available on request

14,00	14	13,8	83	26	36	0,28	5	SCM570-1400Z05R-F0028HB-HP723	30671900
18,00	18	17,8	92	32	42	0,36	5	SCM570-1800Z05R-F0036HB-HP723	30583302

Configurable features



Shank form:
Shank form: HA



Specification:
SCM570-0600Z05R-F0012[shank form]-HP723

Example:

SCM570-0600Z05R-F0012HA-HP723

Shank form HA

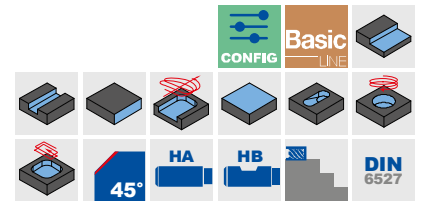
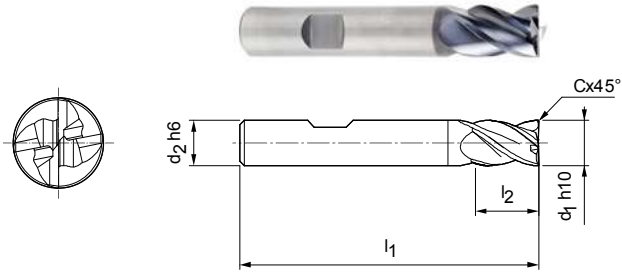
Dimensions in mm.
For cutting data recommendations, see end of chapter.
Special designs and other coatings available upon request.

ECU-Mill-Uni-LV

Shoulder milling cutter, short design
SCM780

Design:

Diameter of milling cutter: 3.00 – 20.00 mm
Cutting material: HP921
Number of cutting edges: 4
Helix angle: 36°/38.5°
Special features: Unequal spacing




Preferred series in stock

Dimensions					z	Specification	Order no.
d ₁ h10	d ₂ h6	l ₁	l ₂	Cx45°			
3,00	6	50	6	0,06	4	SCM780-0300Z04R-F0006HB-HP921	30656944
4,00	6	54	8	0,08	4	SCM780-0400Z04R-F0008HB-HP921	30656945
5,00	6	54	9	0,10	4	SCM780-0500Z04R-F0010HB-HP921	30656946
6,00	6	54	10	0,12	4	SCM780-0600Z04R-F0012HB-HP921	30656947
8,00	8	58	12	0,16	4	SCM780-0800Z04R-F0016HB-HP921	30656949
10,00	10	66	14	0,20	4	SCM780-1000Z04R-F0020HB-HP921	30656950
12,00	12	73	16	0,24	4	SCM780-1200Z04R-F0024HB-HP921	30656951
16,00	16	82	22	0,32	4	SCM780-1600Z04R-F0032HB-HP921	30656953
20,00	20	92	26	0,40	4	SCM780-2000Z04R-F0040HB-HP921	30656955


Available on request

14,00	14	73	16	0,28	4	SCM780-1400Z04R-F0028HB-HP921	30656952
18,00	18	82	22	0,36	4	SCM780-1800Z04R-F0036HB-HP921	30656954

Configurable features



Shank form:
Shank form: HA



Specification:
SCM780-0300Z04R-F0006[shank form]-HP921

Example:

SCM780-0300Z04R-F0006HA-HP921

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

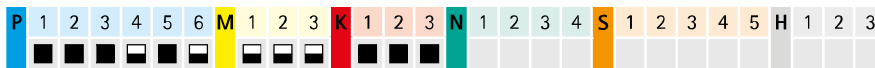
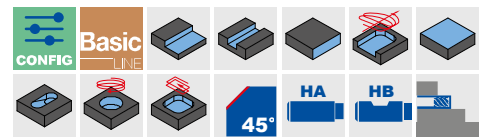
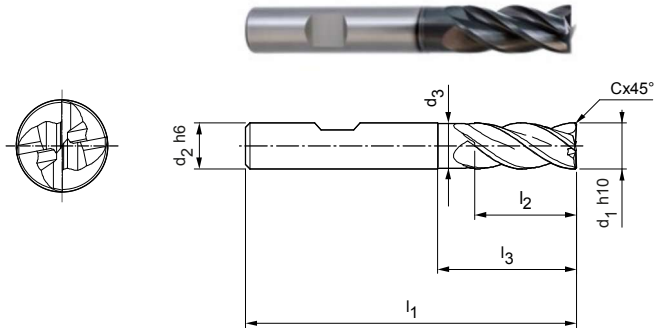
Special designs and other coatings available upon request.

ECU-Mill-Uni-LV

Shoulder milling cutter, long design with neck
SCM790, follow-up product to OptiMill-Uni (z4)

Design:

Diameter of milling cutter: 3.00 – 20.00 mm
Cutting material: HP921
Number of cutting edges: 4
Helix angle: 36°/38.5°
Special features: Unequal spacing




Preferred series in stock

Dimensions							z	Specification	Order no.
d ₁ h10	d ₂ h6	d ₃	l ₁	l ₂	l ₃	Cx45°			
3,00*	6	–	57	8	–	0,06	4	SCM790-0300Z04R-F0006HB-HP921	30656932
4,00*	6	–	57	11	–	0,08	4	SCM790-0400Z04R-F0008HB-HP921	30656933
5,00*	6	–	57	13	–	0,10	4	SCM790-0500Z04R-F0010HB-HP921	30656934
6,00	6	5,8	57	13	20	0,12	4	SCM790-0600Z04R-F0012HB-HP921	30656935
8,00	8	7,8	63	21	25	0,16	4	SCM790-0800Z04R-F0016HB-HP921	30656936
10,00	10	9,8	72	22	30	0,20	4	SCM790-1000Z04R-F0020HB-HP921	30656937
12,00	12	11,8	83	26	36	0,24	4	SCM790-1200Z04R-F0024HB-HP921	30656938
14,00	14	13,8	83	26	36	0,28	4	SCM790-1400Z04R-F0028HB-HP921	30656939
16,00	16	15,8	92	36	42	0,32	4	SCM790-1600Z04R-F0032HB-HP921	30656940
20,00	20	19,8	104	41	53	0,40	4	SCM790-2000Z04R-F0040HB-HP921	30656942


Available on request

18,00	18	17,8	92	36	42	0,36	4	SCM790-1800Z04R-F0036HB-HP921	30656941
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Configurable features



Shank form:
Shank form: HA



Specification:
SCM790-0300Z04R-F006[shank form]-HP921

Example:

SCM790-0300Z04R-F006HA-HP921



Dimensions in mm.

* Design without neck.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Hardened

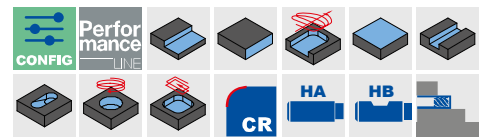
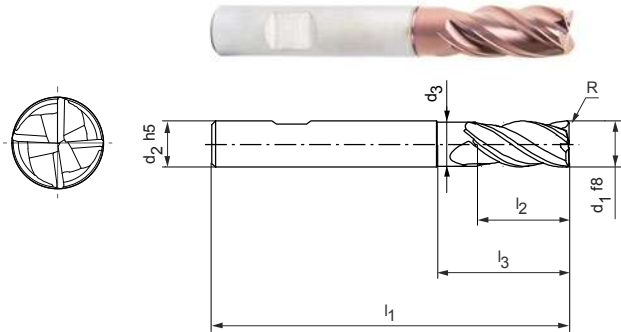
Shoulder milling cutter, long design with neck
SCM102

Design:

Diameter of milling cutter: 4.00 – 20.00 mm
Cutting material: HP810
Number of cutting edges: 4
Helix angle: 42°

Application:

For roughing of parts with a hardness of 45 HRC.



Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f8	d2 h5	d3	l1	l2	l3	R			
4,00	6	-	57	11	-	0,5	4	SCM102-0400Z04R-R0050HB-HP810	31152701
4,00	6	-	57	11	-	1	4	SCM102-0400Z04R-R0100HB-HP810	31152702
6,00	6	5,8	57	13	20	0,5	4	SCM102-0600Z04R-R0050HB-HP810	31152705
6,00	6	5,8	57	13	20	1	4	SCM102-0600Z04R-R0100HB-HP810	31152706
6,00	6	5,8	57	13	20	2	4	SCM102-0600Z04R-R0200HB-HP810	31152708
8,00	8	7,8	63	21	25	0,5	4	SCM102-0800Z04R-R0050HB-HP810	31152709
8,00	8	7,8	63	21	25	1	4	SCM102-0800Z04R-R0100HB-HP810	31152710
8,00	8	7,8	63	21	25	2	4	SCM102-0800Z04R-R0200HB-HP810	31152712
10,00	10	9,8	72	22	30	0,5	4	SCM102-1000Z04R-R0050HB-HP810	31152715
10,00	10	9,8	72	22	30	1	4	SCM102-1000Z04R-R0100HB-HP810	31152716
10,00	10	9,8	72	22	30	2	4	SCM102-1000Z04R-R0200HB-HP810	31152718
12,00	12	11,8	83	26	36	0,5	4	SCM102-1200Z04R-R0050HB-HP810	31152721
12,00	12	11,8	83	26	36	1	4	SCM102-1200Z04R-R0100HB-HP810	31152722
12,00	12	11,8	83	26	36	2	4	SCM102-1200Z04R-R0200HB-HP810	31152724
16,00	16	15,8	92	36	42	0,5	4	SCM102-1600Z04R-R0050HB-HP810	31152728
16,00	16	15,8	92	36	42	1	4	SCM102-1600Z04R-R0100HB-HP810	31152729
16,00	16	15,8	92	36	42	2	4	SCM102-1600Z04R-R0200HB-HP810	31152730
20,00	20	19,8	104	41	55	1	4	SCM102-2000Z04R-R0100HB-HP810	31152734
20,00	20	19,8	104	41	55	2	4	SCM102-2000Z04R-R0200HB-HP810	31152735

Configurable features

Shank form:
Shank form: HA

Specification:
SCM102-0400Z04R-R0050[shank form]-HP810

Example:

SCM102-0400Z04R-R0050HA-HP810

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Hardened

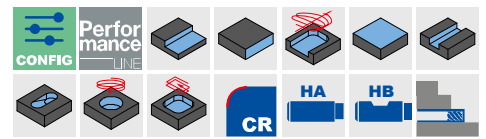
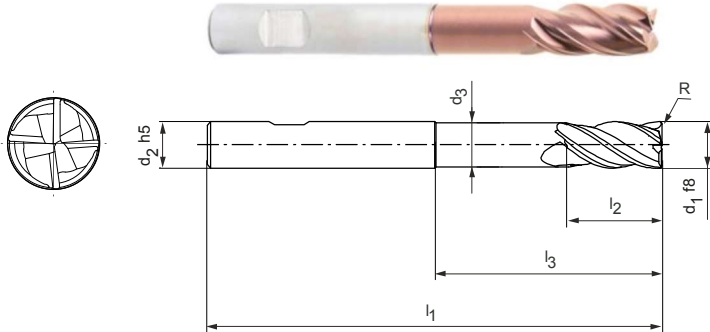
Shoulder milling cutter, overlong design with neck
SCM103

Design:

Diameter of milling cutter: 4.00 – 20.00 mm
Cutting material: HP810
Number of cutting edges: 4
Helix angle: 42°

Application:

For roughing of parts with a hardness of 45 HRC.



Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f8	d2 h5	d3	l1	l2	l3	R			
4,00	6	3,8	62	11	22	0,5	4	SCM103-0400Z04R-R0050HB-HP810	31152738
4,00	6	3,8	62	11	22	1	4	SCM103-0400Z04R-R0100HB-HP810	31152739
6,00	6	5,8	62	13	25	0,5	4	SCM103-0600Z04R-R0050HB-HP810	31152742
6,00	6	5,8	62	13	25	1	4	SCM103-0600Z04R-R0100HB-HP810	31152743
6,00	6	5,8	62	13	25	2	4	SCM103-0600Z04R-R0200HB-HP810	31152744
8,00	8	7,7	68	21	30	1	4	SCM103-0800Z04R-R0100HB-HP810	31152745
8,00	8	7,7	68	21	30	2	4	SCM103-0800Z04R-R0200HB-HP810	31152746
10,00	10	9,7	80	22	38	0,5	4	SCM103-1000Z04R-R0050HB-HP810	31152747
10,00	10	9,7	80	22	38	1	4	SCM103-1000Z04R-R0100HB-HP810	31152748
10,00	10	9,7	80	22	38	2	4	SCM103-1000Z04R-R0200HB-HP810	31152750
12,00	12	11,6	93	26	46	0,5	4	SCM103-1200Z04R-R0050HB-HP810	31152752
12,00	12	11,6	93	26	46	1	4	SCM103-1200Z04R-R0100HB-HP810	31152753
12,00	12	11,6	93	26	46	2	4	SCM103-1200Z04R-R0200HB-HP810	31152755
16,00	16	15,5	108	36	58	0,5	4	SCM103-1600Z04R-R0050HB-HP810	31152757
16,00	16	15,5	108	36	58	1	4	SCM103-1600Z04R-R0100HB-HP810	31152758
16,00	16	15,5	108	36	58	2	4	SCM103-1600Z04R-R0200HB-HP810	31152759
20,00	20	19,5	126	41	74	1	4	SCM103-2000Z04R-R0100HB-HP810	31152761
20,00	20	19,5	126	41	74	2	4	SCM103-2000Z04R-R0200HB-HP810	31152762

Configurable features

Shank form:
Shank form: HA

Specification:
SCM103-0400Z04R-R0050[shank form]-HP810

Example:

SCM103-0400Z04R-R0050HA-HP810

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

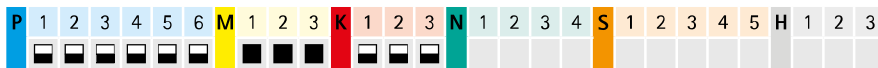
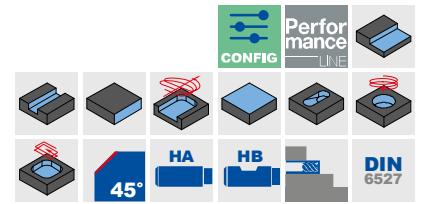
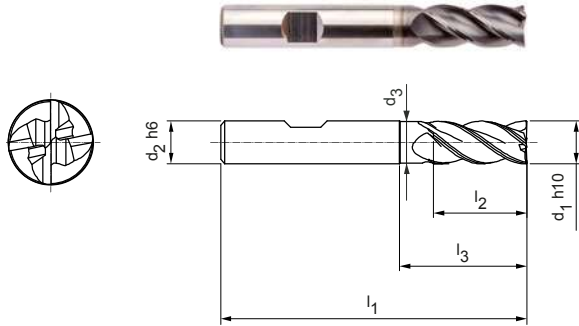
Special designs and other coatings available upon request.

OptiMill®-Inox-HPC

Shoulder milling cutter, long design with neck
SCM108

Design:

Diameter of milling cutter: 3.00 – 20.00 mm
Cutting material: HP921
Number of cutting edges: 4
Helix angle: 38°
Special features: Unequal spacing




Preferred series in stock

Dimensions							z	Specification	Order no.
d1 h10	d2 h6	d3	l1	l2	l3	Cx45°			
3,00	6	-	57	8	-	0,06	4	SCM108-0300Z04R-F0006HB-HP921	31181468
4,00	6	-	57	11	-	0,08	4	SCM108-0400Z04R-F0008HB-HP921	31181469
5,00	6	-	57	13	-	0,10	4	SCM108-0500Z04R-F0010HB-HP921	31181480
6,00	6	5,8	57	13	19	0,12	4	SCM108-0600Z04R-F0012HB-HP921	31181481
8,00	8	7,8	63	19	25	0,16	4	SCM108-0800Z04R-F0016HB-HP921	31181482
10,00	10	9,8	72	22	30	0,20	4	SCM108-1000Z04R-F0020HB-HP921	31181483
12,00	12	11,8	83	26	36	0,24	4	SCM108-1200Z04R-F0024HB-HP921	31181484
16,00	16	15,8	92	32	42	0,32	4	SCM108-1600Z04R-F0032HB-HP921	31181486
20,00	20	19,8	104	38	52	0,40	4	SCM108-2000Z04R-F0040HB-HP921	31181488


Available on request

14,00	14	13,8	83	26	36	0,28	4	SCM108-1400Z04R-F0028HB-HP921	31181485
18,00	18	17,8	92	32	42	0,36	4	SCM108-1800Z04R-F0036HB-HP921	31181487

Configurable features



Shank form:
Shank form: HA



Specification:
SCM108-0300Z04R-F0006[shank form]-HP921

Example:

SCM108-0300Z04R-F0006HA-HP921

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

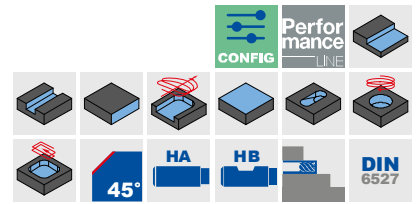
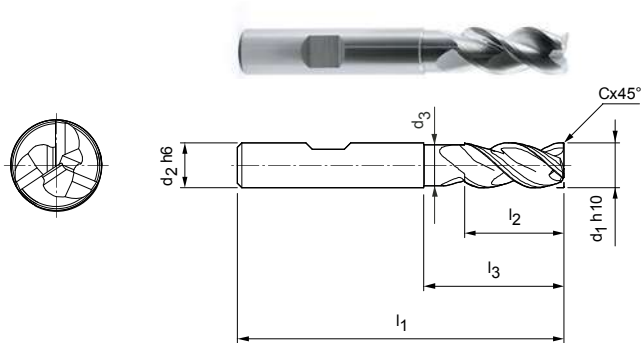
Special designs and other coatings available upon request.

OptiMill®-Alu-HPC

Shoulder milling cutter, long design with neck
SCM270

Design:

Diameter of milling cutter: 3.00 – 20.00 mm
Cutting material: HU210
Number of cutting edges: 3
Helix angle: 42°–43°
Special features: Unequal spacing, grooves polished




Preferred series in stock

Dimensions							z	Specification	Order no.
d1 h10	d2 h6	d3	l1	l2	l3	Cx45°			
3,00*	6	-	57	7	-	0,06	3	SCM270-0300Z03R-F0006HB-HU210	30393590
4,00*	6	-	57	8	-	0,08	3	SCM270-0400Z03R-F0008HB-HU210	30393591
5,00*	6	-	57	10	-	0,10	3	SCM270-0500Z03R-F0010HB-HU210	30393592
6,00	6	5,5	57	10	18	0,12	3	SCM270-0600Z03R-F0012HB-HU210	30393593
8,00	8	7,5	63	16	25	0,16	3	SCM270-0800Z03R-F0016HB-HU210	30393594
10,00	10	9	72	19	30	0,20	3	SCM270-1000Z03R-F0020HB-HU210	30393595
12,00	12	11	83	22	36	0,24	3	SCM270-1200Z03R-F0024HB-HU210	30393596
16,00	16	15	92	26	42	0,32	3	SCM270-1600Z03R-F0032HB-HU210	30393597
20,00	20	19	104	32	52	0,40	3	SCM270-2000Z03R-F0040HB-HU210	30393598


Available on request

14,00	14	13	83	22	36	0,28	3	SCM270-1400Z03R-F0028HB-HU210	30456715
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Configurable features



Shank form:
Shank form: HA



Specification:
SCM270-0300Z03R-F0006[shank form]-HU210

Example:
SCM270-0300Z03R-F0006**HA**-HU210

Shank form HA

Dimensions in mm.
* Design without neck.
For cutting data recommendations, see end of chapter.
Special designs and other coatings available upon request.

OptiMill®-Alu-HPC-Pocket

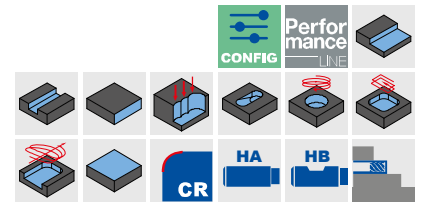
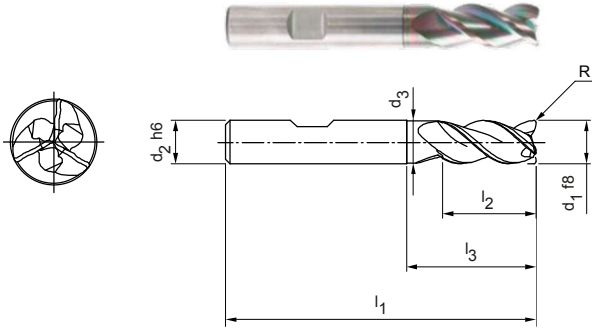
Shoulder milling cutter, long design with neck
SCM850

Design:

Diameter of milling cutter: 5.00 – 20.00 mm
Cutting material: HP913
Number of cutting edges: 3
Helix angle: 42°
Special features: Face geometry with integrated drill tip

Application:

Perfect for inclined plunging up to 45°, in helix milling and grooving.




Preferred series in stock


Dimensions							z	Specification	Order no.
d1 f8	d2 h6	d3	l1	l2	l3	R			
5,00	6	4,8	57	13	-	0,2	3	SCM850-0500Z03R-R0020HB-HP913	31054950
6,00	6	5,8	57	13	19	0,2	3	SCM850-0600Z03R-R0020HB-HP913	31054952
8,00	8	7,8	63	19	25	0,2	3	SCM850-0800Z03R-R0020HB-HP913	31054956
10,00	10	9,8	72	22	30	0,32	3	SCM850-1000Z03R-R0032HB-HP913	31054960
12,00	12	11,8	83	26	36	0,32	3	SCM850-1200Z03R-R0032HB-HP913	31054962
14,00	14	13,8	83	26	36	0,32	3	SCM850-1400Z03R-R0032HB-HP913	31054964
16,00	16	15,8	92	31	42	0,32	3	SCM850-1600Z03R-R0032HB-HP913	31054966
20,00	20	19,8	104	41	52	0,5	3	SCM850-2000Z03R-R0050HB-HP913	31054970

Undersize cutters available on request.

Configurable features



Shank form:
Shank form: HA



Specification:
SCM850-0500Z03R-R0020[shank form]-HP913

Example:

SCM850-0500Z03R-R0020**HA**-HP913

Shank form HA

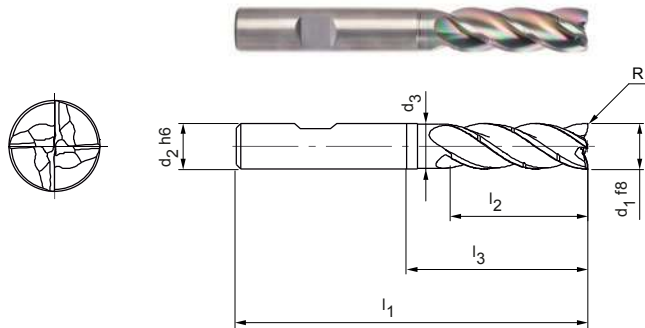
Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Alu-HPC-Pocket

Shoulder milling cutter, 3xD design with neck, includes chip breaker
SCM854

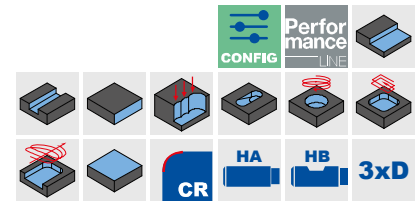


Design:

Diameter of milling cutter: 5.00 – 20.00 mm
Cutting material: HP913
Number of cutting edges: 4
Helix angle: 36°
Special features: Face geometry with integrated drill tip

Application:

Perfect for inclined plunging up to 45°, in helix milling and grooving.



Preferred series in stock

Dimensions							z	Specification	Order no.
d ₁ f8	d ₂ h6	d ₃	l ₁	l ₂	l ₃	R			
5,00	6	4,8	62	17	-	0,20	4	SCM854-0500Z04R-R0020HB-HP913	31302680
6,00	6	5,8	62	18	25	0,20	4	SCM854-0600Z04R-R0020HB-HP913	31302681
8,00	8	7,7	68	24	30	0,20	4	SCM854-0800Z04R-R0020HB-HP913	31302682
10,00	10	9,7	80	30	35	0,32	4	SCM854-1000Z04R-R0032HB-HP913	31302683
12,00	12	11,6	93	36	45	0,32	4	SCM854-1200Z04R-R0032HB-HP913	31302684
14,00	14	13,6	99	42	50	0,32	4	SCM854-1400Z04R-R0032HB-HP913	31302685
16,00	16	15,5	108	48	56	0,32	4	SCM854-1600Z04R-R0032HB-HP913	31302686
20,00	20	19,5	126	60	70	0,50	4	SCM854-2000Z04R-R0050HB-HP913	31302688

Available on request

18,00	18	17,5	117	54	67	0,32	4	SCM854-1800Z04R-R0032HB-HP913	31302687
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Configurable features

Shank form:
Shank form: HA

Specification:
SCM854-0500Z04R-R0020[shank form]-HP913

Example:

SCM854-0500Z04R-R0020**HA**-HP913

Shank form HA

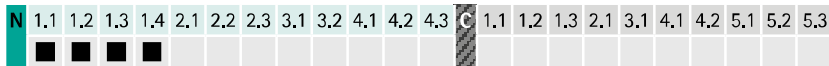
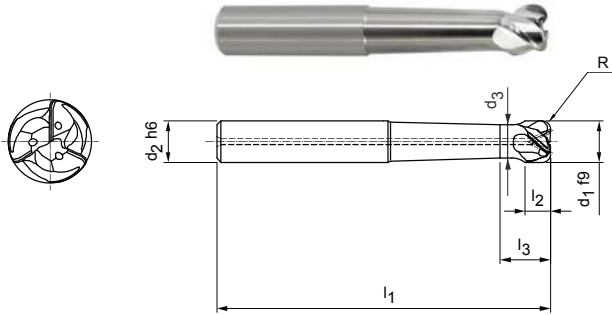
Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-SPM

Shoulder milling cutter with internal cooling
SCM681/691

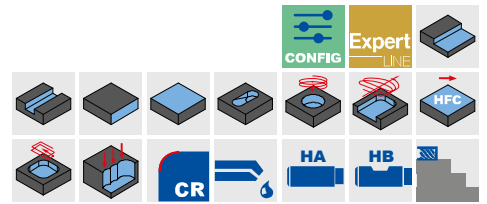


Design:

Diameter of milling cutter: 12.00 – 32.00 mm
Cutting material: HU610
Number of cutting edges: 3
Helix angle: 43°

Application:

For the machining of aluminium structural parts.



Short design, SCM681 | Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f9	d2 h6	d3	l1	l2	l3	R			
32,00	32	27	125	26,3	40,9	4	3	SCM681-3200Z03R-R0400HA-HU610	30551346

Short design, SCM681 | Available upon request

16,00	16	12,8	81	12,8	28	3	3	SCM691-1600Z03R-R0300HA-HU610	30551341
20,00	20	16	90	16	35	3	3	SCM691-2000Z03R-R0300HA-HU610	30551344


Long design, SCM691 | Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f9	d2 h6	d3	l1	l2	l3	R			
12,00	12	9,6	90	10,3	19,4	2	3	SCM691-1200Z03R-R0200HA-HU610	30551330
16,00	16	12,8	105	13,5	23,8	3	3	SCM691-1600Z03R-R0300HA-HU610	30551350
20,00	20	16	120	16,7	28,2	3	3	SCM691-2000Z03R-R0300HA-HU610	30551352
25,00	25	20	145	20,7	33,7	4	3	SCM691-2500Z03R-R0400HA-HU610	30551353
32,00	32	27	173	26,3	40,2	4	3	SCM691-3200Z03R-R0400HA-HU610	30551354


Long design, SCM691 | Available upon request

14,00	16	11,2	99	11,2	45,5	3	3	SCM691-1400Z03R-R0300HA-HU610	30551348
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Configurable features



Shank form:
Shank form: HB



Specification:
SCM681-3200Z03R-R0400[shank form]-HU610

Example:

SCM681-3200Z03R-R0400HB-HU610

Shank form HB

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Diamond-SPM

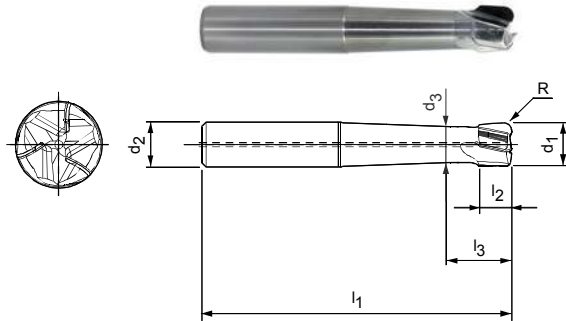
Shoulder milling cutter with internal cooling*
SHM101/110

Design:

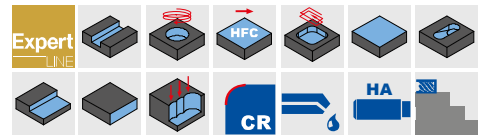
Diameter of milling cutter: 6.00 – 32.00 mm
Cutting material: PU622
Number of cutting edges: 3
Axis angle: 9/12°
Special features: PCD cutting edges

Application:

For the machining of aluminium structural parts.



N	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	C	1.1	1.2	1.3	2.1	3.1	4.1	4.2	5.1	5.2	5.3
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Short design, SHM101 | Preferred series in stock

Dimensions							z	Specification	Order no.
d ₁	d ₂	d ₃	l ₁	l ₂	l ₃	R			
20,00	20	17	90	14,2	22,6	3	3	SHM101-2000CZ03R-R0300HA-PU622	30552846
25,00	25	20	107	17,8	28,2	4	3	SHM101-2500DZ03R-R0400HA-PU622	30552849
32,00	32	27,2	125	20	27,9	4	3	SHM101-3200DZ03R-R0400HA-PU622	30552851

Short design, SHM110, 111 | Available upon request

14,00	16	11,8	77	10	16,6	3	3	SHM101-1400BZ03R-R0300HA-PU622	30552836
15,00	16	12	78	10,6	18,5	3	3	SHM101-1500CZ03R-R0300HA-PU622	30552839
16,00	16	12,8	81	11,4	19,5	3	3	SHM101-1600CZ03R-R0300HA-PU622	30552842
18,00	20	14,4	87	12,8	20,4	3	3	SHM101-1800CZ03R-R0300HA-PU622	30552844

Long design, SHM111 | Preferred series in stock

12,00	12	10,2	90	8,5	15,1	2	3	SHM111-1200BZ03R-R0200HA-PU622	30552834
16,00	16	12,8	105	11,4	19,5	3	3	SHM111-1600CZ03R-R0300HA-PU622	30552843
20,00	20	17	120	14,2	22,6	3	3	SHM111-2000CZ03R-R0300HA-PU622	30552847
25,00	25	20	145	17,8	28,2	4	3	SHM111-2500DZ03R-R0400HA-PU622	30552850
32,00	32	27,2	173	20	27,9	4	3	SHM111-3200DZ03R-R0400HA-PU622	30552852

Long design, SHM111 | Available upon request

6,00	6	5,1	60	6	12,5	1	3	SHM110-0600BZ03R-R0100HA-PU622	30552830
8,00	8	6,4	70	7	13,2	1	3	SHM110-0800BZ03R-R0100HA-PU622	30552832
10,00	10	8,5	80	7,5	13,7	2	3	SHM111-1000BZ03R-R0200HA-PU622	30552833
14,00	16	11,8	99	10	16,6	3	3	SHM111-1400BZ03R-R0300HA-PU622	30552837
15,00	16	12	100	10,6	18,5	3	3	SHM111-1500CZ03R-R0300HA-PU622	30552841
18,00	20	14,4	114	12,8	20,4	3	3	SHM111-1800CZ03R-R0300HA-PU622	30552845

Dimensions in mm.

* Internal cooling from \varnothing 10 mm.

For cutting data recommendations, see end of chapter.

Special designs available upon request.

OptiMill®-Diamond-SPM

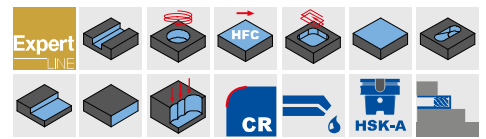
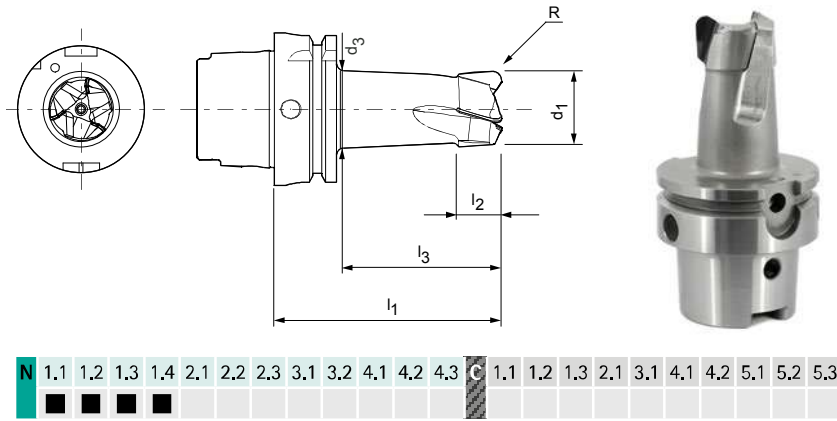
Shoulder milling cutter, with HSK-A (hollow shank taper form A) connection, with internal cooling
SHM121

Design:

Diameter of milling cutter: 32.00 – 50.00 mm
Cutting material: PU622
Number of cutting edges: 3/4
Helix angle: 12°
Special features: PCD cutting edges

Application:

For the machining of aluminium structural parts.



Preferred series in stock

Dimensions						z	Specification	Order no.
d ₁	d ₃	l ₁	l ₂	l ₃	R			
32,00	31,5	86	17	57	4	3	SHM121-3200Z03R-R0400A6-PU622	30583603
40,00	39	98	17	70	4	4	SHM121-4000Z04R-R0400A6-PU622	30597953
50,00	49	109	20	80	4	4	SHM121-5000Z04R-R0400A6-PU622	30590483

Available on request | Design with increased hollow shank taper face connection ø 80 mm

32,00	31,5	86	17	57	4	3	SHM121-3200Z03R-R0400A6-PU622	30625821
50,00	49	109	20	80	4	4	SHM121-5000Z04R-R0400A6-PU622	30625820

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs available upon request.

OptiMill®-Diamond type 50

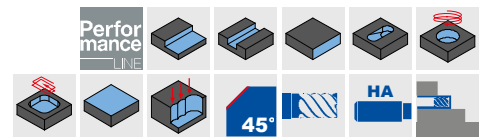
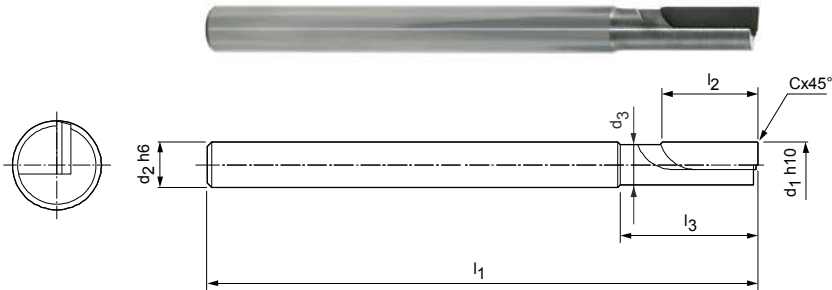
Shoulder milling cutter, overlong design with neck
SHM500

Design:

Diameter of milling cutter: 4.00 – 5.00 mm
Cutting material: PU611
Number of cutting edges: 1
Axis angle: 0°
Special features: PCD cutting edges

Application:

Designed for delicate milling tasks, e.g. in precision mechanics or for the production of printed circuit boards.



Preferred series in stock

Dimensions							z	Specification	Order no.
d1 h10	d2 h6	d3	l1	l2	l3	Cx45°			
4,00	4	3,6	60	10	15	0,10	1	SHM500-0400BZ01R-F0010HA-PU611	30696677
5,00	5	4,4	60	10	15	0,10	1	SHM500-0500BZ01R-F0010HA-PU611	30696678

Dimensions in mm.

For cutting data recommendations, see end of chapter.

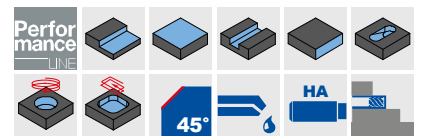
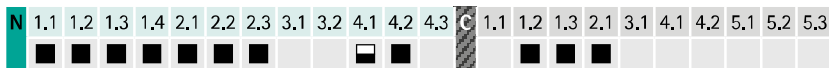
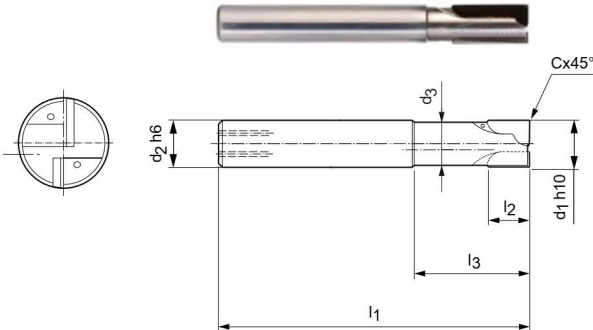
Special designs available upon request.

OptiMill®-Diamond type 51

Shoulder milling cutter, overlong design with neck, includes internal cooling
SHM511 | SHM611 | SHM711

Design:


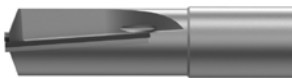
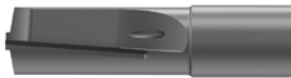
Diameter of milling cutter: 3.00 - 12.00 mm
Cutting material: PU611
Number of cutting edges: 2
Axis angle: neutral/positive/negative
Special features: PCD cutting edge



Preferred series in stock

Dimensions							z	Specification	Order no.		
d1 h10	d2 h6	d3	l1	l2	l3	Cx45°			SHM511	SHM611	SHM711
3,00	6	2,8	60	2,5	15	0,10	2	SHM__*1-0300AZ02R-F0010HA-PU611	30334896	30334944	30334931
4,00	6	3,8	60	2,5	15	0,10	2	SHM__*1-0400AZ02R-F0010HA-PU611	30334901	30334956	30334939
5,00	6	4,6	60	3	15	0,10	2	SHM__*1-0500AZ02R-F0010HA-PU611	30334923	30334957	30334942
6,00	6	5,4	60	10	15	0,10	2	SHM__*1-0600BZ02R-F0010HA-PU611	30696680	30696681	30696682
6,00	6	5,4	60	15	20	0,10	2	SHM__*1-0600CZ02R-F0010HA-PU611	30696683	30696684	30696685
8,00	8	7,4	80	10	20	0,10	2	SHM__*1-0800BZ02R-F0010HA-PU611	30696689	30696690	30696691
8,00	8	7,4	80	20	30	0,10	2	SHM__*1-0800DZ02R-F0010HA-PU611	30696695	30696696	30696697
10,00	10	9,4	80	10	30	0,10	2	SHM__*1-1000BZ02R-F0010HA-PU611	30696698	30696699	30696700
10,00	10	9,4	90	20	30	0,10	2	SHM__*1-1000DZ02R-F0010HA-PU611	30290541	30290551	30290546
12,00	12	11	100	10	30	0,10	2	SHM__*1-1200BZ02R-F0010HA-PU611	30696704	30696705	30696706
12,00	12	11	100	20	30	0,10	2	SHM__*1-1200DZ02R-F0010HA-PU611	30696710	30696711	30696712

Cutting edge form

SHM511	SHM611	SHM711
Neutral axis angle	Negative axis angle	Positive axis angle
Straight cutting edge for neutral use.	Pushing cutting edge. The material is pressed onto the base. This is particularly well suited for thin materials.	Pulling cutting edge for normal use.
		

Dimensions in mm.

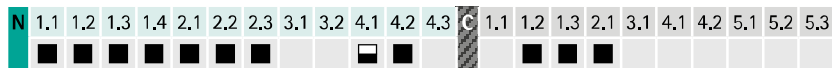
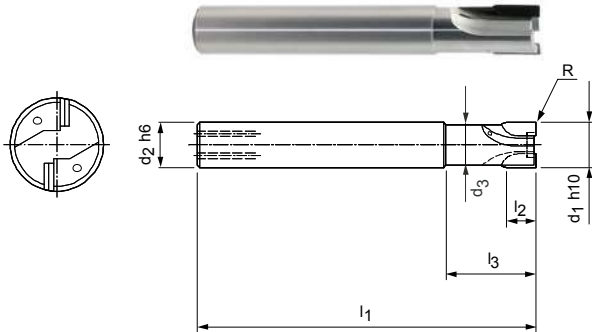
* Specification plus desired cutting edge form (see cutting edge form table).

For cutting data recommendations, see end of chapter.

Special designs and CVD-tipped tools available upon request.

OptiMill®-Diamond type 53

Shoulder milling cutter, long design with neck, includes internal cooling
SHM531

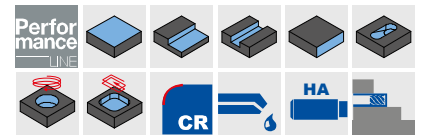


Design:

Diameter of milling cutter: 6.00 – 20.00 mm
Cutting material: PU611
Number of cutting edges: 2 to \varnothing 12 mm
3 from \varnothing 14 mm
Axis angle: $2^\circ/4^\circ/6^\circ$
Special features: No centre cutting edge
PCD cutting edge

Application:

Specially designed for high material removal rates and feeds per tooth. Closed pockets are machined by plunging into the workpiece.



Preferred series in stock

Dimensions							z	Specification	Order no.
d ₁ h10	d ₂ h6	d ₃	l ₁	l ₂	l ₃	R			
6,00	8	5	55	6	15	0,2	2	SHM531-0600AZ02R-R0020HA-PU611	30696717
10,00	10	9	75	6	20	0,2	2	SHM531-1000AZ02R-R0020HA-PU611	30696719
12,00	12	11	85	10	25	0,2	2	SHM531-1200BZ02R-R0020HA-PU611	30696720
14,00	16	13	85	10	25	0,2	3	SHM531-1400BZ03R-R0020HA-PU611	30696721
16,00	16	15	85	10	25	0,2	3	SHM531-1600BZ03R-R0020HA-PU611	30696722
20,00	20	19	100	10	50	0,2	3	SHM531-2000BZ03R-R0020HA-PU611	30696723

Available on request

8,00	8	7,2	60	6	20	0,2	2	SHM531-0800AZ02R-R0020HA-PU611	30696718
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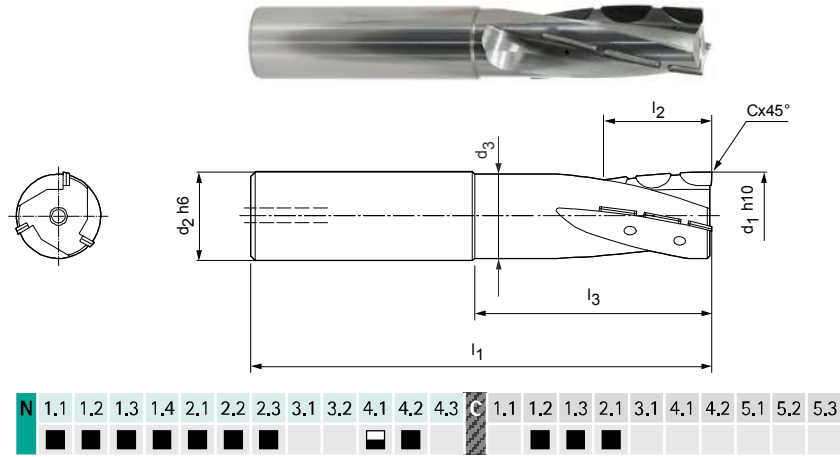
Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs available upon request.

OptiMill®-Diamond type 57

Shoulder milling cutter, long design with neck, includes internal cooling
SHM571

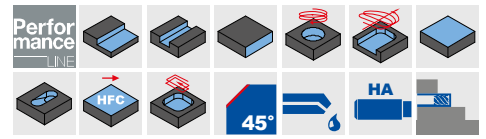


Design:

Diameter of milling cutter: 16.00 – 25.00 mm
Cutting material: PU611
Number of cutting edges: 3
Helix angle: 15°
Special features: No centre cutting edge
PCD cutting edge

Application:

The spirally designed cutting rows are ideally suited for high volume machining, e.g. for integral components.



Preferred series in stock

Dimensions							z	Specification	Order no.
d ₁ h10	d ₂ h6	d ₃	l ₁	l ₂	l ₃	Cx45°			
16,00	16	15	100	30	49	0,10	3	SHM571-1600FZ03R-F0010HA-PU611	30696731
20,00	20	19	100	30	49	0,10	3	SHM571-2000FZ03R-F0010HA-PU611	30696732
25,00	25	24	110	30	49	0,10	3	SHM571-2500FZ03R-F0010HA-PU611	30696733

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs available upon request.

OptiMill®-Diamond type 57

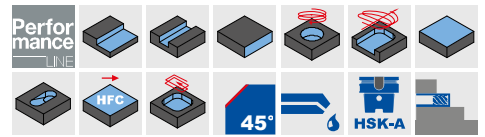
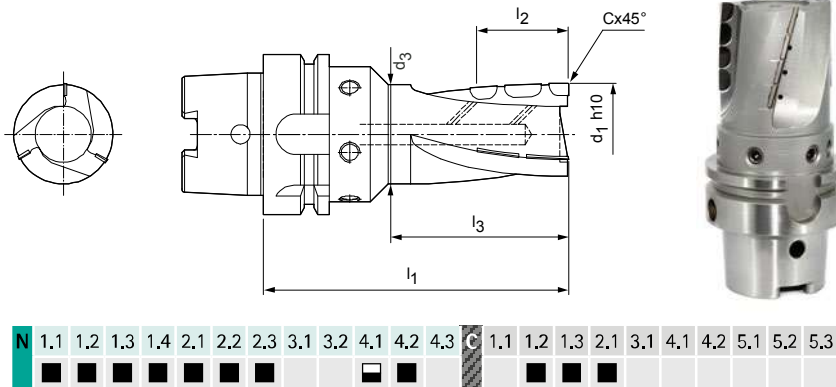
Shoulder milling cutter, with HSK-A (hollow shank taper form A) connection, with internal cooling
SHM571

Design:

Diameter of milling cutter: 32.00 – 63.00 mm
Cutting material: PU611
Number of cutting edges: 3 to \varnothing 40 mm
4 from \varnothing 50 mm
Helix angle: 15°
Special features: No centre cutting edge
PCD cutting edge

Application:

The spirally designed cutting rows are ideally suited for high volume machining.



Preferred series in stock

Dimensions						z	Specification	Order no.
d ₁ h10	d ₃	l ₁	l ₂	l ₃	Cx45°			
32,00	31	100	30	50	0,10	3	SHM571-3200FZ03R-F0010A6-PU611	30696736
40,00	39	100	40	53	0,10	3	SHM571-4000HZ03R-F0010A6-PU611	30696739
50,00	49	100	40	56	0,10	4	SHM571-5000HZ04R-F0010A6-PU611	30696742

Available on request

63,00	62	100	40	73	0,10	4	SHM571-6300HZ04R-F0010A6-PU611	30696745
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Design with shank form SK40 or BT40 available upon request.

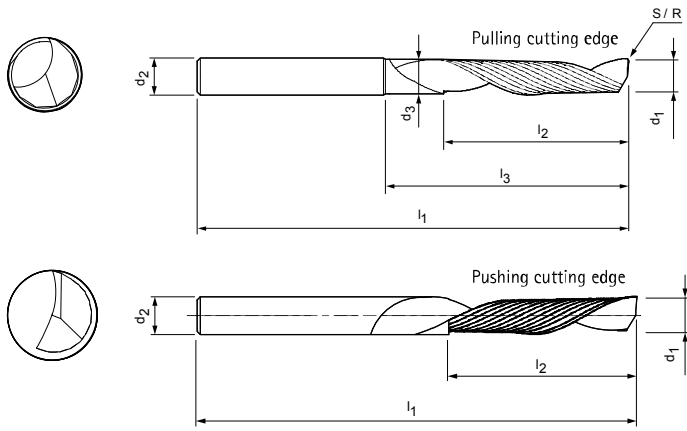
Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs available upon request.

OptiMill®-Mono-Alu

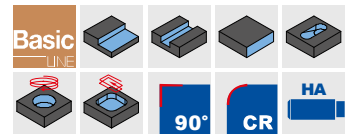
Shoulder milling cutter, design with pulling/pushing cutting edge
SCM280



Design:

- Diameter of milling cutter: 2.00 - 10.00 mm
- Cutting material: HU211
- Number of cutting edges: 1
- Helix angle: 30°
- Special features: Large chip space for unhindered chip discharge

N	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	C	1.1	1.2	1.3	2.1	3.1	4.1	4.2	5.1	5.2	5.3	
	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■



Preferred series in stock

Dimensions							z	Specification	Order no.
d ₁	d ₂	d ₃	l ₁	l ₂	l ₃	R			
2,00	3	-	38	5	-	-	1	SCM280-0200Z01R-S-HA-HU211	30393706
3,00	3	-	38	8	-	-	1	SCM280-0300Z01R-S-HA-HU211	30393708
3,00	4	-	38	8	-	-	1	SCM280-0300Z01R-S-HA-HU211	30393709
4,00	4	-	40	12	-	-	1	SCM280-0400Z01R-S-HA-HU211	30393713
4,00	4	-	70	30	-	-	1	SCM280-0400Z01R-S-HA-HU211	30393714
4,00	6	-	50	10	-	-	1	SCM280-0400Z01R-S-HA-HU211	30393715
4,00	6	-	50	10	-	-	1	SCM280-0400Z01L-S-HA-HU211	30393738
5,00	5	-	60	15	-	-	1	SCM280-0500Z01R-S-HA-HU211	30393718
5,00	6	-	50	12	-	-	1	SCM280-0500Z01R-S-HA-HU211	30393720
6,00	6	-	50	12	-	-	1	SCM280-0600Z01R-S-HA-HU211	30393725
6,00	6	-	60	15	-	-	1	SCM280-0600Z01L-S-HA-HU211	30393742
6,00	6	-	60	20	-	-	1	SCM280-0600Z01R-S-HA-HU211	30393721
6,00	6	-	70	15	-	-	1	SCM280-0600Z01R-S-HA-HU211	30393724
6,00	6	-	70	30	-	-	1	SCM280-0600Z01R-S-HA-HU211	30393722
6,00	6	-	80	38	-	-	1	SCM280-0600Z01R-S-HA-HU211	30393723
6,00	8	5,6	80	20	35	1,50	1	SCM280-0600Z01R-R0150HA-HU211	30393756
8,00	8	-	60	22	-	-	1	SCM280-0800Z01R-S-HA-HU211	30393727
8,00	8	-	80	38	-	-	1	SCM280-0800Z01R-S-HA-HU211	30393728
10,00	10	-	60	25	-	-	1	SCM280-1000Z01R-S-HA-HU211	30393730
10,00	10	-	75	30	-	-	1	SCM280-1000Z01R-S-HA-HU211	30393729

Example:
SCM280-0400Z01R-S-HA-HU211

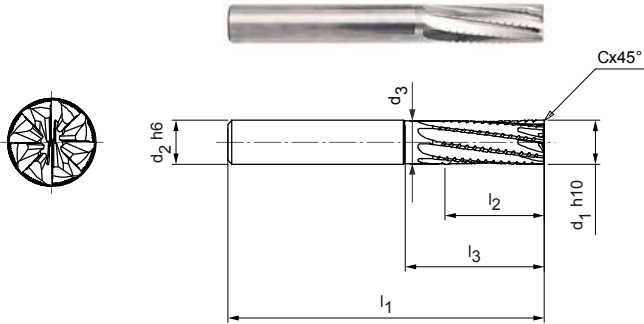


Dimensions in mm.
For cutting data recommendations, see end of chapter.
Special designs and other coatings available upon request.



OptiMill®-Composite-Speed-Plus

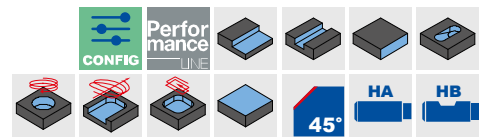
Shoulder milling cutter, design with pulling cutting edge
SCM982



N	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	C	1.1	1.2	1.3	2.1	3.1	4.1	4.2	5.1	5.2	5.3
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Design:
 Diameter of milling cutter: 4.00 – 20.00 mm
 Cutting material: HU610
 Number of cutting edges: 8
 Helix angle: 8°
 Special features: Without coating, extremely sharp cutting edge

Application:
 Roughing and finishing of CFRP in one machining step. Pulling cutting edge for better removal of the chips/dust (e.g. on milling pockets and slots). Particularly suitable for difficult to machine surface layers (e.g. UD or copper mesh) to prevent delamination on the lower edge of the part.




Preferred series in stock

Dimensions							z	Specification	Order no.
d1 h10	d2 h6	d3	l1	l2	l3	Cx45°			
4,00	6	3,90	57	11	-	0,08	8	SCM982-0400Z08R-F0008HA-HU610	31237353
5,00	6	4,90	57	13	-	0,10	8	SCM982-0500Z08R-F0010HA-HU610	31237354
6,00	6	5,80	57	13	19	0,12	8	SCM982-0600Z08R-F0012HA-HU610	31237355
6,00	6	5,80	65	21	27	0,12	8	SCM982-0600Z08R-F0012HA-HU610	31237356
8,00	8	7,80	63	19	25	0,16	8	SCM982-0800Z08R-F0016HA-HU610	31237357
8,00	8	7,80	70	22	32	0,16	8	SCM982-0800Z08R-F0016HA-HU610	31237358
10,00	10	9,70	72	22	30	0,20	8	SCM982-1000Z08R-F0020HA-HU610	31237359
12,00	12	11,60	83	26	36	0,24	8	SCM982-1200Z08R-F0024HA-HU610	31237380
16,00	16	15,50	92	32	42	0,32	8	SCM982-1600Z08R-F0032HA-HU610	31237381


Available on request

20,00	20	19,40	104	38	52	0,40	8	SCM982-2000Z08R-F0040HA-HU610	31237382
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Configurable features



Shank form:
Shank form: HB



Specification:
SCM982-0400Z08R-F0008[shank form]-HU610

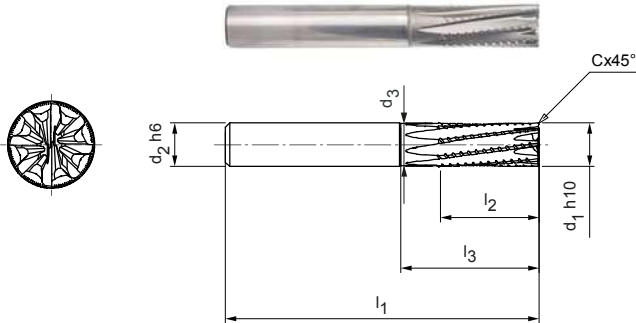
Example:
SCM982-0400Z08R-F0008HB-HU610

Shank form HB

Dimensions in mm.
 For cutting data recommendations, see end of chapter.
 Special designs and other coatings available upon request.

OptiMill®-Composite-Speed-Plus

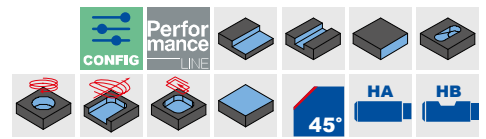
Shoulder milling cutter, design with pushing cutting edge
SCM992



N	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	C	1.1	1.2	1.3	2.1	3.1	4.1	4.2	5.1	5.2	5.3
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Design:
 Diameter of milling cutter: 4.00 – 20.00 mm
 Cutting material: HU610
 Number of cutting edges: 8
 Helix angle: -8 °
 Special features: Without coating, extremely sharp cutting edge

Application:
 Roughing and finishing of CFRP in one machining step. Pushing cutting edge, where the material is pressed onto the base (e.g. very suitable for vacuum clamping). Particularly suitable for difficult to machine surface layers (e.g. UD or copper mesh) to prevent delamination on the upper edge of the part.




Preferred series in stock

Dimensions							z	Specification	Order no.
d1 h10	d2 h6	d3	l1	l2	l3	Cx45°			
4,00	6	3,90	57	11	-	0,08	8	SCM992-0400Z08R-F0008HA-HU610	31242585
5,00	6	4,90	57	13	-	0,10	8	SCM992-0500Z08R-F0010HA-HU610	31242586
6,00	6	5,80	57	13	19	0,12	8	SCM992-0600Z08R-F0012HA-HU610	31242587
6,00	6	5,80	65	21	27	0,12	8	SCM992-0600Z08R-F0012HA-HU610	31242588
8,00	8	7,80	63	19	25	0,16	8	SCM992-0800Z08R-F0016HA-HU610	31242589
8,00	8	7,80	70	22	32	0,16	8	SCM992-0800Z08R-F0016HA-HU610	31242590
10,00	10	9,70	72	22	30	0,20	8	SCM992-1000Z08R-F0020HA-HU610	31242591
12,00	12	11,60	83	26	36	0,24	8	SCM992-1200Z08R-F0024HA-HU610	31242592
16,00	16	15,50	92	32	42	0,32	8	SCM992-1600Z08R-F0032HA-HU610	31242593


Available on request

20,00	20	19,40	104	38	52	0,40	8	SCM992-2000Z08R-F0040HA-HU610	31242594
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Configurable features



Shank form:
Shank form: HB



Specification:
SCM992-0400Z08R-F0008[shank form]-HU610

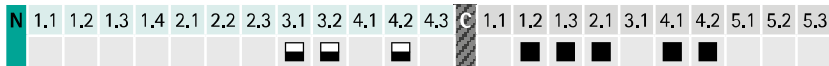
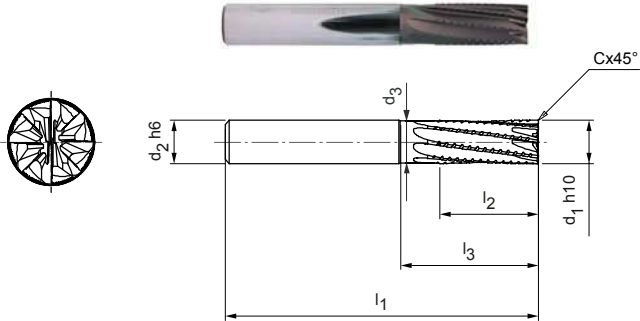
Example:
SCM992-0400Z08R-F0008HB-HU610

Shank form HB

Dimensions in mm.
 For cutting data recommendations, see end of chapter.
 Special designs and other coatings available upon request.

OptiMill®-Composite-Speed-Plus

Shoulder milling cutter, design with pulling cutting edge
SCM980, follow-up product of SCM460

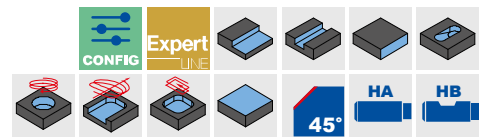


Design:

Diameter of milling cutter: 4.00 – 20.00 mm
Cutting material: HC633
Number of cutting edges: 8
Helix angle: 8°
Special features: Diamond coating

Application:

Roughing and finishing of CFRP in one machining step. Pulling cutting edge for better removal of the chips/dust (e.g. on milling pockets and slots). Particularly suitable for difficult to machine surface layers (e.g. UD or copper mesh) to prevent delamination on the lower edge of the part.




Preferred series in stock

Dimensions							z	Specification	Order no.
d1 h10	d2 h6	d3	l1	l2	l3	Cx45°			
4,00	6	3,90	57	11	-	0,08	8	SCM980-0400Z08R-F0008HA-HC633	31223245
5,00	6	4,90	57	13	-	0,10	8	SCM980-0500Z08R-F0010HA-HC633	31223246
6,00	6	5,80	57	13	19	0,12	8	SCM980-0600Z08R-F0012HA-HC633	31223247
6,00	6	5,80	65	21	27	0,12	8	SCM980-0600Z08R-F0012HA-HC633	31223248
8,00	8	7,80	63	19	25	0,16	8	SCM980-0800Z08R-F0016HA-HC633	31223249
8,00	8	7,80	70	22	32	0,16	8	SCM980-0800Z08R-F0016HA-HC633	31223260
10,00	10	9,70	72	22	30	0,20	8	SCM980-1000Z08R-F0020HA-HC633	31223261
12,00	12	11,60	83	26	36	0,24	8	SCM980-1200Z08R-F0024HA-HC633	31223262
16,00	16	15,50	92	32	42	0,32	8	SCM980-1600Z08R-F0032HA-HC633	31223263


Available on request

20,00	20	19,40	104	38	52	0,40	8	SCM980-2000Z08R-F0040HA-HC633	31223264
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Configurable features



Shank form:
Shank form: HB



Specification:
SCM980-0400Z08R-F0008[shank form]-HC633

Example:

SCM980-0400Z08R-F0008HB-HC633

Shank form HB

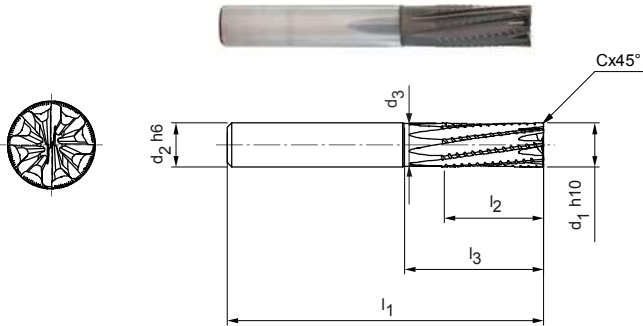
Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Composite-Speed-Plus

Shoulder milling cutter, design with pushing cutting edge
SCM990, follow-up product of SCM470

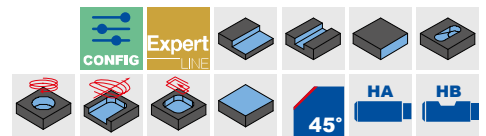


Design:

Diameter of milling cutter: 4.00 – 20.00 mm
Cutting material: HC633
Number of cutting edges: 8
Helix angle: -8 °
Special features: Diamond coating

Application:

Roughing and finishing of CFRP in one machining step. Pushing cutting edge, where the material is pressed onto the base (e.g. very suitable for vacuum clamping). Particularly suitable for difficult to machine surface layers (e.g. UD or copper mesh) to prevent delamination on the upper edge of the part.




Preferred series in stock

Dimensions							z	Specification	Order no.
d1 h10	d2 h6	d3	l1	l2	l3	Cx45°			
4,00	6	3,90	57	11	-	0,08	8	SCM990-0400Z08R-F0008HA-HC633	31223265
5,00	6	4,90	57	13	-	0,10	8	SCM990-0500Z08R-F0010HA-HC633	31223266
6,00	6	5,80	57	13	19	0,12	8	SCM990-0600Z08R-F0012HA-HC633	31223267
6,00	6	5,80	65	21	27	0,12	8	SCM990-0600Z08R-F0012HA-HC633	31223268
8,00	8	7,80	63	19	25	0,16	8	SCM990-0800Z08R-F0016HA-HC633	31223269
8,00	8	7,80	70	22	32	0,16	8	SCM990-0800Z08R-F0016HA-HC633	31223270
10,00	10	9,70	72	22	30	0,20	8	SCM990-1000Z08R-F0020HA-HC633	31223271
12,00	12	11,60	83	26	36	0,24	8	SCM990-1200Z08R-F0024HA-HC633	31223272
16,00	16	15,50	92	32	42	0,32	8	SCM990-1600Z08R-F0032HA-HC633	31223273


Available on request

20,00	20	19,40	104	38	52	0,40	8	SCM990-2000Z08R-F0040HA-HC633	31223274
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Configurable features



Shank form:
Shank form: HB



Specification:
SCM990-0400Z08R-F0008[shank form]-HC633

Example:

SCM990-0400Z08R-F0008HB-HC633

Shank form HB

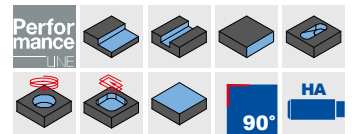
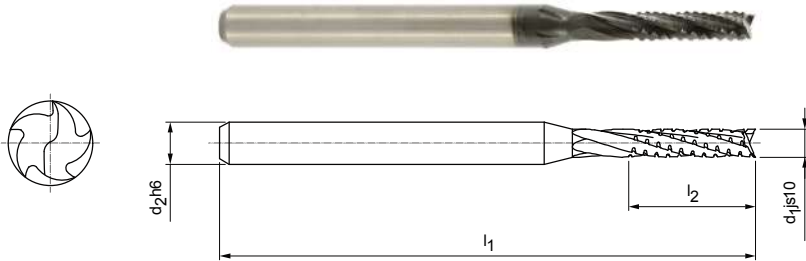
Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Composite-Micro

Shoulder milling cutter, short design, pulling cutting edge
SCM560



Design:

Diameter of milling cutter: 1.00 – 3.00 mm
Cutting material: HC620
Number of cutting edges: Multi-tooth
Special features: Diamond coating

Application:

Pulling cutting edge for better removal of the chips/dust (e.g. on milling pockets and slots). Particularly suitable for difficult to machine surface layers (e.g. UD or copper mesh) to prevent delamination on the lower edge of the part.

Preferred series in stock

Dimensions				z	Specification	Order no.
d ₁ js10	d ₂ h6	l ₁	l ₂			
1,00	3	38	5	Multi-tooth	SCM560-0100ZMVR-S-HA-HC620	30504698
2,00	3	38	9	Multi-tooth	SCM560-0200ZMVR-S-HA-HC620	30504700
3,00	3	38	9	Multi-tooth	SCM560-0300ZMVR-S-HA-HC620	30504702

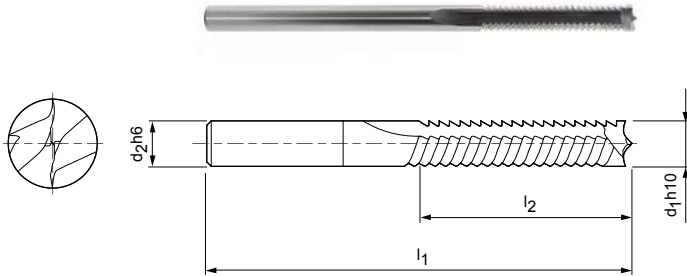
Dimensions in mm.

For cutting data recommendations, see end of chapter.

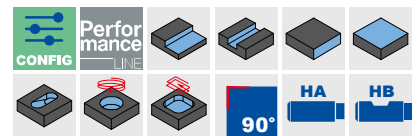
Special designs and other coatings available upon request.

OptiMill®-Composite-TwinCut

Shoulder milling cutter, extra long design
SCM490



N	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	C	1.1	1.2	1.3	2.1	3.1	4.1	4.2	5.1	5.2	5.3
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Design:
 Diameter of milling cutter: 4.00 - 20.00 mm
 Cutting material: HU610
 Number of cutting edges: 2
 Helix angle: 0°
 Special features: Alternating arrangement of the cutting edges

Application:
 For roughing of aramid fibre-reinforced plastics. Prevention of delamination in braided fibres and textile fibre structures.


Preferred series in stock

Dimensions				z	Specification	Order no.
d ₁ h10	d ₂ h6	l ₁	l ₂			
4,00	4	75	20	2	SCM490-0400Z02R-S-HA-HU610	30402708
6,00	6	100	35	2	SCM490-0600Z02R-S-HA-HU610	30402710
8,00	8	100	40	2	SCM490-0800Z02R-S-HA-HU610	30402711


Available on request

5,00	5	75	25	2	SCM490-0500Z02R-S-HA-HU610	30402709
10,00	10	125	50	2	SCM490-1000Z02R-S-HA-HU610	30402712
12,00	12	125	60	2	SCM490-1200Z02R-S-HA-HU610	30402713
16,00	16	150	75	2	SCM490-1600Z02R-S-HA-HU610	30402714
20,00	20	104	45	2	SCM490-2000Z02R-S-HA-HU610	30402715

Configurable features



Shank form:
Shank form: HB



Specification:
SCM490-0400Z02R-S-[shank form]-HU610

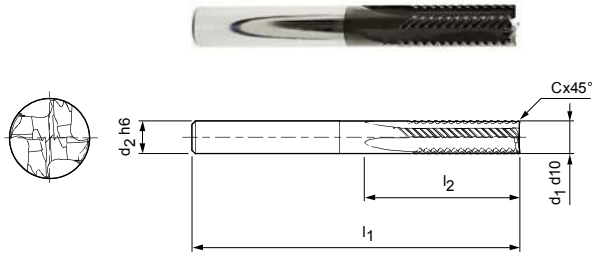
Example:
SCM490-0400Z02R-S-**HB**-HU610

Shank form HB

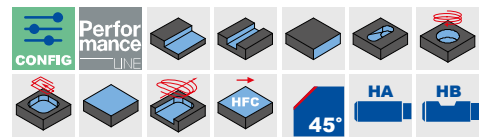
Dimensions in mm.
 For cutting data recommendations, see end of chapter.
 Special designs and other coatings available upon request.

OptiMill®-Thermoplastic-FR

Shoulder milling cutter, overlong design
SCM610



N	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	C	1.1	1.2	1.3	2.1	3.1	4.1	4.2	5.1	5.2	5.3
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Preferred series in stock

Dimensions					z	Specification	Order no.
d ₁ h10	d ₂ h6	l ₁	l ₂	Cx45°			
6,00	6	62	13	0,12	4	SCM610-0600Z04R-F0012HA-HC614	30602341
10,00	10	80	22	0,20	4	SCM610-1000Z04R-F0020HA-HC614	30602345


Available on request

4,00	6	62	11	0,08	4	SCM610-0400Z04R-F0008HA-HC614	30602339
5,00	6	62	13	0,10	4	SCM610-0500Z04R-F0010HA-HC614	30602340
8,00	8	68	19	0,16	4	SCM610-0800Z04R-F0016HA-HC614	30602343
12,00	12	93	26	0,24	4	SCM610-1200Z04R-F0024HA-HC614	30602346
16,00	16	108	32	0,32	4	SCM610-1600Z04R-F0032HA-HC614	30602347
20,00	20	126	38	0,40	4	SCM610-2000Z04R-F0040HA-HC614	30602348

Configurable features



Shank form:
Shank form: HB



Specification:
SCM610-0600Z04R-F0012[shank form]-HC614

Example:

SCM610-0600Z04R-F0012HB-HC614

Shank form HB

Dimensions in mm.

For cutting data recommendations, see end of chapter.

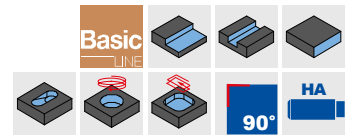
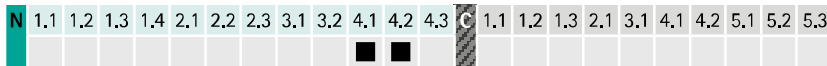
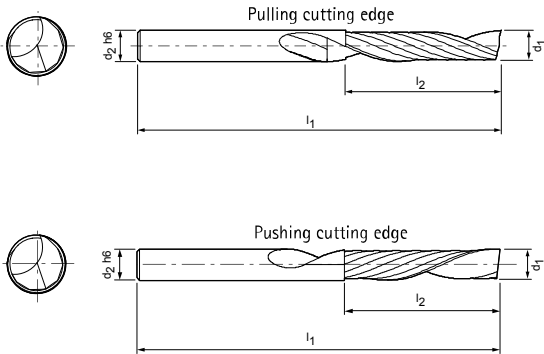
Special designs and other coatings available upon request.

OptiMill®-Mono-Plastic

Shoulder milling cutter, design with pulling/pushing cutting edge
SCM330

Design:

Diameter of milling cutter: 2.00 - 12.00 mm
Cutting material: HU211
Number of cutting edges: 1
Special features: Large chip space for unhindered chip discharge



Preferred series in stock

Dimensions				z	Specification*	Order no.	
d ₁	d ₂ h6	l ₁	l ₂			pulling	pushing
2,00	3	38	8	1	SCM330-0200Z01 [cutting behaviour]-S-HA-HU211	30393650	30393681
3,00	3	38	10	1	SCM330-0300Z01 [cutting behaviour]-S-HA-HU211	30393652	30393683
3,00	4	38	10	1	SCM330-0300Z01 [cutting behaviour]-S-HA-HU211	30393653	-
3,00	4	50	15	1	SCM330-0300Z01 [cutting behaviour]-S-HA-HU211	30393654	30393685
3,00	6	50	10	1	SCM330-0300Z01 [cutting behaviour]-S-HA-HU211	30393655	30393686
4,00	4	40	12	1	SCM330-0400Z01 [cutting behaviour]-S-HA-HU211	30393659	30393688
4,00	4	60	20	1	SCM330-0400Z01 [cutting behaviour]-S-HA-HU211	30393660	-
4,00	4	70	30	1	SCM330-0400Z01 [cutting behaviour]-S-HA-HU211	30393661	-
4,00	6	50	15	1	SCM330-0400Z01 [cutting behaviour]-S-HA-HU211	30393662	30393691
5,00	5	50	16	1	SCM330-0500Z01 [cutting behaviour]-S-HA-HU211	30393665	30393695
5,00	5	70	30	1	SCM330-0500Z01 [cutting behaviour]-S-HA-HU211	30393666	-
6,00	6	60	20	1	SCM330-0600Z01 [cutting behaviour]-S-HA-HU211	30393669	30393698
6,00	6	70	30	1	SCM330-0600Z01 [cutting behaviour]-S-HA-HU211	30393670	30393699
6,00	6	80	38	1	SCM330-0600Z01 [cutting behaviour]-S-HA-HU211	30393671	-
8,00	8	60	25	1	SCM330-0800Z01 [cutting behaviour]-S-HA-HU211	30393674	30393702
8,00	8	80	38	1	SCM330-0800Z01 [cutting behaviour]-S-HA-HU211	30393675	30393703
10,00	10	75	30	1	SCM330-1000Z01 [cutting behaviour]-S-HA-HU211	30393677	-
12,00	12	75	30	1	SCM330-1200Z01 [cutting behaviour]-S-HA-HU211	30393679	-

Dimensions in mm.

For cutting data recommendations, see end of chapter.
Special designs and other coatings available upon request.

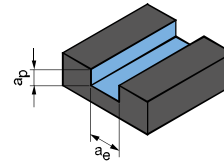
* Specification plus required soft cutting behaviour.
R = pulling | L = pushing

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Tool length/correction factor:	
Length	f_z & v_c
Short	1
Long	0,9
Overlong	0,8
Extra long	0,6

Groove milling



$$a_p = 1 \times D$$

$$a_e = 1 \times D$$

OptiMill-Uni-HPC-Plus | SCM720, 740, 760, 770

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]									
				MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]									
								2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00		
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	175	0.013	0.024	0.035	0.044	0.053	0.061	0.075	0.085	
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	145	0.012	0.023	0.032	0.041	0.050	0.057	0.070	0.080	
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	160	0.013	0.024	0.035	0.044	0.053	0.061	0.075	0.085	
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	110	0.011	0.020	0.029	0.037	0.044	0.051	0.062	0.071	
	P3	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	105	0.012	0.023	0.034	0.043	0.051	0.059	0.072	0.082	
		P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓		✓	95	0.012	0.022	0.032	0.041	0.049	0.056	0.068	0.078	
		P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓		✓	85	0.011	0.021	0.030	0.038	0.046	0.053	0.065	0.074	
	P4	P4.1	Stainless steels, ferritic and martensitic		✓		✓	70	0.008	0.016	0.023	0.030	0.035	0.041	0.050	0.057	
P5	P5.1	Cast steel				✓	105	0.012	0.023	0.034	0.043	0.051	0.059	0.072	0.082		
P6	P6.1	Stainless cast steel, ferritic and martensitic				✓	70	0.006	0.011	0.016	0.021	0.025	0.028	0.035	0.040		
M	M1	M1.1	Stainless steels, austenitic	< 700	✓		✓	50	0.007	0.014	0.020	0.026	0.031	0.036	0.043	0.050	
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓	45	0.006	0.012	0.017	0.021	0.026	0.029	0.036	0.041	
	M2	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700	✓		✓	50	0.008	0.015	0.022	0.028	0.034	0.039	0.047	0.054	
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓	50	0.006	0.012	0.017	0.022	0.027	0.031	0.037	0.043	
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	190	0.021	0.040	0.058	0.074	0.088	0.102	0.124	0.142	
		K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	175	0.018	0.034	0.049	0.063	0.075	0.086	0.106	0.121	
		K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	145	0.015	0.028	0.040	0.052	0.062	0.071	0.087	0.099	
	K2	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	80	0.008	0.016	0.023	0.030	0.035	0.041	0.050	0.057	
		K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	125	0.015	0.028	0.040	0.052	0.062	0.071	0.087	0.099
			K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	120	0.013	0.024	0.035	0.044	0.053	0.061	0.075	0.085

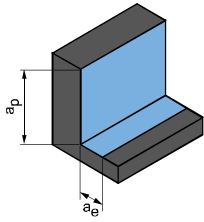
OptiMill-Uni-HPC-Plus | SCM772

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]									
				MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]									
								1.00	3.00	6.00	8.00	10.00	12.00	16.00	20.00		
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	200	0.007	0.020	0.038	0.049	0.058	0.067	0.082	0.094	
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	165	0.007	0.019	0.036	0.046	0.054	0.063	0.077	0.087	
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	180	0.007	0.020	0.038	0.049	0.058	0.067	0.082	0.094	
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	125	0.006	0.017	0.032	0.041	0.049	0.056	0.068	0.078	
	P3	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	120	0.007	0.020	0.037	0.047	0.056	0.065	0.079	0.091	
		P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓		✓	110	0.007	0.019	0.035	0.045	0.054	0.062	0.075	0.086	
		P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓		✓	100	0.006	0.018	0.033	0.042	0.051	0.058	0.071	0.081	
	P4	P4.1	Stainless steels, ferritic and martensitic		✓		✓	80	0.005	0.014	0.025	0.033	0.039	0.045	0.055	0.062	
P5	P5.1	Cast steel				✓	120	0.007	0.020	0.037	0.047	0.056	0.065	0.079	0.091		
P6	P6.1	Stainless cast steel, ferritic and martensitic				✓	80	0.003	0.010	0.018	0.023	0.027	0.031	0.038	0.044		
M	M1	M1.1	Stainless steels, austenitic	< 700	✓		✓	55	0.004	0.012	0.022	0.028	0.034	0.039	0.048	0.055	
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓	50	0.003	0.010	0.018	0.024	0.028	0.032	0.040	0.045	
	M2	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700	✓		✓	60	0.005	0.013	0.024	0.031	0.037	0.042	0.052	0.059	
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓	55	0.004	0.010	0.019	0.024	0.029	0.034	0.041	0.047	
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	215	0.012	0.034	0.064	0.081	0.097	0.112	0.137	0.156	
		K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	200	0.010	0.029	0.054	0.069	0.083	0.095	0.116	0.133	
		K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	160	0.008	0.024	0.045	0.057	0.068	0.078	0.096	0.109	
	K2	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	90	0.005	0.014	0.025	0.033	0.039	0.045	0.055	0.062	
		K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	145	0.008	0.024	0.045	0.057	0.068	0.078	0.096	0.109
			K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	135	0.007	0.020	0.038	0.049	0.058	0.067	0.082	0.094

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

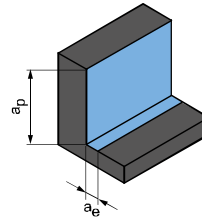
Roughing



$$a_p = 1.5xD$$

$$a_e = 0.25xD$$

Finishing



$$a_p = 1.5xD$$

$$a_e = 0.1xD$$

	v_c [m/min]	f_z [mm]								v_c [m/min]	f_z [mm]							
		Diameter of milling cutter [mm]									Diameter of milling cutter [mm]							
		2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00		2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00
355	0.021	0.041	0.059	0.075	0.090	0.103	0.126	0.145	525	0.034	0.065	0.093	0.119	0.142	0.164	0.200	0.228	
290	0.020	0.038	0.055	0.070	0.084	0.097	0.118	0.135	430	0.032	0.060	0.087	0.111	0.133	0.153	0.187	0.213	
325	0.021	0.041	0.059	0.075	0.090	0.103	0.126	0.145	475	0.034	0.065	0.093	0.119	0.142	0.164	0.200	0.228	
225	0.018	0.034	0.049	0.063	0.075	0.086	0.105	0.120	335	0.028	0.054	0.078	0.099	0.119	0.136	0.167	0.190	
210	0.021	0.040	0.057	0.073	0.087	0.100	0.122	0.140	310	0.033	0.063	0.090	0.115	0.138	0.158	0.193	0.221	
195	0.020	0.038	0.054	0.069	0.083	0.095	0.116	0.132	285	0.031	0.059	0.085	0.109	0.130	0.150	0.183	0.209	
180	0.019	0.035	0.051	0.065	0.078	0.090	0.110	0.125	260	0.029	0.056	0.081	0.103	0.123	0.142	0.173	0.198	
145	0.014	0.027	0.039	0.050	0.060	0.069	0.084	0.096	215	0.023	0.043	0.062	0.079	0.095	0.109	0.133	0.152	
215	0.021	0.040	0.057	0.073	0.087	0.100	0.122	0.140	320	0.033	0.063	0.090	0.115	0.138	0.158	0.193	0.221	
145	0.010	0.019	0.027	0.035	0.042	0.048	0.059	0.067	215	0.016	0.030	0.043	0.055	0.066	0.076	0.093	0.107	
95	0.012	0.024	0.034	0.044	0.053	0.060	0.074	0.084	145	0.020	0.038	0.054	0.069	0.083	0.095	0.117	0.133	
90	0.010	0.020	0.028	0.036	0.044	0.050	0.061	0.070	135	0.016	0.031	0.045	0.057	0.069	0.079	0.097	0.110	
105	0.014	0.026	0.037	0.048	0.057	0.066	0.080	0.092	155	0.021	0.041	0.059	0.075	0.090	0.104	0.127	0.145	
95	0.011	0.020	0.029	0.038	0.045	0.052	0.063	0.072	145	0.017	0.032	0.047	0.059	0.071	0.082	0.100	0.114	
390	0.036	0.068	0.098	0.125	0.150	0.172	0.211	0.241	570	0.056	0.108	0.155	0.198	0.237	0.273	0.333	0.381	
355	0.030	0.058	0.083	0.106	0.128	0.147	0.179	0.205	525	0.048	0.092	0.132	0.168	0.202	0.232	0.283	0.324	
290	0.025	0.048	0.069	0.088	0.105	0.121	0.147	0.169	430	0.040	0.076	0.109	0.139	0.166	0.191	0.233	0.267	
160	0.014	0.027	0.039	0.050	0.060	0.069	0.084	0.096	240	0.023	0.043	0.062	0.079	0.095	0.109	0.133	0.152	
260	0.025	0.048	0.069	0.088	0.105	0.121	0.147	0.169	380	0.040	0.076	0.109	0.139	0.166	0.191	0.233	0.267	
245	0.021	0.041	0.059	0.075	0.090	0.103	0.126	0.145	355	0.034	0.065	0.093	0.119	0.142	0.164	0.200	0.228	

	v_c [m/min]	f_z [mm]								v_c [m/min]	f_z [mm]							
		Diameter of milling cutter [mm]									Diameter of milling cutter [mm]							
		1.00	3.00	6.00	8.00	10.00	12.00	16.00	20.00		1.00	3.00	6.00	8.00	10.00	12.00	16.00	20.00
355	0.012	0.035	0.065	0.083	0.099	0.114	0.139	0.159	480	0.019	0.055	0.102	0.131	0.157	0.180	0.220	0.251	
290	0.011	0.032	0.060	0.077	0.092	0.106	0.130	0.148	395	0.018	0.051	0.096	0.122	0.146	0.168	0.205	0.235	
325	0.012	0.035	0.065	0.083	0.099	0.114	0.139	0.159	435	0.019	0.055	0.102	0.131	0.157	0.180	0.220	0.251	
225	0.010	0.029	0.054	0.069	0.083	0.095	0.116	0.132	305	0.016	0.045	0.085	0.109	0.130	0.150	0.183	0.209	
210	0.012	0.033	0.063	0.080	0.096	0.110	0.134	0.154	285	0.019	0.053	0.099	0.126	0.151	0.174	0.213	0.243	
195	0.011	0.032	0.059	0.076	0.091	0.104	0.127	0.146	260	0.018	0.050	0.094	0.120	0.144	0.165	0.202	0.230	
180	0.011	0.030	0.056	0.072	0.086	0.099	0.120	0.138	240	0.017	0.047	0.089	0.113	0.136	0.156	0.191	0.218	
145	0.008	0.023	0.043	0.055	0.066	0.076	0.093	0.106	195	0.013	0.036	0.068	0.087	0.104	0.120	0.147	0.168	
215	0.012	0.033	0.063	0.080	0.096	0.110	0.134	0.154	295	0.019	0.053	0.099	0.126	0.151	0.174	0.213	0.243	
145	0.006	0.016	0.030	0.039	0.046	0.053	0.065	0.074	195	0.009	0.025	0.048	0.061	0.073	0.084	0.103	0.117	
110	0.007	0.020	0.038	0.048	0.058	0.066	0.081	0.093	160	0.011	0.032	0.060	0.076	0.091	0.105	0.128	0.147	
105	0.006	0.017	0.031	0.040	0.048	0.055	0.067	0.077	150	0.009	0.026	0.049	0.063	0.076	0.087	0.106	0.121	
120	0.008	0.022	0.041	0.052	0.063	0.072	0.088	0.101	180	0.012	0.035	0.065	0.083	0.099	0.114	0.139	0.159	
110	0.006	0.017	0.032	0.041	0.050	0.057	0.070	0.079	160	0.010	0.027	0.051	0.065	0.078	0.090	0.110	0.126	
440	0.020	0.058	0.108	0.138	0.165	0.190	0.232	0.265	650	0.032	0.091	0.171	0.218	0.261	0.300	0.366	0.419	
405	0.017	0.049	0.092	0.117	0.140	0.161	0.197	0.225	595	0.027	0.077	0.145	0.185	0.222	0.255	0.311	0.356	
330	0.014	0.040	0.076	0.096	0.116	0.133	0.162	0.185	485	0.022	0.064	0.119	0.153	0.183	0.210	0.256	0.293	
185	0.008	0.023	0.043	0.055	0.066	0.076	0.093	0.106	270	0.013	0.036	0.068	0.087	0.104	0.120	0.147	0.168	
295	0.014	0.040	0.076	0.096	0.116	0.133	0.162	0.185	430	0.022	0.064	0.119	0.153	0.183	0.210	0.256	0.293	
275	0.012	0.035	0.065	0.083	0.099	0.114	0.139	0.159	405	0.019	0.055	0.102	0.131	0.157	0.180	0.220	0.251	

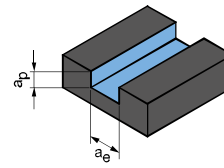
The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Tool length/correction factor:	
Length	f_z & v_c
A/B	1.0
C	0.9
D	0.7
E	0.6

Groove milling



$$a_p = 0.6 \times D$$

$$a_e = 1 \times D$$

CPMill-Uni-HPC | CPM100

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]						
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]						
							8.00	10.00	12.00	16.00	20.00	25.00	
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	160	0.021	0.025	0.028	0.034	0.039	0.044
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	130	0.019	0.023	0.026	0.032	0.037	0.041
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	145	0.021	0.025	0.028	0.034	0.039	0.044
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	100	0.017	0.020	0.024	0.029	0.033	0.037
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	95	0.020	0.024	0.027	0.033	0.038	0.043
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓	85	0.019	0.023	0.026	0.032	0.036	0.040
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓	80	0.018	0.021	0.024	0.030	0.034	0.038
P5	P5.1	Stainless steels, ferritic and martensitic				✓	95	0.020	0.024	0.027	0.033	0.038	0.043
K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	175	0.034	0.041	0.047	0.057	0.066	0.073
	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	160	0.029	0.035	0.040	0.049	0.056	0.062
	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	130	0.024	0.029	0.033	0.040	0.046	0.051
	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	70	0.014	0.016	0.019	0.023	0.026	0.029
	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	115	0.024	0.029	0.033	0.040	0.046	0.051
	K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	110	0.021	0.025	0.028	0.034	0.039	0.044

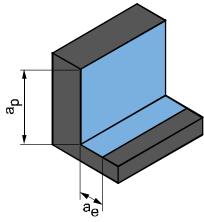
CPMill-Uni-HPC-Slot | CPM110

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]						
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]						
							8.00	10.00	12.00	16.00	20.00	25.00	
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	160	0.021	0.025	0.028	0.034	0.039	0.044
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	130	0.019	0.023	0.026	0.032	0.037	0.041
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	145	0.021	0.025	0.028	0.034	0.039	0.044
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	100	0.017	0.020	0.024	0.029	0.033	0.037
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	95	0.020	0.024	0.027	0.033	0.038	0.043
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓	85	0.019	0.023	0.026	0.032	0.036	0.040
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓	80	0.018	0.021	0.024	0.030	0.034	0.038
P5	P5.1	Stainless steels, ferritic and martensitic				✓	95	0.020	0.024	0.027	0.033	0.038	0.043
K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	175	0.034	0.041	0.047	0.057	0.066	0.073
	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	160	0.029	0.035	0.040	0.049	0.056	0.062
	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	130	0.024	0.029	0.033	0.040	0.046	0.051
	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	70	0.014	0.016	0.019	0.023	0.026	0.029
	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	115	0.024	0.029	0.033	0.040	0.046	0.051
	K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	110	0.021	0.025	0.028	0.034	0.039	0.044

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

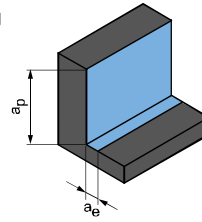
Roughing



$$a_p = 0.56 \times D$$

$$a_e = 0.5 \times D$$

Finishing



$$a_p = 0.56 \times D$$

$$a_e = 0.1 \times D$$

	v_c [m/min]	f_z [mm]						v_c [m/min]	f_z [mm]					
		Diameter of milling cutter [mm]							Diameter of milling cutter [mm]					
		8.00	10.00	12.00	16.00	20.00	25.00		8.00	10.00	12.00	16.00	20.00	25.00
Light Blue	285	0.041	0.049	0.056	0.069	0.079	0.088	385	0.065	0.078	0.089	0.109	0.125	0.139
	235	0.038	0.046	0.053	0.064	0.074	0.082	315	0.061	0.072	0.083	0.102	0.116	0.130
	260	0.041	0.049	0.056	0.069	0.079	0.088	350	0.065	0.078	0.089	0.109	0.125	0.139
	180	0.034	0.041	0.047	0.057	0.066	0.073	245	0.054	0.065	0.074	0.091	0.104	0.116
	170	0.040	0.047	0.055	0.067	0.076	0.085	225	0.063	0.075	0.086	0.105	0.120	0.134
	155	0.038	0.045	0.052	0.063	0.072	0.081	210	0.059	0.071	0.082	0.100	0.114	0.127
	145	0.036	0.043	0.049	0.060	0.068	0.076	190	0.056	0.067	0.077	0.094	0.108	0.121
Light Orange	175	0.040	0.047	0.055	0.067	0.076	0.085	235	0.063	0.075	0.086	0.105	0.120	0.134
	355	0.068	0.082	0.094	0.115	0.131	0.147	520	0.108	0.129	0.149	0.182	0.208	0.232
	325	0.058	0.070	0.080	0.098	0.112	0.125	475	0.092	0.110	0.126	0.154	0.177	0.197
	265	0.048	0.057	0.066	0.080	0.092	0.103	390	0.076	0.091	0.104	0.127	0.145	0.162
	145	0.027	0.033	0.038	0.046	0.053	0.059	215	0.043	0.052	0.059	0.073	0.083	0.093
	235	0.048	0.057	0.066	0.080	0.092	0.103	345	0.076	0.091	0.104	0.127	0.145	0.162
	220	0.041	0.049	0.056	0.069	0.079	0.088	325	0.065	0.078	0.089	0.109	0.125	0.139

	v_c [m/min]	f_z [mm]						v_c [m/min]	f_z [mm]					
		Diameter of milling cutter [mm]							Diameter of milling cutter [mm]					
		8.00	10.00	12.00	16.00	20.00	25.00		8.00	10.00	12.00	16.00	20.00	25.00
Light Blue	285	0.041	0.049	0.056	0.069	0.079	0.088	385	0.065	0.078	0.089	0.109	0.125	0.139
	235	0.038	0.046	0.053	0.064	0.074	0.082	315	0.061	0.072	0.083	0.102	0.116	0.130
	260	0.041	0.049	0.056	0.069	0.079	0.088	350	0.065	0.078	0.089	0.109	0.125	0.139
	180	0.034	0.041	0.047	0.057	0.066	0.073	245	0.054	0.065	0.074	0.091	0.104	0.116
	170	0.040	0.047	0.055	0.067	0.076	0.085	225	0.063	0.075	0.086	0.105	0.120	0.134
	155	0.038	0.045	0.052	0.063	0.072	0.081	210	0.059	0.071	0.082	0.100	0.114	0.127
	145	0.036	0.043	0.049	0.060	0.068	0.076	190	0.056	0.067	0.077	0.094	0.108	0.121
Light Orange	175	0.040	0.047	0.055	0.067	0.076	0.085	235	0.063	0.075	0.086	0.105	0.120	0.134
	355	0.068	0.082	0.094	0.115	0.131	0.147	520	0.108	0.129	0.149	0.182	0.208	0.232
	325	0.058	0.070	0.080	0.098	0.112	0.125	475	0.092	0.110	0.126	0.154	0.177	0.197
	265	0.048	0.057	0.066	0.080	0.092	0.103	390	0.076	0.091	0.104	0.127	0.145	0.162
	145	0.027	0.033	0.038	0.046	0.053	0.059	215	0.043	0.052	0.059	0.073	0.083	0.093
	235	0.048	0.057	0.066	0.080	0.092	0.103	345	0.076	0.091	0.104	0.127	0.145	0.162
	220	0.041	0.049	0.056	0.069	0.079	0.088	325	0.065	0.078	0.089	0.109	0.125	0.139

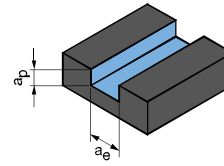
The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Tool length/correction factor:	
Length	f_z & v_c
Short	1
Long	0,9
Overlong	0,8
Extra long	0,6

Groove milling



$$a_p = 1 \times D$$

$$a_e = 1 \times D$$

OptiMill-Uni-HPC-Slot | SCM250

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]									
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]									
							2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00		
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	200	0.013	0.024	0.035	0.044	0.053	0.061	0.075	0.085	
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	165	0.012	0.023	0.032	0.041	0.050	0.057	0.070	0.080	
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	180	0.013	0.024	0.035	0.044	0.053	0.061	0.075	0.085	
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	125	0.011	0.020	0.029	0.037	0.044	0.051	0.062	0.071	
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	120	0.012	0.023	0.034	0.043	0.051	0.059	0.072	0.082	
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓	110	0.012	0.022	0.032	0.041	0.049	0.056	0.068	0.078	
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓	100	0.011	0.021	0.030	0.038	0.046	0.053	0.065	0.074	
	P4	P4.1	Stainless steels, ferritic and martensitic		✓	✓	80	0.008	0.016	0.023	0.030	0.035	0.041	0.050	0.057	
P5	P5.1	Cast steel			✓	120	0.012	0.023	0.034	0.043	0.051	0.059	0.072	0.082		
P6	P6.1	Stainless cast steel, ferritic and martensitic			✓	80	0.006	0.011	0.016	0.021	0.025	0.028	0.035	0.040		
M	M1.1	Stainless steels, austenitic	< 700	✓		✓	55	0.007	0.014	0.020	0.026	0.031	0.036	0.043	0.050	
	M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓	50	0.006	0.012	0.017	0.021	0.026	0.029	0.036	0.041	
	M2	M2.1	Stainless cast steel, austenitic	< 700	✓		✓	60	0.008	0.015	0.022	0.028	0.034	0.039	0.047	0.054
	M3	M3.1	Stainless cast steel, ferritic/austenitic (Duplex)	< 1000			✓	55	0.006	0.012	0.017	0.022	0.027	0.031	0.037	0.043
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	215	0.021	0.040	0.058	0.074	0.088	0.102	0.124	0.142
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	200	0.018	0.034	0.049	0.063	0.075	0.086	0.106	0.121
	K2	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	160	0.015	0.028	0.040	0.052	0.062	0.071	0.087	0.099
	K2	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	90	0.008	0.016	0.023	0.030	0.035	0.041	0.050	0.057
	K3	K3.1	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	145	0.015	0.028	0.040	0.052	0.062	0.071	0.087	0.099
	K3	K3.2	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	135	0.013	0.024	0.035	0.044	0.053	0.061	0.075	0.085

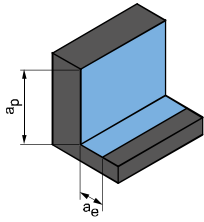
ECU-Mill-Uni-LV | SCM780.790

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]								
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]								
							6.00	8.00	10.00	12.00	16.00	20.00	25.00		
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	170	0.022	0.031	0.040	0.048	0.055	0.067	0.077	
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	140	0.020	0.029	0.037	0.045	0.051	0.063	0.072	
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	155	0.022	0.031	0.040	0.048	0.055	0.067	0.077	
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	110	0.018	0.026	0.033	0.040	0.046	0.056	0.064	
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	100	0.021	0.030	0.039	0.046	0.053	0.065	0.074	
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓	95	0.020	0.029	0.037	0.044	0.050	0.061	0.070	
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓	85	0.019	0.027	0.035	0.041	0.048	0.058	0.066	
P5	P5.1	Cast steel			✓	105	0.021	0.030	0.039	0.046	0.053	0.065	0.074		
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	185	0.036	0.052	0.066	0.080	0.092	0.112	0.128
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	170	0.031	0.044	0.057	0.068	0.078	0.095	0.109
	K2	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	140	0.025	0.036	0.047	0.056	0.064	0.078	0.089
	K2	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	75	0.014	0.021	0.027	0.032	0.037	0.045	0.051
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	120	0.025	0.036	0.047	0.056	0.064	0.078	0.089
	K3	K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	115	0.022	0.031	0.040	0.048	0.055	0.067	0.077

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

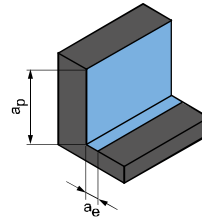
Roughing



$$a_p = 1.5xD$$

$$a_e = 0.25xD$$

Finishing



$$a_p = 1.5xD$$

$$a_e = 0.1xD$$

	v_c [m/min]	f_z [mm]								v_c [m/min]	f_z [mm]							
		Diameter of milling cutter [mm]									Diameter of milling cutter [mm]							
		2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00		2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00
355	0.021	0.041	0.059	0.075	0.090	0.103	0.126	0.145	480	0.034	0.065	0.093	0.119	0.142	0.164	0.200	0.228	
290	0.020	0.038	0.055	0.070	0.084	0.097	0.118	0.135	395	0.032	0.060	0.087	0.111	0.133	0.153	0.187	0.213	
325	0.021	0.041	0.059	0.075	0.090	0.103	0.126	0.145	435	0.034	0.065	0.093	0.119	0.142	0.164	0.200	0.228	
225	0.018	0.034	0.049	0.063	0.075	0.086	0.105	0.120	305	0.028	0.054	0.078	0.099	0.119	0.136	0.167	0.190	
210	0.021	0.040	0.057	0.073	0.087	0.100	0.122	0.140	285	0.033	0.063	0.090	0.115	0.138	0.158	0.193	0.221	
195	0.020	0.038	0.054	0.069	0.083	0.095	0.116	0.132	260	0.031	0.059	0.085	0.109	0.130	0.150	0.183	0.209	
180	0.019	0.035	0.051	0.065	0.078	0.090	0.110	0.125	240	0.029	0.056	0.081	0.103	0.123	0.142	0.173	0.198	
145	0.014	0.027	0.039	0.050	0.060	0.069	0.084	0.096	195	0.023	0.043	0.062	0.079	0.095	0.109	0.133	0.152	
215	0.021	0.040	0.057	0.073	0.087	0.100	0.122	0.140	295	0.033	0.063	0.090	0.115	0.138	0.158	0.193	0.221	
145	0.010	0.019	0.027	0.035	0.042	0.048	0.059	0.067	195	0.016	0.030	0.043	0.055	0.066	0.076	0.093	0.107	
110	0.012	0.024	0.034	0.044	0.053	0.060	0.074	0.084	160	0.020	0.038	0.054	0.069	0.083	0.095	0.117	0.133	
105	0.010	0.020	0.028	0.036	0.044	0.050	0.061	0.070	150	0.016	0.031	0.045	0.057	0.069	0.079	0.097	0.110	
120	0.014	0.026	0.037	0.048	0.057	0.066	0.080	0.092	180	0.021	0.041	0.059	0.075	0.090	0.104	0.127	0.145	
110	0.011	0.020	0.029	0.038	0.045	0.052	0.063	0.072	160	0.017	0.032	0.047	0.059	0.071	0.082	0.100	0.114	
440	0.036	0.068	0.098	0.125	0.150	0.172	0.211	0.241	650	0.056	0.108	0.155	0.198	0.237	0.273	0.333	0.381	
405	0.030	0.058	0.083	0.106	0.128	0.147	0.179	0.205	595	0.048	0.092	0.132	0.168	0.202	0.232	0.283	0.324	
330	0.025	0.048	0.069	0.088	0.105	0.121	0.147	0.169	485	0.040	0.076	0.109	0.139	0.166	0.191	0.233	0.267	
185	0.014	0.027	0.039	0.050	0.060	0.069	0.084	0.096	270	0.023	0.043	0.062	0.079	0.095	0.109	0.133	0.152	
295	0.025	0.048	0.069	0.088	0.105	0.121	0.147	0.169	430	0.040	0.076	0.109	0.139	0.166	0.191	0.233	0.267	
275	0.021	0.041	0.059	0.075	0.090	0.103	0.126	0.145	405	0.034	0.065	0.093	0.119	0.142	0.164	0.200	0.228	

	v_c [m/min]	f_z [mm]							v_c [m/min]	f_z [mm]						
		Diameter of milling cutter [mm]								Diameter of milling cutter [mm]						
		6.00	8.00	10.00	12.00	16.00	20.00	25.00		6.00	8.00	10.00	12.00	16.00	20.00	25.00
305	0.043	0.062	0.080	0.096	0.110	0.134	0.153	410	0.069	0.099	0.126	0.151	0.174	0.212	0.242	
250	0.041	0.058	0.074	0.089	0.102	0.125	0.143	335	0.064	0.092	0.118	0.141	0.162	0.198	0.226	
275	0.043	0.062	0.080	0.096	0.110	0.134	0.153	370	0.069	0.099	0.126	0.151	0.174	0.212	0.242	
195	0.036	0.052	0.066	0.080	0.092	0.112	0.128	260	0.057	0.082	0.105	0.126	0.145	0.177	0.202	
180	0.042	0.060	0.077	0.092	0.106	0.130	0.148	240	0.066	0.095	0.122	0.146	0.168	0.205	0.234	
165	0.040	0.057	0.073	0.088	0.101	0.123	0.141	225	0.063	0.090	0.116	0.138	0.159	0.194	0.222	
150	0.038	0.054	0.069	0.083	0.095	0.116	0.133	205	0.060	0.086	0.109	0.131	0.150	0.184	0.210	
185	0.042	0.060	0.077	0.092	0.106	0.130	0.148	250	0.066	0.095	0.122	0.146	0.168	0.205	0.234	
375	0.072	0.104	0.133	0.159	0.183	0.224	0.256	550	0.114	0.165	0.210	0.252	0.289	0.353	0.404	
345	0.062	0.088	0.113	0.135	0.156	0.190	0.217	505	0.097	0.140	0.179	0.214	0.246	0.300	0.344	
280	0.051	0.073	0.093	0.111	0.128	0.156	0.179	415	0.080	0.115	0.147	0.176	0.203	0.247	0.283	
155	0.029	0.042	0.053	0.064	0.073	0.089	0.102	230	0.046	0.066	0.084	0.101	0.116	0.141	0.162	
250	0.051	0.073	0.093	0.111	0.128	0.156	0.179	365	0.080	0.115	0.147	0.176	0.203	0.247	0.283	
235	0.043	0.062	0.080	0.096	0.110	0.134	0.153	345	0.069	0.099	0.126	0.151	0.174	0.212	0.242	

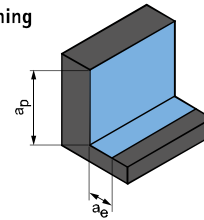
The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Tool length/correction factor:	
Length	f_z & v_c
short	1
Long	1
Overlong	0.8
Extra long	-

Roughing



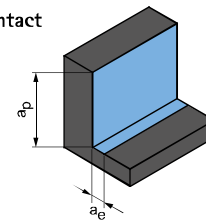
$$a_p = 1.5 \times D$$

$$a_e = 0.25 \times D$$

OptiMill-Uni-HPC-Pocket | SCM800, 810, 840

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]								
				MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]								
								3.80	6.00	8.00	10.00	12.00	16.00	20.00		
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	465	0.053	0.079	0.101	0.122	0.140	0.171	0.195	
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	380	0.049	0.074	0.095	0.113	0.130	0.159	0.182	
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	425	0.053	0.079	0.101	0.122	0.140	0.171	0.195	
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	295	0.044	0.066	0.085	0.101	0.116	0.142	0.163	
	P3	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	275	0.051	0.077	0.098	0.117	0.135	0.165	0.189	
		P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓	255	0.048	0.073	0.093	0.111	0.128	0.156	0.179	
		P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓	235	0.046	0.069	0.088	0.105	0.121	0.148	0.169	
	P4	P4.1	Stainless steels, ferritic and martensitic		✓	✓	✓	190	0.035	0.053	0.068	0.081	0.093	0.114	0.130	
	P5	P5.1	Cast steel		✓	✓	✓	285	0.051	0.077	0.098	0.117	0.135	0.165	0.189	
P6	P6.1	Stainless cast steel, ferritic and martensitic		✓	✓	✓	190	0.025	0.037	0.047	0.057	0.065	0.080	0.091		
M	M1	M1.1	Stainless steels, austenitic	< 700	✓	✓	✓	125	0.031	0.046	0.059	0.071	0.081	0.100	0.114	
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000	✓	✓	✓	120	0.025	0.038	0.049	0.059	0.068	0.082	0.094	
	M2	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700	✓	✓	✓	140	0.033	0.050	0.064	0.077	0.088	0.108	0.124	
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000	✓	✓	✓	125	0.026	0.040	0.051	0.061	0.070	0.085	0.098	
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	510	0.088	0.132	0.169	0.203	0.233	0.284	0.325	
		K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	465	0.075	0.113	0.144	0.172	0.198	0.242	0.276	
		K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	380	0.062	0.093	0.118	0.142	0.163	0.199	0.228	
	K2	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	210	0.035	0.053	0.068	0.081	0.093	0.114	0.130	
		K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	340	0.062	0.093	0.118	0.142	0.163	0.199	0.228
			K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	315	0.053	0.079	0.101	0.122	0.140	0.171	0.195

Part-contact cutting



$$a_p = 1.5 \times D$$

$$a_e = 0.25 \times D$$

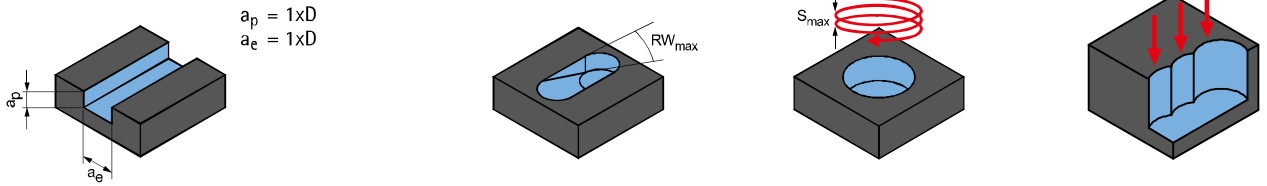
OptiMill-Alu-HPC-Pocket | SCM850

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]						
				MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]						
								5,00	8,00	10,00	12,00	16,00	20,00	
N	N1	N1.1	Aluminium, non-alloy and alloy < 3 % Si		✓	✓	✓	945	0.080	0.120	0.145	0.169	0.210	0.243
		N1.2	Aluminium, alloy ≤ 7 % Si		✓	✓	✓	625	0.084	0.126	0.152	0.177	0.221	0.256
		N1.3	Aluminium, alloy > 7-12 % Si		✓	✓	✓	500	0.088	0.132	0.160	0.186	0.231	0.268
		N1.4	Aluminium, alloy > 12 % Si		✓	✓	✓	360	0.096	0.144	0.174	0.202	0.252	0.292
	N2	N2.1	Copper, non-alloy and low-alloy	< 300	✓	✓	✓	360	0.064	0.096	0.116	0.135	0.168	0.195
		N2.2	Copper, alloy	> 300	✓	✓	✓	270	0.064	0.096	0.116	0.135	0.168	0.195
		N2.3	Brass, bronze, gunmetal	< 1200	✓	✓	✓	450	0.040	0.060	0.073	0.084	0.105	0.122
	N4	N4.1	Plastic, thermoplastics		✓	✓	✓	125	0.040	0.060	0.073	0.084	0.105	0.122
		N4.2	Plastic, thermosets		✓	✓	✓	185	0.040	0.060	0.073	0.084	0.105	0.122
		N4.3	Plastic, foams		✓	✓	✓	565	0.024	0.036	0.044	0.051	0.063	0.073

* MAPAL machining groups

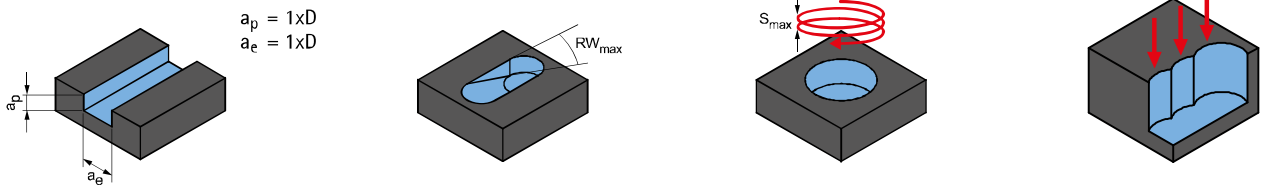
** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

Groove milling



v_c [m/min]	f_z [mm]							Ramps	Helix milling		Drilling	
	Diameter of milling cutter [mm]							RW_{max}	S_{max}	EW_{max}		f_z factor
	3.80	6.00	8.00	10.00	12.00	16.00	20.00			G = 1.5	G = 1.8	
230	0.031	0.047	0.060	0.072	0.082	0.101	0.115	45°	0.75xD	25°	16°	0.9
185	0.029	0.044	0.056	0.067	0.077	0.094	0.107	45°	0.75xD	25°	16°	0.8
205	0.031	0.047	0.060	0.072	0.082	0.101	0.115	45°	0.75xD	25°	16°	0.8
145	0.026	0.039	0.050	0.060	0.069	0.084	0.096	45°	0.75xD	25°	16°	0.7
135	0.030	0.045	0.058	0.069	0.080	0.097	0.111	30°	0.5xD	18°	11°	0.8
125	0.029	0.043	0.055	0.066	0.075	0.092	0.105	30°	0.5xD	18°	11°	0.7
115	0.027	0.041	0.052	0.062	0.071	0.087	0.100	30°	0.5xD	18°	11°	0.7
95	0.021	0.031	0.040	0.048	0.055	0.067	0.077	15°	0.5xD	18°	11°	
140	0.030	0.045	0.058	0.069	0.080	0.097	0.111	30°	0.5xD	18°	11°	
95	0.015	0.022	0.028	0.033	0.038	0.047	0.054	15°	0.5xD	18°	11°	
60	0.018	0.027	0.035	0.042	0.048	0.059	0.067	15°	0.5xD	18°	11°	
60	0.015	0.023	0.029	0.035	0.040	0.049	0.056	15°	0.5xD	18°	11°	
70	0.020	0.030	0.038	0.045	0.052	0.064	0.073	15°	0.5xD	18°	11°	
60	0.016	0.023	0.030	0.036	0.041	0.050	0.058	15°	0.5xD	18°	11°	
250	0.052	0.078	0.100	0.119	0.137	0.168	0.192	45°	0.75xD	25°	16°	0.8
230	0.044	0.066	0.085	0.102	0.117	0.143	0.163	45°	0.75xD	25°	16°	0.8
185	0.036	0.055	0.070	0.084	0.096	0.117	0.134	45°	0.75xD	25°	16°	0.8
105	0.021	0.031	0.040	0.048	0.055	0.067	0.077	45°	0.75xD	25°	16°	0.8
165	0.036	0.055	0.070	0.084	0.096	0.117	0.134	45°	0.75xD	25°	16°	0.8
155	0.031	0.047	0.060	0.072	0.082	0.101	0.115	45°	0.75xD	25°	16°	0.8

Full cutting



v_c [m/min]	f_z [mm]						Ramps	Helix milling		Drilling	
	Diameter of milling cutter [mm]						RW_{max}	S_{max}	EW_{max}		f_z factor
	5.00	8.00	10.00	12.00	16.00	20.00			G = 1.5	G = 1.8	
610	0.047	0.071	0.086	0.099	0.124	0.144	45°	0.75xD	25°	16°	0.8
405	0.049	0.074	0.090	0.104	0.130	0.151	45°	0.75xD	25°	16°	0.8
325	0.052	0.078	0.094	0.109	0.136	0.158	45°	0.75xD	25°	16°	0.8
235	0.057	0.085	0.103	0.119	0.149	0.172	45°	0.75xD	25°	16°	0.8
235	0.038	0.057	0.068	0.080	0.099	0.115	45°	0.75xD	25°	16°	0.8
175	0.038	0.057	0.068	0.080	0.099	0.115	45°	0.75xD	25°	16°	0.8
295	0.024	0.035	0.043	0.050	0.062	0.072	45°	0.75xD	25°	16°	0.8
80	0.024	0.035	0.043	0.050	0.062	0.072	45°	0.75xD	25°	16°	0.8
120	0.024	0.035	0.043	0.050	0.062	0.072	45°	0.75xD	25°	16°	0.8
365	0.014	0.021	0.026	0.030	0.037	0.043	45°	0.75xD	25°	16°	0.8

Explanation of terms:

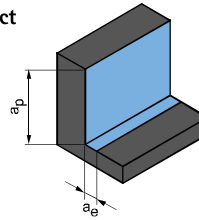
- RW_{max} = Maximum angle of the ramp
- S_{max} = Maximum slope of the helix
- G = Ratio of circular pocket \emptyset when plunging to the tool \emptyset
E.g.: Tool \emptyset 12 mm at G=1.5 results in a pocket \emptyset of 18 mm
- EW_{max} = Slope angle of the helix (results from G and S_{max})

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Part-contact cutting



$$a_p = 3 \times D$$

$$a_e = 0.1 \times D$$

OptiMill-Alu-HPC-Pocket | SCM854

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v _c [m/min]	f _z [mm]							
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]							
							5.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00
N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si		✓	✓	✓	915	0.061	0.091	0.110	0.126	0.141	0.154	0.166	0.176
	N1.2 Aluminium, alloy ≤ 7 % Si		✓	✓	✓	610	0.064	0.096	0.115	0.132	0.148	0.162	0.174	0.185
	N1.3 Aluminium, alloy > 7-12 % Si		✓	✓	✓	485	0.067	0.101	0.121	0.139	0.155	0.169	0.182	0.193
	N1.4 Aluminium, alloy > 12 % Si		✓	✓	✓	350	0.073	0.110	0.131	0.151	0.169	0.185	0.199	0.211
N2	N2.1 Copper, non-alloy and low-alloy	< 300	✓	✓	✓	350	0.049	0.073	0.088	0.101	0.113	0.123	0.132	0.141
	N2.2 Copper, alloy	> 300	✓	✓	✓	265	0.049	0.073	0.088	0.101	0.113	0.123	0.132	0.141
	N2.3 Brass, bronze, gunmetal	< 1200	✓	✓	✓	440	0.030	0.046	0.055	0.063	0.070	0.077	0.083	0.088
N4	N4.1 Plastic, thermoplastics		✓	✓	✓	120	0.030	0.046	0.055	0.063	0.070	0.077	0.083	0.088
	N4.2 Plastic, thermosets		✓	✓	✓	180	0.030	0.046	0.055	0.063	0.070	0.077	0.083	0.088
	N4.3 Plastic, foams		✓	✓		315	0.018	0.027	0.033	0.038	0.042	0.046	0.050	0.053

OptiMill-Alu-HPC-Pocket | SCM854

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
			MQL/Air	Dry	Coolant
N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si		✓	✓	✓
	N1.2 Aluminium, alloy ≤ 7 % Si		✓	✓	✓
	N1.3 Aluminium, alloy > 7-12 % Si		✓	✓	✓
	N1.4 Aluminium, alloy > 12 % Si		✓	✓	✓
N2	N2.1 Copper, non-alloy and low-alloy	< 300	✓	✓	✓
	N2.2 Copper, alloy	> 300	✓	✓	✓
	N2.3 Brass, bronze, gunmetal	< 1200	✓	✓	✓
N4	N4.1 Plastic, thermoplastics		✓	✓	✓
	N4.2 Plastic, thermosets		✓	✓	✓
	N4.3 Plastic, foams		✓	✓	

Calculation example for 42CrMo4 ø 12 mm:

$$f_z | a_e | h_m \text{ max.} = \frac{D}{100} \cdot \text{See table for value}$$

N1.1	Aluminium, non-alloy and alloy < 3 % Si	✓	✓	✓	915	0.061	0.091	0.110	0.126	0.141	0.154	0.166	0.176
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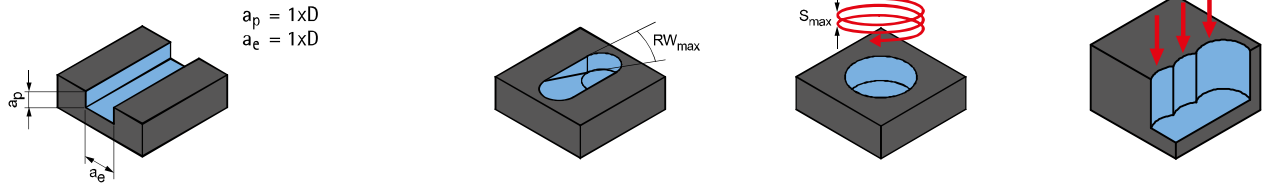
1 $f_z = \frac{12 \text{ mm}}{100} \cdot 1,2 = 0,144 \text{ mm}$

2 $h_m \text{ max.} = \frac{12 \text{ mm}}{100} \cdot 0,84 = 0,101 \text{ mm}$

* MAPAL machining groups

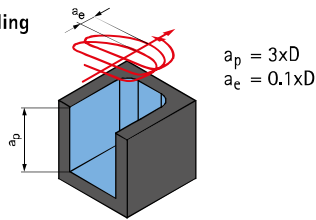
** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

Full cutting

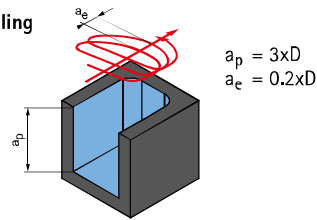


v_c [m/min]	f_z [mm]								Ramps	Helix milling		Grooving	
	Diameter of milling cutter [mm]								RW_{max}	S_{max}	EW_{max}		f_z factor
	5.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00			G = 1.5	G = 1.8	
495	0.045	0.068	0.081	0.093	0.104	0.114	0.123	0.130	45°	0.75xD	25°	16°	0.8
330	0.047	0.071	0.085	0.098	0.109	0.120	0.129	0.137	45°	0.75xD	25°	16°	0.8
265	0.050	0.075	0.089	0.103	0.115	0.125	0.135	0.143	45°	0.75xD	25°	16°	0.8
190	0.054	0.081	0.097	0.112	0.125	0.137	0.147	0.156	45°	0.75xD	25°	16°	0.8
190	0.036	0.054	0.065	0.075	0.083	0.091	0.098	0.104	45°	0.75xD	25°	16°	0.8
145	0.036	0.054	0.065	0.075	0.083	0.091	0.098	0.104	45°	0.75xD	25°	16°	0.8
240	0.023	0.034	0.041	0.047	0.052	0.057	0.061	0.065	45°	0.75xD	25°	16°	0.8
65	0.023	0.034	0.041	0.047	0.052	0.057	0.061	0.065	45°	0.75xD	25°	16°	0.8
100	0.023	0.034	0.041	0.047	0.052	0.057	0.061	0.065	45°	0.75xD	25°	16°	0.8
170	0.014	0.020	0.024	0.028	0.031	0.034	0.037	0.039	45°	0.75xD	25°	16°	0.8

Trochoidal milling



Trochoidal milling



v_c [m/min]	f_z [mm] in % of D	h_{max} [mm] in % of D	v_c [m/min]	f_z [mm] in % of D	h_{max} [mm] in % of D
915	0.1 - 1.4	0.84	810	0.7 - 0.9	1.12
610	0.1 - 1.5	0.90	540	0.7 - 1.0	1.20
485	1.0 - 1.3	0.78	430	0.8 - 1.0	1.04
350	1.1 - 1.5	0.90	310	0.8 - 1.1	1.20
350	0.7 - 1.0	0.60	310	0.5 - 0.8	0.80
265	0.7 - 1.0	0.60	235	0.5 - 0.8	0.80
440	0.4 - 0.6	0.36	390	0.3 - 0.5	0.48
120	0.4 - 0.6	0.36	105	0.3 - 0.5	0.48
180	0.4 - 0.6	0.36	160	0.3 - 0.5	0.48
315	0.3 - 0.4	0.24	280	0.2 - 0.3	0.32

Explanation of terms:

RW_{max} = Maximum angle of the ramp

S_{max} = Maximum slope of the helix

G = Ratio of circular pocket \varnothing when plunging to the tool \varnothing

E.g.: Tool \varnothing 12 mm at G=1.5 results in a pocket \varnothing of 18 mm

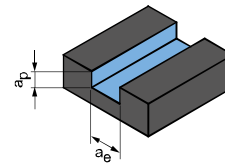
EW_{max} = Slope angle of the helix (results from G and S_{max})

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Tool length/correction factor:	
Length	f_z & v_c
Short	1
Long	0,9
Overlong	0,8
Extra long	0,6

Groove milling – partial slot



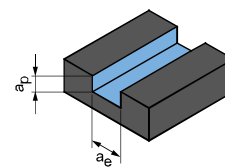
$$a_p = 1xD$$

$$a_e = 0,6xD$$

OptiMill-Uni-HPC-Silent | SCM570

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]								
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]								
							6.00	8.00	10.00	12.00	16.00	20.00	25.00		
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	235	0.045	0.057	0.069	0.079	0.096	0.110	0.123	
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	190	0.042	0.053	0.064	0.074	0.090	0.103	0.115	
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	210	0.045	0.057	0.069	0.079	0.096	0.110	0.123	
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	150	0.037	0.048	0.057	0.066	0.080	0.092	0.102	
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	135	0.043	0.055	0.066	0.076	0.093	0.106	0.119	
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓	125	0.041	0.052	0.063	0.072	0.088	0.101	0.113	
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓	115	0.039	0.050	0.059	0.068	0.083	0.095	0.106	
	P4	P4.1	Stainless steels, ferritic and martensitic		✓	✓	95	0.030	0.038	0.046	0.053	0.064	0.073	0.082	
P5	P5.1	Cast steel			✓	140	0.043	0.055	0.066	0.076	0.093	0.106	0.119		
P6	P6.1	Stainless cast steel, ferritic and martensitic			✓	95	0.021	0.027	0.032	0.037	0.045	0.051	0.057		
M	M1.1	Stainless steels, austenitic	< 700	✓		✓	65	0.026	0.033	0.040	0.046	0.056	0.064	0.072	
	M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓	60	0.022	0.028	0.033	0.038	0.046	0.053	0.059	
	M2	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700	✓		✓	70	0.028	0.036	0.043	0.050	0.061	0.070	0.078
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓	65	0.022	0.029	0.034	0.039	0.048	0.055	0.061
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	250	0.075	0.095	0.114	0.131	0.160	0.183	0.205
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	230	0.063	0.081	0.097	0.112	0.136	0.156	0.174
	K2	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	190	0.052	0.067	0.080	0.092	0.112	0.128	0.143
	K2	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	105	0.030	0.038	0.046	0.053	0.064	0.073	0.082
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	170	0.052	0.067	0.080	0.092	0.112	0.128	0.143
	K3	K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	160	0.045	0.057	0.069	0.079	0.096	0.110	0.123

Groove milling



$$a_p = 1xD$$

$$a_e = 1xD$$

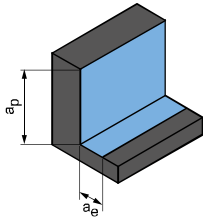
OptiMill-Inox-HPC | SCM108

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]									
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]									
							3.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00		
M	M1	M1.1	Stainless steels, austenitic	< 700	✓		✓	70	0.011	0.013	0.019	0.025	0.030	0.035	0.044	0.051
	M1	M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓	65	0.009	0.011	0.016	0.020	0.025	0.029	0.036	0.042
	M2	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700	✓		✓	75	0.011	0.015	0.021	0.027	0.032	0.038	0.047	0.055
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓	70	0.009	0.012	0.016	0.021	0.026	0.030	0.037	0.043

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

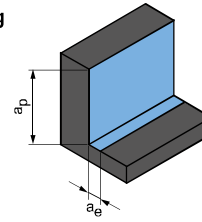
Roughing



$$a_p = 1.5 \times D$$

$$a_e = 0.25 \times D$$

Finishing

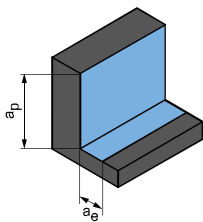


$$a_p = 1.5 \times D$$

$$a_e = 0.1 \times D$$

v_c [m/min]	f_z [mm]								v_c [m/min]	f_z [mm]							
	Diameter of milling cutter [mm]									Diameter of milling cutter [mm]							
	6.00	8.00	10.00	12.00	16.00	20.00	25.00	6.00		8.00	10.00	12.00	16.00	20.00	25.00		
355	0.059	0.075	0.090	0.103	0.126	0.145	0.161	480	0.093	0.119	0.142	0.164	0.200	0.228	0.255		
290	0.055	0.070	0.084	0.097	0.118	0.135	0.151	395	0.087	0.111	0.133	0.153	0.187	0.213	0.238		
325	0.059	0.075	0.090	0.103	0.126	0.145	0.161	435	0.093	0.119	0.142	0.164	0.200	0.228	0.255		
225	0.049	0.063	0.075	0.086	0.105	0.120	0.134	305	0.078	0.099	0.119	0.136	0.167	0.190	0.212		
210	0.057	0.073	0.087	0.100	0.122	0.140	0.156	285	0.090	0.115	0.138	0.158	0.193	0.221	0.246		
195	0.054	0.069	0.083	0.095	0.116	0.132	0.148	260	0.085	0.109	0.130	0.150	0.183	0.209	0.234		
180	0.051	0.065	0.078	0.090	0.110	0.125	0.140	240	0.081	0.103	0.123	0.142	0.173	0.198	0.221		
145	0.039	0.050	0.060	0.069	0.084	0.096	0.108	195	0.062	0.079	0.095	0.109	0.133	0.152	0.170		
215	0.057	0.073	0.087	0.100	0.122	0.140	0.156	295	0.090	0.115	0.138	0.158	0.193	0.221	0.246		
145	0.027	0.035	0.042	0.048	0.059	0.067	0.075	195	0.043	0.055	0.066	0.076	0.093	0.107	0.119		
110	0.034	0.044	0.053	0.060	0.074	0.084	0.094	160	0.054	0.069	0.083	0.095	0.117	0.133	0.149		
105	0.028	0.036	0.044	0.050	0.061	0.070	0.078	150	0.045	0.057	0.069	0.079	0.097	0.110	0.123		
120	0.037	0.048	0.057	0.066	0.080	0.092	0.102	180	0.059	0.075	0.090	0.104	0.127	0.145	0.161		
110	0.029	0.038	0.045	0.052	0.063	0.072	0.081	160	0.047	0.059	0.071	0.082	0.100	0.114	0.127		
440	0.098	0.125	0.150	0.172	0.211	0.241	0.269	650	0.155	0.198	0.237	0.273	0.333	0.381	0.425		
405	0.083	0.106	0.128	0.147	0.179	0.205	0.228	595	0.132	0.168	0.202	0.232	0.283	0.324	0.361		
330	0.069	0.088	0.105	0.121	0.147	0.169	0.188	485	0.109	0.139	0.166	0.191	0.233	0.267	0.297		
185	0.039	0.050	0.060	0.069	0.084	0.096	0.108	270	0.062	0.079	0.095	0.109	0.133	0.152	0.170		
295	0.069	0.088	0.105	0.121	0.147	0.169	0.188	430	0.109	0.139	0.166	0.191	0.233	0.267	0.297		
275	0.059	0.075	0.090	0.103	0.126	0.145	0.161	405	0.093	0.119	0.142	0.164	0.200	0.228	0.255		

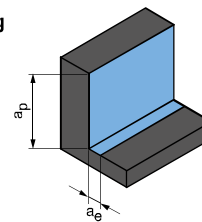
Roughing



$$a_p = 1.5 \times D$$

$$a_e = 0.25 \times D$$

Finishing



$$a_p = 1.5 \times D$$

$$a_e = 0.1 \times D$$

v_c [m/min]	f_z [mm]								v_c [m/min]	f_z [mm]							
	Diameter of milling cutter [mm]									Diameter of milling cutter [mm]							
	3.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00		3.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00
110	0.018	0.023	0.033	0.042	0.051	0.059	0.074	0.086	160	0.028	0.036	0.051	0.066	0.080	0.093	0.117	0.135
105	0.015	0.019	0.027	0.035	0.042	0.049	0.061	0.071	150	0.023	0.030	0.043	0.055	0.066	0.077	0.097	0.112
120	0.019	0.025	0.035	0.045	0.055	0.064	0.080	0.093	180	0.031	0.039	0.056	0.072	0.087	0.101	0.127	0.147
110	0.015	0.020	0.028	0.036	0.043	0.051	0.063	0.073	160	0.024	0.031	0.044	0.057	0.069	0.080	0.100	0.116

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

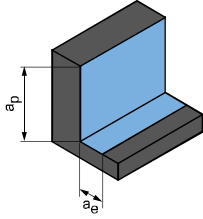
OptiMill-Hardened | SCM102, 103

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			
				MQL/Air	Dry	Coolant	
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓
	P3	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓
		P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓
		P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓
	P4	P4.1	Stainless steels, ferritic and martensitic		✓		✓
	P5	P5.1	Cast steel		✓		✓
	P6	P6.1	Stainless cast steel, ferritic and martensitic		✓		✓
H	H1	H1.1	Hardened steel / cast steel	< 44	✓	✓	
		H1.2	Hardened steel / cast steel	< 55	✓	✓	
	H2	H2.1	Hardened steel / cast steel	< 60	✓		

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

Roughing



Next page:
Finishing

a_p [mm] in % of D	a_e [mm] in % of D	v_c [m/min]	f_z [mm]								
			Diameter of milling cutter [mm]								
			4.00	5.00	6.00	8.00	10.00	12.00	16.00	20.00	
50	8	180 - 200	0.032	0.040	0.048	0.055	0.075	0.095	0.110	0.140	
50	8	160 - 180	0.030	0.038	0.046	0.052	0.071	0.090	0.105	0.133	
50	8	170 - 190	0.032	0.040	0.048	0.055	0.075	0.095	0.110	0.140	
50	8	150 - 170	0.030	0.038	0.046	0.052	0.071	0.090	0.105	0.133	
50	8	170 - 190	0.032	0.040	0.048	0.055	0.075	0.095	0.110	0.140	
50	7	150 - 170	0.030	0.038	0.046	0.052	0.071	0.090	0.105	0.133	
50	7	130 - 150	0.027	0.034	0.041	0.047	0.064	0.081	0.094	0.119	
50	7	130 - 150	0.027	0.034	0.041	0.047	0.064	0.081	0.094	0.119	
50	7	130 - 150	0.027	0.034	0.041	0.047	0.064	0.081	0.094	0.119	
50	8	140 - 160	0.029	0.036	0.043	0.050	0.068	0.086	0.099	0.126	
50	2	100 - 125	0.027	0.034	0.041	0.047	0.064	0.081	0.094	0.119	
50	1.5	80 - 100	0.022	0.028	0.034	0.039	0.053	0.067	0.077	0.098	
50	1.2	60 - 80	0.019	0.024	0.029	0.033	0.045	0.057	0.066	0.084	

The specified machining values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

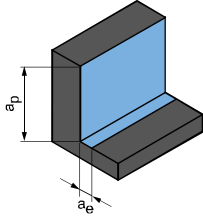
OptiMill-Hardened | SCM102, 103

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
				MQL/Air	Dry	Coolant
P	P1	P1.1 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓
		P1.2 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓
	P2	P2.1 Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓
		P2.2 Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓
	P3	P3.1 Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓
		P3.2 Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓
		P3.3 Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓
	P4	P4.1 Stainless steels, ferritic and martensitic		✓		✓
	P5	P5.1 Cast steel		✓		✓
	P6	P6.1 Stainless cast steel, ferritic and martensitic		✓		✓
M	M1	M1.1 Stainless steels, austenitic	< 700			✓
		M1.2 Stainless steels, ferritic/austenitic (duplex)	< 1000			✓
	M2	M2.1 Stainless/heat-resistant cast steel, austenitic	< 700			✓
	M3	M3.1 Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓
K	K1	K1.1 Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓
		K2.1 Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓
		K2.2 Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓
	K3	K2.3 Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓
		K3.1 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓
		K3.2 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓
H	H1	H1.1 Hardened steel / cast steel	< 44	✓	✓	
		H1.2 Hardened steel / cast steel	< 55	✓	✓	
	H2	H2.1 Hardened steel / cast steel	< 60	✓		

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

Finishing



	a_p [mm] in % of D	a_e [mm] in % of D	v_c [m/min]	f_z [mm]							
				Diameter of milling cutter [mm]							
				4.00	5.00	6.00	8.00	10.00	12.00	16.00	20.00
	100	2	200 - 220	0.025	0.030	0.040	0.050	0.065	0.075	0.090	0.105
	100	2	180 - 200	0.024	0.029	0.038	0.048	0.062	0.071	0.086	0.100
	100	2	180 - 200	0.025	0.030	0.040	0.050	0.065	0.075	0.090	0.105
	100	2	160 - 180	0.024	0.029	0.038	0.048	0.062	0.071	0.086	0.100
	100	2	180 - 200	0.025	0.030	0.040	0.050	0.065	0.075	0.090	0.105
	100	2	160 - 180	0.024	0.029	0.038	0.048	0.062	0.071	0.086	0.100
	100	2	140 - 160	0.021	0.026	0.034	0.043	0.055	0.064	0.077	0.089
	100	2	140 - 160	0.021	0.026	0.034	0.043	0.055	0.064	0.077	0.089
	100	2	140 - 160	0.021	0.026	0.034	0.043	0.055	0.064	0.077	0.089
	100	2	150 - 170	0.023	0.027	0.036	0.045	0.059	0.068	0.081	0.095
	100	1.5	110 - 130	0.023	0.027	0.036	0.045	0.059	0.068	0.081	0.095
	100	1.5	90 - 110	0.021	0.026	0.034	0.043	0.055	0.064	0.077	0.089
	100	1.5	110 - 130	0.023	0.027	0.036	0.045	0.059	0.068	0.081	0.095
	100	1.5	90 - 130	0.021	0.026	0.034	0.043	0.055	0.064	0.077	0.089
	100	2.5	200 - 220	0.025	0.030	0.040	0.050	0.065	0.075	0.090	0.105
	100	2.5	180 - 200	0.024	0.029	0.038	0.048	0.062	0.071	0.086	0.100
	100	2.5	180 - 200	0.024	0.029	0.038	0.048	0.062	0.071	0.086	0.100
	100	2.5	170 - 190	0.023	0.027	0.036	0.045	0.059	0.068	0.081	0.095
	100	2.5	200 - 220	0.025	0.030	0.040	0.050	0.065	0.075	0.090	0.105
	100	2.5	180 - 200	0.024	0.029	0.038	0.048	0.062	0.071	0.086	0.100
	100	1.5	110 - 130	0.021	0.026	0.034	0.043	0.055	0.064	0.077	0.089
	100	1.2	90 - 115	0.018	0.021	0.028	0.035	0.046	0.053	0.063	0.074
	100	0.8	70 - 90	0.015	0.018	0.024	0.030	0.039	0.045	0.054	0.063

The specified machining values are guide values.

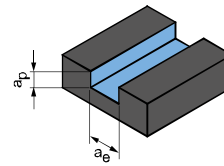
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Tool length/correction factor:	
Length	f_z & v_c
Short	1
Long	0,9
Overlong	0,8
Extra long	0,6

Groove milling



$$a_p = 1 \times D$$

$$a_e = 1 \times D$$

OptiMill-Alu-HPC | SCM270

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]								
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]								
							2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00	
N	N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si	✓	✓	✓	765	0.021	0.041	0.059	0.075	0.090	0.104	0.127	0.145	
		N1.2 Aluminium, alloy ≤ 7 % Si	✓	✓	✓	510	0.023	0.043	0.062	0.079	0.095	0.109	0.133	0.152	
		N1.3 Aluminium, alloy > 7-12 % Si	✓	✓	✓	405	0.024	0.045	0.065	0.083	0.099	0.114	0.139	0.159	
		N1.4 Aluminium, alloy > 12 % Si	✓	✓	✓	295	0.026	0.049	0.071	0.090	0.108	0.124	0.152	0.174	
	N2	N2.1 Copper, non-alloy and low-alloy	< 300	✓	✓	✓	295	0.017	0.033	0.047	0.060	0.072	0.083	0.101	0.116
		N2.2 Copper, alloy	> 300	✓	✓	✓	220	0.017	0.033	0.047	0.060	0.072	0.083	0.101	0.116
		N2.3 Brass, bronze, gunmetal	< 1200	✓	✓	✓	365	0.011	0.020	0.029	0.038	0.045	0.052	0.063	0.072
	N4	N4.1 Plastic, thermoplastics		✓	✓	✓	100	0.011	0.020	0.029	0.038	0.045	0.052	0.063	0.072
		N4.2 Plastic, thermosets		✓	✓	✓	150	0.011	0.020	0.029	0.038	0.045	0.052	0.063	0.072
		N4.3 Plastic, foams		✓	✓		265	0.006	0.012	0.018	0.023	0.027	0.031	0.038	0.043

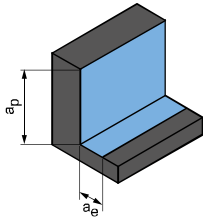
OptiMill-Mono-Alu | SCM281

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]							
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]							
							2.00	3.00	4.00	5.00	6.00	8.00	12.00	
N	N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si	✓	✓	✓	765	0.043	0.063	0.082	0.100	0.118	0.151	0.207	
		N1.2 Aluminium, alloy ≤ 7 % Si	✓	✓	✓	510	0.045	0.066	0.086	0.105	0.124	0.158	0.218	
		N1.3 Aluminium, alloy > 7-12 % Si	✓	✓	✓	405	0.047	0.069	0.090	0.110	0.130	0.166	0.228	
		N1.4 Aluminium, alloy > 12 % Si	✓	✓	✓	295	0.051	0.075	0.098	0.120	0.141	0.181	0.249	
	N2	N2.1 Copper, non-alloy and low-alloy	< 300	✓	✓	✓	295	0.034	0.050	0.066	0.080	0.094	0.120	0.166
		N2.2 Copper, alloy	> 300	✓	✓	✓	220	0.034	0.050	0.066	0.080	0.094	0.120	0.166
		N2.3 Brass, bronze, gunmetal	< 1200	✓	✓	✓	365	0.021	0.031	0.041	0.050	0.059	0.075	0.104
	N4	N4.1 Plastic, thermoplastics		✓	✓	✓	100	0.021	0.031	0.041	0.050	0.059	0.075	0.104
		N4.2 Plastic, thermosets		✓	✓	✓	150	0.021	0.031	0.041	0.050	0.059	0.075	0.104
		N4.3 Plastic, foams		✓	✓		265	0.013	0.019	0.025	0.030	0.035	0.045	0.062

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

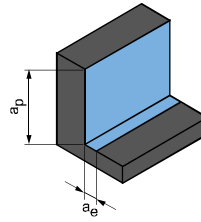
Roughing



$$a_p = 1.5 \times D$$

$$a_e = 0.25 \times D$$

Finishing



$$a_p = 1.5 \times D$$

$$a_e = 0.1 \times D$$

v_c [m/min]	f_z [mm]								v_c [m/min]	f_z [mm]							
	Diameter of milling cutter [mm]									Diameter of milling cutter [mm]							
	2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00		2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00
1,180	0.030	0.057	0.082	0.105	0.126	0.145	0.177	0.202	1,410	0.042	0.080	0.115	0.147	0.176	0.202	0.246	0.282
785	0.032	0.060	0.087	0.111	0.132	0.152	0.186	0.213	940	0.044	0.084	0.120	0.154	0.184	0.212	0.259	0.296
625	0.033	0.063	0.091	0.116	0.139	0.159	0.195	0.223	750	0.046	0.088	0.126	0.161	0.193	0.222	0.271	0.310
450	0.036	0.069	0.099	0.126	0.151	0.174	0.212	0.243	540	0.050	0.096	0.138	0.176	0.211	0.242	0.296	0.338
450	0.024	0.046	0.066	0.084	0.101	0.116	0.142	0.162	540	0.033	0.064	0.092	0.117	0.140	0.161	0.197	0.225
340	0.024	0.046	0.066	0.084	0.101	0.116	0.142	0.162	405	0.033	0.064	0.092	0.117	0.140	0.161	0.197	0.225
565	0.015	0.029	0.041	0.053	0.063	0.072	0.089	0.101	675	0.021	0.040	0.057	0.073	0.088	0.101	0.123	0.141
155	0.015	0.029	0.041	0.053	0.063	0.072	0.089	0.101	185	0.021	0.040	0.057	0.073	0.088	0.101	0.123	0.141
230	0.015	0.029	0.041	0.053	0.063	0.072	0.089	0.101	275	0.021	0.040	0.057	0.073	0.088	0.101	0.123	0.141
405	0.009	0.017	0.025	0.032	0.038	0.043	0.053	0.061	485	0.013	0.024	0.034	0.044	0.053	0.061	0.074	0.085

v_c [m/min]	f_z [mm]							v_c [m/min]	f_z [mm]						
	Diameter of milling cutter [mm]								Diameter of milling cutter [mm]						
	2.00	3.00	4.00	5.00	6.00	8.00	12.00		2.00	3.00	4.00	5.00	6.00	8.00	12.00
1,180	0.060	0.088	0.115	0.140	0.165	0.211	0.290	1,410	0.084	0.122	0.160	0.195	0.229	0.293	0.403
785	0.063	0.092	0.120	0.147	0.173	0.221	0.304	940	0.088	0.129	0.168	0.205	0.241	0.308	0.424
625	0.066	0.097	0.126	0.154	0.181	0.232	0.319	750	0.092	0.135	0.176	0.215	0.252	0.322	0.444
450	0.072	0.106	0.138	0.168	0.198	0.253	0.348	540	0.100	0.147	0.192	0.234	0.275	0.352	0.484
450	0.048	0.070	0.092	0.112	0.132	0.168	0.232	540	0.067	0.098	0.128	0.156	0.184	0.234	0.323
340	0.048	0.070	0.092	0.112	0.132	0.168	0.232	405	0.067	0.098	0.128	0.156	0.184	0.234	0.323
565	0.030	0.044	0.057	0.070	0.082	0.105	0.145	675	0.042	0.061	0.080	0.098	0.115	0.147	0.202
155	0.030	0.044	0.057	0.070	0.082	0.105	0.145	185	0.042	0.061	0.080	0.098	0.115	0.147	0.202
230	0.030	0.044	0.057	0.070	0.082	0.105	0.145	275	0.042	0.061	0.080	0.098	0.115	0.147	0.202
405	0.018	0.026	0.034	0.042	0.049	0.063	0.087	485	0.025	0.037	0.048	0.059	0.069	0.088	0.121

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Tool length/correction factor:	
Length	f_z & v_c
Short	1
long	0,9

OptiMill-SPM | SCM681, 691

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
			MQL/Air	Dry	Coolant
N N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si		✓	✓	✓
	N1.2 Aluminium, alloy ≤ 7 % Si		✓	✓	✓
	N1.3 Aluminium, alloy > 7-12 % Si		✓	✓	✓
	N1.4 Aluminium, alloy > 12 % Si		✓	✓	✓

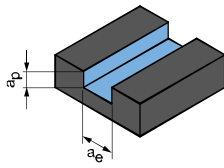
OptiMill-Diamond-SPM | SHM101, 110, 111

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
			MQL/Air	Dry	Coolant
N N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si		✓	✓	✓
	N1.2 Aluminium, alloy ≤ 7 % Si		✓	✓	✓
	N1.3 Aluminium, alloy > 7-12 % Si		✓	✓	✓
	N1.4 Aluminium, alloy > 12 % Si		✓	✓	✓

OptiMill-Diamond-SPM, HSK (hollow shank taper) design | SHM121

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
			MQL/Air	Dry	Coolant
N N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si		✓	✓	✓
	N1.2 Aluminium, alloy ≤ 7 % Si		✓	✓	✓
	N1.3 Aluminium, alloy > 7-12 % Si		✓	✓	✓
	N1.4 Aluminium, alloy > 12 % Si		✓	✓	✓

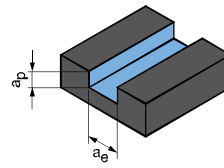
Groove milling



$$a_p = 0.5 \times D$$

$$a_e = 1 \times D$$

Groove milling



$$a_p = 0.3 \times D$$

$$a_e = 1 \times D$$

v_c [m/min]	f_z [mm]								v_c [m/min]	f_z [mm]							
	Diameter of milling cutter [mm]									Diameter of milling cutter [mm]							
	6.00	8.00	10.00	12.00	16.00	20.00	25.00	32.00		6.00	8.00	10.00	12.00	16.00	20.00	25.00	32.00
1,990	0.111	0.142	0.170	0.196	0.239	0.273	0.305	0.332	1,990	0.128	0.164	0.196	0.225	0.275	0.315	0.351	0.383
1,320	0.117	0.149	0.179	0.206	0.251	0.287	0.320	0.349	1,320	0.135	0.172	0.206	0.237	0.289	0.331	0.369	0.402
1,055	0.122	0.156	0.187	0.215	0.263	0.301	0.336	0.366	1,055	0.141	0.180	0.216	0.248	0.303	0.346	0.387	0.421
760	0.134	0.171	0.204	0.235	0.287	0.328	0.366	0.399	760	0.154	0.197	0.235	0.271	0.331	0.378	0.422	0.459

Diameter of milling cutter [mm]		Diameter of milling cutter [mm]		Diameter of milling cutter [mm]		Diameter of milling cutter [mm]		Diameter of milling cutter [mm]		Diameter of milling cutter [mm]		Diameter of milling cutter [mm]		Diameter of milling cutter [mm]	
6.00 – 8.00		10.00 – 12.00		16.00 – 20.00		25.00 – 32.00		6.00 – 8.00		10.00 – 12.00		16.00 – 20.00		25.00 – 32.00	
v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]
max. 300	0.10–0.12	max. 600	0.12–0.20	max. 900	0.20–0.30	max. 1,500	0.20–0.30	max. 300	0.12–0.15	max. 600	0.15–0.25	max. 900	0.25–0.33	max. 1,500	0.25–0.33
max. 300	0.10–0.12	max. 600	0.12–0.20	max. 900	0.20–0.30	max. 1,500	0.20–0.30	max. 300	0.12–0.15	max. 600	0.15–0.25	max. 900	0.25–0.33	max. 1,500	0.25–0.33
max. 300	0.10–0.12	max. 600	0.12–0.20	max. 900	0.20–0.30	max. 1,500	0.20–0.30	max. 300	0.12–0.15	max. 600	0.15–0.25	max. 900	0.25–0.33	max. 1,500	0.25–0.33
< 300	0.09–0.11	< 600	0.10–0.18	< 900	0.18–0.25	< 1,200	0.18–0.25	< 300	0.10–0.12	< 600	0.12–0.20	< 900	0.20–0.30	< 1,200	0.20–0.30

Diameter of milling cutter [mm]		Diameter of milling cutter [mm]		Diameter of milling cutter [mm]		Diameter of milling cutter [mm]		Diameter of milling cutter [mm]		Diameter of milling cutter [mm]		Diameter of milling cutter [mm]	
32.00		40.00		50.00		32.00		40.00		50.00		32.00	
v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]
1,500	0.15–0.25	1,800	0.20–0.30	1,800	0.20–0.30	1,500	0.20–0.33	1,800	0.25–0.33	1,800	0.25–0.33	1,500	0.25–0.33
1,500	0.15–0.25	1,800	0.20–0.30	1,800	0.20–0.30	1,500	0.20–0.33	1,800	0.25–0.33	1,800	0.25–0.33	1,500	0.25–0.33
1,500	0.15–0.25	1,800	0.20–0.30	1,800	0.20–0.30	1,500	0.20–0.33	1,800	0.25–0.33	1,800	0.25–0.33	1,500	0.25–0.33
< 1,500	0.12–0.20	< 1,800	0.18–0.25	< 1,800	0.18–0.25	< 1,500	0.15–0.25	< 1,800	0.20–0.30	< 1,800	0.22–0.30	< 1,500	0.22–0.30

The specified machining values are guide values.

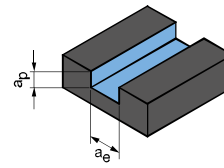
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

OptiMill-Diamond type 51 | SHM511, 611, 711
 OptiMill-Diamond type 50 | SHM500
 OptiMill-Diamond type 53 | SHM531
 OptiMill-Diamond type 57 | SHM571

Groove milling



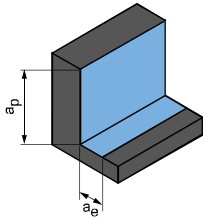
$$a_p = 0.5 \times D$$

$$a_e = 1 \times D$$

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			Diameter of milling cutter [mm]								
			MQL/Air	Dry	Coolant	3.00 – 6.00		8.00 – 10.00		12.00 – 16.00		18.00 – 25.00		
						v _c [m/min]	f _z [mm]	v _c [m/min]	f _z [mm]	v _c [m/min]	f _z [mm]	v _c [m/min]	f _z [mm]	
N	N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si	✓	✓	✓	200	0.10-0.12	500	0.12-0.15	800	0.15-0.20	1,000	0.18-0.23	
		N1.2 Aluminium, alloy ≤ 7 % Si	✓	✓	✓	200	0.10-0.12	500	0.12-0.15	800	0.15-0.20	1,000	0.18-0.23	
		N1.3 Aluminium, alloy > 7-12 % Si	✓	✓	✓	200	0.10-0.12	500	0.12-0.15	800	0.15-0.20	1,000	0.18-0.23	
		N1.4 Aluminium, alloy > 12 % Si	✓	✓	✓	200	0.10-0.12	500	0.12-0.15	800	0.15-0.20	1,000	0.18-0.23	
	N2	N2.1 Copper, non-alloy and low-alloy	< 300	✓	✓	✓	200	0.10-0.12	500	0.12-0.15	800	0.15-0.20	1,000	0.18-0.23
		N2.2 Copper, alloy	> 300	✓	✓	✓	200	0.10-0.12	500	0.12-0.15	800	0.15-0.20	1,000	0.18-0.23
		N2.3 Brass, bronze, gunmetal	< 1200	✓	✓	✓	200	0.10-0.12	500	0.12-0.15	800	0.15-0.20	1,000	0.18-0.23
	N4	N4.1 Plastic, thermoplastics												
		N4.2 Plastic, thermosets		✓	✓	✓	200	0.10-0.12	500	0.12-0.15	800	0.15-0.20	1,000	0.18-0.23
		N4.3 Plastic, foams												
C	C1.1 Plastic matrix, aramide fibre-reinforced (AFRP)													
	C1.2 Plastic matrix (thermosetting), CFRP/GFRP		✓	✓	✓	200	0.10-0.12	500	0.12-0.15	800	0.15-0.20	1,000	0.18-0.23	
	C1.3 Plastic matrix (thermoplastic), CFRP/GFRP		✓	✓	✓	200	0.10-0.12	500	0.12-0.15	800	0.15-0.20	1,000	0.18-0.23	
	C2.1 Carbon matrix, carbon fibre-reinforced (CFC)		✓	✓	✓	200	0.10-0.12	500	0.12-0.15	800	0.15-0.20	1,000	0.18-0.23	

* MAPAL machining groups

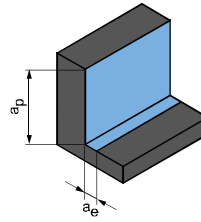
Roughing



$$a_p = 0.5 \times D$$

$$a_e = 0.25 \times D$$

Finishing



$$a_p = 0.1 \times D$$

$$a_e = 0.1 \times D$$

		Diameter of milling cutter [mm]								Diameter of milling cutter [mm]							
		3.00 – 6.00		8.00 – 10.00		12.00 – 16.00		18.00 – 25.00		3.00 – 6.00		8.00 – 10.00		12.00 – 16.00		18.00 – 25.00	
	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	
	240	0.10-0.12	480	0.12-0.16	720	0.16-0.20	960	0.16-0.22	300	0.12-0.15	600	0.15-0.20	900	0.20-0.25	1,200	0.20-0.27	
	240	0.10-0.12	480	0.12-0.16	720	0.16-0.20	960	0.16-0.22	300	0.12-0.15	600	0.15-0.20	900	0.20-0.25	1,200	0.20-0.27	
	240	0.10-0.12	480	0.12-0.16	720	0.16-0.20	960	0.16-0.22	300	0.12-0.15	600	0.15-0.20	900	0.20-0.25	1,200	0.20-0.27	
	240	0.10-0.12	480	0.12-0.16	720	0.16-0.20	960	0.16-0.22	300	0.12-0.15	600	0.15-0.20	900	0.20-0.25	1,200	0.20-0.27	
	240	0.10-0.12	480	0.12-0.16	720	0.16-0.20	960	0.16-0.22	300	0.12-0.15	600	0.15-0.20	900	0.20-0.25	1,200	0.20-0.27	
	240	0.10-0.12	480	0.12-0.16	720	0.16-0.20	960	0.16-0.22	300	0.12-0.15	600	0.15-0.20	900	0.20-0.25	1,200	0.20-0.27	
	240	0.10-0.12	480	0.12-0.16	720	0.16-0.20	960	0.16-0.22	300	0.12-0.15	600	0.15-0.20	900	0.20-0.25	1,200	0.20-0.27	
	240	0.10-0.12	480	0.12-0.16	720	0.16-0.20	960	0.16-0.22	300	0.12-0.15	600	0.15-0.20	900	0.20-0.25	1,200	0.20-0.27	
	240	0.10-0.12	480	0.12-0.16	720	0.16-0.20	960	0.16-0.22	300	0.12-0.15	600	0.15-0.20	900	0.20-0.25	1,200	0.20-0.27	
	240	0.10-0.12	480	0.12-0.16	720	0.16-0.20	960	0.16-0.22	300	0.12-0.15	600	0.15-0.20	900	0.20-0.25	1,200	0.20-0.27	

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Tool length/correction factor:	
Length	f_z & v_c
Short	1
Long	0,9
Overlong	0,8
Extra long	0,6

**OptiMill-Diamond type 57, with HSK-A
(hollow shank taper form A) connection | SHM571**

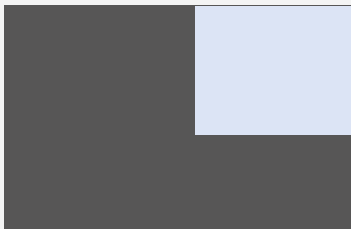
MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
			MQL/Air	Dry	Coolant
N N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si		✓	✓	✓
	N1.2 Aluminium, alloy ≤ 7 % Si		✓	✓	✓
	N1.3 Aluminium, alloy > 7-12 % Si		✓	✓	✓
	N1.4 Aluminium, alloy > 12 % Si		✓	✓	✓

Application examples

Full cutting



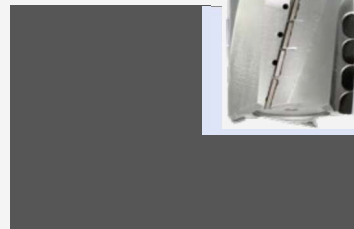
$a_p = 100\%$
 $a_e = 100\%$



Part-contact cutting



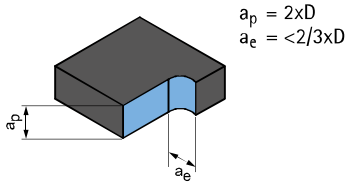
$a_p = 100\%$
 $a_e = 100\%$



Comment:

The OptiMill-Diamond type 57, design with HSK-A (hollow shank taper form A) connection, is a milling cutter for trimming. It is not suitable for full slot milling with max. a_p and a_e .

Trimming



		Diameter of milling cutter [mm]							
		32.00		40.00		50.00		63.00	
	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	
	1,200	0.15 - 0.25	1,500	0.20 - 0.30	1,800	0.20 - 0.30	1,800	0.20 - 0.30	
	1,200	0.15 - 0.25	1,500	0.20 - 0.30	1,800	0.20 - 0.30	1,800	0.20 - 0.30	
	1,200	0.15 - 0.25	1,500	0.20 - 0.30	1,800	0.20 - 0.30	1,800	0.20 - 0.30	
	< 1,200	0.12 - 0.20	< 1,500	0.18 - 0.25	< 1,800	0.18 - 0.25	< 1,800	0.18 - 0.25	

Trimming



$a_p = < 100 \%$
 $a_e = \text{max. } 2/3 \times D$



Groove milling



$a_p = 1/3 \text{ SKL}$
 $a_e = 100 \%$

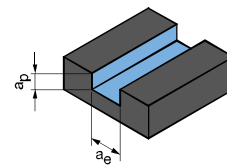


The specified machining values are guide values.
 The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Groove milling



$$a_p = 1 \times D$$

$$a_e = 1 \times D$$

OptiMill-Composite-Speed-Plus, uncoated | SCM982, 992

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v _c [m/min]	f _z [mm]							
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]							
							4.00	6.00	8.00	10.00	12.00	16.00	20.00	
N N4	N4.1	Plastic, thermoplastics	✓	✓	✓	125								
	N4.2	Plastic, thermosets	✓	✓	✓		0.020	0.029	0.038	0.045	0.052	0.063	0.072	
	N4.3	Plastic, foams	✓	✓										
C C1	C1.1	Plastic matrix, aramide fibre-reinforced (AFRP)	✓	✓	✓	120								
	C1.2	Plastic matrix (thermosetting), CFRP/GFRP	✓	✓	✓		0.021	0.026	0.031	0.035	0.038	0.042	0.043	
	C1.3	Plastic matrix (thermoplastic), CFRP/GFRP	✓	✓	✓		80	0.021	0.026	0.031	0.035	0.038	0.042	0.043
	C C2	C2.1	Carbon matrix, carbon fibre-reinforced (CFC)	✓	✓	✓	120	0.018	0.023	0.027	0.031	0.033	0.037	0.038
		C4.1	Sandwich construction, honeycomb core	✓	✓			165	0.012	0.015	0.017	0.019	0.021	0.023
	C C4	C4.2	Sandwich construction, foam core	✓	✓		125	0.019	0.024	0.028	0.032	0.035	0.039	0.041

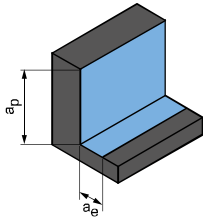
OptiMill-Composite-Speed-Plus, coated | SCM980, 990

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v _c [m/min]	f _z [mm]							
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]							
							4.00	6.00	8.00	10.00	12.00	16.00	20.00	
C C1	C1.1	Plastic matrix, aramide fibre-reinforced (AFRP)	✓	✓	✓	145								
	C1.2	Plastic matrix (thermosetting), CFRP/GFRP	✓	✓	✓		0.021	0.026	0.031	0.035	0.038	0.042	0.043	
	C1.3	Plastic matrix (thermoplastic), CFRP/GFRP	✓	✓	✓		100	0.021	0.026	0.031	0.035	0.038	0.042	0.043
	C C2	C2.1	Carbon matrix, carbon fibre-reinforced (CFC)	✓	✓	✓	145	0.018	0.023	0.027	0.031	0.033	0.037	0.038
		C4.1	Sandwich construction, honeycomb core	✓	✓			195	0.012	0.015	0.017	0.019	0.021	0.023
	C C4	C4.2	Sandwich construction, foam core	✓	✓		150	0.019	0.024	0.028	0.032	0.035	0.039	0.041

OptiMill-Composite-Micro | SCM560

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	v _c [m/min]	f _z [mm]									
				Diameter of milling cutter [mm]									
				2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00		
N N4	N4.1	Plastic, thermoplastics	105										
	N4.2	Plastic, thermosets		0.005	0.008	0.011							
	N4.3	Plastic, foams											
C C1	C1.1	Plastic matrix, aramide fibre-reinforced (AFRP)	105										
	C1.2	Plastic matrix (thermosetting), CFRP/GFRP		0.005	0.008	0.011							
	C1.3	Plastic matrix (thermoplastic), CFRP/GFRP		70	0.005	0.008	0.011						
	C C2	C2.1	Carbon matrix, carbon fibre-reinforced (CFC)	145	0.012	0.018	0.023						
		C4.1	Sandwich construction, honeycomb core		195	0.008	0.012	0.015					
	C C4	C4.2	Sandwich construction, foam core	150	0.010	0.019	0.024						

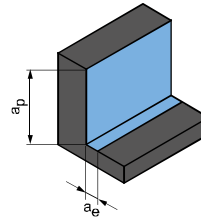
Roughing



$$a_p = 1.5 \times D$$

$$a_e = 0.25 \times D$$

Finishing



$$a_p = 1.5 \times D$$

$$a_e = 0.1 \times D$$

	v_c [m/min]	f_z [mm]							v_c [m/min]	f_z [mm]						
		Diameter of milling cutter [mm]								Diameter of milling cutter [mm]						
		4.00	6.00	8.00	10.00	12.00	16.00	20.00		4.00	6.00	8.00	10.00	12.00	16.00	20.00
190	0.029	0.041	0.053	0.063	0.072	0.089	0.101	230	0.040	0.057	0.073	0.088	0.101	0.123	0.141	
200	0.021	0.026	0.031	0.035	0.038	0.042	0.043	295	0.021	0.026	0.031	0.035	0.038	0.042	0.043	
135	0.021	0.026	0.031	0.035	0.038	0.042	0.043	195	0.021	0.026	0.031	0.035	0.038	0.042	0.043	
200	0.018	0.023	0.027	0.031	0.033	0.037	0.038	295	0.018	0.023	0.027	0.031	0.033	0.037	0.038	
270	0.012	0.015	0.017	0.019	0.021	0.023	0.024	395	0.012	0.015	0.017	0.019	0.021	0.023	0.024	
200	0.019	0.024	0.028	0.032	0.035	0.039	0.041	300	0.019	0.024	0.028	0.032	0.035	0.039	0.041	

	v_c [m/min]	f_z [mm]							v_c [m/min]	f_z [mm]						
		Diameter of milling cutter [mm]								Diameter of milling cutter [mm]						
		4.00	6.00	8.00	10.00	12.00	16.00	20.00		4.00	6.00	8.00	10.00	12.00	16.00	20.00
240	0.021	0.026	0.031	0.035	0.038	0.042	0.043	355	0.021	0.026	0.031	0.035	0.038	0.042	0.043	
160	0.021	0.026	0.031	0.035	0.038	0.042	0.043	235	0.021	0.026	0.031	0.035	0.038	0.042	0.043	
240	0.018	0.023	0.027	0.031	0.033	0.037	0.038	355	0.018	0.023	0.027	0.031	0.033	0.037	0.038	
325	0.012	0.015	0.017	0.019	0.021	0.023	0.024	480	0.012	0.015	0.017	0.019	0.021	0.023	0.024	
245	0.019	0.024	0.028	0.032	0.035	0.039	0.041	360	0.019	0.024	0.028	0.032	0.035	0.039	0.041	

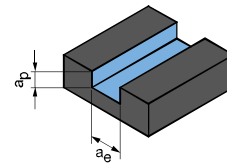
	v_c [m/min]	f_z [mm]							v_c [m/min]	f_z [mm]						
		Diameter of milling cutter [mm]								Diameter of milling cutter [mm]						
		2.00	4.00	6.00	8.00	10.00	12.00	16.00		20.00	2.00	4.00	6.00	8.00	10.00	12.00
210	0.008	0.013	0.018					310	0.012	0.02	0.028					
210	0.008	0.013	0.018					310	0.012	0.02	0.028					
140	0.008	0.013	0.018					210	0.012	0.02	0.028					
240	0.012	0.018	0.023					355	0.012	0.018	0.023					
325	0.008	0.012	0.015					480	0.008	0.012	0.015					
245	0.010	0.019	0.024					360	0.010	0.019	0.024					

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Groove milling



$$a_p = 1 \times D$$

$$a_e = 1 \times D$$

OptiMill-Composite-TwinCut | SCM490

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	v _c [m/min]	f _z [mm]							
				Diameter of milling cutter [mm]							
				2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00
C C1	C1.1	Plastic matrix, aramide fibre-reinforced (AFRP)	110	0.015	0.027	0.038	0.049	0.06	0.07	0.087	0.101
	C1.2	Plastic matrix (thermosetting), CFRP/GFRP									
	C1.3	Plastic matrix (thermoplastic), CFRP/GFRP									

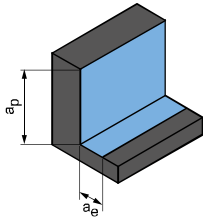
OptiMill-Thermoplastic-FR | SCM610

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	v _c [m/min]	f _z [mm]							
				Diameter of milling cutter [mm]							
				2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00
N N4	N4.1	Plastic, thermoplastics	100	0.011	0.019	0.027	0.035	0.043	0.05	0.062	0.072
	N4.2	Plastic, thermosets									
	N4.3	Plastic, foams									
C C1	C1.1	Plastic matrix, aramide fibre-reinforced (AFRP)	100	0.011	0.019	0.027	0.035	0.043	0.05	0.062	0.072
	C1.2	Plastic matrix (thermosetting), CFRP/GFRP									
	C1.3	Plastic matrix (thermoplastic), CFRP/GFRP									

OptiMill-Mono-Plastic | SCM330

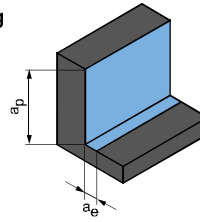
MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	v _c [m/min]	f _z [mm]							
				Diameter of milling cutter [mm]							
				2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00
N N4	N4.1	Plastic, thermoplastics	100	0.022	0.03	0.028	0.047	0.055	0.07	0.085	0.1
	N4.2	Plastic, thermosets	150	0.022	0.03	0.028	0.047	0.055	0.07	0.085	0.1
	N4.3	Plastic, foams									

Roughing



$a_p = 1.5 \times D$
 $a_e = 0.25 \times D$

Finishing



$a_p = 1.5 \times D$
 $a_e = 0.1 \times D$

v_c [m/min]	f_z [mm]									v_c [m/min]	f_z [mm]								
	Diameter of milling cutter [mm]										Diameter of milling cutter [mm]								
	2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00	2.00		4.00	6.00	8.00	10.00	12.00	16.00	20.00		
220	0.026	0.046	0.065	0.084	0.101	0.118	0.148	0.171	325	0.041	0.072	0.103	0.132	0.16	0.187	0.234	0.271		

v_c [m/min]	f_z [mm]									v_c [m/min]	f_z [mm]								
	Diameter of milling cutter [mm]										Diameter of milling cutter [mm]								
	2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00	2.00		4.00	6.00	8.00	10.00	12.00	16.00	20.00		
200	0.018	0.033	0.046	0.06	0.072	0.084	0.106	0.122	295	0.029	0.052	0.073	0.094	0.115	0.133	0.167	0.194		

v_c [m/min]	f_z [mm]									v_c [m/min]	f_z [mm]								
	Diameter of milling cutter [mm]										Diameter of milling cutter [mm]								
	2.00	4.00	6.00	8.00	10.00	12.00	16.00	20.00	2.00		4.00	6.00	8.00	10.00	12.00	16.00	20.00		
200	0.037	0.051	0.065	0.079	0.093	0.119	0.145	0.169	295	0.058	0.081	0.103	0.125	0.147	0.189	0.229	0.267		
300	0.037	0.051	0.065	0.079	0.093	0.119	0.145	0.169	445	0.058	0.081	0.103	0.125	0.147	0.189	0.229	0.267		

The specified machining values are guide values.
 The optimum data for the respective machining task should be determined during the test or machining.





SHOULDER MILLING CUTTER – ROUGHING

Universal application

OptiMill-Uni-HPC-Rough	108
OptiMill-Uni-Wave	110
ECU-Mill-Uni-Rough&Finish CPMill-Uni-Rough&Finish	120

Non-ferrous metals

OptiMill-SPM-Rough	118
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Technical appendix

Cutting data recommendations	122
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OptiMill®-Uni-HPC-Rough

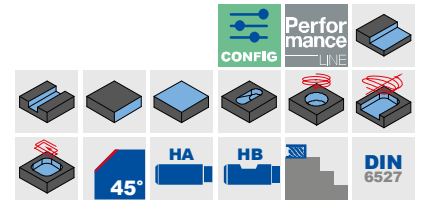
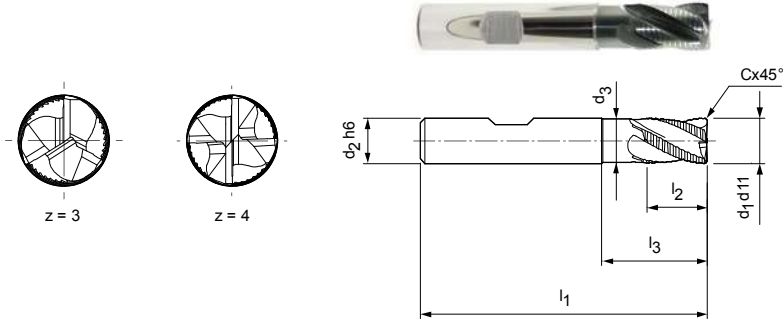
Shoulder milling cutter, short design with neck
SCM700

Design:

Diameter of milling cutter: 5.00 – 20.00 mm
Cutting material: HP213
Number of cutting edges: 3 to ø 8 mm
4 from ø 9 mm

Helix angle: 30°


Special features: Unequal spacing,
profile undercut HPC
roughing teeth




Preferred series in stock

Dimensions							z	Specification	Order no.
d ₁ d ₁₁	d ₂ h ₆	d ₃	l ₁	l ₂	l ₃	Cx45°			
*5,00	6	–	54	8	–	0,30	3	SCM700-0500Z03R-F0030HB-HP213	30653380
6,00	6	5,5	54	8	18	0,30	3	SCM700-0600Z03R-F0030HB-HP213	30653381
*7,00	8	–	58	11	–	0,30	3	SCM700-0700Z03R-F0030HB-HP213	30653382
8,00	8	7,5	58	11	22	0,30	3	SCM700-0800Z03R-F0030HB-HP213	30653383
*9,00	10	–	66	13	–	0,50	4	SCM700-0900Z04R-F0050HB-HP213	30653384
10,00	10	9,5	66	13	26	0,50	4	SCM700-1000Z04R-F0050HB-HP213	30653385
12,00	12	11	73	16	28	0,50	4	SCM700-1200Z04R-F0050HB-HP213	30653386
14,00	14	13	76	16	31	0,50	4	SCM700-1400Z04R-F0050HB-HP213	30653387
16,00	16	15	82	19	34	0,50	4	SCM700-1600Z04R-F0050HB-HP213	30653388
18,00	18	17	84	19	36	0,50	4	SCM700-1800Z04R-F0050HB-HP213	30653389
20,00	20	19	92	20	42	0,50	4	SCM700-2000Z04R-F0050HB-HP213	30653390

Configurable features



Shank form:
Shank form: HA



Specification:
SCM700-0500Z03R-F0030[shank form]-HP213

Example:

SCM700-0500Z03R-F0030HA-HP213

Shank form HA

Dimensions in mm.

* Design without neck.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Rough

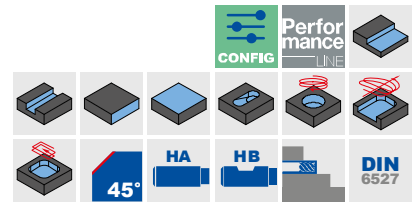
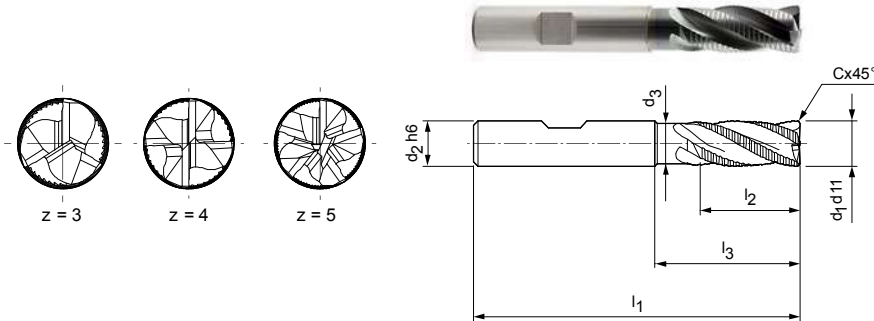
Shoulder milling cutter, long design with neck
SCM710

Design:

Diameter of milling cutter: 4.00 – 25.00 mm
Cutting material: HP213
Number of cutting edges: 3 to ø 8 mm
4 from ø 9 mm
5 from ø 25 mm

Helix angle: 30°


Special features: Unequal spacing, profile undercut HPC roughing teeth




Preferred series in stock

Dimensions							z	Specification	Order no.
d ₁ d ₁₁	d ₂ h ₆	d ₃ h ₉	l ₁	l ₂	l ₃	Cx45°			
*4,00	6	–	57	8	–	0,30	3	SCM710-0400Z03R-F0030HB-HP213	30653391
*5,00	6	–	57	13	–	0,30	3	SCM710-0500Z03R-F0030HB-HP213	30653392
6,00	6	5,5	57	13	21	0,30	3	SCM710-0600Z03R-F0030HB-HP213	30653393
*7,00	8	–	63	16	–	0,30	3	SCM710-0700Z03R-F0030HB-HP213	30653394
8,00	8	7,5	63	16	26	0,30	3	SCM710-0800Z03R-F0030HB-HP213	30653395
*9,00	10	–	72	19	–	0,50	4	SCM710-0900Z04R-F0050HB-HP213	30653396
10,00	10	9,5	72	22	32	0,50	4	SCM710-1000Z04R-F0050HB-HP213	30653397
*11,00	12	–	83	26	–	0,50	4	SCM710-1100Z04R-F0050HB-HP213	30653398
12,00	12	11	83	26	38	0,50	4	SCM710-1200Z04R-F0050HB-HP213	30653399
*13,00	14	–	83	26	–	0,50	4	SCM710-1300Z04R-F0050HB-HP213	30653400
14,00	14	13	83	26	42	0,50	4	SCM710-1400Z04R-F0050HB-HP213	30653401
16,00	16	15	92	32	44	0,50	4	SCM710-1600Z04R-F0050HB-HP213	30653402
18,00	18	17	92	32	48	0,50	4	SCM710-1800Z04R-F0050HB-HP213	30653403
20,00	20	19	104	38	54	0,50	4	SCM710-2000Z04R-F0050HB-HP213	30653405
25,00	25	24	121	45	65	0,50	5	SCM710-2500Z05R-F0050HB-HP213	30673093

Configurable features



Shank form:
Shank form: HA



Specification:
SCM710-0400Z03R-F0030[shank form]-HP213

Example:

SCM710-0400Z03R-F0030HA-HP213

Shank form HA

Dimensions in mm.

* Design without neck.

For cutting data recommendations, see end of chapter.

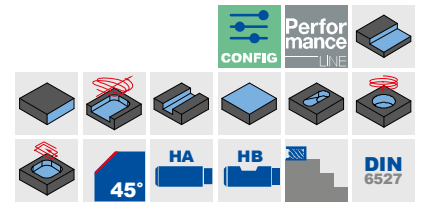
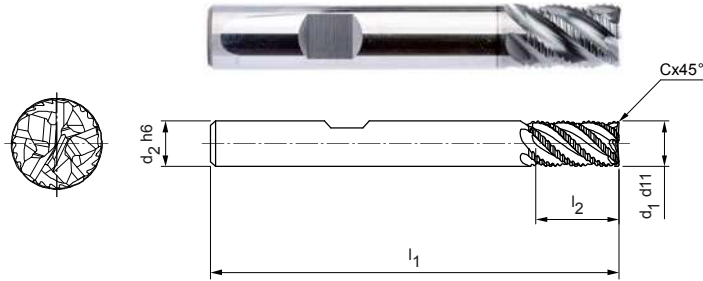
Special designs and other coatings available upon request.

OptiMill®-Uni-Wave

Shoulder milling cutter, short design
SCM890

Design:

Diameter of milling cutter: 4.00 – 25.00 mm
Cutting material: HP723
Number of cutting edges: 5
Helix angle: ~ 41.5°
Special features: Unequal spacing, newly developed roughing profile




Preferred series in stock

Dimensions					z	Specification	Order no.
d ₁ d ₁₁	d ₂ h ₆	l ₁	l ₂	Cx45°			
4,00	6	54	8	0,20	5	SCM890-0400Z05R-F0020HB-HP723	30917921
5,00	6	54	9	0,25	5	SCM890-0500Z05R-F0025HB-HP723	30917923
6,00	6	54	10	0,30	5	SCM890-0600Z05R-F0030HB-HP723	30917924
7,00	8	58	11	0,35	5	SCM890-0700Z05R-F0035HB-HP723	30917925
8,00	8	58	12	0,40	5	SCM890-0800Z05R-F0040HB-HP723	30917926
9,00	10	66	13	0,45	5	SCM890-0900Z05R-F0045HB-HP723	30917927
10,00	10	66	14	0,50	5	SCM890-1000Z05R-F0050HB-HP723	30917928
12,00	12	73	16	0,60	5	SCM890-1200Z05R-F0060HB-HP723	30917929
14,00	14	75	18	0,70	5	SCM890-1400Z05R-F0070HB-HP723	30917930
16,00	16	82	22	0,80	5	SCM890-1600Z05R-F0080HB-HP723	30917931
20,00	20	92	26	1,00	5	SCM890-2000Z05R-F0100HB-HP723	30917933
25,00	25	105	32	1,25	5	SCM890-2500Z05R-F0125HB-HP723	30917934


Available on request

18,00	18	84	24	0,9	5	SCM890-1800Z05R-F0090HB-HP723	30917932
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Configurable features



Shank form:
Shank form: HA



Specification:
SCM890-0400Z05R-F0020[shank form]-HP723

Example:

SCM890-0400Z05R-F0020HA-HP723

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

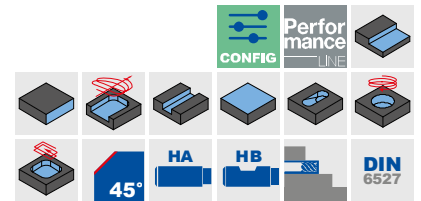
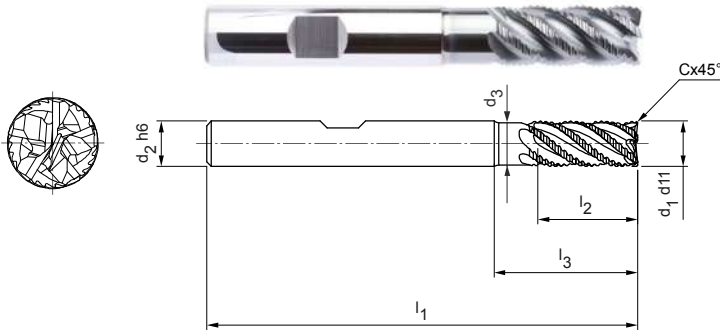
Special designs and other coatings available upon request.

OptiMill®-Uni-Wave

Shoulder milling cutter, long design with neck
SCM880

Design:

Diameter of milling cutter: 4.00 – 25.00 mm
Cutting material: HP723
Number of cutting edges: 5
Helix angle: ~ 41.5°
Special features: Unequal spacing, newly developed roughing profile




Preferred series in stock

Dimensions							z	Specification	Order no.
d1 d11	d2 h6	d3	l1	l2	l3	Cx45°			
4,00	6	3,7	57	11	19	0,20	5	SCM880-0400Z05R-F0020HB-HP723	30917935
5,00	6	4,6	57	13	19	0,25	5	SCM880-0500Z05R-F0025HB-HP723	30917936
6,00	6	5,6	57	13	19	0,30	5	SCM880-0600Z05R-F0030HB-HP723	30917937
7,00	8	6,5	63	16	25	0,35	5	SCM880-0700Z05R-F0035HB-HP723	30917938
8,00	8	7,4	63	19	25	0,40	5	SCM880-0800Z05R-F0040HB-HP723	30917939
9,00	10	8,3	72	19	30	0,45	5	SCM880-0900Z05R-F0045HB-HP723	30917940
10,00	10	9,3	72	22	30	0,50	5	SCM880-1000Z05R-F0050HB-HP723	30917941
12,00	12	11,1	83	26	36	0,60	5	SCM880-1200Z05R-F0060HB-HP723	30917942
14,00	14	13	83	26	36	0,70	5	SCM880-1400Z05R-F0070HB-HP723	30917943
16,00	16	14,8	92	32	42	0,80	5	SCM880-1600Z05R-F0080HB-HP723	30917944
20,00	20	18,5	104	38	52	1,00	5	SCM880-2000Z05R-F0100HB-HP723	30917946
25,00	25	23,1	125	50	65	1,25	5	SCM880-2500Z05R-F0125HB-HP723	30917947


Available on request

18,00	18	16,7	92	32	42	0,9	5	SCM880-1800Z05R-F0090HB-HP723	30917945
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Configurable features



Shank form:
Shank form: HA



Specification:
SCM880-0400Z05R-F0020[shank form]-HP723

Example:

SCM880-0400Z05R-F0020HA-HP723

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

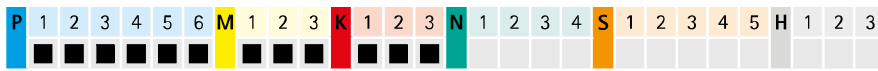
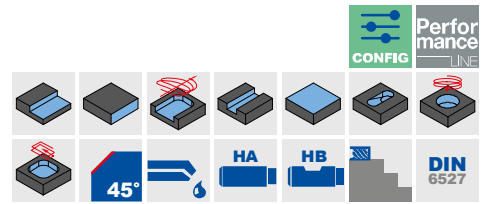
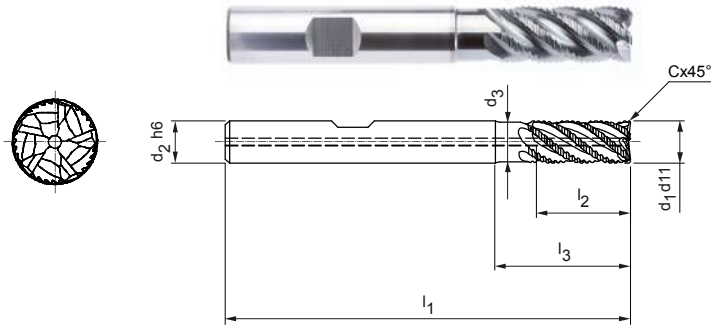
Special designs and other coatings available upon request.

OptiMill®-Uni-Wave

Shoulder milling cutter, long design with neck, with internal coolant supply
SCM881

Design:

Diameter of milling cutter: 4.00 – 20.00 mm
Cutting material: HP920
Number of cutting edges: 5
Helix angle: ~ 41°
Special features: Unequal spacing, newly developed roughing profile



Preferred series in stock

Dimensions							z	Specification	Order no.
d1 d11	d2 h6	d3	l1	l2	l3	Cx45°			
4,00	6	3,7	57	11	19	0,20	5	SCM881-0400Z05R-F0020HB-HP920	31102736
5,00	6	4,6	57	13	19	0,25	5	SCM881-0500Z05R-F0025HB-HP920	31102737
6,00	6	5,6	57	13	19	0,30	5	SCM881-0600Z05R-F0030HB-HP920	31102738
8,00	8	7,4	63	19	25	0,40	5	SCM881-0800Z05R-F0040HB-HP920	31102750
10,00	10	9,3	72	22	30	0,50	5	SCM881-1000Z05R-F0050HB-HP920	31102752
12,00	12	11,1	83	26	36	0,60	5	SCM881-1200Z05R-F0060HB-HP920	31102753
16,00	16	14,8	92	32	42	0,80	5	SCM881-1600Z05R-F0080HB-HP920	31102755
20,00	20	18,5	104	38	52	1,00	5	SCM881-2000Z05R-F0100HB-HP920	31102756

Available on request

14,00	14	13	83	26	36	0,70	5	SCM881-1400Z05R-F0070HB-HP920	31102754
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Configurable features

Shank form:
Shank form: HA

Specification:
SCM881-0400Z05R-F0020[shank form]-HP920

Example:

SCM881-0400Z05R-F0020HA-HP920

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Uni-Wave

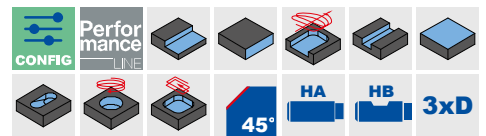
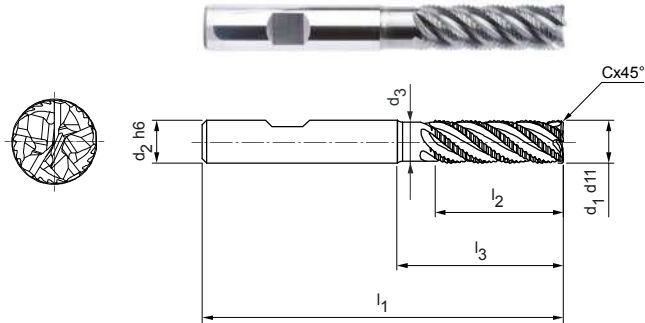
Shoulder milling cutter, design 3xD with neck
SCM900

Design:

Diameter of milling cutter: 5.00 – 25.00 mm
Cutting material: HP210
Number of cutting edges: 5
Helix angle: ~ 42°
Special features: Unequal spacing, newly developed roughing profile

Application:

Suitable for shoulder milling up to a maximum cutting width of 0,25xD. Also suitable for trochoidal milling.



Preferred series in stock

Dimensions							z	Specification	Order no.
d1 d11	d2 h6	d3	l1	l2	l3	Cx45°			
5,00	6	4,6	62	17	24	0,25	5	SCM900-0500Z05R-F0025HB3-HP210	31054554
6,00	6	5,6	62	18	25	0,30	5	SCM900-0600Z05R-F0030HB3-HP210	31054555
8,00	8	7,7	68	24	30	0,40	5	SCM900-0800Z05R-F0040HB3-HP210	31054556
10,00	10	9,3	80	30	35	0,50	5	SCM900-1000Z05R-F0050HB3-HP210	31054557
12,00	12	11,1	93	36	45	0,60	5	SCM900-1200Z05R-F0060HB3-HP210	31054558
14,00	14	13	99	42	50	0,70	5	SCM900-1400Z05R-F0070HB3-HP210	31054559
16,00	16	14,8	108	48	55	0,80	5	SCM900-1600Z05R-F0080HB3-HP210	31054570
20,00	20	18,5	126	60	70	1,00	5	SCM900-2000Z05R-F0100HB3-HP210	31054572

Available on request

18,00	18	16,7	117	54	67	0,90	5	SCM900-1800Z05R-F0090HB3-HP210	31054571
25,00	25	21,1	150	75	92	1,25	5	SCM900-2500Z05R-F0125HB3-HP210	31054573

Configurable features

Shank form:
Shank form: HA

Specification:
SCM900-0500Z05R-F0025[shank form]3-HP210

Example:

SCM900-0500Z05R-F0025HA3-HP210



Dimensions in mm.

For cutting data recommendations, see end of chapter.

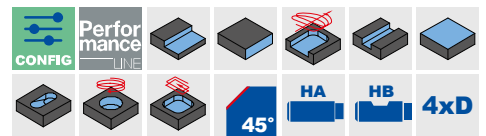
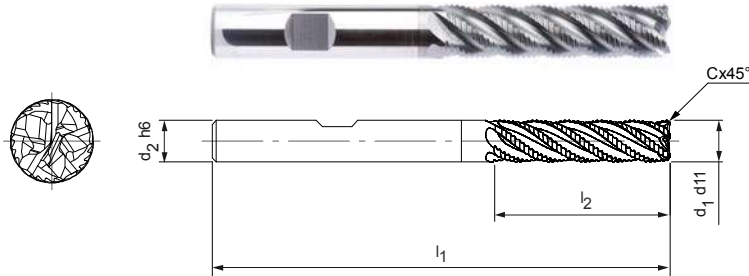
Special designs and other coatings available upon request.

OptiMill®-Uni-Wave

Shoulder milling cutter, 4xD design
SCM900

Design:

Diameter of milling cutter: 6.00 – 20.00 mm
Cutting material: HP723
Number of cutting edges: 5
Helix angle: 38°
Special features: Unequal spacing, newly developed roughing profile



Preferred series in stock

Dimensions					z	Specification	Order no.
d ₁ d ₁₁	d ₂ h ₆	l ₁	l ₂	Cx45°			
6,00	6	66	24	0,30	5	SCM900-0600Z05R-F0030HB4-HP723	31200325
8,00	8	74	32	0,40	5	SCM900-0800Z05R-F0040HB4-HP723	31200326
10,00	10	89	40	0,50	5	SCM900-1000Z05R-F0050HB4-HP723	31200327
12,00	12	100	48	0,60	5	SCM900-1200Z05R-F0060HB4-HP723	31200328
16,00	16	123	64	0,80	5	SCM900-1600Z05R-F0080HB4-HP723	31200329
20,00	20	140	80	1,00	5	SCM900-2000Z05R-F0100HB4-HP723	31200330

Configurable features

Shank form:
Shank form: HA

Specification:
SCM900-0600Z05R-F0030[shank form]4-HP723

Example:

SCM900-0600Z05R-F0030HA4-HP723

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

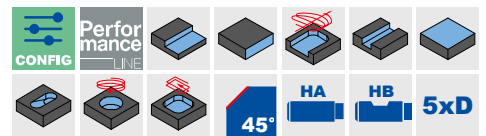
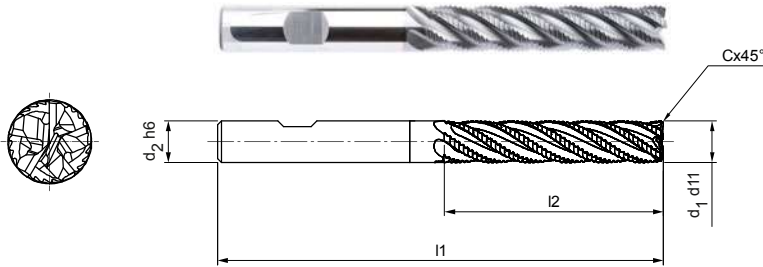
Special designs and other coatings available upon request.

OptiMill®-Uni-Wave

Shoulder milling cutter, 5xD design
SCM900

Design:

Diameter of milling cutter: 6.00 – 20.00 mm
Cutting material: HP723
Number of cutting edges: 5
Helix angle: 35°
Special features: Unequal spacing, newly developed roughing profile



Preferred series in stock

Dimensions					z	Specification	Order no.
d ₁ d ₁₁	d ₂ h ₆	l ₁	l ₂	Cx45°			
6,00	6	69	30	0,30	5	SCM900-0600Z05R-F0030HB5-HP723	31240648
8,00	8	81	40	0,40	5	SCM900-0800Z05R-F0040HB5-HP723	31240649
10,00	10	96	50	0,50	5	SCM900-1000Z05R-F0050HB5-HP723	31240670
12,00	12	112	60	0,60	5	SCM900-1200Z05R-F0060HB5-HP723	31240671
16,00	16	136	80	0,80	5	SCM900-1600Z05R-F0080HB5-HP723	31240672
20,00	20	160	100	1,00	5	SCM900-2000Z05R-F0100HB5-HP723	31240673

Configurable features

Shank form:
Shank form: HA

Specification:
SCM900-0600Z05R-F0030[shank form]5-HP723

Example:

SCM900-0600Z05R-F0030HA5-HP723

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

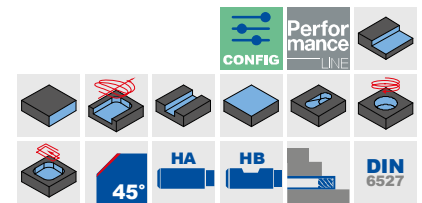
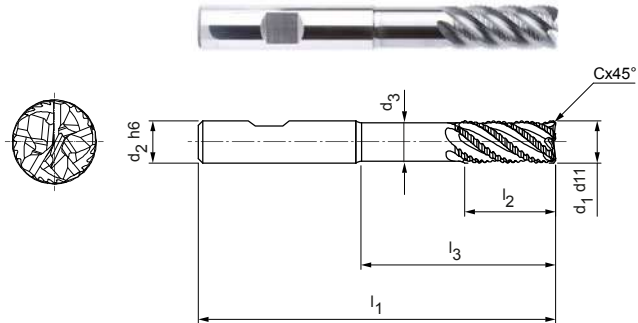
Special designs and other coatings available upon request.

OptiMill®-Uni-Wave

Shoulder milling cutter, overlong design with neck
SCM900

Design:

Diameter of milling cutter: 5.00 – 25.00 mm
Cutting material: HP210
Number of cutting edges: 5
Helix angle: ~ 41.5°
Special features: Unequal spacing,
newly developed
roughing profile



Preferred series in stock

Dimensions							z	Specification	Order no.
d1 d11	d2 h6	d3	l1	l2	l3	Cx45°			
5,00	6	4,6	62	13	24	0,25	5	SCM900-0500Z05R-F0025HB-HP210	31054574
6,00	6	5,6	62	13	25	0,30	5	SCM900-0600Z05R-F0030HB-HP210	31054575
8,00	8	7,4	68	21	30	0,40	5	SCM900-0800Z05R-F0040HB-HP210	31054576
10,00	10	9,3	80	22	38	0,50	5	SCM900-1000Z05R-F0050HB-HP210	31054577
12,00	12	11,1	93	26	46	0,60	5	SCM900-1200Z05R-F0060HB-HP210	31054578
14,00	14	13	99	26	52	0,70	5	SCM900-1400Z05R-F0070HB-HP210	31054579
16,00	16	14,8	108	36	58	0,80	5	SCM900-1600Z05R-F0080HB-HP210	31054580
20,00	20	18,5	126	41	74	1,00	5	SCM900-2000Z05R-F0100HB-HP210	31054582

Available on request

18,00	18	16,7	117	36	67	0,90	5	SCM900-1800Z05R-F0090HB-HP210	31054581
25,00	25	23,1	150	50	92	1,25	5	SCM900-2500Z05R-F0125HB-HP210	31054583

Configurable features



Shank form:
Shank form: HA



Specification:

SCM900-0500Z05R-F0025[shank form]-HP210

Example:

SCM900-0500Z05R-F0025HA-HP210

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

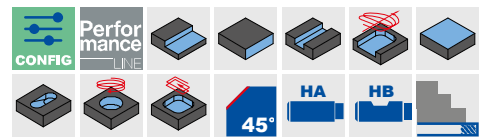
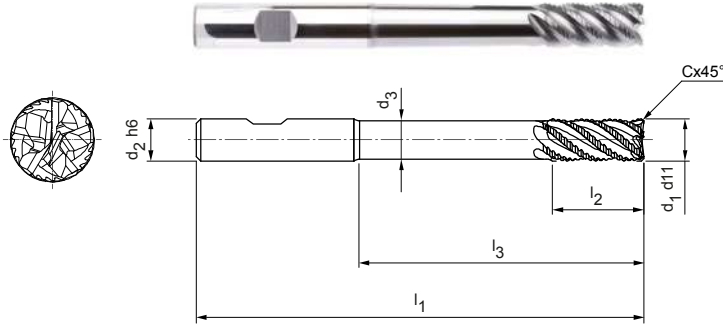
Special designs and other coatings available upon request.

OptiMill®-Uni-Wave

Shoulder milling cutter, extra long design with neck
SCM910

Design:


Diameter of milling cutter: 6.00 – 20.00 mm
Cutting material: HP723
Number of cutting edges: 5
Helix angle: ~ 42°
Special features: Unequal spacing, newly developed roughing profile




Preferred series in stock

Dimensions							z	Specification	Order no.
d1 d11	d2 h6	d3	l1	l2	l3	Cx45°			
6,00	6	5,4	80	13	42	0,30	5	SCM910-0600Z05R-F0030HB-HP723	31096360
8,00	8	7,2	100	21	62	0,40	5	SCM910-0800Z05R-F0040HB-HP723	31096362
10,00	10	9	100	22	58	0,50	5	SCM910-1000Z05R-F0050HB-HP723	31096363
12,00	12	10,8	120	26	73	0,60	5	SCM910-1200Z05R-F0060HB-HP723	31096364
16,00	16	14,4	150	36	100	0,80	5	SCM910-1600Z05R-F0080HB-HP723	31096365
20,00	20	18	150	41	98	1,00	5	SCM910-2000Z05R-F0100HB-HP723	31096366

Configurable features



Shank form:
Shank form: HA



Specification:
SCM910-0600Z05R-F0030[shank form]-HP723

Example:

SCM910-0600Z05R-F0030HA-HP723

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-SPM-Rough

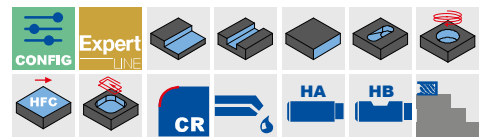
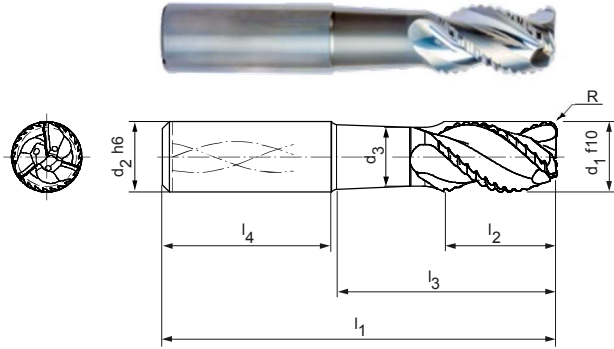
Shoulder milling cutter, design with internal coolant supply
SCM951/961

Design:

Diameter of milling cutter: 12.00 - 25.00 mm
Cutting material: HU318
Number of cutting edges: 3
Helix angle: 43°

Application:

High volume machining of structural parts made of aluminium. For full performance of the Opti-Mill-SPM-Rough, it is recommended to use it on high performance machines from 50 kW.



N	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	C	1.1	1.2	1.3	2.1	3.1	4.1	4.2	5.1	5.2	5.3
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Metric dimensions | Preferred series in stock

Dimensions								z	Specification	Order no.
d1 f9	d2 h6	d3	l1	l2	l3	l4	R			
12,00	12	10	83	18	38	45	2,00	3	SCM951-1200Z03R-R0200HA-HU318	31080117
16,00	16	13,40	92	24	47	45	2,00	3	SCM951-1600Z03R-R0200HA-HU318	31080119
16,00	16	13,40	92	24	47	45	3,00	3	SCM951-1600Z03R-R0300HA-HU318	31080140
20,00	20	16,80	104	35	56	48	2,00	3	SCM951-2000Z03R-R0200HA-HU318	31080142
20,00	20	16,80	104	35	56	48	3,00	3	SCM951-2000Z03R-R0300HA-HU318	31080143
20,00	20	16,80	104	35	56	48	4,00	3	SCM951-2000Z03R-R0400HA-HU318	31080144
25,00	25	21	108	35	52	56	3,00	3	SCM951-2500Z03R-R0300HA-HU318	31080145
25,00	25	21	108	35	52	56	4,00	3	SCM951-2500Z03R-R0400HA-HU318	31080146
25,00	25	21	136	38	80	56	3,00	3	SCM961-2500Z03R-R0300HA-HU318	31080147
25,00	25	21	136	38	80	56	4,00	3	SCM961-2500Z03R-R0400HA-HU318	31080148

Inch dimensions | Available upon request

1/2"	1/2"	0,417"	3 1/2"	3/4"	1 5/8"	1,772"	0,09"	3	SCM951-1270Z03R-R0228HA-HU318	31080118
3/4"	3/4"	0,63"	4 1/8"	1 1/4"	2 1/8"	1,89"	0,12"	3	SCM951-1905Z03R-R0305HA-HU318	31080141
1"	1"	0,839"	5"	1 1/2"	2,783"	2,205"	0,12"	3	SCM951-2540Z03R-R0305HA-HU318	31080149

Configurable features

Shank form:
Shank form: HB

Specification:
SCM951-1200Z03R-R0200[shank form]-HU318

Example:

SCM951-1200Z03R-R0200HB-HU318

Shank form HB

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

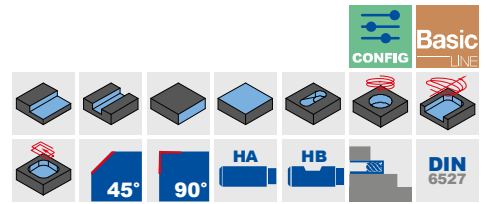
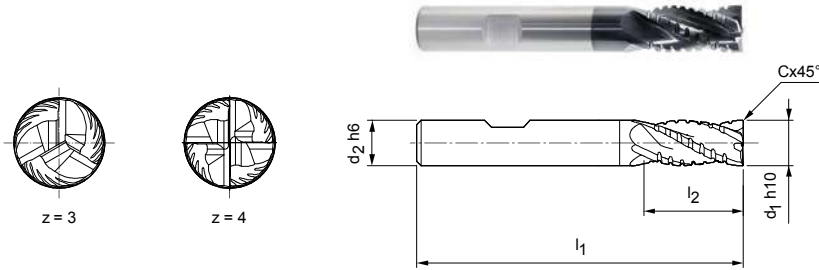


ECU-Mill-Uni-Rough&Finish

Shoulder milling cutter, long design
SCM220

Design:

Diameter of milling cutter: 6.00 – 20.00 mm
Cutting material: HP213
Number of cutting edges: 3 to ø 8 mm
4 from ø 10 mm
Helix angle: 30°




Preferred series in stock

Dimensions					z	Specification	Order no.
d ₁ h10	d ₂ h6	l ₁	l ₂	Cx45°			
6,00	6	57	13	-	3	SCM220-0600Z03R-S-HB-HP213	30393471
8,00	8	63	19	0,08	3	SCM220-0800Z03R-F0008HB-HP213	30393472
10,00	10	72	22	0,10	4	SCM220-1000Z04R-F0010HB-HP213	30393473
12,00	12	83	26	0,12	4	SCM220-1200Z04R-F0012HB-HP213	30393474
16,00	16	92	32	0,16	4	SCM220-1600Z04R-F0016HB-HP213	30393476
20,00	20	104	38	0,20	4	SCM220-2000Z04R-F0020HB-HP213	30393478


Available on request

14,00	14	83	26	0,14	4	SCM220-1400Z04R-F0014HB-HP213	30393475
18,00	18	92	32	0,18	4	SCM220-1800Z04R-F0018HB-HP213	30393477

Configurable features



Shank form:
Shank form: HA



Specification:
SCM220-0800Z03R-F0008[shank form]-HP213

Example:

SCM220-0800Z03R-F0008HA-HP213

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

CPMill®-Uni-Rough&Finish

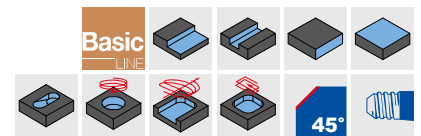
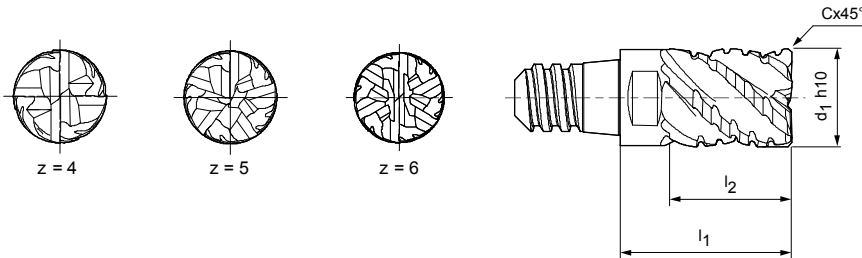
Design with CFS connection
CPM140

Design:

Diameter of milling cutter: 8.00 – 25.00 mm
Cutting material: HP383
Number of cutting edges: 4 to ø 12.00 mm
5 at ø 16.00 mm
6 from ø 20.00 mm

Helix angle: 45°

Special features: Special roughing geometry, also suitable for unstable clamping.




Preferred series in stock

Dimensions					z	a _p max.	SW	Specification	Order no.
d ₁ h10	CFS size	l ₁	l ₂	Cx45°					
8,00	6	15	10	0,16	4	7,5	SW 6	CPM140-0800Z04-F0016-06-HP383	30371395
10,00	8	18	12,5	0,20	4	9,4	SW 8	CPM140-1000Z04-F0020-08-HP383	30371396
12,00	10	22	15	0,24	4	11,3	SW 10	CPM140-1200Z04-F0024-10-HP383	30371397
16,00	12	28	20	0,32	5	15	SW 13	CPM140-1600Z05-F0032-12-HP383	30371398
20,00	16	35	25	0,40	6	18,8	SW 16	CPM140-2000Z06-F0040-16-HP383	30371400

Available on request

25,00	20	45	32	0,5	6	23,4	SW 21	CPM140-2500Z06-F0050-20-HP383	30371401
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Accessories

	CFS replaceable head holders CFS201	Page 218
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Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Tool length/correction factor:	
Length	f_z & v_c
short	1
long	0.9

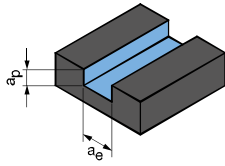
OptiMill-Uni-HPC-Rough | SCM700, 710

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
				MQL/Air	Dry	Coolant
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓		✓
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓		✓
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓		✓
	P4.1	Stainless steels, ferritic and martensitic		✓		✓
	P5.1	Cast steel				✓
	P6.1	Stainless cast steel, ferritic and martensitic				✓
M	M1.1	Stainless steels, austenitic	< 700	✓		✓
	M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓
	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700	✓		✓
	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓
K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓
	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓
	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓
	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓
	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓
	K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

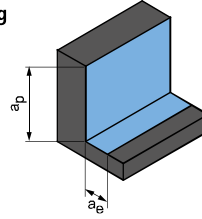
Groove milling



$$a_p = 1 \times D$$

$$a_e = 1 \times D$$

Roughing



$$a_p = 1,5 \times D$$

$$a_e = 0,25 \times D$$

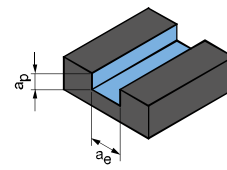
	v_c [m/min]	f_z [mm]							v_c [m/min]	f_z [mm]						
		Diameter of milling cutter [mm]								Diameter of milling cutter [mm]						
		6.00	8.00	10.00	12.00	16.00	20.00	25.00		6.00	8.00	10.00	12.00	16.00	20.00	25.00
	200	0.035	0.044	0.053	0.061	0.075	0.085	0.095	355	0.059	0.075	0.090	0.103	0.126	0.145	0.161
	165	0.032	0.041	0.050	0.057	0.070	0.080	0.089	290	0.055	0.070	0.084	0.097	0.118	0.135	0.151
	180	0.035	0.044	0.053	0.061	0.075	0.085	0.095	325	0.059	0.075	0.090	0.103	0.126	0.145	0.161
	125	0.029	0.037	0.044	0.051	0.062	0.071	0.079	225	0.049	0.063	0.075	0.086	0.105	0.120	0.134
	120	0.034	0.043	0.051	0.059	0.072	0.082	0.092	210	0.057	0.073	0.087	0.100	0.122	0.140	0.156
	110	0.032	0.041	0.049	0.056	0.068	0.078	0.087	195	0.054	0.069	0.083	0.095	0.116	0.132	0.148
	100	0.030	0.038	0.046	0.053	0.065	0.074	0.082	180	0.051	0.065	0.078	0.090	0.110	0.125	0.140
	80	0.023	0.030	0.035	0.041	0.050	0.057	0.063	145	0.039	0.050	0.060	0.069	0.084	0.096	0.108
	120	0.034	0.043	0.051	0.059	0.072	0.082	0.092	215	0.057	0.073	0.087	0.100	0.122	0.140	0.156
80	0.016	0.021	0.025	0.028	0.035	0.040	0.044	145	0.027	0.035	0.042	0.048	0.059	0.067	0.075	
	55	0.020	0.026	0.031	0.036	0.043	0.050	0.055	110	0.034	0.044	0.053	0.060	0.074	0.084	0.094
	50	0.017	0.021	0.026	0.029	0.036	0.041	0.046	105	0.028	0.036	0.044	0.050	0.061	0.070	0.078
	60	0.022	0.028	0.034	0.039	0.047	0.054	0.060	120	0.037	0.048	0.057	0.066	0.080	0.092	0.102
	55	0.017	0.022	0.027	0.031	0.037	0.043	0.048	110	0.029	0.038	0.045	0.052	0.063	0.072	0.081
	215	0.058	0.074	0.088	0.102	0.124	0.142	0.158	440	0.098	0.125	0.150	0.172	0.211	0.241	0.269
	200	0.049	0.063	0.075	0.086	0.106	0.121	0.135	405	0.083	0.106	0.128	0.147	0.179	0.205	0.228
	160	0.040	0.052	0.062	0.071	0.087	0.099	0.111	330	0.069	0.088	0.105	0.121	0.147	0.169	0.188
	90	0.023	0.030	0.035	0.041	0.050	0.057	0.063	185	0.039	0.050	0.060	0.069	0.084	0.096	0.108
	145	0.040	0.052	0.062	0.071	0.087	0.099	0.111	295	0.069	0.088	0.105	0.121	0.147	0.169	0.188
	135	0.035	0.044	0.053	0.061	0.075	0.085	0.095	275	0.059	0.075	0.090	0.103	0.126	0.145	0.161

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Groove milling



$$a_p = 1 \times D$$

$$a_e = 1 \times D$$

OptiMill-Uni-Wave | SCM800, 880, 881, 890, 900, 910

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v _c [m/min]	f _z [mm]									
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]									
							4.00	6.00	8.00	10.00	12.00	16.00	20.00	25.00		
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	200	0.027	0.038	0.049	0.058	0.067	0.082	0.094	0.105	
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	160	0.025	0.036	0.046	0.054	0.063	0.077	0.087	0.098	
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	180	0.027	0.038	0.049	0.058	0.067	0.082	0.094	0.105	
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	125	0.022	0.032	0.041	0.049	0.056	0.068	0.078	0.087	
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	115	0.026	0.037	0.047	0.056	0.065	0.079	0.091	0.101	
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓	110	0.024	0.035	0.045	0.054	0.062	0.075	0.086	0.096	
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓	100	0.023	0.033	0.042	0.051	0.058	0.071	0.081	0.091	
	P4	P4.1	Stainless steels, ferritic and martensitic		✓	✓	80	0.018	0.025	0.033	0.039	0.045	0.055	0.062	0.07	
	P5	P5.1	Cast steel			✓	120	0.026	0.037	0.047	0.056	0.065	0.079	0.091	0.101	
	P6	P6.1	Stainless cast steel, ferritic and martensitic			✓	80	0.012	0.018	0.023	0.027	0.031	0.038	0.044	0.049	
M	M1.1	Stainless steels, austenitic	< 700	✓		✓	55	0.015	0.022	0.028	0.034	0.039	0.048	0.055	0.061	
	M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓	50	0.013	0.018	0.024	0.028	0.032	0.04	0.045	0.051	
	M2	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700	✓		✓	60	0.017	0.024	0.031	0.037	0.042	0.052	0.059	0.066
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓	55	0.013	0.019	0.024	0.029	0.034	0.041	0.047	0.052
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	215	0.044	0.064	0.081	0.097	0.112	0.137	0.156	0.174
	K1	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	200	0.038	0.054	0.069	0.083	0.095	0.116	0.133	0.148
	K2	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	160	0.031	0.045	0.057	0.068	0.078	0.096	0.109	0.122
	K2	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	90	0.018	0.025	0.033	0.039	0.045	0.055	0.062	0.07
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	145	0.031	0.045	0.057	0.068	0.078	0.096	0.109	0.122
	K3	K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	135	0.027	0.038	0.049	0.058	0.067	0.082	0.094	0.105

Tool length/correction factor

Length	v _c	f _z
short / long / 3xD	1	1
overlong / 4xD	0.8	0.9
extra long / 5xD	0.6	0.7

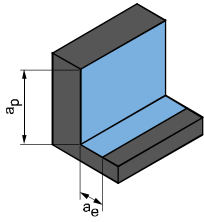
Please be aware:

Using the SCM900 in the 3xD design is only recommended up to a maximum cutting width of 0.25xD.

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

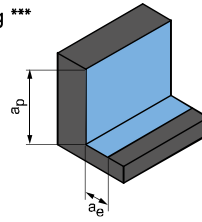
Roughing



$$a_p = 1.5 \times D$$

$$a_e = 0.25 \times D$$

Roughing ***



$$a_p = 3 \times D$$

$$a_e = 0.2 \times D$$

*** Valid for SCM900 - design 3xD

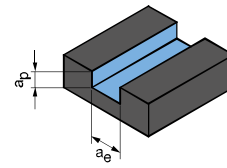
v _c [m/min]	f _z [mm]									v _c [m/min]	f _z [mm]								
	Diameter of milling cutter [mm]										Diameter of milling cutter [mm]								
	4.00	6.00	8.00	10.00	12.00	16.00	20.00	25.00			5.00	6.00	8.00	10.00	12.00	16.00	20.00	25.00	
405	0.045	0.065	0.083	0.099	0.114	0.139	0.159	0.177		355	0.054	0.064	0.082	0.098	0.112	0.137	0.157	0.175	
330	0.042	0.06	0.077	0.092	0.106	0.13	0.148	0.166		290	0.051	0.060	0.076	0.091	0.105	0.128	0.146	0.163	
370	0.045	0.065	0.083	0.099	0.114	0.139	0.159	0.177		320	0.054	0.064	0.082	0.098	0.112	0.137	0.157	0.175	
260	0.038	0.054	0.069	0.083	0.095	0.116	0.132	0.148		225	0.045	0.053	0.068	0.081	0.094	0.114	0.131	0.146	
240	0.044	0.063	0.08	0.096	0.11	0.134	0.154	0.171		210	0.053	0.062	0.079	0.094	0.109	0.133	0.152	0.169	
220	0.041	0.059	0.076	0.091	0.104	0.127	0.146	0.163		190	0.050	0.059	0.075	0.090	0.103	0.126	0.144	0.161	
200	0.039	0.056	0.072	0.086	0.099	0.12	0.138	0.154		175	0.047	0.055	0.071	0.085	0.097	0.119	0.136	0.152	
165	0.03	0.043	0.055	0.066	0.076	0.093	0.106	0.118		145	0.036	0.043	0.054	0.065	0.075	0.091	0.105	0.117	
245	0.044	0.063	0.08	0.096	0.11	0.134	0.154	0.171		215	0.053	0.062	0.079	0.094	0.109	0.133	0.152	0.169	
165	0.021	0.03	0.039	0.046	0.053	0.065	0.074	0.083		145	0.025	0.030	0.038	0.046	0.052	0.064	0.073	0.082	
110	0.026	0.038	0.048	0.058	0.066	0.081	0.093	0.103		110	0.032	0.037	0.048	0.057	0.066	0.080	0.092	0.102	
105	0.022	0.031	0.04	0.048	0.055	0.067	0.077	0.086		105	0.026	0.031	0.039	0.047	0.054	0.066	0.076	0.085	
120	0.029	0.041	0.052	0.063	0.072	0.088	0.101	0.112		125	0.034	0.040	0.052	0.062	0.071	0.087	0.099	0.111	
110	0.023	0.032	0.041	0.05	0.057	0.07	0.079	0.089		110	0.027	0.032	0.041	0.049	0.056	0.069	0.078	0.088	
440	0.075	0.108	0.138	0.165	0.19	0.232	0.265	0.296		450	0.091	0.106	0.136	0.163	0.187	0.229	0.262	0.292	
405	0.064	0.092	0.117	0.14	0.161	0.197	0.225	0.251		410	0.077	0.090	0.116	0.138	0.159	0.194	0.222	0.248	
330	0.053	0.076	0.096	0.116	0.133	0.162	0.185	0.207		335	0.063	0.075	0.095	0.114	0.131	0.160	0.183	0.204	
185	0.03	0.043	0.055	0.066	0.076	0.093	0.106	0.118		185	0.036	0.043	0.054	0.065	0.075	0.091	0.105	0.117	
295	0.053	0.076	0.096	0.116	0.133	0.162	0.185	0.207		300	0.063	0.075	0.095	0.114	0.131	0.160	0.183	0.204	
275	0.045	0.065	0.083	0.099	0.114	0.139	0.159	0.177		280	0.054	0.064	0.082	0.098	0.112	0.137	0.157	0.175	

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Groove milling



$$a_p = 0.3 \times D$$

$$a_e = 1 \times D$$

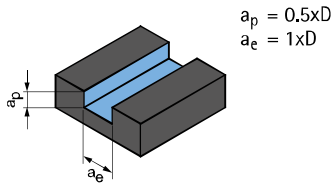
OptiMill-SPM-Rough | SCM951, 961

MMG*	Workpiece material	Strength/ hardness [N/mm ²] [HRC]	Cooling			v _c [m/min]	f _z [mm]			
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]			
							12.00	16.00	20.00	25.00
N N1	N1.1	Aluminium, non-alloy and alloy < 3 % Si	✓	✓	✓	1,530	0.271	0.331	0.378	0.422
	N1.2	Aluminium, alloy ≤ 7 % Si	✓	✓	✓	1,015	0.284	0.347	0.397	0.443
	N1.3	Aluminium, alloy > 7-12 % Si	✓	✓	✓	810	0.298	0.364	0.416	0.464
	N1.4	Aluminium, alloy > 12 % Si	✓	✓	✓	585	0.325	0.397	0.454	0.506

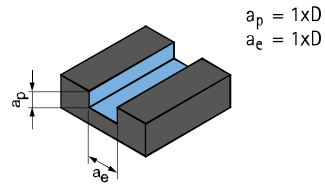
* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

Groove milling



Groove milling



	v_c [m/min]	f_z [mm]				v_c [m/min]	f_z [mm]			
		Diameter of milling cutter [mm]					Diameter of milling cutter [mm]			
		12.00	16.00	20.00	25.00		12.00	16.00	20.00	25.00
	1,530	0.235	0.287	0.328	0.366	1,530	0.186	0.228	0.260	0.291
	1,015	0.247	0.301	0.345	0.384	1,015	0.196	0.239	0.273	0.305
	810	0.258	0.316	0.361	0.403	810	0.205	0.251	0.286	0.320
	585	0.282	0.344	0.394	0.439	585	0.224	0.273	0.313	0.349

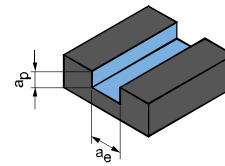
The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Tool length/correction factor:	
Length	f_z & v_c
Short	1
Long	0,9
Overlong	0,8
Extra long	0,6

Groove milling



$$a_p = 1 \times D$$

$$a_e = 1 \times D$$

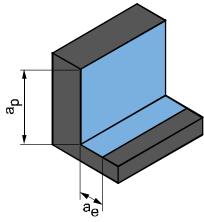
ECU-Mill-Uni-Rough&Finish | SCM220

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]							
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]							
							6.00	8.00	10.00	12.00	16.00	20.00	25.00	
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	140	0.028	0.035	0.042	0.049	0.060	0.068	0.076
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	115	0.026	0.033	0.040	0.046	0.056	0.064	0.071
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	125	0.028	0.035	0.042	0.049	0.060	0.068	0.076
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	90	0.023	0.030	0.035	0.041	0.050	0.057	0.063
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	85	0.027	0.034	0.041	0.047	0.058	0.066	0.074
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓	75	0.025	0.033	0.039	0.045	0.055	0.062	0.070
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓	70	0.024	0.031	0.037	0.042	0.052	0.059	0.066
	P4	P4.1	Stainless steels, ferritic and martensitic		✓	✓	55	0.018	0.024	0.028	0.033	0.040	0.045	0.051
P5	P5.1	Cast steel			✓	85	0.027	0.034	0.041	0.047	0.058	0.066	0.074	
P6	P6.1	Stainless cast steel, ferritic and martensitic			✓	55	0.013	0.017	0.020	0.023	0.028	0.032	0.035	
M	M1.1	Stainless steels, austenitic	< 700	✓		✓	40	0.016	0.021	0.025	0.028	0.035	0.040	0.044
	M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓	35	0.013	0.017	0.021	0.024	0.029	0.033	0.037
	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700	✓		✓	40	0.018	0.022	0.027	0.031	0.038	0.043	0.048
	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓	40	0.014	0.018	0.021	0.024	0.030	0.034	0.038
K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	150	0.046	0.059	0.071	0.081	0.099	0.114	0.127
	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	140	0.039	0.050	0.060	0.069	0.084	0.097	0.108
	K2.2	Cast iron with spheroidal graphite, GJS	500-800	✓	✓	✓	115	0.032	0.041	0.050	0.057	0.070	0.080	0.089
	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	65	0.018	0.024	0.028	0.033	0.040	0.045	0.051
	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	100	0.032	0.041	0.050	0.057	0.070	0.080	0.089
	K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	95	0.028	0.035	0.042	0.049	0.060	0.068	0.076
N	N1.1	Aluminium, non-alloy and alloy < 3 % Si		✓	✓	✓	535	0.047	0.060	0.072	0.083	0.101	0.116	0.129
	N1.2	Aluminium, alloy ≤ 7 % Si		✓	✓	✓	355	0.049	0.063	0.076	0.087	0.106	0.122	0.136
	N1.3	Aluminium, alloy > 7-12 % Si		✓	✓	✓	285	0.052	0.066	0.079	0.091	0.111	0.127	0.142
	N1.4	Aluminium, alloy > 12 % Si		✓	✓	✓	205	0.057	0.072	0.087	0.099	0.121	0.139	0.155
	N2.1	Copper, non-alloy and low-alloy	< 300	✓	✓	✓	205	0.038	0.048	0.058	0.066	0.081	0.093	0.103
	N2.2	Copper, alloy	> 300	✓	✓	✓	155	0.038	0.048	0.058	0.066	0.081	0.093	0.103
	N2.3	Brass, bronze, gunmetal	< 1200	✓	✓	✓	255	0.024	0.030	0.036	0.041	0.051	0.058	0.065

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

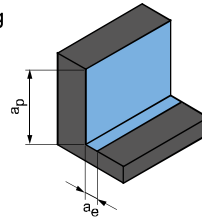
Roughing



$$a_p = 1.5 \times D$$

$$a_e = 0.25 \times D$$

Finishing



$$a_p = 1.5 \times D$$

$$a_e = 0.1 \times D$$

	v_c [m/min]	f_z [mm]							v_c [m/min]	f_z [mm]						
		Diameter of milling cutter [mm]								Diameter of milling cutter [mm]						
		6.00	8.00	10.00	12.00	16.00	20.00	25.00		6.00	8.00	10.00	12.00	16.00	20.00	25.00
	250	0.047	0.060	0.072	0.083	0.101	0.116	0.129	335	0.074	0.095	0.114	0.131	0.160	0.183	0.204
	205	0.044	0.056	0.067	0.077	0.094	0.108	0.120	275	0.069	0.089	0.106	0.122	0.149	0.171	0.190
	225	0.047	0.060	0.072	0.083	0.101	0.116	0.129	305	0.074	0.095	0.114	0.131	0.160	0.183	0.204
	160	0.039	0.050	0.060	0.069	0.084	0.096	0.108	215	0.062	0.079	0.095	0.109	0.133	0.152	0.170
	145	0.045	0.058	0.070	0.080	0.098	0.112	0.125	200	0.072	0.092	0.110	0.127	0.155	0.177	0.197
	135	0.043	0.055	0.066	0.076	0.093	0.106	0.118	185	0.068	0.087	0.104	0.120	0.147	0.168	0.187
	125	0.041	0.052	0.062	0.072	0.088	0.100	0.112	170	0.064	0.082	0.099	0.113	0.139	0.158	0.177
	100	0.031	0.040	0.048	0.055	0.067	0.077	0.086	140	0.050	0.063	0.076	0.087	0.107	0.122	0.136
	150	0.045	0.058	0.070	0.080	0.098	0.112	0.125	205	0.072	0.092	0.110	0.127	0.155	0.177	0.197
	100	0.022	0.028	0.034	0.039	0.047	0.054	0.060	140	0.035	0.044	0.053	0.061	0.075	0.085	0.095
	75	0.027	0.035	0.042	0.048	0.059	0.067	0.075	115	0.043	0.055	0.066	0.076	0.093	0.107	0.119
	70	0.023	0.029	0.035	0.040	0.049	0.056	0.062	105	0.036	0.046	0.055	0.063	0.077	0.088	0.099
	85	0.030	0.038	0.046	0.052	0.064	0.073	0.082	125	0.047	0.060	0.072	0.083	0.101	0.116	0.129
	75	0.024	0.030	0.036	0.041	0.051	0.058	0.065	115	0.037	0.048	0.057	0.065	0.080	0.091	0.102
	310	0.078	0.100	0.120	0.138	0.169	0.193	0.215	455	0.124	0.158	0.190	0.218	0.266	0.305	0.340
	285	0.067	0.085	0.102	0.117	0.143	0.164	0.183	415	0.105	0.135	0.161	0.185	0.226	0.259	0.289
	230	0.055	0.070	0.084	0.097	0.118	0.135	0.151	340	0.087	0.111	0.133	0.153	0.187	0.213	0.238
	130	0.031	0.040	0.048	0.055	0.067	0.077	0.086	190	0.050	0.063	0.076	0.087	0.107	0.122	0.136
	205	0.055	0.070	0.084	0.097	0.118	0.135	0.151	300	0.087	0.111	0.133	0.153	0.187	0.213	0.238
	195	0.047	0.060	0.072	0.083	0.101	0.116	0.129	285	0.074	0.095	0.114	0.131	0.160	0.183	0.204
	825	0.066	0.084	0.101	0.116	0.142	0.162	0.181	985	0.092	0.117	0.140	0.161	0.197	0.225	0.252
	550	0.069	0.088	0.106	0.122	0.149	0.170	0.190	655	0.096	0.123	0.147	0.169	0.207	0.237	0.264
	440	0.073	0.093	0.111	0.128	0.156	0.178	0.199	525	0.101	0.129	0.154	0.178	0.217	0.248	0.277
	315	0.079	0.101	0.121	0.139	0.170	0.194	0.217	380	0.110	0.141	0.168	0.194	0.237	0.270	0.302
	315	0.053	0.067	0.081	0.093	0.113	0.130	0.145	380	0.073	0.094	0.112	0.129	0.158	0.180	0.201
	235	0.053	0.067	0.081	0.093	0.113	0.130	0.145	285	0.073	0.094	0.112	0.129	0.158	0.180	0.201
	395	0.033	0.042	0.050	0.058	0.071	0.081	0.090	470	0.046	0.059	0.070	0.081	0.099	0.113	0.126

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Correction factor:	
Length	f_z & v_c
A/B	1.0
C	0.9
D	0.7
E	0.6

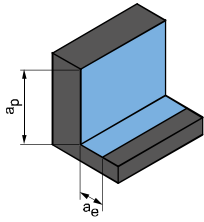
CPMill-Uni-Rough&Finish | CPM140

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
				MQL/Air	Dry	Coolant
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓		✓
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓		✓
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓		✓
	P5.1	Cast steel				✓
K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓
	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓
	K2.2	Cast iron with spheroidal graphite, GJS	500-800	✓	✓	✓
	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓
	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓
	K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓
N	N1.1	Aluminium, non-alloy and alloy < 3 % Si		✓	✓	✓
	N1.2	Aluminium, alloy ≤ 7 % Si		✓	✓	✓
	N1.3	Aluminium, alloy > 7-12 % Si		✓	✓	✓
	N1.4	Aluminium, alloy > 12 % Si		✓	✓	✓
	N2.1	Copper, non-alloy and low-alloy	< 300	✓	✓	✓
	N2.2	Copper, alloy	> 300	✓	✓	✓
	N2.3	Brass, bronze, gunmetal	< 1200	✓	✓	✓

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

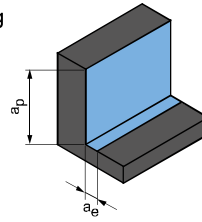
Roughing



$$a_p = 0.94 \times D$$

$$a_e = 0.25 \times D$$

Finishing



$$a_p = 0.94 \times D$$

$$a_e = 0.1 \times D$$

	v_c [m/min]	f_z [mm]						v_c [m/min]	f_z [mm]					
		Diameter of milling cutter [mm]							Diameter of milling cutter [mm]					
		8,00	10,00	12,00	16,00	20,00	25,00		8,00	10,00	12,00	16,00	20,00	25,00
	250	0.036	0.043	0.050	0.061	0.070	0.078	335	0.057	0.069	0.079	0.096	0.110	0.123
	205	0.034	0.041	0.047	0.057	0.065	0.073	275	0.054	0.064	0.074	0.090	0.103	0.115
	225	0.036	0.043	0.050	0.061	0.070	0.078	305	0.057	0.069	0.079	0.096	0.110	0.123
	160	0.030	0.036	0.042	0.051	0.058	0.065	215	0.048	0.057	0.066	0.080	0.092	0.103
	145	0.035	0.042	0.048	0.059	0.067	0.075	200	0.055	0.066	0.076	0.093	0.107	0.119
	135	0.033	0.040	0.046	0.056	0.064	0.071	185	0.053	0.063	0.072	0.088	0.101	0.113
	125	0.031	0.038	0.043	0.053	0.060	0.067	170	0.050	0.060	0.068	0.084	0.096	0.107
	150	0.035	0.042	0.048	0.059	0.067	0.075	205	0.055	0.066	0.076	0.093	0.107	0.119
	310	0.060	0.072	0.083	0.102	0.116	0.130	455	0.096	0.114	0.132	0.161	0.184	0.205
	285	0.051	0.062	0.071	0.086	0.099	0.110	415	0.081	0.097	0.112	0.137	0.156	0.174
	230	0.042	0.051	0.058	0.071	0.081	0.091	340	0.067	0.080	0.092	0.113	0.129	0.144
	130	0.024	0.029	0.033	0.041	0.046	0.052	190	0.038	0.046	0.053	0.064	0.074	0.082
	205	0.042	0.051	0.058	0.071	0.081	0.091	300	0.067	0.080	0.092	0.113	0.129	0.144
	195	0.036	0.043	0.050	0.061	0.070	0.078	285	0.057	0.069	0.079	0.096	0.110	0.123
	825	0.051	0.061	0.070	0.085	0.098	0.109	985	0.071	0.085	0.097	0.119	0.136	0.152
	550	0.053	0.064	0.073	0.090	0.103	0.114	655	0.074	0.089	0.102	0.125	0.143	0.159
	440	0.056	0.067	0.077	0.094	0.107	0.120	525	0.078	0.093	0.107	0.131	0.150	0.167
	315	0.061	0.073	0.084	0.103	0.117	0.131	380	0.085	0.102	0.117	0.143	0.163	0.182
	315	0.041	0.049	0.056	0.068	0.078	0.087	380	0.057	0.068	0.078	0.095	0.109	0.121
	235	0.041	0.049	0.056	0.068	0.078	0.087	285	0.057	0.068	0.078	0.095	0.109	0.121
	395	0.025	0.030	0.035	0.043	0.049	0.055	470	0.035	0.042	0.049	0.059	0.068	0.076

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.





SHOULDER MILLING CUTTER – FINISHING

Universal application

OptiMill-Uni-HPC-Finish | CPMill-Uni-HPC-Finish _____ 134

Hardened steel

OptiMill-Hardened-Finish _____ 140

Non-ferrous metals

OptiMill-SPM-Finish _____ 145

Technical appendix

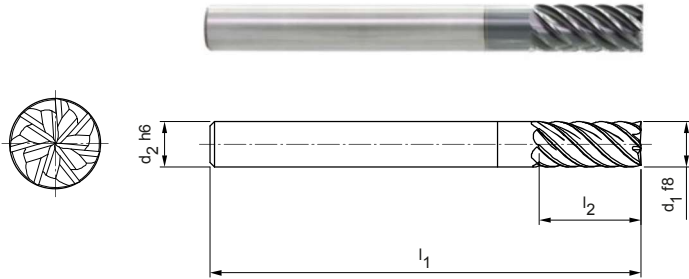
Cutting data recommendations _____ 146

OptiMill®-Uni-HPC-Finish

Shoulder milling cutter, 2xD design
SCM830

Design:

Diameter of milling cutter: 4.00 – 20.00 mm
Cutting material: HP213
Number of cutting edges: 7
Helix angle: 45°
Special features: Unequal spacing



Preferred series in stock

Dimensions					z	Specification	Order no.
d ₁ f8	d ₂ h6	l ₁	l ₂	Cx45°			
4,00	6	57	11	0,04	7	SCM830-0400Z07R-F0004HA2-HP213	30936070
5,00	6	57	13	0,05	7	SCM830-0500Z07R-F0005HA2-HP213	30936071
6,00	6	57	13	0,06	7	SCM830-0600Z07R-F0006HA2-HP213	30936072
8,00	8	63	19	0,08	7	SCM830-0800Z07R-F0008HA2-HP213	30936073
10,00	10	72	22	0,10	7	SCM830-1000Z07R-F0010HA2-HP213	30936074
12,00	12	83	26	0,12	7	SCM830-1200Z07R-F0012HA2-HP213	30936076
14,00	14	83	26	0,14	7	SCM830-1400Z07R-F0014HA2-HP213	30936077
16,00	16	92	32	0,16	7	SCM830-1600Z07R-F0016HA2-HP213	30936078
20,00	20	104	41	0,20	7	SCM830-2000Z07R-F0020HA2-HP213	30936090

Available on request

18,00	18	92	32	0,18	7	SCM830-1800Z07R-F0018HA2-HP213	30936079
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Configurable features

Shank form:
Shank form: HB

Specification:
SCM830-0400Z07R-F0004[shank form]2-HP213

Example:

SCM830-0400Z07R-F0004HB2-HP213

Shank form HB

Dimensions in mm.

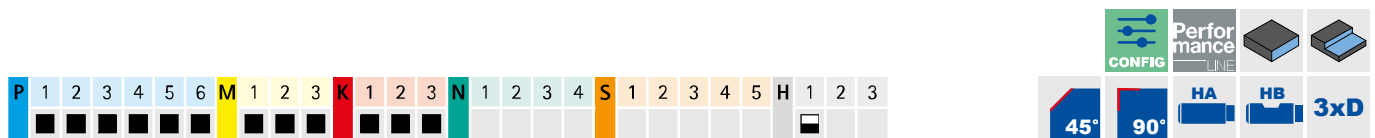
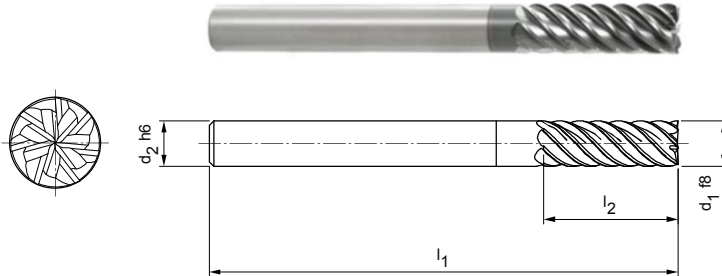
For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Finish

Shoulder milling cutter, 3xD design
SCM830

Design:
Diameter of milling cutter: 4.00 – 20.00 mm
Cutting material: HP213
Number of cutting edges: 7
Helix angle: ~ 45°
Special features: Unequal spacing



Design with chamfer | Preferred series in stock

Dimensions					z	Specification	Order no.
d ₁ f8	d ₂ h6	l ₁	l ₂	Cx45°			
4,00	6	62	16	0,04	7	SCM830-0400Z07R-F0004HA3-HP213	30936093
5,00	6	62	17	0,05	7	SCM830-0500Z07R-F0005HA3-HP213	30936094
6,00	6	62	18	0,06	7	SCM830-0600Z07R-F0006HA3-HP213	30936095
8,00	8	68	24	0,08	7	SCM830-0800Z07R-F0008HA3-HP213	30936096
10,00	10	80	30	0,10	7	SCM830-1000Z07R-F0010HA3-HP213	30936098
12,00	12	93	36	0,12	7	SCM830-1200Z07R-F0012HA3-HP213	30936099
14,00	14	99	42	0,14	7	SCM830-1400Z07R-F0014HA3-HP213	30936110
16,00	16	108	48	0,16	7	SCM830-1600Z07R-F0016HA3-HP213	30936111
20,00	20	126	60	0,20	7	SCM830-2000Z07R-F0020HA3-HP213	30936114

Design with chamfer | Available on request

18,00	18	117	54	0,18	7	SCM830-1800Z07R-F0018HA3-HP213	30936112
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Design with sharp edge | Preferred series in stock

4,00	6	62	16	-	7	SCM830-0400Z07R-S-HA3-HP213	31046210
5,00	6	62	17	-	7	SCM830-0500Z07R-S-HA3-HP213	31046211
6,00	6	62	18	-	7	SCM830-0600Z07R-S-HA3-HP213	31046212
8,00	8	68	24	-	7	SCM830-0800Z07R-S-HA3-HP213	31046213
10,00	10	80	30	-	7	SCM830-1000Z07R-S-HA3-HP213	31046214
12,00	12	93	36	-	7	SCM830-1200Z07R-S-HA3-HP213	31046215
14,00	14	99	42	-	7	SCM830-1400Z07R-S-HA3-HP213	31046216
16,00	16	108	48	-	7	SCM830-1600Z07R-S-HA3-HP213	31046217
20,00	20	126	60	-	7	SCM830-2000Z07R-S-HA3-HP213	31046219

Design with sharp edge | Available on request

18,00	18	117	54	-	7	SCM830-1800Z07R-S-HA3-HP213	31046218
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Configurable features



Shank form:
Shank form: HB



Specification:

SCM830-0400Z07R-F0004[shank form]3-HP213

Example:

SCM830-0400Z07R-F0004HB3-HP213

Shank form HB

Dimensions in mm.

For cutting data recommendations, see end of chapter.

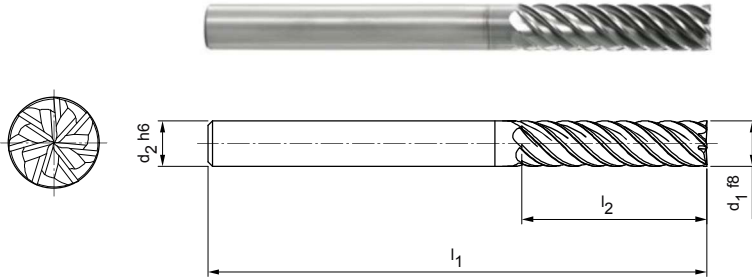
Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Finish

Shoulder milling cutter, 4xD design
SCM830

Design:

Diameter of milling cutter: 6.00 – 25.00 mm
Cutting material: HP213
Number of cutting edges: 7
Helix angle: 45°
Special features: Unequal spacing



Preferred series in stock

Dimensions					z	Specification	Order no.
d ₁ f8	d ₂ h6	l ₁	l ₂	Cx45°			
6,00	6	66	24	0,06	7	SCM830-0600Z07R-F0006HA4-HP209	30936116
8,00	8	74	32	0,08	7	SCM830-0800Z07R-F0008HA4-HP209	30936117
10,00	10	89	40	0,10	7	SCM830-1000Z07R-F0010HA4-HP209	30936118
12,00	12	100	48	0,12	7	SCM830-1200Z07R-F0012HA4-HP209	30936119
14,00	14	122	70	0,14	7	SCM830-1400Z07R-F0014HA4-HP209	30936131
16,00	16	123	64	0,16	7	SCM830-1600Z07R-F0016HA4-HP209	30936132
20,00	20	140	80	0,20	7	SCM830-2000Z07R-F0020HA4-HP209	30936134

Available on request

18,00	18	130	72	0,18	7	SCM830-1800Z07R-F0018HA4-HP209	30936133
25,00	25	170	100	0,25	7	SCM830-2500Z07R-F0025HA4-HP209	30936136

Configurable features

Shank form:
Shank form: HB

Specification:
SCM830-0600Z07R-F0006[shank form]4-HP209

Example:

SCM830-0600Z07R-F0006HB4-HP209

Shank form HB

Dimensions in mm.

For cutting data recommendations, see end of chapter.

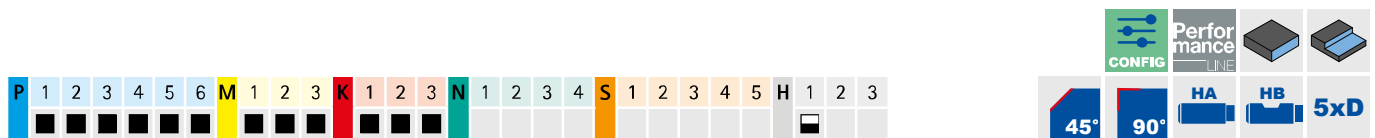
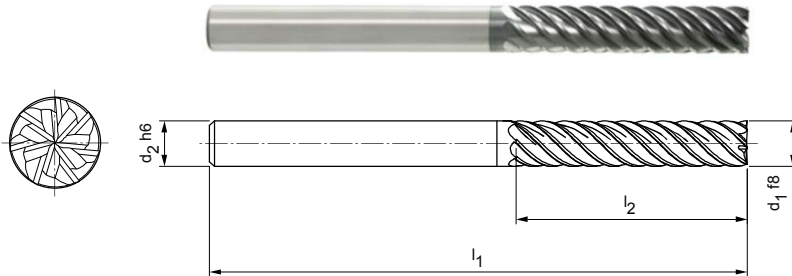
Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Finish

Shoulder milling cutter, 5xD design
SCM830

Design:

Diameter of milling cutter: 8,00 – 25,00 mm
Cutting material: HP209
Number of cutting edges: 7
Helix angle: ~ 45°
Special features: Unequal spacing



Design with chamfer | Preferred series in stock

Dimensions					z	Specification	Order no.
d ₁ f8	d ₂ h6	l ₁	l ₂	Cx45°			
8,00	8	81	40	0,08	7	SCM830-0800Z07R-F0008HA5-HP209	30936137
10,00	10	96	50	0,10	7	SCM830-1000Z07R-F0010HA5-HP209	30936138
12,00	12	112	60	0,12	7	SCM830-1200Z07R-F0012HA5-HP209	30936139
14,00	14	122	70	0,14	7	SCM830-1400Z07R-F0014HA5-HP209	30936150
16,00	16	136	80	0,16	7	SCM830-1600Z07R-F0016HA5-HP209	30936151
20,00	20	160	100	0,20	7	SCM830-2000Z07R-F0020HA5-HP209	30936153

Design with chamfer | Available on request

18,00	18	147	90	0,18	7	SCM830-1800Z07R-F0018HA5-HP209	30936152
25,00	25	195	125	0,25	7	SCM830-2500Z07R-F0025HA5-HP209	30936154

Edge design with sharp edge

8,00	8	81	40	-	7	SCM830-0800Z07R-S-HA5-HP209	31046449
10,00	10	96	50	-	7	SCM830-1000Z07R-S-HA5-HP209	31046470
12,00	12	112	60	-	7	SCM830-1200Z07R-S-HA5-HP209	31046471
14,00	14	122	70	-	7	SCM830-1400Z07R-S-HA5-HP209	31046473
16,00	16	136	80	-	7	SCM830-1600Z07R-S-HA5-HP209	31046474
20,00	20	160	100	-	7	SCM830-2000Z07R-S-HA5-HP209	31046476

Design with sharp edge | Available on request

18,00	18	147	90	-	7	SCM830-1800Z07R-S-HA5-HP209	31046475
25,00	25	195	125	-	7	SCM830-2500Z07R-S-HA5-HP209	31046477

Configurable features



Shank form:
Shank form: HB



Specification:

SCM830-0800Z07R-F0008[shank form]5-HP209

Example:

SCM830-0800Z07R-F0008HB5-HP209

Shank form HB

Dimensions in mm.

For cutting data recommendations, see end of chapter.

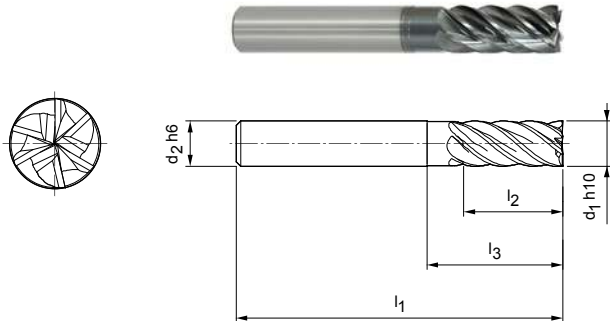
Special designs and other coatings available upon request.

OptiMill®-Uni-HPC-Finish

Shoulder milling cutter, long design with neck
SCM370

Design:

Diameter of milling cutter: 6.00 – 20.00 mm
Cutting material: HP213
Number of cutting edges: 6
Helix angle: 39°/41°
Special features: Unequal spacing



Preferred series in stock

Dimensions					z	Specification	Order no.
d ₁ h10	d ₂ h6	l ₁	l ₂	l ₃			
6,00	6	57	15	20	6	SCM370-0600Z06R-S-HA-HP213	30393541
8,00	8	63	21	25	6	SCM370-0800Z06R-S-HA-HP213	30393542
10,00	10	72	22	30	6	SCM370-1000Z06R-S-HA-HP213	30393543
12,00	12	83	26	36	6	SCM370-1200Z06R-S-HA-HP213	30393544
16,00	16	92	36	42	6	SCM370-1600Z06R-S-HA-HP213	30393545
20,00	20	104	41	55	6	SCM370-2000Z06R-S-HA-HP213	30393546

Configurable features



Shank form:
Shank form: HB



Specification:

SCM370-0600Z06R-S-[shank form]-HP213

Example:

SCM370-0600Z06R-S-HB-HP213

Shank form HB

Dimensions in mm.

For cutting data recommendations, see end of chapter.

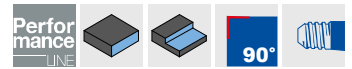
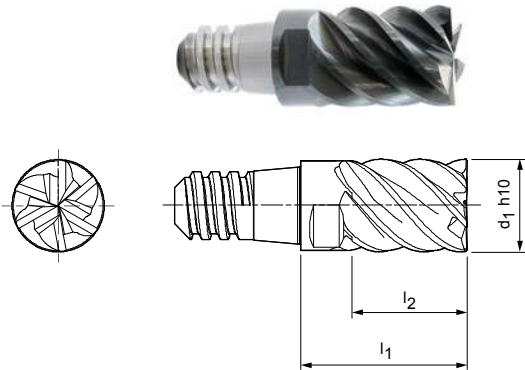
Special designs and other coatings available upon request.

CPMill®-Uni-HPC-Finish

Shoulder milling cutter, design with CFS connection
CPM130

Design:

Diameter of milling cutter: 8.00 – 25.00 mm
Cutting material: HP383
Number of cutting edges: 6
Helix angle: 45°
Special features: Unequal spacing




Preferred series in stock

Dimensions				z	a _p max.	SW	Specification	Order no.
d ₁ h10	CFS size	l ₁	l ₂					
8,00	6	15	10	6	7,5	SW 6	CPM130-0800Z06-S-06-HP383	30371380
10,00	8	18	12,5	6	9,4	SW 8	CPM130-1000Z06-S-08-HP383	30371381
12,00	10	22	15	6	11,3	SW 10	CPM130-1200Z06-S-10-HP383	30371382
16,00	12	28	20	6	15	SW 13	CPM130-1600Z06-S-12-HP383	30371383
20,00	16	35	25	6	18,8	SW 16	CPM130-2000Z06-S-16-HP383	30371386

Available on request

25,00	20	45	32	6	23,4	SW 21	CPM130-2500Z06-S-20-HP383	30371387
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Accessories

	CFS replaceable head holders CFS201	Page 218
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Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Hardened-Finish

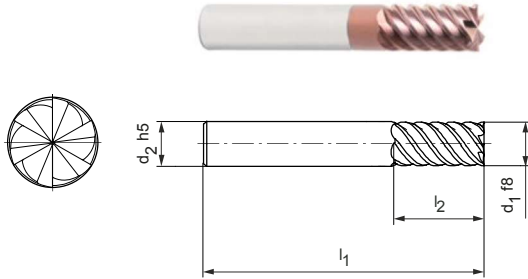
Shoulder milling cutter, 2xD design
SCM104

Design:

Diameter of milling cutter: 4.00 – 25.00 mm
Cutting material: HP808
Number of cutting edges: 6
Helix angle: 55°

Application:

For finishing of parts with a hardness of 45 HRC.



Design with sharp edge | Preferred series in stock

Dimensions					z	Specification	Order no.
d ₁ f8	d ₂ h5	l ₁	l ₂	R			
4,00	6	57	11	–	6	SCM104-0400Z06R-S-HA2-HP808	31152764
5,00	6	57	13	–	6	SCM104-0500Z06R-S-HA2-HP808	31152765
6,00	6	57	13	–	6	SCM104-0600Z06R-S-HA2-HP808	31152766
8,00	8	63	19	–	6	SCM104-0800Z06R-S-HA2-HP808	31152767
10,00	10	72	22	–	6	SCM104-1000Z06R-S-HA2-HP808	31152768
12,00	12	83	26	–	6	SCM104-1200Z06R-S-HA2-HP808	31152769
16,00	16	92	32	–	6	SCM104-1600Z06R-S-HA2-HP808	31152771

Design with sharp edge | Available on request

20,00	20	104	41	–	6	SCM104-2000Z06R-S-HA2-HP808	31152773
25,00	25	125	50	–	6	SCM104-2500Z06R-S-HA2-HP808	31152774

Design with corner radius | Preferred series in stock

4,00	6	57	11	0,5	6	SCM104-0400Z06R-R0050HA2-HP808	31199098
5,00	6	57	13	0,5	6	SCM104-0500Z06R-R0050HA2-HP808	31199099
5,00	6	57	13	1	6	SCM104-0500Z06R-R0100HA2-HP808	31199100
6,00	6	57	13	0,5	6	SCM104-0600Z06R-R0050HA2-HP808	31199101
6,00	6	57	13	1	6	SCM104-0600Z06R-R0100HA2-HP808	31199102
8,00	8	63	19	0,5	6	SCM104-0800Z06R-R0050HA2-HP808	31199103
8,00	8	63	19	1	6	SCM104-0800Z06R-R0100HA2-HP808	31199104
10,00	10	72	22	0,5	6	SCM104-1000Z06R-R0050HA2-HP808	31199105
10,00	10	72	22	1	6	SCM104-1000Z06R-R0100HA2-HP808	31199106
12,00	12	83	26	0,5	6	SCM104-1200Z06R-R0050HA2-HP808	31199107
12,00	12	83	26	1	6	SCM104-1200Z06R-R0100HA2-HP808	31199108
16,00	16	92	32	0,5	6	SCM104-1600Z06R-R0050HA2-HP808	31199109
16,00	16	92	32	1	6	SCM104-1600Z06R-R0100HA2-HP808	31199110
16,00	16	92	32	2	6	SCM104-1600Z06R-R0200HA2-HP808	31199111

Design with corner radius | Available on request

20,00	20	104	41	1	6	SCM104-2000Z06R-R0100HA2-HP808	31199112
25,00	20	104	41	2	6	SCM104-2500Z06R-R0200HA2-HP808	31199113

Configurable features



Shank form:
Shank form: HB



Example:
SCM104-0400Z06R-S-**HB4**-HP808

Shank form HB

Specification:

SCM104-0400Z06R-S-[shank form]2-HP808

OptiMill®-Hardened-Finish

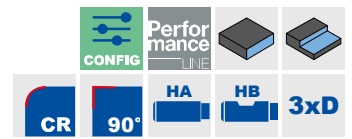
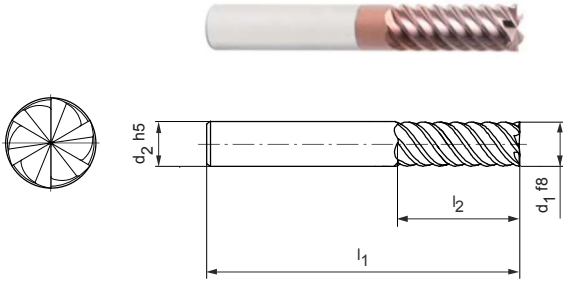
Shoulder milling cutter, 3xD design
SCM104

Design:

Diameter of milling cutter: 4.00 – 25.00 mm
Cutting material: HP808
Number of cutting edges: 6
Helix angle: 55°

Application:

For finishing of parts with a hardness of 45 HRC.



Design with sharp edge | Preferred series in stock

Dimensions					z	Specification	Order no.
d ₁ f8	d ₂ h5	l ₁	l ₂	R			
4,00	6	62	16	-	6	SCM104-0400Z06R-S-HA3-HP808	31152775
5,00	6	62	17	-	6	SCM104-0500Z06R-S-HA3-HP808	31152776
6,00	6	62	18	-	6	SCM104-0600Z06R-S-HA3-HP808	31152777
8,00	8	68	24	-	6	SCM104-0800Z06R-S-HA3-HP808	31152778
10,00	10	80	30	-	6	SCM104-1000Z06R-S-HA3-HP808	31152779
12,00	12	93	36	-	6	SCM104-1200Z06R-S-HA3-HP808	31152780
16,00	16	108	48	-	6	SCM104-1600Z06R-S-HA3-HP808	31152782

Design with sharp edge | Available on request

20,00	20	126	60	-	6	SCM104-2000Z06R-S-HA3-HP808	31152785
25,00	25	150	75	-	6	SCM104-2500Z06R-S-HA3-HP808	31152786


Design with corner radius | Preferred series in stock

4,00	6	62	16	0,5	6	SCM104-0400Z06R-R0050HA3-HP808	31199114
5,00	6	62	17	0,5	6	SCM104-0500Z06R-R0050HA3-HP808	31199115
5,00	6	62	17	1	6	SCM104-0500Z06R-R0100HA3-HP808	31199116
6,00	6	62	18	0,5	6	SCM104-0600Z06R-R0050HA3-HP808	31199117
6,00	6	62	18	1	6	SCM104-0600Z06R-R0100HA3-HP808	31199118
8,00	8	68	24	0,5	6	SCM104-0800Z06R-R0050HA3-HP808	31199119
8,00	8	68	24	1	6	SCM104-0800Z06R-R0100HA3-HP808	31199120
10,00	10	80	30	0,5	6	SCM104-1000Z06R-R0050HA3-HP808	31199121
10,00	10	80	30	1	6	SCM104-1000Z06R-R0100HA3-HP808	31199122
12,00	12	93	36	0,5	6	SCM104-1200Z06R-R0050HA3-HP808	31199123
12,00	12	93	36	1	6	SCM104-1200Z06R-R0100HA3-HP808	31199124
16,00	16	108	48	0,5	6	SCM104-1600Z06R-R0050HA3-HP808	31199125
16,00	16	108	48	1	6	SCM104-1600Z06R-R0100HA3-HP808	31199126
16,00	16	108	48	2	6	SCM104-1600Z06R-R0200HA3-HP808	31199127


Design with corner radius | Available on request

20,00	20	126	60	1	6	SCM104-2000Z06R-R0100HA2-HP808	31199128
20,00	20	126	60	2	6	SCM104-2000Z06R-R0200HA2-HP808	31199129

Configurable features



Shank form:
Shank form: HB



Specification:
SCM104-0400Z06R-S-[shank form]3-HP808

Example:
SCM104-0400Z06R-S-HB3-HP808

Shank form HB

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Hardened-Finish

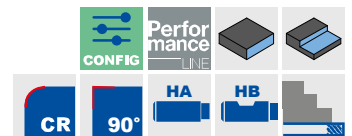
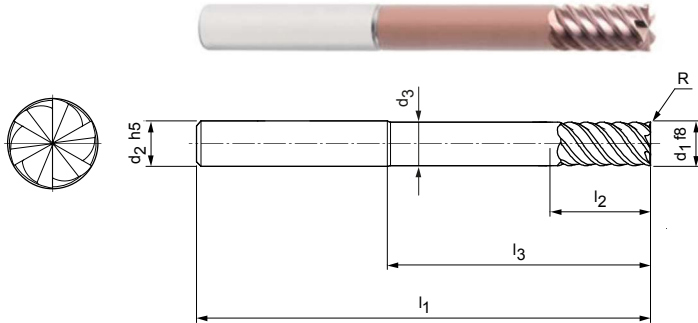
Shoulder milling cutter, extra long design with neck
SCM124

Design:

Diameter of milling cutter: 6.00 – 20.00 mm
Cutting material: HP808
Number of cutting edges: 6
Helix angle: 55°

Application:

For finishing of parts with a hardness of 45 HRC.



Design with sharp edge | Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f8	d2 h5	d3	l1	l2	l3	R			
6,00	6	5,8	80	13	42	-	6	SCM124-0600Z06R-S-HA-HP808	31199092
8,00	8	7,8	100	21	62	-	6	SCM124-0800Z06R-S-HA-HP808	31199093
10,00	10	9,7	100	22	58	-	6	SCM124-1000Z06R-S-HA-HP808	31199094
12,00	12	11,7	120	26	73	-	6	SCM124-1200Z06R-S-HA-HP808	31199095
16,00	16	15,6	150	36	100	-	6	SCM124-1600Z06R-S-HA-HP808	31199096

Design with sharp edge | Available on request

20,00	20	19,5	150	41	98	-	6	SCM124-2000Z06R-S-HA-HP808	31199097
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Design with corner radius | Preferred series in stock

6,00	6	5,8	80	13	42	0,5	6	SCM124-0600Z06R-R0050HA-HP808	31199130
6,00	6	5,8	80	13	42	1	6	SCM124-0600Z06R-R0100HA-HP808	31199131
8,00	8	7,8	100	21	62	0,5	6	SCM124-0800Z06R-R0050HA-HP808	31199132
8,00	8	7,8	100	21	62	1	6	SCM124-0800Z06R-R0100HA-HP808	31199133
10,00	10	9,7	100	22	58	0,5	6	SCM124-1000Z06R-R0050HA-HP808	31199134
10,00	10	9,7	100	22	58	1	6	SCM124-1000Z06R-R0100HA-HP808	31199135
12,00	12	11,7	120	26	73	0,5	6	SCM124-1200Z06R-R0050HA-HP808	31199136
12,00	12	11,7	120	26	73	1	6	SCM124-1200Z06R-R0100HA-HP808	31199137
16,00	16	15,6	150	36	100	0,5	6	SCM124-1600Z06R-R0050HA-HP808	31199138
16,00	16	15,6	150	36	100	1	6	SCM124-1600Z06R-R0100HA-HP808	31199139
16,00	16	15,6	150	36	100	2	6	SCM124-1600Z06R-R0200HA-HP808	31199140


Design with corner radius | Available on request

20,00	20	19,5	150	41	98	1	6	SCM124-2000Z06R-R0100HA-HP808	31199141
20,00	20	19,5	150	41	98	2	6	SCM124-2000Z06R-R0200HA-HP808	31199142

Configurable features



Shank form:
Shank form: HB



Specification:
SCM124-0600Z06R-S-[shank form]-HP808

Example:

SCM124-0600Z06R-S-HB-HP808

Shank form HB

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-SPM-Finish

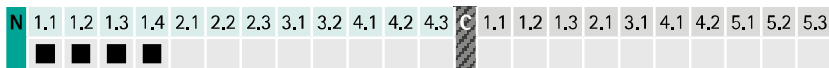
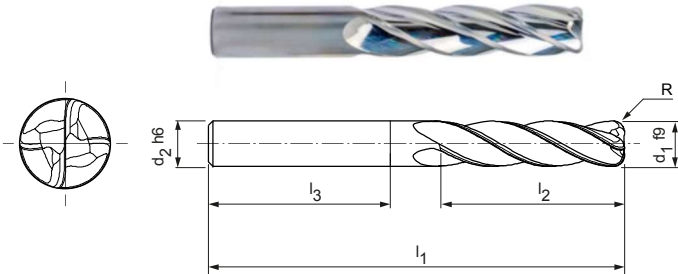
Shoulder milling cutter, 4xD design
SCM970

Design:

Diameter of milling cutter: 12.00 - 25.00 mm
Cutting material: HU019
Number of cutting edges: 4
Helix angle: 31°

Application:

Finishing of structural parts made of aluminium. Machining of deep pockets and delicate component structures even with large wrappings without "pull effect" (for example at the pocket corners).



Metric dimensions | Preferred series in stock

Dimensions						z	Specification	Order no.
d1 f9	d2 h6	l1	l2	l4	R			
12,00	12	100	48	45	2	4	SCM970-1200Z04R-R0200HA-HU019	31111852
12,00	12	100	48	45	3	4	SCM970-1200Z04R-R0300HA-HU019	31082278
16,00	16	123	64	48	3	4	SCM970-1600Z04R-R0300HA-HU019	31082280
16,00	16	123	64	48	4	4	SCM970-1600Z04R-R0400HA-HU019	31082281
20,00	20	140	80	50	3	4	SCM970-2000Z04R-R0300HA-HU019	31082283
20,00	20	140	80	50	4	4	SCM970-2000Z04R-R0400HA-HU019	31082284

Metric dimensions | Available upon request

25,00	25	170	100	56	3	4	SCM970-2500Z04R-R0300HA-HU019	31082285
25,00	25	170	100	56	3	4	SCM970-2500Z04R-R0300HB-HU019	31190883

Inch dimensions | Available upon request

1/2"	1/2"	4"	2"	1,771"	0,12"	4	SCM970-1270Z04R-R0300HA-HU019	31082279
3/4"	3/4"	5 1/2"	3"	1,968"	0,12"	4	SCM970-1905Z04R-R0300HA-HU019	31082282

Configurable features

Shank form:
Shank form: HB

Specification:
SCM970-1200Z04R-R0200[shank form]-HU019

Example:

SCM970-1200Z04R-R0200HB-HU019

Shank form HB

Dimensions in mm.

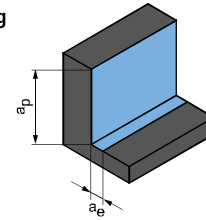
For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Finishing



$$a_p = 1.5 \times D$$

$$a_e = 0.1 \times D$$

OptiMill-Uni-HPC-Finish | SCM370, 830

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v _c [m/min]	f _z [mm]								
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]								
							4.00	6.00	8.00	10.00	12.00	16.00	20.00	25.00	
P	P1	P1.1 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	385	0.042	0.06	0.077	0.093	0.106	0.13	0.149	0.166
		P1.2 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	315	0.039	0.056	0.072	0.086	0.099	0.121	0.139	0.155
	P2	P2.1 Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	350	0.042	0.06	0.077	0.093	0.106	0.13	0.149	0.166
		P2.2 Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	245	0.035	0.05	0.064	0.077	0.089	0.108	0.124	0.138
	P3	P3.1 Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	225	0.041	0.058	0.075	0.089	0.103	0.126	0.144	0.16
		P3.2 Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓	210	0.039	0.055	0.071	0.085	0.097	0.119	0.136	0.152
		P3.3 Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓	190	0.036	0.052	0.067	0.08	0.092	0.113	0.129	0.144
	P4	P4.1 Stainless steels, ferritic and martensitic		✓	✓	✓	155	0.028	0.04	0.052	0.062	0.071	0.087	0.099	0.11
	P5	P5.1 Cast steel			✓	✓	235	0.041	0.058	0.075	0.089	0.103	0.126	0.144	0.16
	P6	P6.1 Stainless cast steel, ferritic and martensitic			✓	✓	155	0.02	0.028	0.036	0.043	0.05	0.061	0.069	0.077
M	M1	M1.1 Stainless steels, austenitic	< 700	✓	✓	✓	130	0.025	0.035	0.045	0.054	0.062	0.076	0.087	0.097
		M1.2 Stainless steels, ferritic/austenitic (duplex)	< 1000		✓	✓	120	0.02	0.029	0.037	0.045	0.051	0.063	0.072	0.08
	M2	M2.1 Stainless/heat-resistant cast steel, austenitic	< 700	✓	✓	✓	145	0.027	0.038	0.049	0.059	0.067	0.082	0.094	0.105
	M3	M3.1 Stainless cast steel, ferritic/austenitic (duplex)	< 1000		✓	✓	130	0.021	0.03	0.039	0.046	0.053	0.065	0.074	0.083
K	K1	K1.1 Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	520	0.07	0.101	0.129	0.154	0.177	0.216	0.248	0.276
		K2.1 Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	475	0.06	0.086	0.109	0.131	0.151	0.184	0.21	0.235
	K2	K2.2 Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	390	0.049	0.071	0.09	0.108	0.124	0.152	0.173	0.193
		K2.3 Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	215	0.028	0.04	0.052	0.062	0.071	0.087	0.099	0.11
	K3	K3.1 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	345	0.049	0.071	0.09	0.108	0.124	0.152	0.173	0.193
		K3.2 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	325	0.042	0.06	0.077	0.093	0.106	0.13	0.149	0.166

Factors for tool lengths 3xD/4xD/5xD ***

Max. machining depth a _p	a _e max.	Correction factors	
		v _c	f _z
3xD	0,1xD	0,9	0,9
4xD	0,05xD	0,9	0,7
5xD	0,05xD	0,8	0,6

* MAPAL machining groups

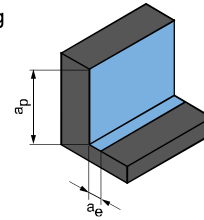
** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

*** In order to achieve very good surface results, the feed rate must be reduced further.

The specified machining values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.

Finishing



$$a_p = 0.94 \times D$$

$$a_e = 0.1 \times D$$

CPMill-Uni-HPC-Finish | CPM130

MMG*	Workpiece material			Strength/ hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]					
					MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]					
									8.00	10.00	12.00	16.00	20.00	25.00
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	385	0.057	0.069	0.079	0.096	0.11	0.123
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	315	0.054	0.064	0.074	0.09	0.103	0.115
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	350	0.057	0.069	0.079	0.096	0.11	0.123
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	245	0.048	0.057	0.066	0.08	0.092	0.103
	P3	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	225	0.055	0.066	0.076	0.093	0.107	0.119
		P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓	210	0.053	0.063	0.072	0.088	0.101	0.113
		P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓	190	0.05	0.06	0.068	0.084	0.096	0.107
P5	P5.1	Cast steel				✓	235	0.055	0.066	0.076	0.093	0.107	0.119	
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	520	0.096	0.114	0.132	0.161	0.184	0.205
		K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	475	0.081	0.097	0.112	0.137	0.156	0.174
	K2	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	390	0.067	0.08	0.092	0.113	0.129	0.144
		K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	215	0.038	0.046	0.053	0.064	0.074	0.082
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	345	0.067	0.08	0.092	0.113	0.129	0.144
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	325	0.057	0.069	0.079	0.096	0.11	0.123

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group. The specified machining values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

OptiMill-Hardened-Finish | SCM104

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			
			Dry	Air/MQL	Coolant	
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓
	P4.1	Stainless steels, ferritic and martensitic			✓	✓
	P5.1	Cast steel			✓	✓
	P6.1	Stainless cast steel, ferritic and martensitic			✓	✓
M	M1.1	Stainless steels, austenitic	< 700			✓
	M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓
	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700			✓
	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓
K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓
	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓
	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓
	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓
	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓
	K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓
H	H1.1	Hardened steel / cast steel	< 44	✓	✓	
	H1.2	Hardened steel / cast steel	< 55	✓	✓	
	H2.1	Hardened steel / cast steel	< 60		✓	
	H2.2	Hardened steel / cast steel	< 65		✓	
	H2.3	Hardened steel / cast steel	< 68		✓	
	H3.1	Wear-resistant cast/chill casting, GJN		✓	✓	

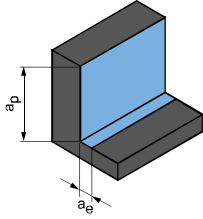
OptiMill-SPM-Finish | SCM970

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
			MQL/Air	Dry	Coolant
N	N1.1	Aluminium, non-alloy and alloy < 3 % Si	✓	✓	✓
	N1.2	Aluminium, alloy ≤ 7 % Si	✓	✓	✓
	N1.3	Aluminium, alloy > 7-12 % Si	✓	✓	✓
	N1.4	Aluminium, alloy > 12 % Si	✓	✓	✓

* MAPAL machining groups

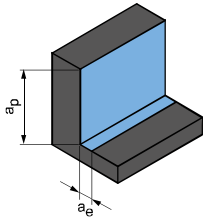
** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

Finishing



	a_p [mm] in % of D	a_e [mm] in % of D	v_c [m/min]	f_z [mm]									
				Diameter of milling cutter [mm]									
				4.00	5.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00
	100	2	200 - 220	0.025	0.030	0.040	0.050	0.065	0.075	0.090	0.105	0.118	0.131
	100	2	180 - 200	0.024	0.029	0.038	0.048	0.062	0.071	0.086	0.100	0.112	0.124
	100	2	180 - 200	0.025	0.030	0.040	0.050	0.065	0.075	0.090	0.105	0.118	0.131
	100	2	160 - 180	0.024	0.029	0.038	0.048	0.062	0.071	0.086	0.100	0.112	0.124
	100	2	180 - 200	0.025	0.030	0.040	0.050	0.065	0.075	0.090	0.105	0.118	0.131
	100	2	160 - 180	0.024	0.029	0.038	0.048	0.062	0.071	0.086	0.100	0.112	0.124
	100	2	140 - 160	0.021	0.026	0.034	0.043	0.055	0.064	0.077	0.089	0.100	0.111
	100	2	140 - 160	0.021	0.026	0.034	0.043	0.055	0.064	0.077	0.089	0.100	0.111
	100	2	140 - 160	0.021	0.026	0.034	0.043	0.055	0.064	0.077	0.089	0.100	0.111
	100	2	150 - 170	0.023	0.027	0.036	0.045	0.059	0.068	0.081	0.095	0.106	0.118
	100	1.8	110 - 130	0.023	0.027	0.036	0.045	0.059	0.068	0.081	0.095	0.106	0.118
	100	1.5	90 - 110	0.021	0.026	0.034	0.043	0.055	0.064	0.077	0.089	0.100	0.111
	100	1.8	110 - 130	0.023	0.027	0.036	0.045	0.059	0.068	0.081	0.095	0.106	0.118
	100	1.5	90 - 130	0.021	0.026	0.034	0.043	0.055	0.064	0.077	0.089	0.100	0.111
	100	2	200 - 220	0.025	0.030	0.040	0.050	0.065	0.075	0.090	0.105	0.118	0.131
	100	2	180 - 200	0.024	0.029	0.038	0.048	0.062	0.071	0.086	0.100	0.112	0.124
	100	2	180 - 200	0.024	0.029	0.038	0.048	0.062	0.071	0.086	0.100	0.112	0.124
	100	2	170 - 190	0.023	0.027	0.036	0.045	0.059	0.068	0.081	0.095	0.106	0.118
	100	2	200 - 220	0.025	0.030	0.040	0.050	0.065	0.075	0.090	0.105	0.118	0.131
	100	2	180 - 200	0.024	0.029	0.038	0.048	0.062	0.071	0.086	0.100	0.112	0.124
	100	1.5	110 - 130	0.021	0.026	0.034	0.043	0.055	0.064	0.077	0.089	0.100	0.111
	100	1.2	90 - 115	0.018	0.021	0.028	0.035	0.046	0.053	0.063	0.074	0.082	0.092
	100	0.8	80 - 100	0.015	0.018	0.024	0.030	0.039	0.045	0.054	0.063	0.071	0.079
	100	0.6	70 - 90	0.013	0.015	0.020	0.025	0.033	0.038	0.045	0.053	0.059	0.066
	100	0.4	60 - 85	0.010	0.012	0.016	0.020	0.026	0.030	0.036	0.042	0.047	0.052
	100	0.8	80 - 100	0.015	0.018	0.024	0.030	0.039	0.045	0.054	0.063	0.071	0.079

Finishing



$a_p = 1xD$
 $a_e = 0.1xD$

$a_p = 1xD$
 $a_e = 0.1xD$

	v_c [m/min]	f_z [mm]			
		Diameter of milling cutter [mm]			
		12.00	16.00	20.00	25.00
	985	0.107	0.131	0.150	0.167
	655	0.112	0.137	0.157	0.175
	525	0.118	0.144	0.164	0.184
	380	0.128	0.157	0.179	0.200

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.





SHOULDER MILLING CUTTER – TROCHOIDAL MILLING

Universal application

OptiMill-Tro-Uni 152

Steel and stainless steel

OptiMill-Tro-PM 155

Hardened steel

OptiMill-Tro-H 160

Titanium and nickel-based alloys

OptiMill-Tro-S 161

OptiMill-Tro-Titan 162

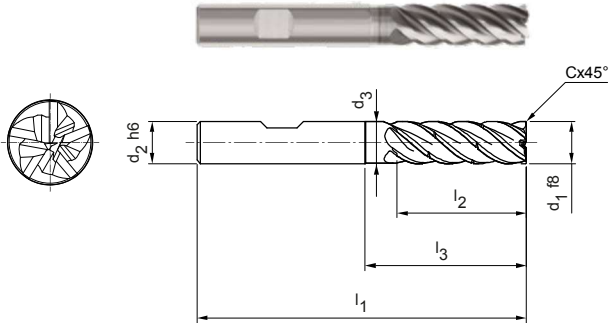
Technical appendix

Cutting data recommendations 164

Application notes Trochoidal milling 402

OptiMill®-Tro-Uni

Shoulder milling cutter, 3xD design with neck, includes chip breaker
SCM580 | SCM940



Design:

- Diameter of milling cutter: 4.00 – 20.00 mm
- Cutting material: HP213
- Number of cutting edges: 5
- Helix angle: ~ 41°
- Balancing quality: Cutting edge portion balanced on G2.5 according to DIN ISO1940-G2.5
- Special features: Unequal spacing, chip breaker

Application:

Design with chip breaker for optimum chip control. Ensures chips are shortened.

Product configuration bar: P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2 3

Icons: CONFIG, Expert LINE, 45°, HA, HB, 3xD

Preferred series in stock

Dimensions							z	Chip breaker	Specification	Order no.
d1 f8	d2 h6	d3	l1	l2	l3	Cx45°				
4,00	6	3,9	62	16	23	0,08	5	1	SCM580-0400Z05R-F0008HB-HP213	30615710
5,00	6	4,8	62	17	24	0,10	5	1	SCM580-0500Z05R-F0010HB-HP213	30564623
6,00	6	5,8	62	18	25	0,12	5	1	SCM580-0600Z05R-F0012HB-HP213	30564624
8,00	8	7,8	68	24	30	0,16	5	1	SCM580-0800Z05R-F0016HB-HP213	30564625
10,00	10	9,8	80	30	35	0,20	5	1	SCM580-1000Z05R-F0020HB-HP213	30564626
12,00	12	11,8	93	36	45	0,24	5	2	SCM940-1200Z05R-F0024HB3-HP213	31054530
14,00	14	13,8	99	42	50	0,28	5	2	SCM940-1400Z05R-F0028HB3-HP213	31054531
16,00	16	15,8	108	48	55	0,32	5	2	SCM940-1600Z05R-F0032HB3-HP213	31054532
20,00	20	19,8	126	60	70	0,40	5	2	SCM940-2000Z05R-F0040HB3-HP213	31054533

Configurable features

Shank form:
Shank form: HA

Specification up to ø 10 mm:
SCM580-0400Z05R-F0008[shank form]-HP213

Specification from ø 12 mm:
SCM940-1200Z05R-F0024[shank form]3-HP213

Example:

SCM580-0400Z05R-F0008HA-HP213

_____ Shank form HA

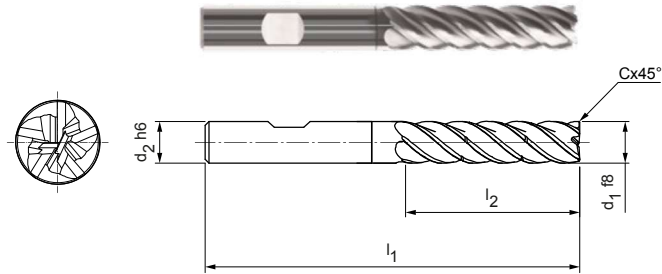
Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Tro-Uni

Shoulder milling cutter, 4xD design, with chip breaker
SCM940

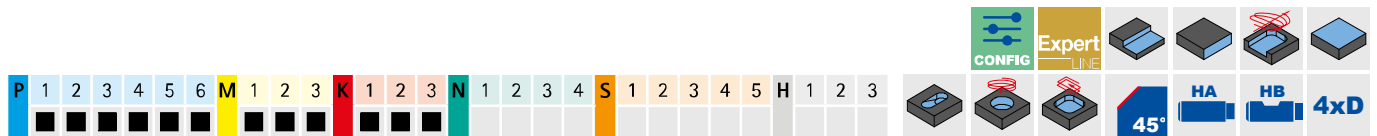


Design:

- Diameter of milling cutter: 5.00 – 20.00 mm
- Cutting material: HP209
- Number of cutting edges: 5
- Helix angle: ~ 41°
- Balancing quality: Cutting edge portion balanced on G2.5 according to DIN ISO 1940-G2.5
- Special features: Unequal spacing, chip breaker

Application:

Design with chip breaker for optimum chip control. Ensures chips are shortened.




Preferred series in stock

Dimensions					z	Chip breaker	Specification	Order no.
d ₁ f8	d ₂ h6	l ₁	l ₂	Cx45°				
5,00	6	66	20	0,10	5	2	SCM940-0500Z05R-F0010HB4-HP209	31054534
6,00	6	66	24	0,12	5	2	SCM940-0600Z05R-F0012HB4-HP209	31054535
8,00	8	74	32	0,16	5	2	SCM940-0800Z05R-F0016HB4-HP209	31054536
10,00	10	89	40	0,20	5	2	SCM940-1000Z05R-F0020HB4-HP209	31054537
12,00	12	100	48	0,24	5	2	SCM940-1200Z05R-F0024HB4-HP209	31054538
16,00	16	123	64	0,32	5	2	SCM940-1600Z05R-F0032HB4-HP209	31054540
20,00	20	140	80	0,40	5	2	SCM940-2000Z05R-F0040HB4-HP209	31054541


Available on request

14,00	14	108	56	0,28	5	2	SCM940-1400Z05R-F0028HB4-HP209	31054539
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Configurable features



Shank form:
Shank form: HA



Specification:
SCM940-0500Z05R-F0010[shank form]4-HP209

Example:

SCM940-0500Z05R-F0010**HA**4-HP209

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Tro-Uni

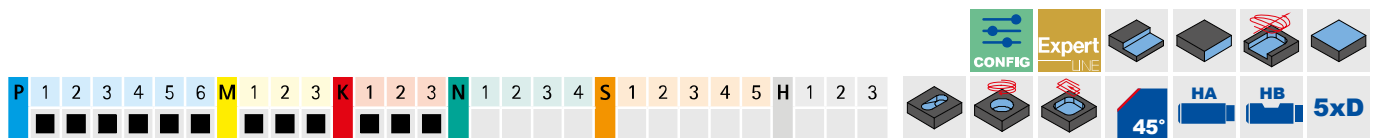
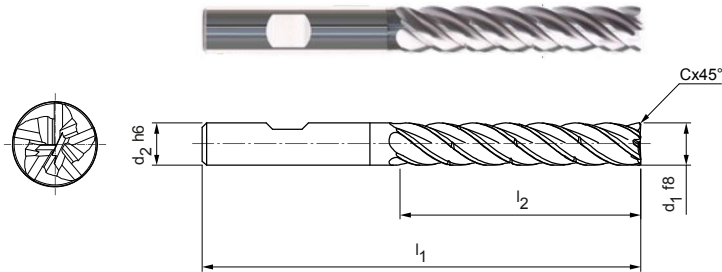
Shoulder milling cutter, 5xD design, with chip breaker
SCM940

Design:

Diameter of milling cutter: 8,00 – 20,00 mm
Cutting material: HP209
Number of cutting edges: 5
Helix angle: ~ 41°
Balancing quality: Cutting edge portion balanced on G2.5 according to DIN ISO 1940-G2.5
Special features: Unequal spacing, chip breaker

Application:

Design with chip breaker for optimum chip control. Ensures chips are shortened.



Preferred series in stock

Dimensions					z	Chip breaker	Specification	Order no.
d ₁ f8	d ₂ h6	l ₁	l ₂	Cx45°				
8,00	8	81	40	0,16	5	3	SCM940-0800Z05R-F0016HB5-HP209	31054542
10,00	10	96	50	0,20	5	3	SCM940-1000Z05R-F0020HB5-HP209	31054543
12,00	12	112	60	0,24	5	3	SCM940-1200Z05R-F0024HB5-HP209	31054544
16,00	16	136	80	0,32	5	3	SCM940-1600Z05R-F0032HB5-HP209	31054546
20,00	20	160	100	0,40	5	3	SCM940-2000Z05R-F0040HB5-HP209	31054547

Available on request

14,00	14	122	70	0,28	5	3	SCM940-1400Z05R-F0028HB5-HP209	31054545
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Configurable features



Shank form:
Shank form: HA



Specification:

SCM940-0800Z05R-F0016[shank form]5-HP209

Example:

SCM940-0800Z05R-F0016HA5-HP209

Shank form HA

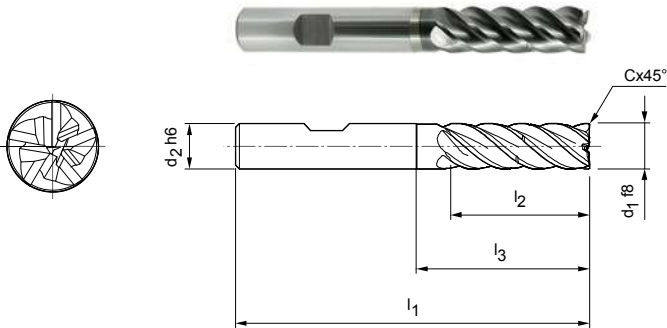
Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Tro-PM

Shoulder milling cutter, 3xD design with neck, includes chip breaker
SCM590



Design:

- Diameter of milling cutter: 4.00 – 25.00 mm
- Cutting material: HP723
- Number of cutting edges: 5
- Helix angle: 41° – 42°
- Balancing quality: Cutting edge portion balanced on G2.5 according to DIN ISO 1940-G2.5
- Special features: Unequal spacing, chip breaker

Application:


Design with chip breaker for optimum chip control. Ensures chips are shortened.




Preferred series in stock

Dimensions						z	Chip breaker	Specification	Order no.
d1 f8	d2 h6	l1	l2	l3	Cx45°				
4,00	6	62	16	23	0,08	5	1	SCM590-0400Z05R-F0008HB-HP723	30563364
5,00	6	62	17	24	0,10	5	1	SCM590-0500Z05R-F0010HB-HP723	30563365
6,00	6	62	18	25	0,12	5	1	SCM590-0600Z05R-F0012HB-HP723	30563366
8,00	8	68	24	30	0,16	5	1	SCM590-0800Z05R-F0016HB-HP723	30563367
10,00	10	80	30	35	0,20	5	1	SCM590-1000Z05R-F0020HB-HP723	30563368
12,00	12	93	36	45	0,24	5	1	SCM590-1200Z05R-F0024HB-HP723	30563369
14,00	14	99	42	50	0,28	5	1	SCM590-1400Z05R-F0028HB-HP723	30563370
16,00	16	108	48	55	0,32	5	1	SCM590-1600Z05R-F0032HB-HP723	30563371
18,00	18	117	54	67	0,36	5	1	SCM590-1800Z05R-F0036HB-HP723	30615879
20,00	20	126	60	70	0,40	5	1	SCM590-2000Z05R-F0040HB-HP723	30563372
25,00	25	150	75	92	0,50	5	1	SCM590-2500Z05R-F0050HB-HP723	30615113

Configurable features



Shank form:
Shank form: HA



Specification:
SCM590-0400Z05R-F0008[shank form]-HP723

Example:

SCM590-0400Z05R-F0008HA-HP723

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

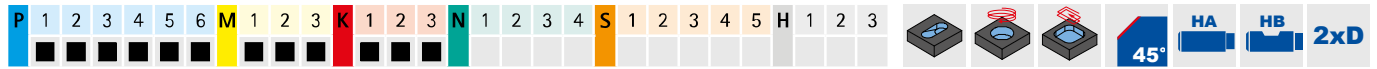
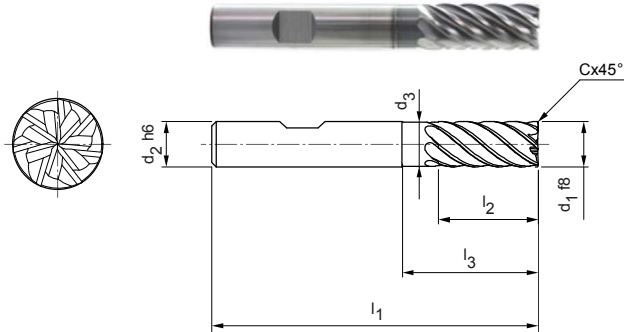
Special designs and other coatings available upon request.

OptiMill®-Tro-PM

Shoulder milling cutter, 2xD design with neck
SCM820

Design:

Diameter of milling cutter: 4.00 – 25.00 mm
 Cutting material: HP723
 Number of cutting edges: 7
 Helix angle: ~ 40°
 Balancing quality: Cutting edge portion balanced on G2.5 according to DIN ISO 1940-G2.5
 Special features: Unequal spacing




Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f8	d2 h6	d3	l1	l2	l3	Cx45°			
4,00	6	-	57	11	-	0,08	7	SCM820-0400Z07R-F0008HB2-HP723	30855545
5,00	6	-	57	13	-	0,10	7	SCM820-0500Z07R-F0010HB2-HP723	30855546
6,00	6	5,8	57	13	19	0,12	7	SCM820-0600Z07R-F0012HB2-HP723	30855547
8,00	8	7,8	63	19	25	0,16	7	SCM820-0800Z07R-F0016HB2-HP723	30855548
10,00	10	9,8	72	22	30	0,20	7	SCM820-1000Z07R-F0020HB2-HP723	30855549
12,00	12	11,8	83	26	36	0,24	7	SCM820-1200Z07R-F0024HB2-HP723	30855550
16,00	16	15,8	92	32	42	0,32	7	SCM820-1600Z07R-F0032HB2-HP723	30855552
20,00	20	19,8	104	41	52	0,40	7	SCM820-2000Z07R-F0040HB2-HP723	30855554


Available on request

14,00	14	13,8	83	26	36	0,28	7	SCM820-1400Z07R-F0028HB2-HP723	30855551
18,00	18	17,8	92	32	42	0,36	7	SCM820-1800Z07R-F0036HB2-HP723	30855553
25,00	25	24,5	125	50	65	0,50	7	SCM820-2500Z07R-F0050HB2-HP723	30855555

Configurable features



Shank form:
Shank form: HA



Specification:
SCM820-0400Z07R-F0008[shank form]2-HP723

Example:

SCM820-0400Z07R-F0008HA2-HP723

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Tro-PM

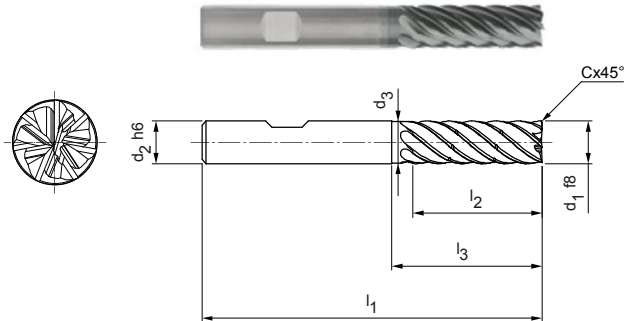
Shoulder milling cutter, 3xD design with neck, includes chip breaker
SCM820 | SCM930

Design:

Diameter of milling cutter: 4.00 – 20.00 mm
Cutting material: HP723
Number of cutting edges: 7
Helix angle: ~ 40°
Balancing quality: Cutting edge portion balanced to G2.5 according to DIN ISO 1940-G2.5
Special features: Unequal spacing, chip breaker

Application:

Design with chip breaker for optimum chip control. Ensures chips are shortened.



Preferred series in stock

Dimensions							z	Chip breaker	Specification	Order no.
d ₁ f8	d ₂ h6	d ₃	l ₁	l ₂	l ₃	Cx45°				
4,00	6	3,9	62	16	23	0,08	7	1	SCM820-0400Z07R-F0008HB3-HP723	30855556
5,00	6	4,8	62	17	24	0,10	7	1	SCM820-0500Z07R-F0010HB3-HP723	30855557
6,00	6	5,8	62	18	25	0,12	7	1	SCM820-0600Z07R-F0012HB3-HP723	30855558
8,00	8	7,8	68	24	30	0,16	7	1	SCM820-0800Z07R-F0016HB3-HP723	30855559
10,00	10	9,8	80	30	35	0,20	7	1	SCM820-1000Z07R-F0020HB3-HP723	30855560
12,00	12	11,8	93	36	45	0,24	7	2	SCM930-1200Z07R-F0024HB3-HP723	31054500
16,00	16	15,8	108	48	55	0,32	7	2	SCM930-1600Z07R-F0032HB3-HP723	31054502
20,00	20	19,8	126	60	70	0,40	7	2	SCM930-2000Z07R-F0040HB3-HP723	31054503

Available on request

14,00	14	13,8	99	42	50	0,28	7	2	SCM930-1400Z07R-F0028HB3-HP723	31054501
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Configurable features



Shank form:
Shank form: HA



Specification up to ø 10 mm:

SCM820-0400Z07R-F0008[shank form]3-HP723

Specification from ø 12 mm:

SCM930-1200Z07R-F0024[shank form]3-HP723

Example:

SCM820-0400Z07R-F0008HA3-HP723

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Tro-PM

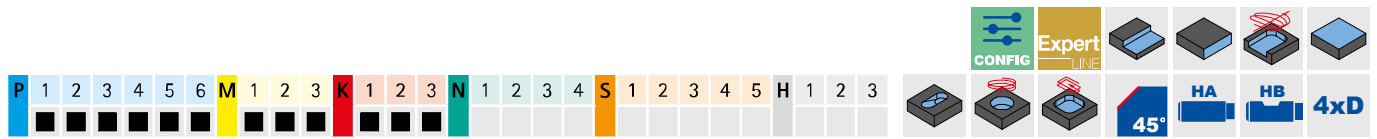
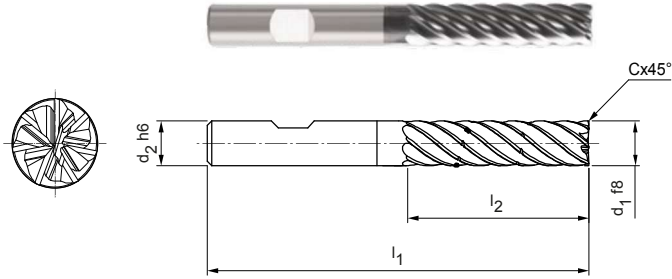
Shoulder milling cutter, 4xD design, with chip breaker
SCM930

Design:

Diameter of milling cutter: 6.00 – 20.00 mm
Cutting material: HP210
Number of cutting edges: 7
Helix angle: ~ 38°
Special features: Unequal spacing, chip breaker

Application:

Design with chip breaker for optimum chip control. Ensures chips are shortened.




Preferred series in stock

Dimensions					z	Chip breaker	Specification	Order no.
d ₁ f8	d ₂ h6	l ₁	l ₂	Cx45°				
6,00	6	66	24	0,12	7	2	SCM930-0600Z07R-F0012HB4-HP210	31054505
8,00	8	74	32	0,16	7	2	SCM930-0800Z07R-F0016HB4-HP210	31054506
10,00	10	89	40	0,20	7	2	SCM930-1000Z07R-F0020HB4-HP210	31054507
12,00	12	100	48	0,24	7	2	SCM930-1200Z07R-F0024HB4-HP210	31054508
16,00	16	123	64	0,32	7	2	SCM930-1600Z07R-F0032HB4-HP210	31054510
20,00	20	140	80	0,40	7	2	SCM930-2000Z07R-F0040HB4-HP210	31054511


Available on request

14,00	14	108	56	0,28	7	2	SCM930-1400Z07R-F0028HB4-HP210	31054509
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Configurable features



Shank form:
Shank form: HA



Specification:
SCM930-0600Z07R-F0012[shank form]4-H210

Example:

SCM930-0600Z07R-F0012**HA**4-HP210

_____ Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Tro-PM

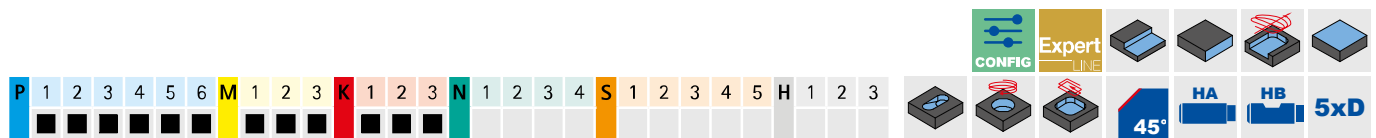
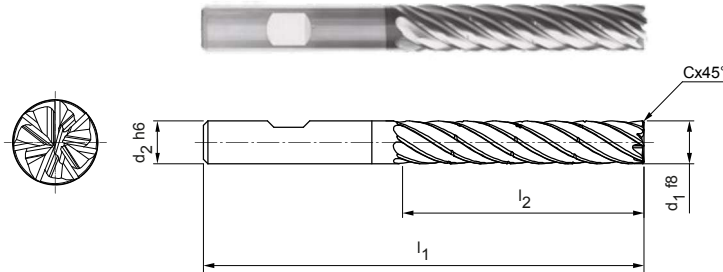
Shoulder milling cutter, 5xD design, with chip breaker
SCM930

Design:

Diameter of milling cutter: 8,00 – 20,00 mm
Cutting material: HP210
Number of cutting edges: 7
Helix angle: ~ 36°
Special features: Unequal spacing, chip breaker

Application:

Design with chip breaker for optimum chip control. Ensures chips are shortened.



Preferred series in stock

Dimensions					z	Chip breaker	Specification	Order no.
d ₁ f8	d ₂ h6	l ₁	l ₂	Cx45°				
8,00	8	81	40	0,16	7	3	SCM930-0800Z07R-F0016HB5-HP210	31054512
10,00	10	96	50	0,20	7	3	SCM930-1000Z07R-F0020HB5-HP210	31054513
12,00	12	112	60	0,24	7	3	SCM930-1200Z07R-F0024HB5-HP210	31054514
16,00	16	136	80	0,32	7	3	SCM930-1600Z07R-F0032HB5-HP210	31054516
20,00	20	160	100	0,40	7	3	SCM930-2000Z07R-F0040HB5-HP210	31054517

Available on request

14,00	14	122	70	0,28	7	3	SCM930-1400Z07R-F0028HB5-HP210	31054515
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Configurable features



Shank form:
Shank form: HA



Specification:

SCM590-0400Z05R-F0008[shank form]5-HP210

Example:

SCM590-0400Z05R-F0008HA5-HP210

Shank form HA

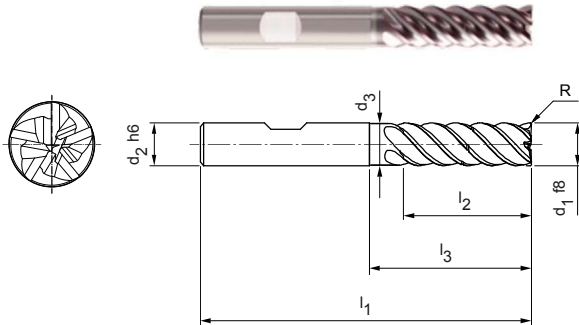
Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Tro-H

Shoulder milling cutter, 3xD design with neck, includes chip breaker
SCM920

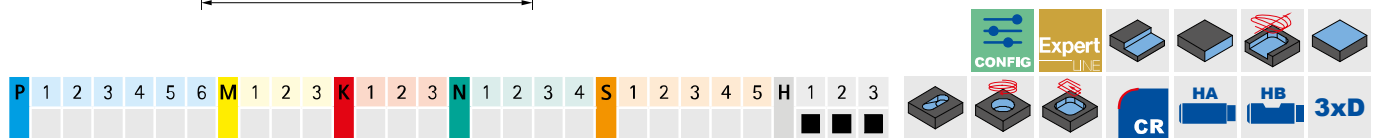


Design:

Diameter of milling cutter: 6.00 – 25.00 mm
Cutting material: HP827
Number of cutting edges: 5
Helix angle: 41° – 42°
Balancing quality: Cutting edge portion balanced on G2.5 according to DIN ISO 1940-G2.5
Special features: Unequal spacing, chip breaker

Application:

Design with chip breaker for optimum chip control. Ensures chips are shortened.




Preferred series in stock

Dimensions							z	Chip breaker	Specification	Order no.
d ₁ f8	d ₂ h6	d ₃	l ₁	l ₂	l ₃	R				
6,00	6	5,8	62	18	25	0,1	5	1	SCM920-0600Z05R-R0010HB-HP827	31053921
8,00	8	7,8	68	24	30	0,2	5	1	SCM920-0800Z05R-R0020HB-HP827	31053922
10,00	10	9,8	80	30	35	0,2	5	1	SCM920-1000Z05R-R0020HB-HP827	31053923
12,00	12	11,8	93	36	45	0,3	5	1	SCM920-1200Z05R-R0030HB-HP827	31053924
14,00	14	13,8	99	42	50	0,3	5	1	SCM920-1400Z05R-R0030HB-HP827	31053925
16,00	16	15,8	108	48	55	0,3	5	1	SCM920-1600Z05R-R0030HB-HP827	31053926
20,00	20	19,8	126	60	70	0,3	5	1	SCM920-2000Z05R-R0030HB-HP827	31053928


Available on request

18,00	18	17,8	117	54	67	0,3	5	1	SCM920-1800Z05R-R0030HB-HP827	31053927
25,00	25	24,5	150	75	92	0,4	5	1	SCM920-2500Z05R-R0040HB-HP827	31053929

Configurable features



Shank form:
Shank form: HA



Specification:
SCM920-0600Z05R-R0010[shank form]-HP827

Example:

SCM920-0600Z05R-R0010HA-HP827

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

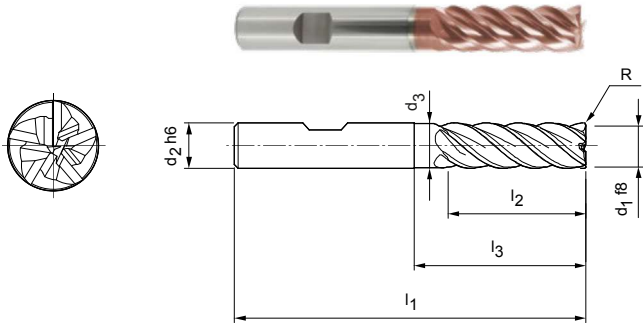
Special designs and other coatings available upon request.

OptiMill®-Tro-S

Shoulder milling cutter, design 3xD with neck
SCM600

Design:

Diameter of milling cutter: 6.00 – 25.00 mm
 Cutting material: HP828
 Number of cutting edges: 5
 Helix angle: 41° – 42°
 Balancing quality: Cutting edge portion balanced on G2.5 according to DIN ISO 1940-G2.5
 Special features: Unequal spacing



CONFIG Expert LINE

P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2 3

CR HA HB 3xD

Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f8	d2 h6	d3	l1	l2	l3	R			
6,00	6	5,8	62	18	25	0,1	5	SCM600-0600Z05R-R0010HB-HP828	30564634
8,00	8	7,8	68	24	30	0,2	5	SCM600-0800Z05R-R0020HB-HP828	30564635
10,00	10	9,8	80	30	35	0,2	5	SCM600-1000Z05R-R0020HB-HP828	30564636
12,00	12	11,8	93	36	45	0,3	5	SCM600-1200Z05R-R0030HB-HP828	30564637
16,00	16	15,8	108	48	55	0,3	5	SCM600-1600Z05R-R0030HB-HP828	30564639
20,00	20	19,8	126	60	70	0,3	5	SCM600-2000Z05R-R0030HB-HP828	30564640

Available on request

14,00	14	13,8	99	42	50	0,3	5	SCM600-1400Z05R-R0030HB-HP828	30564638
18,00	18	17,8	117	54	67	0,3	5	SCM600-1800Z05R-R0030HB-HP828	30605011
25,00	25	24,5	150	75	92	0,4	5	SCM600-2500Z05R-R0040HB-HP828	30605016

Configurable features

Shank form:
Shank form: HA

Specification:
SCM600-0600Z05R-R0010[shank form]-HP828

Example:

SCM600-0600Z05R-R0010HA-HP828

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

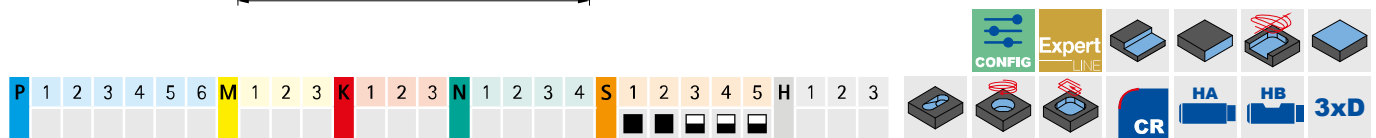
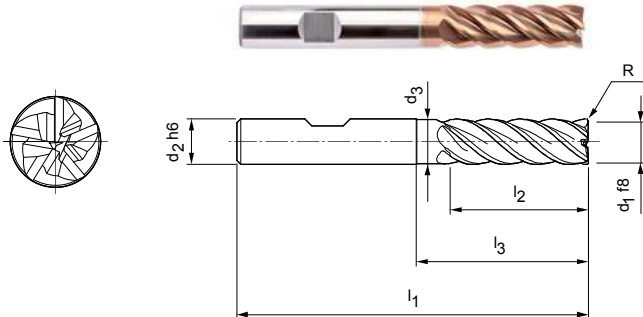
Special designs and other coatings available upon request.

OptiMill®-Tro-Titan

Shoulder milling cutter, design 3xD with neck
SCM630

Design:

Diameter of milling cutter: 6.00 – 25.00 mm
Cutting material: HP826
Number of cutting edges: 5
Helix angle: 41° – 42°
Balancing quality: Cutting edge portion balanced on G2.5 according to DIN ISO 1940-G2.5
Special features: Unequal spacing



Preferred series in stock

Dimensions							z	Specification	Order no.
d1 f8	d2 h6	d3	l1	l2	l3	R			
6,00	6	5,8	62	18	25	0,1	5	SCM630-0600Z05R-R0010HB-HP826	30651032
8,00	8	7,8	68	24	30	0,2	5	SCM630-0800Z05R-R0020HB-HP826	30651033
10,00	10	9,8	80	30	35	0,2	5	SCM630-1000Z05R-R0020HB-HP826	30651034
12,00	12	11,8	93	36	45	0,3	5	SCM630-1200Z05R-R0030HB-HP826	30651035
16,00	16	15,8	108	48	55	0,3	5	SCM630-1600Z05R-R0030HB-HP826	30651037
20,00	20	19,8	126	60	70	0,3	5	SCM630-2000Z05R-R0030HB-HP826	30651039

Available on request

14,00	14	–	99	42	50	0,3	5	SCM630-1400Z05R-R0030HB-HP826	30651036
18,00	18	–	117	54	67	0,3	5	SCM630-1800Z05R-R0030HB-HP826	30651038
25,00	25	–	150	75	92	0,4	5	SCM630-2500Z05R-R0040HB-HP826	30651040

Configurable features

Shank form:
Shank form: HA

Specification:
SCM630-0600Z05R-R0010[shank form]-HP826

Example:

SCM630-0600Z05R-R0010HA-HP826

Shank form HA

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.



Cutting data recommendations for trochoidal milling cutters

Feed and cutting speed

Correction factors

Factor	v _c			a _e	h _m max.
	P	K	M		
2xD	1,10		1,05	1,05	1,05
3xD	1,00		1,00	1,00	1,00
4xD	0,85		0,92	0,90	0,94
5xD	0,60		0,80	0,80	0,87

OptiMill-Tro-Uni | SCM580, 940

OptiMill-Tro-PM | SCM590, 820, 930

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
				MQL/Air	Dry	Coolant
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓		✓
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓		✓
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓		✓
	P4.1	Stainless steels, ferritic and martensitic		✓		✓
	P5.1	Cast steel				
	P6.1	Stainless cast steel, ferritic and martensitic				✓
M	M1.1	Stainless steels, austenitic	< 700	✓		✓
	M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓
	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700	✓		✓
	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓
K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓
	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓
	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓
	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓
	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓
	K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓

Calculation example for 42CrMo4 ø 12 mm:

$$f_z | a_e | h_m \text{ max.} = \frac{D}{100} \cdot \text{See table for value}$$

P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	280 – 380	1.0 – 1.6	8 – 12	0.56 – 0.68
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$$1 \quad f_z = \frac{12 \text{ mm}}{100} \cdot 1,2 = 0,144 \text{ mm}$$

$$2 \quad a_e = \frac{12 \text{ mm}}{100} \cdot 10 = 1,2 \text{ mm}$$

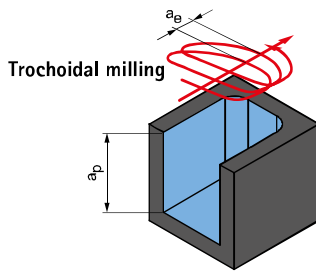
$$3 \quad h_m \text{ max.} = \frac{12 \text{ mm}}{100} \cdot 0,6 = 0,072 \text{ mm}$$

Note:

In the case of trochoidal milling, the specified cutting conditions change during the machining process. This also depends on the CAM software used and the machining position of the tool in the workpiece. The feed and cutting width or contact angle are constantly changing during machining in order to achieve, as far as is possible, the most constant average chip thickness depending on the contour.

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.



a_p = depending on max. machining depth of the tool
 a_e = depending on the workpiece material

v_c [m/min]	f_z [mm] in % of D	a_e [mm] in % of D	h_m max. [mm] in % of D	Machining example	
380 - 520	1.4 - 2.0	14 - 18	0.66 - 0.80	16MnCr5 $\phi = 12$ mm $v_c = 500$ m/min $f_z = 0.28$ mm $a_e = 1.8$ mm $a_p = 32$ mm	42CrMo4 $\phi = 12$ mm $v_c = 375$ m/min $f_z = 0.17$ mm $a_e = 1.2$ mm $a_p = 32$ mm
320 - 460	1.2 - 1.8	12 - 16	0.62 - 0.76		
340 - 480	1.2 - 1.8	10 - 14	0.58 - 0.71		
280 - 380	1.0 - 1.6	8 - 12	0.56 - 0.68		
250 - 360	1.1 - 1.7	9 - 15	0.56 - 0.67		
230 - 340	0.9 - 1.5	8 - 13	0.54 - 0.64		
210 - 320	0.8 - 1.4	6 - 12	0.52 - 0.62		
180 - 260	0.8 - 1.2	6 - 12	0.50 - 0.60		
220 - 300	1.2 - 1.8	8 - 12	0.54 - 0.62		
160 - 240	0.8 - 1.4	6 - 12	0.50 - 0.60		
140 - 220	0.6 - 1.0	5 - 10	0.48 - 0.60	X5CrNi18-8 $\phi = 12$ mm $v_c = 180$ m/min $f_z = 0.09$ mm	$a_e = 1.2$ mm $a_p = 32$ mm
110 - 180	0.6 - 1.0	5 - 10	0.46 - 0.58		
130 - 200	0.8 - 1.2	6 - 12	0.52 - 0.60		
120 - 180	0.8 - 1.2	5 - 10	0.46 - 0.56		
400 - 500	2.0 - 2.6	15 - 20	0.64 - 0.78		
340 - 500	1.8 - 2.4	12 - 16	0.62 - 0.7		
300 - 440	1.6 - 2.2	10 - 14	0.58 - 0.68		
180 - 260	1.4 - 2.0	8 - 12	0.56 - 0.68		
280 - 360	1.6 - 2.2	10 - 16	0.6 - 0.68		
210 - 340	1.4 - 2.0	10 - 16	0.58 - 0.66		

The specified machining values are guide values.

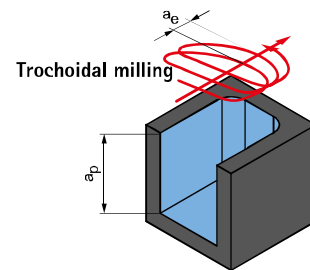
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for trochoidal milling cutters

Feed and cutting speed

OptiMill-Tro-H | SCM920

MMG*		Workpiece material	Strength/ hardness [N/mm ²] [HRC]	Cooling			v _c [m/min]	f _z [mm] in % of D	a _e [mm] in % of D	h _m max. [mm] in % of D
				MQL/Air	Dry	Coolant				
H	H1	H1.1	Hardened steel / cast steel	< 44	✓	✓	100 – 160	0.48 – 0.67	6 – 10	0.38 – 0.50
		H1.2	Hardened steel / cast steel	< 55	✓	✓	80 – 140	0.45 – 0.65	4 – 8	0.28 – 0.36
	H2	H2.1	Hardened steel / cast steel	< 60	✓	✓	60 – 120	0.4 – 0.52	3 – 6	0.27 – 0.34
		H2.2	Hardened steel / cast steel	< 65	✓	✓	50 – 110	0.37 – 0.5	3 – 5	0.26 – 0.33
		H2.3	Hardened steel / cast steel	< 68	✓	✓	50 – 100	0.3 – 0.48	2 – 5	0.25 – 0.32
	H3	H3.1	Wear-resistant cast/chill casting, GJN		✓		60 – 120	0.35 – 0.55	3 – 6	0.28 – 0.34



$a_p = \max. 3xD$
 $a_e = \text{depending on the workpiece material}$

OptiMill-Tro-S | SCM600

OptiMill-Tro-Titan | SCM630

MMG*		Workpiece material	Strength/ hardness [N/mm ²] [HRC]	Cooling			v _c [m/min]	f _z [mm] in % of D	a _e [mm] in % of D	h _m max. [mm] in % of D
				MQL/Air	Dry	Coolant				
S	S1	S1.1	Titanium, titanium alloys	< 400		✓	110 – 170	0.65 – 1.3	6 – 12	0.52 – 0.6
		S2.1	Titanium, titanium alloys	< 1200		✓	90 – 150	0.6 – 1.2	5 – 10	0.46 – 0.56
	S2	S2.2	Titanium, titanium alloys	> 1200		✓	70 – 130	0.4 – 1.0	5 – 10	0.42 – 0.54
		S3	S3.1	Nickel, non-alloy and alloy	< 900		✓	60 – 120	0.4 – 1.0	5 – 10
	S3.2		Nickel, non-alloy and alloy	> 900		✓	50 – 100	0.3 – 0.9	5 – 10	0.4 – 0.52
	S4	S4.1	High-temperature super alloy Ni, Co and Fe-based			✓	35 – 90	0.3 – 0.8	4 – 8	0.38 – 0.46
	S5	S5.1	Tungsten and molybdenum alloys			✓	35 – 90	0.3 – 0.8	4 – 8	0.38 – 0.46

Note:

In the case of trochoidal milling, the specified cutting conditions change during the machining process. This also depends on the CAM software used and the machining position of the tool in the workpiece. The feed and cutting width or contact angle are constantly changing during machining in order to achieve, as far as is possible, the most constant average chip thickness depending on the contour.

	Machining example	
	90MnCrV8 $\varnothing = 12 \text{ mm}$ $v_c = 110 \text{ m/min}$ $f_z = 0.052 \text{ mm}$ $h_m = 0.04 \text{ mm}$ $a_e = 1 \text{ mm}$	

	Machining example	
	TiAl6V4 $\varnothing = 12 \text{ mm}$ $v_c = 140 \text{ m/min}$ $f_z = 0.09 \text{ mm}$ $a_e = 1.2 \text{ mm}$ $a_p = 30 \text{ mm}$	

The specified machining values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.



HIGH-FEED MILLING

Universal application

OptiMill-3D-HF _____ 170

CPMill-Uni-FeedPlus _____ 172

Hardened steel

OptiMill-3D-HF-Hardened _____ 171

Technical appendix

Cutting data recommendations _____ 174



OptiMill®-3D-HF

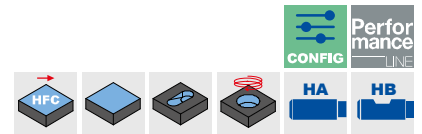
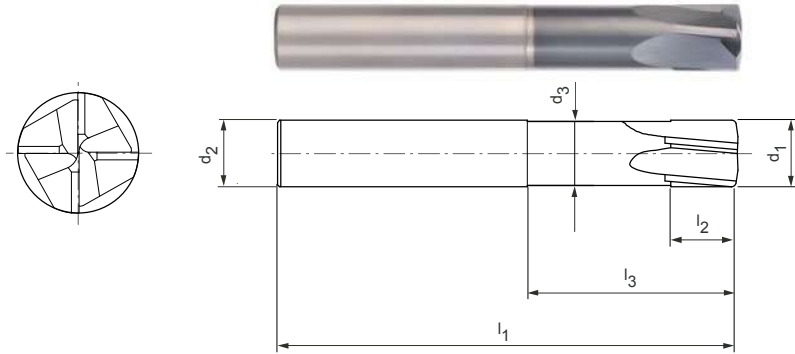
High-feed milling cutter, design with neck
MHF101

Design:

Diameter of milling cutter: 3.00 – 16.00 mm
Cutting material: HP806
Number of cutting edges: 4
Helix angle: 5°

Application:

Especially for roughing of parts with a hardness of up to 55 HRC.



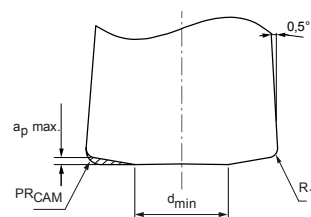
Preferred series in stock

Dimensions							z	a _p max.	PR _{CAM}	d _{min}	Shank form HA	
d ₁	R ₁	l ₃	d ₂ h6	l ₁	l ₂	d ₃					Specification	Order no.
3,00	0,15	9	4	50	3	2,85	4	0,13	0,2	1,5	MHF101-030-0015-0900X050-HP806	31150920
3,00	0,15	15	4	50	3	2,85	4	0,13	0,2	1,5	MHF101-030-0015-1500X050-HP806	31150921
3,00	0,15	9	6	60	3	2,85	4	0,13	0,2	1,5	MHF101-030-0015-0900X060-HP806	31150922
3,00	0,15	15	6	60	3	2,85	4	0,13	0,2	1,5	MHF101-030-0015-1500X060-HP806	31150923
4,00	0,2	12	6	60	4	3,8	4	0,17	0,3	2	MHF101-040-0020-1200X060-HP806	31150924
4,00	0,2	20	6	60	4	3,8	4	0,17	0,3	2	MHF101-040-0020-2000X060-HP806	31150925
5,00	0,25	15	6	60	5	4,75	4	0,2	0,4	2,3	MHF101-050-0025-1500X060-HP806	31150926
5,00	0,25	20	6	60	5	4,75	4	0,2	0,4	2,3	MHF101-050-0025-2000X060-HP806	31150927
6,00	0,3	18	6	60	6	5,7	4	0,24	0,5	3	MHF101-060-0030-1800X060-HP806	31150928
6,00	0,3	24	6	60	6	5,7	4	0,24	0,5	3	MHF101-060-0030-2400X060-HP806	31150929
8,00	0,4	24	8	64	8	7,7	4	0,31	0,7	3,8	MHF101-080-0040-2400X064-HP806	31150930
8,00	0,4	32	8	64	8	7,7	4	0,31	0,7	3,8	MHF101-080-0040-3200X064-HP806	31150931
8,00	0,4	40	8	75	8	7,7	4	0,31	0,7	3,8	MHF101-080-0040-4000X075-HP806	31150932
10,00	0,5	30	10	75	10	9,65	4	0,39	0,85	5	MHF101-100-0050-3000X075-HP806	31150933
10,00	0,5	40	10	75	10	9,65	4	0,39	0,85	5	MHF101-100-0050-4000X075-HP806	31150934
10,00	0,5	50	10	100	10	9,65	4	0,39	0,85	5	MHF101-100-0050-5000X100-HP806	31150935
12,00	0,6	36	12	75	12	11,6	4	0,46	1	5,8	MHF101-120-0060-3600X075-HP806	31150936
12,00	0,6	48	12	100	12	11,6	4	0,46	1	5,8	MHF101-120-0060-4800X100-HP806	31150937
12,00	0,6	60	12	100	12	11,6	4	0,46	1	5,8	MHF101-120-0060-6000X100-HP806	31150938
16,00	0,8	48	16	100	16	15,5	4	0,61	1,4	8	MHF101-160-0080-4800X100-HP806	31150939

Configurable features

Shank form:
Shank form: HB

Detailed view of face:



Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-3D-HF-Hardened

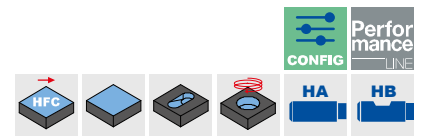
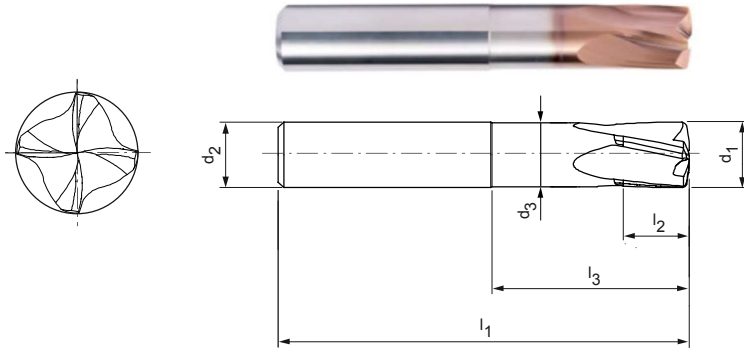
High-feed milling cutter with innovative face geometry, design with neck
MHF102

Design:

Diameter of milling cutter: 2.00 - 16.00 mm
Cutting material: HP810
Number of cutting edges: 4
Helix angle: 12°
Special feature: Innovative face geometry

Application:

Especially for roughing and finishing of hardened parts with a hardness of 45 HRC or higher, as well as in interrupted cut. The innovative face geometry allows very good surface finishes to be achieved during finishing.



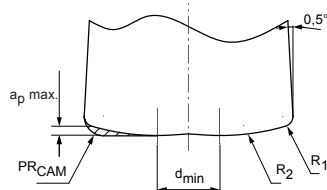
Preferred series in stock

Dimensions								z	ap max.	PRCAM	d _{min}	Shank form HA	
d ₁	R ₁	R ₂	l ₃	d ₂ h5	l ₁	l ₂	d ₃					Specification	Order no.
2,00	0,1	2,3	6	4	50	2	1,9	4	0,09	0,18	0,6	MHF102-020-0010-0600X050-HP810	31150940
2,00	0,1	2,3	10	4	50	2	1,9	4	0,09	0,18	0,6	MHF102-020-0010-1000X050-HP810	31150941
2,00	0,1	2,3	6	6	60	2	1,9	4	0,09	0,18	0,6	MHF102-020-0010-0600X060-HP810	31150942
2,00	0,1	2,3	10	6	60	2	1,9	4	0,09	0,18	0,6	MHF102-020-0010-1000X060-HP810	31150943
3,00	0,15	3,45	9	4	50	3	2,85	4	0,13	0,275	0,9	MHF102-030-0015-0900X050-HP810	31150944
3,00	0,15	3,45	15	4	50	3	2,85	4	0,13	0,275	0,9	MHF102-030-0015-1500X050-HP810	31150945
3,00	0,15	3,45	9	6	60	3	2,85	4	0,13	0,275	0,9	MHF102-030-0015-0900X060-HP810	31150946
3,00	0,15	3,45	15	6	60	3	2,85	4	0,13	0,275	0,9	MHF102-030-0015-1500X060-HP810	31150947
4,00	0,2	4,6	12	6	60	4	3,8	4	0,17	0,368	1,2	MHF102-040-0020-1200X060-HP810	31150948
4,00	0,2	4,6	20	6	60	4	3,8	4	0,17	0,368	1,2	MHF102-040-0020-2000X060-HP810	31150949
5,00	0,25	5,75	15	6	60	5	4,75	4	0,22	0,46	1,5	MHF102-050-0025-1500X060-HP810	31150950
5,00	0,25	5,75	20	6	60	5	4,75	4	0,22	0,46	1,5	MHF102-050-0025-2000X060-HP810	31150951
6,00	0,3	6,9	18	6	60	6	5,7	4	0,26	0,55	1,8	MHF102-060-0030-1800X060-HP810	31150952
6,00	0,3	6,9	24	6	60	6	5,7	4	0,26	0,55	1,8	MHF102-060-0030-2400X060-HP810	31150953
8,00	0,4	9,2	24	8	64	8	7,7	4	0,35	0,74	2,4	MHF102-080-0040-2400X064-HP810	31150954
8,00	0,4	9,2	32	8	64	8	7,7	4	0,35	0,74	2,4	MHF102-080-0040-3200X064-HP810	31150955
8,00	0,4	9,2	40	8	75	8	7,7	4	0,35	0,74	2,4	MHF102-080-0040-4000X075-HP810	31150956
10,00	0,5	11,5	30	10	75	10	9,65	4	0,44	0,92	3	MHF102-100-0050-3000X075-HP810	31150957
10,00	0,5	11,5	40	10	75	10	9,65	4	0,44	0,92	3	MHF102-100-0050-4000X075-HP810	31150958
10,00	0,5	11,5	50	10	100	10	9,65	4	0,44	0,92	3	MHF102-100-0050-5000X100-HP810	31150959
12,00	0,6	13,8	36	12	75	12	11,6	4	0,52	1,11	3,6	MHF102-120-0060-3600X075-HP810	31150960
12,00	0,6	13,8	48	12	100	12	11,6	4	0,52	1,11	3,6	MHF102-120-0060-4800X100-HP810	31150961
12,00	0,6	13,8	60	12	100	12	11,6	4	0,52	1,11	3,6	MHF102-120-0060-6000X100-HP810	31150962
16,00	0,8	18,4	48	16	100	16	15,5	4	0,7	1,47	4,8	MHF102-160-0080-4800X100-HP810	31150963

Configurable features

Shank form:
Shank form: HB

Detailed view of face:



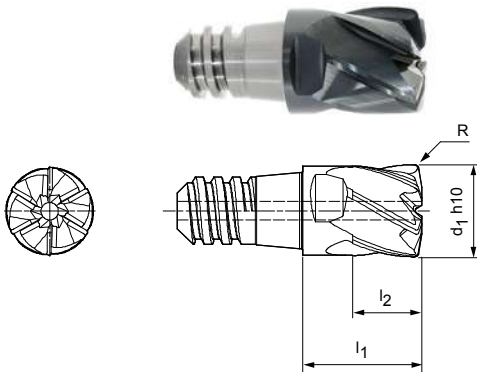
Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

CPMill®-Uni-FeedPlus

Design with CFS connection, with internal cooling
CPM171

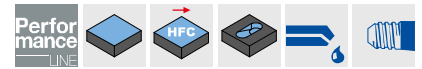


Design:

Diameter of milling cutter: 8.00 – 25.00 mm
Cutting material: HP383
Number of cutting edges: 6
Helix angle: 30°

Application:

High-feed milling with low a_p , angled entry and pocket milling with long projection lengths.



Preferred series in stock

					z	a_p max.	SW	Specification	Order no.
d_1 h10	CFS size	l_1	l_2	R					
8,00	6	11	6	0,4	6	0,4	SW 6	CPM171-0800Z06-R0040-06-HP383	30371359
10,00	8	13	7,5	0,5	6	0,5	SW 8	CPM171-1000Z06-R0050-08-HP383	30371360
12,00	10	16	9	0,6	6	0,6	SW 10	CPM171-1200Z06-R0060-10-HP383	30371361
16,00	12	20	12	0,8	6	0,8	SW 13	CPM171-1600Z06-R0080-12-HP383	30371362
20,00	16	25	15	1	6	1	SW 16	CPM171-2000Z06-R0100-16-HP383	30371364
25,00	20	32	19	1,25	6	1,25	SW 21	CPM171-2500Z06-R0125-20-HP383	30371365

Accessories

	CFS replaceable head holders CFS201	Page 218
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Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.



Cutting data recommendations for high-feed milling cutters

Feed and cutting speed

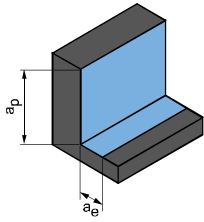
OptiMill-3D-HF | MHF101

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
				MQL/Air	Dry	Coolant
P	P1	P1.1 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	
		P1.2 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	
	P2	P2.1 Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	
		P2.2 Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	
	P3	P3.1 Tool, bearing, spring and high-speed steels**	< 800	✓	✓	
		P3.2 Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	
		P3.3 Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	
	P4	P4.1 Stainless steels, ferritic and martensitic		✓		✓
	P5	P5.1 Cast steel		✓		✓
	P6	P6.1 Stainless cast steel, ferritic and martensitic		✓		✓
K	K1	K1.1 Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	
		K2.1 Cast iron with spheroidal graphite, GJS	< 500	✓	✓	
	K2	K2.2 Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	
		K2.3 Cast iron with spheroidal graphite, GJS	> 800	✓	✓	
	K3	K3.1 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	
		K3.2 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	
H	H1	H1.1 Hardened steel / cast steel	< 44	✓	✓	
		H1.2 Hardened steel / cast steel	< 55	✓	✓	
	H2	H2.1 Hardened steel / cast steel	< 60	✓	✓	

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

Roughing



Plunge angle
1.0° - 1.5°

	a_p [mm] in % of D	a_e [mm] in % of D	v_c [m/min]	f_z [mm]								
				Diameter of milling cutter [mm]								
				2.00	3.00	4.00	5.00	6.00	8.00	10.00	12.00	16.00
	3.8	60	200 – 250	0.100	0.150	0.200	0.225	0.287	0.400	0.550	0.625	0.625
	3.8	60	150 – 200	0.100	0.150	0.200	0.225	0.287	0.400	0.550	0.625	0.625
	3.8	60	200 – 250	0.100	0.150	0.200	0.225	0.287	0.400	0.550	0.625	0.625
	3.8	65	150 – 200	0.100	0.150	0.200	0.225	0.287	0.400	0.550	0.625	0.625
	3.8	60	180 – 220	0.100	0.150	0.200	0.225	0.287	0.325	0.325	0.475	0.475
	3.8	65	150 – 180	0.100	0.150	0.200	0.225	0.287	0.325	0.325	0.475	0.475
	3.8	65	120 – 150	0.100	0.150	0.200	0.225	0.287	0.325	0.325	0.475	0.475
	3.8	60	90 – 110	0.100	0.150	0.200	0.225	0.287	0.325	0.325	0.475	0.475
	3.8	60	90 – 110	0.100	0.150	0.200	0.225	0.287	0.325	0.325	0.475	0.475
	3.8	60	70 – 90	0.100	0.150	0.200	0.225	0.287	0.325	0.325	0.475	0.475
	3.8	70	250 – 300	0.100	0.150	0.200	0.225	0.287	0.400	0.550	0.625	0.625
	3.8	70	250 – 300	0.100	0.150	0.200	0.225	0.287	0.400	0.550	0.625	0.625
	3.8	70	150 – 200	0.100	0.150	0.200	0.225	0.287	0.325	0.325	0.475	0.475
	3.8	70	150 – 200	0.100	0.150	0.200	0.225	0.287	0.325	0.325	0.475	0.475
	3.8	70	150 – 200	0.100	0.150	0.200	0.225	0.287	0.325	0.325	0.475	0.475
	3.8	70	150 – 200	0.100	0.150	0.200	0.225	0.287	0.325	0.325	0.475	0.475
	3.5	70	150 – 190	0.100	0.150	0.200	0.225	0.287	0.400	0.550	0.625	0.625
	3.2	65	120 – 150	0.100	0.150	0.200	0.225	0.287	0.325	0.325	0.475	0.475
	2.8	55	100 – 120	0.100	0.150	0.175	0.200	0.250	0.250	0.300	0.350	0.400

The specified machining values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for high-feed milling cutters

Feed and cutting speed

OptiMill-3D-HF-Hardened | MHF102, 103

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
				MQL/Air	Dry	Coolant
P	P1	P1.1 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	
		P1.2 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	
	P2	P2.1 Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	
		P2.2 Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	
	P3	P3.1 Tool, bearing, spring and high-speed steels**	< 800	✓	✓	
		P3.2 Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	
		P3.3 Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	
	P4	P4.1 Stainless steels, ferritic and martensitic		✓		✓
	P5	P5.1 Cast steel		✓		✓
	P6	P6.1 Stainless cast steel, ferritic and martensitic		✓		✓
K	K1	K1.1 Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	
		K2.1 Cast iron with spheroidal graphite, GJS	< 500	✓	✓	
	K2	K2.2 Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	
		K2.3 Cast iron with spheroidal graphite, GJS	> 800	✓	✓	
	K3	K3.1 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	
		K3.2 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	
H	H1	H1.1 Hardened steel / cast steel	< 44	✓	✓	
		H1.2 Hardened steel / cast steel	< 55	✓	✓	
	H2	H2.1 Hardened steel / cast steel	< 60	✓		
		H2.2 Hardened steel / cast steel	< 65	✓		
		H2.3 Hardened steel / cast steel	< 68	✓		
	H3	H3.1 Wear-resistant cast/chill casting, GJN		✓	✓	

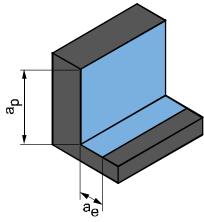
OptiMill-3D-HF-Hardened | MHF102, 103

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
				MQL/Air	Dry	Coolant
H2	H2.1	Hardened steel / cast steel	< 60	✓		
	H2.2	Hardened steel / cast steel	< 65	✓		
	H2.3	Hardened steel / cast steel	< 68	✓		
H3	H3.1	Wear-resistant cast/chill casting, GJN		✓	✓	

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

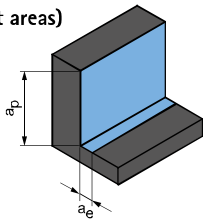
Roughing



Plunge angle
1.0° - 1.5°

a_p [mm] in % of D	a_e [mm] in % of D	v_c [m/min]	f_z [mm]									
			Diameter of milling cutter [mm]									
			2.00	3.00	4.00	5.00	6.00	8.00	10.00	12.00	16.00	
4.2	60	280 - 340	0.100	0.130	0.180	0.210	0.250	0.350	0.460	0.580	0.700	
4.2	60	240 - 300	0.080	0.110	0.160	0.190	0.230	0.310	0.430	0.520	0.620	
4.2	60	260 - 320	0.100	0.130	0.180	0.210	0.250	0.350	0.450	0.560	0.650	
4.2	65	240 - 300	0.080	0.100	0.150	0.180	0.220	0.310	0.410	0.500	0.580	
4.2	60	280 - 340	0.100	0.130	0.170	0.200	0.240	0.340	0.430	0.520	0.620	
4.2	65	260 - 300	0.090	0.100	0.150	0.180	0.220	0.300	0.390	0.460	0.580	
4.2	65	240 - 280	0.080	0.100	0.140	0.170	0.210	0.290	0.380	0.440	0.560	
4.2	60	160 - 200	0.100	0.130	0.180	0.210	0.250	0.350	0.400	0.500	0.620	
4.2	60	180 - 220	0.100	0.110	0.160	0.200	0.230	0.330	0.380	0.470	0.590	
4.2	60	160 - 200	0.100	0.110	0.160	0.200	0.230	0.320	0.370	0.450	0.570	
4.2	70	250 - 300	0.100	0.130	0.180	0.210	0.250	0.350	0.460	0.580	0.700	
4.2	70	250 - 300	0.080	0.110	0.160	0.190	0.230	0.310	0.430	0.520	0.620	
4.2	70	200 - 250	0.100	0.130	0.180	0.210	0.250	0.350	0.450	0.560	0.650	
4.2	70	200 - 250	0.080	0.100	0.150	0.180	0.220	0.310	0.410	0.500	0.580	
4.2	70	220 - 270	0.100	0.130	0.180	0.210	0.250	0.350	0.450	0.560	0.650	
4.2	70	200 - 250	0.080	0.100	0.150	0.180	0.220	0.310	0.410	0.500	0.580	
4.2	70	180 - 250	0.071	0.103	0.135	0.170	0.210	0.280	0.350	0.420	0.560	
4.2	65	150 - 200	0.066	0.096	0.127	0.158	0.190	0.256	0.320	0.385	0.510	
4	55	110 - 150	0.062	0.083	0.106	0.142	0.172	0.220	0.280	0.330	0.420	
3	40	80 - 120	0.044	0.065	0.086	0.109	0.131	0.170	0.210	0.245	0.305	
2.2	35	60 - 85	0.027	0.046	0.066	0.084	0.100	0.130	0.150	0.180	0.210	
3.5	45	90 - 120	0.055	0.070	0.090	0.120	0.140	0.180	0.220	0.250	0.320	

Finishing (flat areas)



Plunge angle
0.5° - 1.0°

a_p [mm] in % of D	a_e [mm] in % of D	v_c [m/min]	f_z [mm]									
			Diameter of milling cutter [mm]									
			2.00	3.00	4.00	5.00	6.00	8.00	10.00	12.00	16.00	
0.8	8	160 - 185	0.040	0.048	0.058	0.072	0.105	0.144	0.182	0.210	0.290	
0.4	7.2	130 - 170	0.028	0.037	0.046	0.063	0.084	0.110	0.148	0.174	0.221	
0.2	6	110 - 130	0.018	0.028	0.038	0.055	0.070	0.082	0.118	0.140	0.162	
0.6	8	160 - 180	0.038	0.042	0.055	0.070	0.092	0.128	0.160	0.190	0.270	

For finishing operations on planar surfaces, depending on the material removal rate (a_e) and the selected machining strategy, residual material may remain on the part. For this reason, $a_e < d_{\min}$ should be selected for planar surfaces.

The specified machining values are guide values.

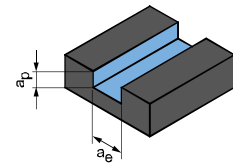
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendation for CPMill replaceable milling cutters

Feed and cutting speed

Correction factor:	
Length	f_z & v_c
A/B	1,0
C	0,9
D	0,7
E	0,6

Groove milling



$$a_p = 0.05 \times D$$

$$a_e = 1 \times D$$

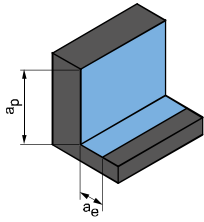
CPMill-Uni-FeedPlus | CPM171

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v_c [m/min]	f_z [mm]						
			MQL/Air	Dry	Coolant		Diameter of milling cutter [mm]						
							8.00	10.00	12.00	16.00	20.00	25.00	
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	160	0.179	0.214	0.246	0.301	0.344	0.383
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	130	0.167	0.200	0.230	0.281	0.321	0.358
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	145	0.179	0.214	0.246	0.301	0.344	0.383
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	100	0.149	0.178	0.205	0.250	0.286	0.320
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	95	0.173	0.207	0.238	0.291	0.332	0.371
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓	85	0.164	0.196	0.226	0.276	0.315	0.352
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓	80	0.155	0.186	0.213	0.260	0.298	0.332
P5	P5.1	Cast steel				✓	95	0.173	0.207	0.238	0.291	0.332	0.371
K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	175	0.298	0.357	0.410	0.501	0.573	0.639
	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	160	0.253	0.303	0.349	0.426	0.487	0.543
	K2.2	Cast iron with spheroidal graphite, GJS	500-800	✓	✓	✓	130	0.209	0.250	0.287	0.351	0.401	0.447
	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	70	0.119	0.143	0.164	0.200	0.229	0.256
	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	115	0.209	0.250	0.287	0.351	0.401	0.447
	K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	110	0.179	0.214	0.246	0.301	0.344	0.383

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

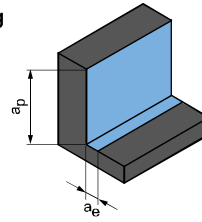
Roughing



$$a_p = 00.5 \times D$$

$$a_e = 0.25 \times D$$

Finishing



$$a_p = 00.5 \times D$$

$$a_e = 0.1 \times D$$

	v_c [m/min]	f_z [mm]						v_c [m/min]	f_z [mm]					
		Diameter of milling cutter [mm]							Diameter of milling cutter [mm]					
		8.00	10.00	12.00	16.00	20.00	25.00		8.00	10.00	12.00	16.00	20.00	25.00
	285	0.357	0.428	0.492	0.601	0.687	0.767	385	0.565	0.677	0.778	0.950	1.087	1.213
	235	0.334	0.400	0.459	0.561	0.641	0.716	315	0.528	0.632	0.726	0.887	1.014	1.132
	260	0.357	0.428	0.492	0.601	0.687	0.767	350	0.565	0.677	0.778	0.950	1.087	1.213
	180	0.298	0.357	0.410	0.501	0.573	0.639	245	0.471	0.564	0.648	0.792	0.906	1.011
	170	0.346	0.414	0.476	0.581	0.664	0.741	225	0.546	0.654	0.752	0.919	1.050	1.172
	155	0.328	0.392	0.451	0.551	0.630	0.703	210	0.518	0.621	0.713	0.871	0.996	1.112
	145	0.310	0.371	0.426	0.521	0.596	0.665	190	0.490	0.587	0.674	0.824	0.942	1.051
	175	0.346	0.414	0.476	0.581	0.664	0.741	235	0.546	0.654	0.752	0.919	1.050	1.172
	355	0.596	0.714	0.820	1.002	1.145	1.278	520	0.942	1.128	1.297	1.584	1.811	2.021
	325	0.506	0.607	0.697	0.852	0.974	1.087	475	0.801	0.959	1.102	1.346	1.539	1.718
	265	0.417	0.499	0.574	0.701	0.802	0.895	390	0.659	0.790	0.908	1.109	1.268	1.415
	145	0.238	0.285	0.328	0.401	0.458	0.511	215	0.377	0.451	0.519	0.634	0.724	0.808
	235	0.417	0.499	0.574	0.701	0.802	0.895	345	0.659	0.790	0.908	1.109	1.268	1.415
	220	0.357	0.428	0.492	0.601	0.687	0.767	325	0.565	0.677	0.778	0.950	1.087	1.213

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.



PROFILE MILLING

Universal application

OptiMill-3D-BN	182
CPMill-Uni-Radius	184
CPMill-Uni-Torus	185

Hardened steel

OptiMill-3D-BN-Hardened	183
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Non-ferrous metals

OptiMill-Diamond-Radius	186
OptiMill-Diamond-Torus	187

Plastics and composite materials

OptiMill-Composite-Speed-Radius	188
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Technical appendix

Cutting data recommendations	190
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OptiMill®-3D-BN

Ball nose milling cutter, cylindrical design with working depth
MBN101

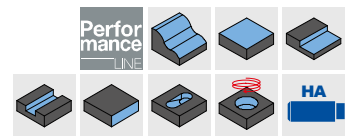
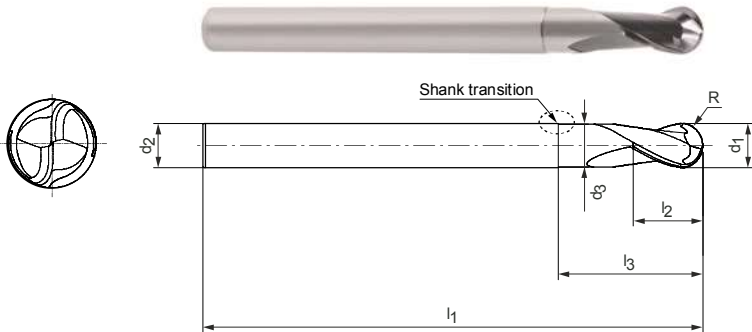
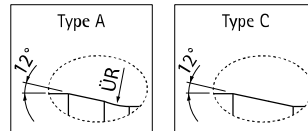
Design:

Diameter of milling cutter: 1.00 - 12.00 mm
Cutting material: HP801/HP820
Number of cutting edges: 2
Helix angle: 28°
Radial contour tolerance: ±0.005 if $d_1 \leq 6$ mm
±0.01 if $d_1 > 6$ mm

Application:

Suitable for machining workpiece materials up to 55 HRC.

Shank transition:



Preferred series in stock

Dimensions							Working depth at x° incline				Type	Specification	Order no.
d ₁	R	l ₃	d ₂ h5	l ₁	l ₂	d ₃	0.5 °	1°	1.5 °	3°			
1,00	0,5	3	4	50	1,2	0,94	3,47	3,57	3,66	4,01	A	MBN101-010-0050-0300X050-HP820	31153292
1,00	0,5	5	4	50	1,2	0,94	5,54	5,68	5,8	6,66	A	MBN101-010-0050-0500X050-HP820	31153294
2,00	1	8	4	50	2,3	1,94	9,09	9,45	9,74	10,49	A	MBN101-020-0100-0800X050-HP801	31153313
2,50	1,25	25	6	75	2,9	2,44	26,72	27,37	28,5	32,97	A	MBN101-025-0125-2500X075-HP801	31153328
3,00	1,5	10	6	60	3,5	2,94	11,17	11,56	11,88	12,98	A	MBN101-030-0150-1000X060-HP801	31153329
3,00	1,5	15	6	60	3,5	2,94	16,38	16,87	17,26	19,62	A	MBN101-030-0150-1500X060-HP801	31153330
3,00	1,5	20	6	60	3,5	2,94	21,56	22,13	22,76	26,25	A	MBN101-030-0150-2000X060-HP801	31153331
3,00	1,5	25	6	75	3,5	2,94	26,71	27,36	28,47	32,2	A	MBN101-030-0150-2500X075-HP801	31153332
4,00	2	10	6	60	4,6	3,94	11,14	11,52	11,84	12,82	A	MBN101-040-0200-1000X060-HP801	31153333
4,00	2	15	6	60	4,6	3,94	16,36	16,84	17,23	19,46	A	MBN101-040-0200-1500X060-HP801	31153334
4,00	2	20	6	60	4,6	3,94	21,54	22,1	22,69	24,85	A	MBN101-040-0200-2000X060-HP801	31153335
4,00	2	25	6	75	4,6	3,94	26,7	27,33	28,4	29,85	A	MBN101-040-0200-2500X075-HP801	31153336
4,00	2	30	6	75	4,6	3,94	31,84	32,66	34,1	34,85	A	MBN101-040-0200-3000X075-HP801	31153337
4,00	2	35	6	75	4,6	3,94	36,98	38,11	39,8	39,85	A	MBN101-040-0200-3500X075-HP801	31153338
5,00	2,5	15	6	60	5,8	4,9	15,78	16,38	17,03	17,59	C	MBN101-050-0250-1500X060-HP801	31153339
5,00	2,5	20	6	60	5,8	4,9	21	21,82	22,59	-	C	MBN101-050-0250-2000X060-HP801	31153340
5,00	2,5	25	6	60	5,8	4,9	26,21	27,27	27,59	-	C	MBN101-050-0250-2500X060-HP801	31153341
5,00	2,5	30	6	75	5,8	4,9	31,42	32,59	-	-	C	MBN101-050-0250-3000X075-HP801	31153342
6,00	3	15	6	60	6,9	5,9	-	-	-	-	-	MBN101-060-0300-1500X060-HP801	31153343
6,00	3	20	6	60	6,9	5,9	-	-	-	-	-	MBN101-060-0300-2000X060-HP801	31153344
6,00	3	25	6	60	6,9	5,9	-	-	-	-	-	MBN101-060-0300-2500X060-HP801	31153345
6,00	3	30	6	75	6,9	5,9	-	-	-	-	-	MBN101-060-0300-3000X075-HP801	31153346
6,00	3	35	6	75	6,9	5,9	-	-	-	-	-	MBN101-060-0300-3500X075-HP801	31153347
8,00	4	25	8	64	9,2	7,8	-	-	-	-	-	MBN101-080-0400-2500X064-HP801	31153348
8,00	4	50	8	100	9,2	7,8	-	-	-	-	-	MBN101-080-0400-5000X100-HP801	31153349
10,00	5	30	10	75	11,5	9,8	-	-	-	-	-	MBN101-100-0500-3000X075-HP801	31153350
10,00	5	50	10	100	11,5	9,8	-	-	-	-	-	MBN101-100-0500-5000X100-HP801	31153351
12,00	6	35	12	75	13,8	11,8	-	-	-	-	-	MBN101-120-0600-3500X075-HP801	31153352
12,00	6	60	12	100	13,8	11,8	-	-	-	-	-	MBN101-120-0600-6000X100-HP801	31153353

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-3D-BN-Hardened

Ball nose milling cutter, design with working depth
MBN107

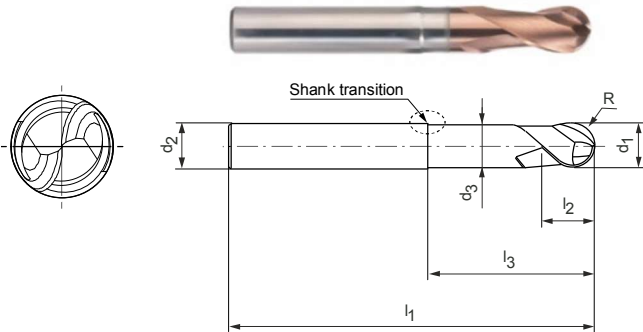
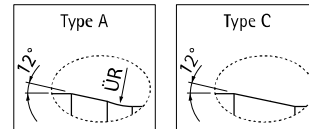
Design:

Diameter of milling cutter: 3.00 - 12.00 mm
Cutting material: HP808/HP818
Number of cutting edges: 2
Helix angle: 30°
Radial contour tolerance: ± 0.005 if $d_1 \leq 6$ mm
 ± 0.01 if $d_1 > 6$ mm

Application:

Suitable for machining workpiece materials up to 68 HRC.

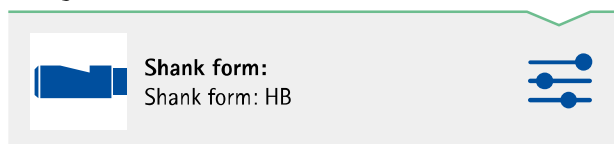
Shank transition:



Preferred series in stock

Dimensions							Working depth at α° incline				Type	Shank form HA Specification	Order no.
d_1	R	l_3	d_2 h5	l_1	l_2	d_3	0.5 °	1°	1.5 °	3°			
3,00	1,5	10	6	60	3,5	2,94	11,17	11,56	11,88	12,98	A	MBN107-030-0150-1000X060-HP808	31153744
3,00	1,5	15	6	60	3,5	2,94	16,38	16,87	17,26	19,62	A	MBN107-030-0150-1500X060-HP808	31153745
3,00	1,5	20	6	60	3,5	2,94	21,56	22,13	22,76	26,25	A	MBN107-030-0150-2000X060-HP808	31153746
3,00	1,5	25	6	75	3,5	2,94	26,71	27,36	28,47	32,2	A	MBN107-030-0150-2500X075-HP808	31153748
4,00	2	10	6	60	4,6	3,94	11,14	11,52	11,84	12,82	A	MBN107-040-0200-1000X060-HP808	31153749
4,00	2	15	6	60	4,6	3,94	16,36	16,84	17,23	19,46	A	MBN107-040-0200-1500X060-HP808	31153750
4,00	2	20	6	60	4,6	3,94	21,54	22,1	22,69	24,85	A	MBN107-040-0200-2000X060-HP808	31153751
4,00	2	25	6	75	4,6	3,94	26,7	27,33	28,4	29,85	A	MBN107-040-0200-2500X075-HP808	31153752
4,00	2	30	6	75	4,6	3,94	31,84	32,66	34,1	34,85	A	MBN107-040-0200-3000X075-HP808	31153753
4,00	2	35	6	75	4,6	3,94	36,98	38,11	39,8	39,85	A	MBN107-040-0200-3500X075-HP808	31153754
5,00	2,5	15	6	60	5,8	4,9	15,78	16,38	17,03	17,59	C	MBN107-050-0250-1500X060-HP808	31153755
5,00	2,5	20	6	60	5,8	4,9	21	21,82	22,59	-	C	MBN107-050-0250-2000X060-HP808	31153756
5,00	2,5	25	6	60	5,8	4,9	26,21	27,27	27,59	-	C	MBN107-050-0250-2500X060-HP808	31153757
5,00	2,5	30	6	75	5,8	4,9	31,42	32,59	-	-	C	MBN107-050-0250-3000X075-HP808	31153758
6,00	3	15	6	60	6,9	5,9	-	-	-	-	-	MBN107-060-0300-1500X060-HP808	31153759
6,00	3	20	6	60	6,9	5,9	-	-	-	-	-	MBN107-060-0300-2000X060-HP808	31153760
6,00	3	25	6	60	6,9	5,9	-	-	-	-	-	MBN107-060-0300-2500X060-HP808	31153761
6,00	3	30	6	75	6,9	5,9	-	-	-	-	-	MBN107-060-0300-3000X075-HP808	31153762
6,00	3	35	6	75	6,9	5,9	-	-	-	-	-	MBN107-060-0300-3500X075-HP808	31153763
8,00	4	25	8	64	9,2	7,8	-	-	-	-	-	MBN107-080-0400-2500X064-HP808	31153764
8,00	4	50	8	100	9,2	7,8	-	-	-	-	-	MBN107-080-0400-5000X100-HP808	31153765
10,00	5	30	10	75	11,5	9,8	-	-	-	-	-	MBN107-100-0500-3000X075-HP808	31153766
10,00	5	50	10	100	11,5	9,8	-	-	-	-	-	MBN107-100-0500-5000X100-HP808	31153767
12,00	6	35	12	75	13,8	11,8	-	-	-	-	-	MBN107-120-0600-3500X075-HP808	31153768
12,00	6	60	12	100	13,8	11,8	-	-	-	-	-	MBN107-120-0600-6000X100-HP808	31153769

Configurable features



Dimensions in mm.

For cutting data recommendations, see end of chapter.

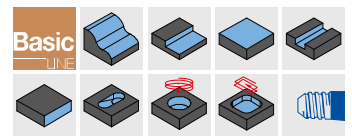
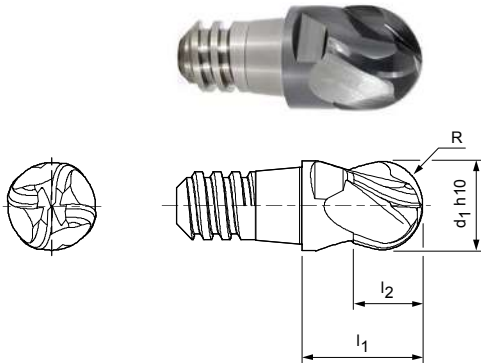
Special designs and other coatings available upon request.

CPMill®-Uni-Radius

Design with CFS connection
CPM150

Design:

Diameter of milling cutter: 8.00 – 25.00 mm
Cutting material: HP383
Number of cutting edges: 4
Helix angle: 30°




Preferred series in stock

Dimensions					z	ap max.	SW	Specification	Order no.
d1 h10	CFS size	l1	l2	R					
10,00	8	13	7,5	5	4	5,6	SW 8	CPM150-1000Z04-R0500-08-HP383	30371416
12,00	10	16	9	6	4	6,8	SW 10	CPM150-1200Z04-R0600-10-HP383	30371417
16,00	12	20	12	8	4	9	SW 13	CPM150-1600Z04-R0800-12-HP383	30371418
20,00	16	25	15	10	4	11,3	SW 16	CPM150-2000Z04-R1000-16-HP383	30371420

Available on request

8,00	6	11	6	4	4	4,5	SW 6	CPM150-0800Z04-R0400-06-HP383	30371595
25,00	20	32	19	12,5	4	14	SW 21	CPM150-2500Z04-R1250-20-HP383	30371421

Accessories

	CFS replaceable head holders CFS201	Page 218
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Dimensions in mm.

For cutting data recommendations, see end of chapter.

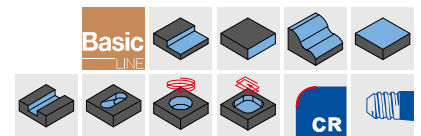
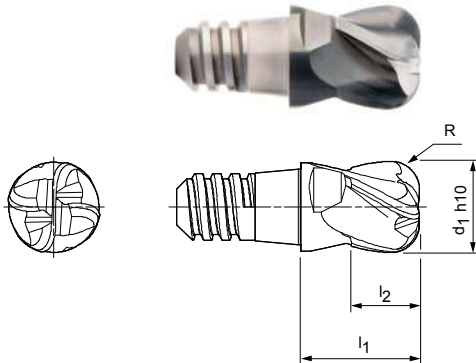
Special designs and other coatings available upon request.

CPMill®-Uni-Torus

Design with CFS connection
CPM160

Design:

Diameter of milling cutter: 8.00 – 25.00 mm
Cutting material: HP383
Number of cutting edges: 4
Helix angle: 30°




Preferred series in stock

Dimensions					z	a _p max.	SW	Specification	Order no.
d ₁ 10	CFS size	l ₁	l ₂	R					
8,00	6	11	6	1	4	4,5	SW 6	CPM160-0800Z04-R0100-06-HP383	30371402
8,00	6	11	6	2	4	4,5	SW 6	CPM160-0800Z04-R0200-06-HP383	30371403
10,00	8	13	7,5	1,5	4	5,6	SW 8	CPM160-1000Z04-R0150-08-HP383	30371404
10,00	8	13	7,5	3	4	5,6	SW 8	CPM160-1000Z04-R0300-08-HP383	30371405
12,00	10	16	9	1,5	4	6,8	SW 10	CPM160-1200Z04-R0150-10-HP383	30371406
12,00	10	16	9	4	4	6,8	SW 10	CPM160-1200Z04-R0400-10-HP383	30371407
16,00	12	20	12	2	4	9	SW 13	CPM160-1600Z04-R0200-12-HP383	30371408
16,00	12	20	12	5	4	9	SW 13	CPM160-1600Z04-R0500-12-HP383	30371409
20,00	16	25	15	2	4	11,3	SW 16	CPM160-2000Z04-R0200-16-HP383	30371412
20,00	16	25	15	6	4	11,3	SW 16	CPM160-2000Z04-R0600-16-HP383	30371413
25,00	20	32	19	6	4	14	SW 21	CPM160-2500Z04-R0600-20-HP383	30371415

Available on request

25,00	20	32	19	3	4	14	SW21	CPM160-2500Z04-R0300-20-HP383	30371414
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Accessories

	CFS replaceable head holders CFS201	Page 218
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Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Diamond-Radius

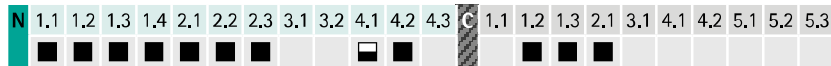
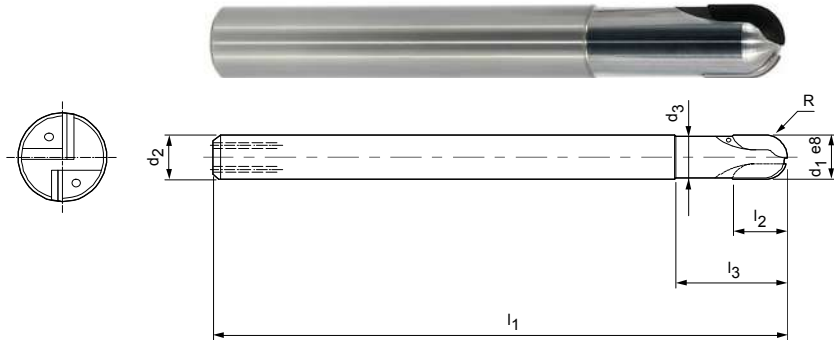
Ball nose milling cutter, overlong design with neck, includes internal cooling
SHM521

Design:

Diameter of milling cutter: 3.00 – 16.00 mm
Cutting material: PU611
Number of cutting edges: 2
Axis angle: 0°
Special features: PCD cutting edges for a long tool life

Application:

Ideal for contour and form milling aluminium parts.



Preferred series in stock

Dimensions							z	Specification	Order no.
d ₁ h10	d ₂ h6	d ₃	l ₁	l ₂	l ₃	R			
3,00	6	2,8	60	2,5	9	1,5	2	SHM521-0300AZ02R-R0150HA-PU611	30340718
4,00	6	3,8	60	2,5	15	2	2	SHM521-0400AZ02R-R0200HA-PU611	30334958
5,00	6	4,6	60	3	15	2,5	2	SHM521-0500AZ02R-R0250HA-PU611	30340720
6,00	6	5,5	80	6	15	3	2	SHM521-0600BZ02R-R0300HA-PU611	30334960
8,00	8	6,9	80	10	20	4	2	SHM521-0800BZ02R-R0400HA-PU611	30696715
10,00	10	8,9	80	10	26	5	2	SHM521-1000BZ02R-R0500HA-PU611	30696716
12,00	12	11,2	100	10	35	6	2	SHM521-1200BZ02R-R0600HA-PU611	30324570
16,00	16	15	125	10	35	8	2	SHM521-1600BZ02R-R0800HA-PU611	30324494

Dimensions in mm.

For cutting data recommendations, see end of chapter.

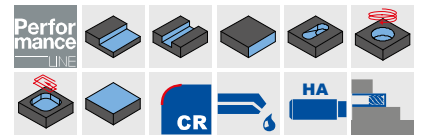
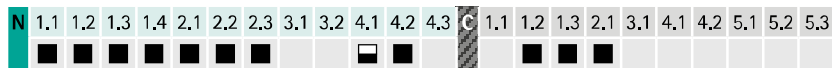
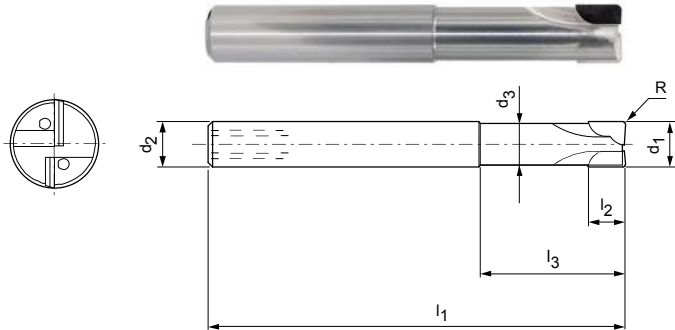
Special designs and CVD-tipped tools available upon request.

OptiMill®-Diamond-Torus

Corner radius milling cutter, long design with neck, includes internal cooling
SHM551

Design:

Diameter of milling cutter: 3.00 – 12.00 mm
Cutting material: PU611
Number of cutting edges: 2
Axis angle: 0°
Special features: PCD cutting edges for a long tool life



Preferred series in stock

Dimensions							z	Specification	Order no.
d ₁ e8	d ₂ h6	d ₃	l ₁	l ₂	l ₃	R			
3,00	6	2,8	50	2,5	14	0,3	2	SHM551-0300AZ02R-R0030HA-PU611	30334961
4,00	6	3,8	50	2,5	14	0,5	2	SHM551-0400AZ02R-R0050HA-PU611	30334966
5,00	6	4,6	54	3	18	0,5	2	SHM551-0500AZ02R-R0050HA-PU611	30334969
6,00	6	5,5	57	6	21	0,5	2	SHM551-0600BZ02R-R0050HA-PU611	30334973
6,00	6	5,5	57	6	21	1	2	SHM551-0600BZ02R-R0100HA-PU611	30334974
8,00	8	7,4	63	7	27	0,5	2	SHM551-0800BZ02R-R0050HA-PU611	30334976
10,00	10	9,2	72	8	32	0,5	2	SHM551-1000BZ02R-R0050HA-PU611	30334980
10,00	10	9,2	72	8	32	1	2	SHM551-1000BZ02R-R0100HA-PU611	30334981

Available on request

3,00	6	2,8	50	2,5	14	0,5	2	SHM551-0300AZ02R-R0050HA-PU611	30334962
3,00	6	2,8	50	2,5	14	1	2	SHM551-0300AZ02R-R0100HA-PU611	30334963
4,00	6	3,8	50	2,5	14	0,3	2	SHM551-0400AZ02R-R0030HA-PU611	30334964
4,00	6	3,8	50	2,5	14	1	2	SHM551-0400AZ02R-R0100HA-PU611	30334967
5,00	6	4,6	54	3	18	1	2	SHM551-0500AZ02R-R0100HA-PU611	30334971
6,00	6	5,5	57	6	21	1,5	2	SHM551-0600BZ02R-R0150HA-PU611	30334975
8,00	8	7,4	63	7	27	1	2	SHM551-0800BZ02R-R0100HA-PU611	30334977
8,00	8	7,4	63	7	27	1,5	2	SHM551-0800BZ02R-R0150HA-PU611	30334978
8,00	8	7,4	63	7	27	2	2	SHM551-0800BZ02R-R0200HA-PU611	30334979
10,00	10	9,2	72	8	32	1,5	2	SHM551-1000BZ02R-R0150HA-PU611	30334982
10,00	10	9,2	72	8	32	2	2	SHM551-1000BZ02R-R0200HA-PU611	30334983
12,00	12	11,2	83	9	38	0,5	2	SHM551-1200BZ02R-R0050HA-PU611	30334984
12,00	12	11,2	83	9	38	1	2	SHM551-1200BZ02R-R0100HA-PU611	30334985
12,00	12	11,2	83	9	38	1,5	2	SHM551-1200BZ02R-R0150HA-PU611	30334986
12,00	12	11,2	83	9	38	2	2	SHM551-1200BZ02R-R0200HA-PU611	30334987

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs available upon request.

OptiMill®-Composite-Speed-Radius

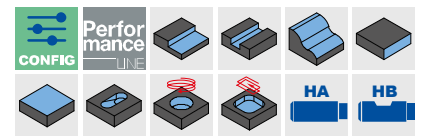
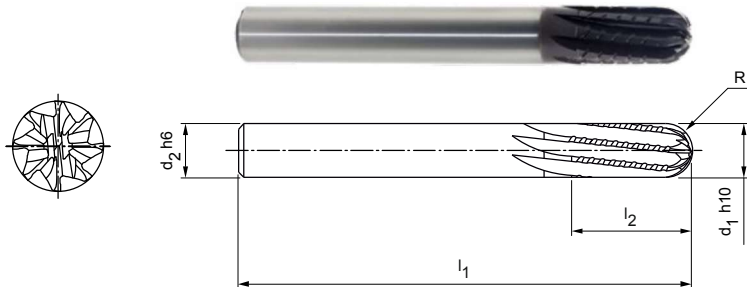
Ball nose milling cutter, design with pulling cut, with full radius
SCM870

Design:

Diameter of milling cutter: 4.00 – 20.00 mm
Cutting material: HC611/HC619
Number of cutting edges: 8
Helix angle: 8°
Special features: Diamond coating for long tool life

Application:

Pulling cutting edge for better removal of the chips/dust (e.g. on milling pockets and slots). Particularly suitable for difficult to machine surface layers (e.g. UD or copper mesh) to prevent delamination on the lower edge of the part.



N	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	C	1.1	1.2	1.3	2.1	3.1	4.1	4.2	5.1	5.2	5.3
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Preferred series in stock

Dimensions					z	Specification	Order no.
d1 h10	d2 h6	l1	l2	R			
4,00	6	60	16	2	8	SCM870-0400Z08R-R0200HA-HC619	30869182
6,00	6	75	28	3	8	SCM870-0600Z08R-R0300HA-HC619	30869186
8,00	8	75	32	4	8	SCM870-0800Z08R-R0400HA-HC619	30869188
10,00	10	72	32	5	8	SCM870-1000Z08R-R0500HA-HC619	30869189

Available on request

12,00	12	83	32	6	8	SCM870-1200Z08R-R0600HA-HC611	30869190
16,00	16	92	36	8	8	SCM870-1600Z08R-R0800HA-HC611	30869191
20,00	20	104	45	10	8	SCM870-2000Z08R-R1000HA-HC611	30869192

Configurable features



Shank form:
Shank form: HB



Specification up to ø 10 mm:

SCM870-0400Z08R-R0200[shank form]-HC619

Specification from ø 12 mm:

SCM870-1200Z08R-R0600[shank form]-HC611

Example:

SCM870-0400Z08R-R0200HB-HC619

Shank form HB

Dimensions in mm.

For cutting data recommendations, see end of chapter.

Special designs and other coatings available upon request.



Cutting data recommendations for Ball nose milling cutter

Feed and cutting speed

OptiMill-3D-BN | MBN101

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			
				MQL/Air	Dry	Coolant	
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓
	P3	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓
		P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓
		P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓
	P4	P4.1	Stainless steels, ferritic and martensitic		✓		✓
	P5	P5.1	Cast steel		✓		✓
	P6	P6.1	Stainless cast steel, ferritic and martensitic		✓		✓
M	M1	M1.1	Stainless steels, austenitic	< 700			✓
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓
	M2	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700			✓
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓
		K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓
		K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓
	K2	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓
		K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓
	K3	K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓
H	H1	H1.1	Hardened steel / cast steel	< 44	✓	✓	
		H1.2	Hardened steel / cast steel	< 55	✓	✓	
	H2	H2.1	Hardened steel / cast steel	< 60	✓		

Working depth correction factor - k_{AT}

AT	k_{AT}		
	a_p	n	v_f
≤ 3xD	1,00	1,00	1,00
≤ 5xD	0,80	0,90	0,90
≤ 6xD	0,70	0,85	0,85
≤ 8xD	0,60	0,75	0,75
≤ 10xD	0,50	0,70	0,70
≤ 12xD	0,45***	0,65	0,65
≤ 15xD	0,40***	0,60	0,60
≤ 20xD	0,35***	0,60	0,60
≤ 25xD	0,35***	0,50	0,50
≤ 30xD	0,30***	0,50	0,50
≤ 35xD	0,30***	0,50	0,50

Cone angle correction factor - k_{KW}

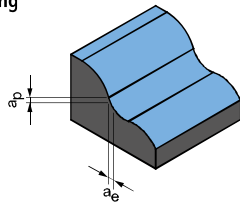
φ [°]	k_{KW}		
	a_p	n	v_f
0	1,00	1,00	1,00
0,5	1,01	1,01	1,01
1	1,02	1,02	1,02
1,5	1,03	1,03	1,03
3	1,06	1,06	1,06

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

*** Consultation with a MAPAL application engineer.

Roughing



Plunge angle
1.0 ° - 3.0 °

Next page:
Finishing

ap [mm] in % of D	ae [mm] in % of D	Vc [m/min]	fz [mm]																			
			Diameter of milling cutter [mm]																			
			0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	1.80	2.00	2.50	3.00	4.00	5.00	6.00	8.00	10.00	12.00	16.00
5	< 25	250-300	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	0.300
4.5	< 25	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	0.264
5	< 25	250-300	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	0.300
4.5	< 25	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	0.264
5	< 25	250-300	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223	0.285
4.5	< 20	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	0.264
4	< 20	220-260	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	0.219
5	< 25	240-280	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	0.300
5	< 25	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	0.264
4.5	< 25	200-250	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	0.219
5	< 25	85-110	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	0.264
5	< 25	60-85	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	0.219
5	< 25	85-110	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	0.264
5	< 25	60-85	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	0.219
6	< 30	250-300	0.004	0.005	0.007	0.010	0.012	0.014	0.019	0.024	0.034	0.042	0.048	0.060	0.073	0.101	0.128	0.150	0.198	0.240	0.282	0.360
6	< 30	250-300	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	0.300
6	< 30	240-280	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	0.300
6	< 30	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	0.264
6	< 30	250-300	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	0.219
6	< 30	240-280	0.002	0.002	0.004	0.005	0.006	0.007	0.010	0.012	0.017	0.022	0.025	0.031	0.038	0.052	0.066	0.078	0.102	0.124	0.146	0.186
4	< 18	220-280	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	0.219
3	< 12	160-220	0.002	0.002	0.004	0.005	0.006	0.007	0.010	0.012	0.017	0.021	0.024	0.030	0.037	0.050	0.064	0.075	0.099	0.120	0.141	0.180
1.5	< 3	100-160	0.001	0.002	0.002	0.003	0.004	0.005	0.006	0.008	0.011	0.014	0.016	0.020	0.024	0.034	0.043	0.050	0.066	0.080	0.094	0.120

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for Ball nose milling cutter

Feed and cutting speed

OptiMill-3D-BN | MBN101

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			
			MQL/Air	Dry	Coolant	
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓
	P4.1	Stainless steels, ferritic and martensitic		✓		✓
	P5.1	Cast steel		✓		✓
	P6.1	Stainless cast steel, ferritic and martensitic		✓		✓
M	M1.1	Stainless steels, austenitic	< 700			✓
	M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓
	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700			✓
	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓
K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓
	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓
	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓
	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓
	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓
	K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓
H	H1.1	Hardened steel / cast steel	< 44	✓	✓	
	H1.2	Hardened steel / cast steel	< 55	✓	✓	
	H2.1	Hardened steel / cast steel	< 60	✓		

Working depth correction factor - k_{AT}

AT	k_{AT}		
	a_p	n	v_f
≤ 3xD	1,00	1,00	1,00
≤ 5xD	0,80	0,90	0,90
≤ 6xD	0,70	0,85	0,85
≤ 8xD	0,60	0,75	0,75
≤ 10xD	0,50	0,70	0,70
≤ 12xD	0,45***	0,65	0,65
≤ 15xD	0,40***	0,60	0,60
≤ 20xD	0,35***	0,60	0,60
≤ 25xD	0,35***	0,50	0,50
≤ 30xD	0,30***	0,50	0,50
≤ 35xD	0,30***	0,50	0,50

Cone angle correction factor - k_{KW}

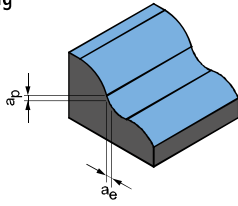
φ [°]	k_{KW}		
	a_p	n	v_f
0	1,00	1,00	1,00
0,5	1,01	1,01	1,01
1	1,02	1,02	1,02
1,5	1,03	1,03	1,03
3	1,06	1,06	1,06

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

*** Consultation with a MAPAL application engineer.

Finishing



Plunge angle
0,5 ° - 1,0 °

a_p [mm] in % of D	a_e [mm] in % of D	V_c [m/min]	f_z [mm]																			
			Diameter of milling cutter [mm]																			
			0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	1.80	2.00	2.50	3.00	4.00	5.00	6.00	8.00	10.00	12.00	16.00
1.5	2.5	280-340	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223	0.285
1.4	2.4	280-320	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.4	2.4	270-320	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223	0.285
1.3	2.3	260-300	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.3	2.3	280-320	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.032	0.036	0.045	0.055	0.076	0.097	0.113	0.149	0.181	0.212	0.271
1.2	2.2	260-300	0.002	0.003	0.005	0.006	0.008	0.010	0.013	0.016	0.022	0.028	0.032	0.040	0.048	0.067	0.085	0.099	0.131	0.159	0.187	0.238
1	2	240-280	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163	0.208
1.3	2.3	260-300	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223	0.285
1.3	2.3	260-300	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.2	2.2	220-270	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163	0.208
1.3	2.3	90-120	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.2	2.2	70-90	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163	0.208
1.3	2.3	90-120	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.2	2.2	70-90	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163	0.208
1.5	2.5	280-340	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223	0.285
1.4	2.4	280-320	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.3	2.3	270-320	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.2	2.2	260-300	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.4	2.4	280-320	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163	0.208
1.3	2.3	260-300	0.002	0.002	0.004	0.005	0.006	0.007	0.009	0.012	0.017	0.021	0.024	0.029	0.036	0.050	0.063	0.074	0.097	0.118	0.139	0.177
1.2	2.2	240-280	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.014	0.020	0.025	0.029	0.036	0.044	0.061	0.077	0.090	0.119	0.144	0.170	0.217
1	2	160-240	0.002	0.003	0.004	0.005	0.007	0.008	0.011	0.014	0.019	0.024	0.027	0.034	0.042	0.058	0.073	0.086	0.113	0.137	0.161	0.206
0.8	1.8	120-160	0.001	0.002	0.003	0.004	0.005	0.006	0.008	0.010	0.013	0.017	0.019	0.024	0.029	0.040	0.051	0.060	0.079	0.096	0.113	0.144

The specified machining values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for Ball nose milling cutter

Feed and cutting speed

OptiMill-3D-BN-Hardened | MBN107

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
				MQL/Air	Dry	Coolant
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓
	P4.1	Stainless steels, ferritic and martensitic		✓		✓
	P5.1	Cast steel		✓		✓
	P6.1	Stainless cast steel, ferritic and martensitic		✓		✓
	K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓
K2.1		Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓
K2.2		Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓
K2.3		Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓
K3.1		Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓
K3.2		Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓
H	H1.1	Hardened steel / cast steel	< 44	✓	✓	
	H1.2	Hardened steel / cast steel	< 55	✓	✓	
	H2.1	Hardened steel / cast steel	< 60	✓		
	H2.2	Hardened steel / cast steel	< 65	✓		
	H2.3	Hardened steel / cast steel	< 68	✓		
	H3.1	Wear-resistant cast/chill casting, GJN		✓	✓	

Working depth correction factor - k_{AT}

AT	k_{AT}		
	a_p	n	v_f
≤ 3xD	1,00	1,00	1,00
≤ 5xD	0,80	0,90	0,90
≤ 6xD	0,70	0,85	0,85
≤ 8xD	0,60	0,75	0,75
≤ 10xD	0,50	0,70	0,70
≤ 12xD	0,45***	0,65	0,65
≤ 15xD	0,40***	0,60	0,60
≤ 20xD	0,35***	0,60	0,60
≤ 25xD	0,35***	0,50	0,50
≤ 30xD	0,30***	0,50	0,50
≤ 35xD	0,30***	0,50	0,50

Cone angle correction factor - k_{KW}

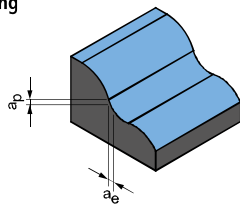
φ [°]	k_{KW}		
	a_p	n	v_f
0	1,00	1,00	1,00
0,5	1,01	1,01	1,01
1	1,02	1,02	1,02
1,5	1,03	1,03	1,03
3	1,06	1,06	1,06

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

*** Consultation with a MAPAL application engineer.

Roughing



Plunge angle
1,0 ° - 3,0 °

Next page:
Finishing

a_p [mm] in % of D	a_e [mm] in % of D	V_c [m/min]	f_z [mm]																			
			Diameter of milling cutter [mm]																			
			0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	1.80	2.00	2.50	3.00	4.00	5.00	6.00	8.00	10.00	12.00	16.00
5	< 25	250-300	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	0.300
4.5	< 25	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	0.264
5	< 25	250-300	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	0.300
4.5	< 25	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	0.264
5	< 25	250-300	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223	0.285
4.5	< 20	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	0.264
4	< 20	220-260	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	0.219
5	< 25	240-280	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	0.300
5	< 25	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	0.264
4.5	< 25	200-250	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	0.219
6	< 30	250-300	0.004	0.005	0.007	0.010	0.012	0.014	0.019	0.024	0.034	0.042	0.048	0.060	0.073	0.101	0.128	0.150	0.198	0.240	0.282	0.360
6	< 30	250-300	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	0.300
6	< 30	240-280	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	0.300
6	< 30	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	0.264
6	< 30	250-300	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	0.219
6	< 30	240-280	0.002	0.002	0.004	0.005	0.006	0.007	0.010	0.012	0.017	0.022	0.025	0.031	0.038	0.052	0.066	0.078	0.102	0.124	0.146	0.186
4	< 18	220-280	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	0.219
3	< 12	160-220	0.002	0.002	0.004	0.005	0.006	0.007	0.010	0.012	0.017	0.021	0.024	0.030	0.037	0.050	0.064	0.075	0.099	0.120	0.141	0.180
1.5	< 3	100-160	0.001	0.002	0.002	0.003	0.004	0.005	0.006	0.008	0.011	0.014	0.016	0.020	0.024	0.034	0.043	0.050	0.066	0.080	0.094	0.120
0.8	< 1.8	60-100	0.001	0.001	0.002	0.002	0.003	0.004	0.005	0.006	0.008	0.011	0.012	0.015	0.018	0.025	0.032	0.038	0.050	0.060	0.071	0.090
0.5	< 1.5	40-80	0.001	0.001	0.001	0.002	0.002	0.003	0.004	0.004	0.006	0.008	0.009	0.011	0.013	0.019	0.024	0.028	0.036	0.044	0.052	0.066
1.5	< 3	100-160	0.001	0.002	0.002	0.003	0.004	0.005	0.006	0.008	0.011	0.014	0.016	0.020	0.024	0.034	0.043	0.050	0.066	0.080	0.094	0.120

The specified machining values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for Ball nose milling cutter

Feed and cutting speed

OptiMill-3D-BN-Hardened | MBN107

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			
				MQL/Air	Dry	Coolant	
P	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	
	P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	
	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	
	P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	
	P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓	✓	✓	
	P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓	✓	✓	
	P4.1	Stainless steels, ferritic and martensitic		✓		✓	
	P5.1	Cast steel		✓		✓	
	P6.1	Stainless cast steel, ferritic and martensitic		✓		✓	
	K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓
		K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓
K2.2		Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	
K2.3		Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	
K3.1		Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	
K3.2		Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	
H	H1.1	Hardened steel / cast steel	< 44	✓	✓		
	H1.2	Hardened steel / cast steel	< 55	✓	✓		
	H2.1	Hardened steel / cast steel	< 60	✓			
	H2.2	Hardened steel / cast steel	< 65	✓			
	H2.3	Hardened steel / cast steel	< 68	✓			
	H3.1	Wear-resistant cast/chill casting, GJN		✓	✓		

Working depth correction factor - k_{AT}

AT	k _{AT}		
	a _p	n	v _f
≤ 3xD	1,00	1,00	1,00
≤ 5xD	0,80	0,90	0,90
≤ 6xD	0,70	0,85	0,85
≤ 8xD	0,60	0,75	0,75
≤ 10xD	0,50	0,70	0,70
≤ 12xD	0,45***	0,65	0,65
≤ 15xD	0,40***	0,60	0,60
≤ 20xD	0,35***	0,60	0,60
≤ 25xD	0,35***	0,50	0,50
≤ 30xD	0,30***	0,50	0,50
≤ 35xD	0,30***	0,50	0,50

Cone angle correction factor - k_{KW}

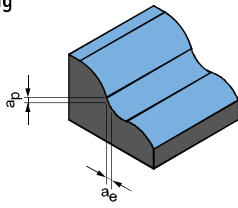
φ [°]	k _{KW}		
	a _p	n	v _f
0	1,00	1,00	1,00
0,5	1,01	1,01	1,01
1	1,02	1,02	1,02
1,5	1,03	1,03	1,03
3	1,06	1,06	1,06

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

*** Consultation with a MAPAL application engineer.

Finishing



Plunge angle
0,5 ° - 1,0 °

ap [mm] in % of D	ae [mm] in % of D	Vc [m/min]	fz [mm]																			
			Diameter of milling cutter [mm]																			
			0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	1.80	2.00	2.50	3.00	4.00	5.00	6.00	8.00	10.00	12.00	16.00
1.5	2.5	280-340	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223	0.285
1.4	2.4	280-320	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.4	2.4	270-320	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223	0.285
1.3	2.3	260-300	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.3	2.3	280-320	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.032	0.036	0.045	0.055	0.076	0.097	0.113	0.149	0.181	0.212	0.271
1.2	2.2	260-300	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1	2	240-280	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163	0.208
1.3	2.3	260-300	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223	0.285
1.3	2.3	260-300	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.2	2.2	220-270	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163	0.208
1.5	2.5	280-340	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223	0.285
1.4	2.4	280-320	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.3	2.3	270-320	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.2	2.2	260-300	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	0.251
1.4	2.4	280-320	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163	0.208
1.3	2.3	260-300	0.002	0.002	0.004	0.005	0.006	0.007	0.009	0.012	0.017	0.021	0.024	0.029	0.036	0.050	0.063	0.074	0.097	0.118	0.139	0.177
1.2	2.2	250-300	0.003	0.004	0.005	0.007	0.009	0.011	0.015	0.018	0.026	0.032	0.037	0.046	0.056	0.077	0.098	0.114	0.151	0.183	0.215	0.274
1	2	200-250	0.002	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.041	0.051	0.070	0.089	0.104	0.137	0.166	0.195	0.249
0.8	1.8	130-200	0.002	0.003	0.005	0.006	0.008	0.009	0.012	0.015	0.021	0.026	0.030	0.038	0.046	0.063	0.081	0.094	0.124	0.151	0.177	0.226
0.6	1.6	100-150	0.002	0.003	0.004	0.005	0.007	0.008	0.011	0.014	0.019	0.024	0.027	0.034	0.042	0.058	0.073	0.086	0.113	0.137	0.161	0.206
0.5	1.5	70-120	0.001	0.002	0.003	0.004	0.005	0.006	0.008	0.010	0.013	0.017	0.019	0.024	0.029	0.040	0.051	0.060	0.079	0.096	0.113	0.144
0.8	1.8	130-200	0.002	0.003	0.005	0.006	0.008	0.009	0.012	0.015	0.021	0.026	0.030	0.038	0.046	0.063	0.081	0.094	0.124	0.151	0.177	0.226

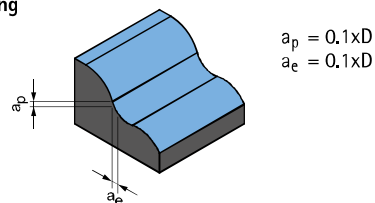
The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for Ball nose milling cutter

Feed and cutting speed

Correction factor:	
Length	f_z & v_c
A/B	1,0
C	0,9
D	0,7
E	0,6

Finishing



CPMill-Uni-Radius | CPM150

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
				MQL/Air	Dry	Coolant
P	P1	P1.1 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓
		P1.2 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓
	P2	P2.1 Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓
		P2.2 Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓		✓
	P3	P3.1 Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓
		P3.2 Tool, bearing, spring and high-speed steels**	< 1000	✓		✓
		P3.3 Tool, bearing, spring and high-speed steels**	< 1500	✓		✓
	P5	P5.1 Cast steel				✓
K	K1	K1.1 Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓
		K2.1 Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓
	K2	K2.2 Cast iron with spheroidal graphite, GJS	500-800	✓	✓	✓
		K2.3 Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓
	K3	K3.1 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓
		K3.2 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓
N	N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si		✓	✓	✓
		N1.2 Aluminium, alloy ≤ 7 % Si		✓	✓	✓
		N1.3 Aluminium, alloy > 7-12 % Si		✓	✓	✓
		N1.4 Aluminium, alloy > 12 % Si		✓	✓	✓
	N2	N2.1 Copper, non-alloy and low-alloy	< 300	✓	✓	✓
		N2.2 Copper, alloy	> 300	✓	✓	✓
		N2.3 Brass, bronze, gunmetal	< 1200	✓	✓	✓

OptiMill-Diamond-Radius | SHM521

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
				MQL/Air	Dry	Coolant
N	N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si		✓	✓	✓
		N1.2 Aluminium, alloy ≤ 7 % Si		✓	✓	✓
		N1.3 Aluminium, alloy > 7-12 % Si		✓	✓	✓
		N1.4 Aluminium, alloy > 12 % Si		✓	✓	✓
	N2	N2.1 Copper, non-alloy and low-alloy	< 300	✓	✓	✓
		N2.2 Copper, alloy	> 300	✓	✓	✓
		N2.3 Brass, bronze, gunmetal	< 1200	✓	✓	✓
	N4	N4.1 Plastic, thermoplastics				
		N4.2 Plastic, thermosets		✓	✓	✓
		N4.3 Plastic, foams				
C	C1	C1.1 Plastic matrix, aramide fibre-reinforced (AFRP)		✓	✓	✓
		C1.2 Plastic matrix (thermosetting), CFRP/GFRP		✓	✓	✓
		C1.3 Plastic matrix (thermoplastic), CFRP/GFRP		✓	✓	✓
	C2	C2.1 Carbon matrix, carbon fibre-reinforced (CFC)		✓	✓	✓

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

	v _c [m/min]	f _z [mm]					
		Diameter of milling cutter [mm]					
		8.00	10.00	12.00	16.00	20.00	25.00
	240	0.052	0.063	0.072	0.088	0.100	0.112
	195	0.049	0.058	0.067	0.082	0.094	0.105
	220	0.052	0.063	0.072	0.088	0.100	0.112
	155	0.044	0.052	0.060	0.073	0.084	0.093
	140	0.050	0.060	0.069	0.085	0.097	0.108
	130	0.048	0.057	0.066	0.080	0.092	0.103
	120	0.045	0.054	0.062	0.076	0.087	0.097
	145	0.050	0.060	0.069	0.085	0.097	0.108
	325	0.087	0.104	0.120	0.146	0.167	0.187
	295	0.074	0.089	0.102	0.124	0.142	0.159
	245	0.061	0.073	0.084	0.102	0.117	0.131
	135	0.035	0.042	0.048	0.059	0.067	0.075
	215	0.061	0.073	0.084	0.102	0.117	0.131
	205	0.052	0.063	0.072	0.088	0.100	0.112
	705	0.064	0.077	0.089	0.108	0.124	0.138
	470	0.068	0.081	0.093	0.114	0.130	0.145
	375	0.071	0.085	0.097	0.119	0.136	0.152
	270	0.077	0.093	0.106	0.130	0.149	0.166
	270	0.052	0.062	0.071	0.087	0.099	0.111
	200	0.052	0.062	0.071	0.087	0.099	0.111
	335	0.032	0.039	0.044	0.054	0.062	0.069

	Diameter of milling cutter [mm]					
	3,00 - 6,00		8,00 - 10,00		12,00 - 16,00	
	v _c [m/min]	f _z [mm]	v _c [m/min]	f _z [mm]	v _c [m/min]	f _z [mm]
	300	0.12 - 0.15	600	0.15 - 0.20	900	0.20 - 0.25
	300	0.12 - 0.15	600	0.15 - 0.20	900	0.20 - 0.25
	300	0.12 - 0.15	600	0.15 - 0.20	900	0.20 - 0.25
	300	0.12 - 0.15	600	0.15 - 0.20	900	0.20 - 0.25
	300	0.12 - 0.15	600	0.15 - 0.20	900	0.20 - 0.25
	300	0.12 - 0.15	600	0.15 - 0.20	900	0.20 - 0.25
	300	0.12 - 0.15	600	0.15 - 0.20	900	0.20 - 0.25
	300	0.12 - 0.15	600	0.15 - 0.20	900	0.20 - 0.25
	300	0.12 - 0.15	600	0.15 - 0.20	900	0.20 - 0.25
	300	0.12 - 0.15	600	0.15 - 0.20	900	0.20 - 0.25
	300	0.12 - 0.15	600	0.15 - 0.20	900	0.20 - 0.25

The specified machining values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for corner radius milling cutters

Feed and cutting speed

Korrekturfaktor:	
Länge	f_z & v_c
A/B	1,0
C	0,9
D	0,7
E	0,6

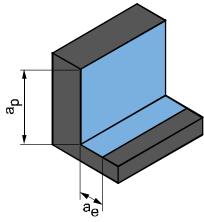
CPMill-Uni-Torus | CPM241

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
				MQL/Air	Dry	Coolant
P	P1	P1.1 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓
		P1.2 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓
	P2	P2.1 Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓
		P2.2 Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓		✓
	P3	P3.1 Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓
		P3.2 Tool, bearing, spring and high-speed steels**	< 1000	✓		✓
		P3.3 Tool, bearing, spring and high-speed steels**	< 1500	✓		✓
	P5	P5.1 Cast steel				✓
K	K1	K1.1 Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓
		K2.1 Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓
	K2	K2.2 Cast iron with spheroidal graphite, GJS	500-800	✓	✓	✓
		K2.3 Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓
	K3	K3.1 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓
		K3.2 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓
N	N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si		✓	✓	✓
		N1.2 Aluminium, alloy ≤ 7 % Si		✓	✓	✓
		N1.3 Aluminium, alloy > 7-12 % Si		✓	✓	✓
		N1.4 Aluminium, alloy > 12 % Si		✓	✓	✓
	N2	N2.1 Copper, non-alloy and low-alloy	< 300	✓	✓	✓
		N2.2 Copper, alloy	> 300	✓	✓	✓
		N2.3 Brass, bronze, gunmetal	< 1200	✓	✓	✓

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

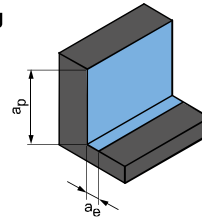
Roughing



$$a_p = 0.56 \times D$$

$$a_e = 0.5 \times D$$

Finishing



$$a_p = 0.56 \times D$$

$$a_e = 0.1 \times D$$

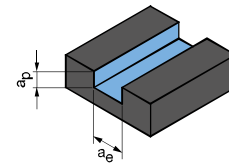
	v_c [m/min]	f_z [mm]						v_c [m/min]	f_z [mm]					
		Diameter of milling cutter [mm]							Diameter of milling cutter [mm]					
		8,00	10,00	12,00	16,00	20,00	25,00		8,00	10,00	12,00	16,00	20,00	25,00
	125	0.015	0.018	0.021	0.026	0.029	0.033	240	0.034	0.041	0.047	0.057	0.066	0.073
	105	0.014	0.017	0.020	0.024	0.027	0.031	195	0.032	0.038	0.044	0.054	0.061	0.068
	115	0.015	0.018	0.021	0.026	0.029	0.033	220	0.034	0.041	0.047	0.057	0.066	0.073
	80	0.013	0.015	0.018	0.021	0.024	0.027	155	0.028	0.034	0.039	0.048	0.055	0.061
	75	0.015	0.018	0.020	0.025	0.028	0.032	140	0.033	0.040	0.045	0.055	0.063	0.071
	70	0.014	0.017	0.019	0.024	0.027	0.030	130	0.031	0.037	0.043	0.053	0.060	0.067
	65	0.013	0.016	0.018	0.022	0.025	0.028	120	0.030	0.035	0.041	0.050	0.057	0.063
	75	0.015	0.018	0.020	0.025	0.028	0.032	145	0.033	0.040	0.045	0.055	0.063	0.071
	140	0.025	0.030	0.035	0.043	0.049	0.055	325	0.057	0.068	0.078	0.096	0.109	0.122
	125	0.022	0.026	0.030	0.036	0.042	0.046	295	0.048	0.058	0.067	0.081	0.093	0.104
	105	0.018	0.021	0.025	0.030	0.034	0.038	245	0.040	0.048	0.055	0.067	0.077	0.085
	60	0.010	0.012	0.014	0.017	0.020	0.022	135	0.023	0.027	0.031	0.038	0.044	0.049
	90	0.018	0.021	0.025	0.030	0.034	0.038	215	0.040	0.048	0.055	0.067	0.077	0.085
	85	0.015	0.018	0.021	0.026	0.029	0.033	205	0.034	0.041	0.047	0.057	0.066	0.073
	470	0.024	0.028	0.032	0.040	0.045	0.050	705	0.042	0.050	0.058	0.071	0.081	0.090
	315	0.025	0.030	0.034	0.042	0.048	0.053	470	0.044	0.053	0.061	0.074	0.085	0.095
	250	0.026	0.031	0.036	0.044	0.050	0.056	375	0.046	0.055	0.064	0.078	0.089	0.099
	180	0.028	0.034	0.039	0.047	0.054	0.061	270	0.050	0.060	0.069	0.085	0.097	0.108
	180	0.019	0.023	0.026	0.032	0.036	0.040	270	0.034	0.040	0.046	0.057	0.065	0.072
	135	0.019	0.023	0.026	0.032	0.036	0.040	200	0.034	0.040	0.046	0.057	0.065	0.072
	225	0.012	0.014	0.016	0.020	0.023	0.025	335	0.021	0.025	0.029	0.035	0.040	0.045

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for corner radius milling cutters

Feed and cutting speed

Groove milling



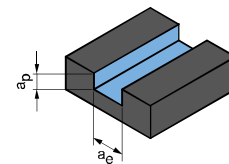
$$a_p = 0,5xD$$

$$a_e = 1xD$$

OptiMill-Diamond-Torus | SHM551

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			Diameter of milling cutter [mm]						
			MOL/Air	Dry	Coolant	3.00 – 6.00		8.00 – 10.00		12.00		
						v _c [m/min]	f _z [mm]	v _c [m/min]	f _z [mm]	v _c [m/min]	f _z [mm]	
N	N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si	✓	✓	✓	200	0.10–0.12	500	0.12–0.18	800	0.15–0.20	
		N1.2 Aluminium, alloy ≤ 7 % Si	✓	✓	✓	200	0.10–0.12	500	0.12–0.18	800	0.15–0.20	
		N1.3 Aluminium, alloy > 7–12 % Si	✓	✓	✓	200	0.10–0.12	500	0.12–0.18	800	0.15–0.20	
		N1.4 Aluminium, alloy > 12 % Si	✓	✓	✓	200	0.10–0.12	500	0.12–0.18	800	0.15–0.20	
	N2	N2.1 Copper, non-alloy and low-alloy	< 300	✓	✓	✓	200	0.10–0.12	500	0.12–0.18	800	0.15–0.20
		N2.2 Copper, alloy	> 300	✓	✓	✓	200	0.10–0.12	500	0.12–0.18	800	0.15–0.20
		N2.3 Brass, bronze, gunmetal	< 1.200	✓	✓	✓	200	0.10–0.12	500	0.12–0.18	800	0.15–0.20
	N4	N4.1 Plastic, thermoplastics										
		N4.2 Plastic, thermosets		✓	✓	✓	200	0.10–0.12	500	0.12–0.18	800	0.15–0.20
		N4.3 Plastic, foams										
C	C1.1 Plastic matrix, aramide fibre-reinforced (AFRP)											
	C1.2 Plastic matrix (thermosetting), CFRP/GFRP		✓	✓	✓	200	0.10–0.12	500	0.12–0.18	800	0.15–0.20	
	C1.3 Plastic matrix (thermoplastic), CFRP/GFRP		✓	✓	✓	200	0.10–0.12	500	0.12–0.18	800	0.15–0.20	
	C2.1 Carbon matrix, carbon fibre-reinforced (CFC)		✓	✓	✓	200	0.10–0.12	500	0.12–0.18	800	0.15–0.20	

Groove milling



$$a_p = 1xD$$

$$a_e = 1xD$$

OptiMill-Composite-Speed-Radius | SCM870

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v _c [m/min]	f _z [mm]						
			MOL/Air	Dry	Coolant		Diameter of milling cutter [mm]						
							4.00	6.00	8.00	10.00	12.00	16.00	20.00
N	N4	N4.1 Plastic, thermoplastics											
		N4.2 Plastic, thermosets	✓	✓	✓	150	0.020	0.029	0.038	0.045	0.052	0.063	0.072
		N4.3 Plastic, foams											
C	C1	C1.1 Plastic matrix, aramide fibre-reinforced (AFRP)											
		C1.2 Plastic matrix (thermosetting), CFRP/GFRP	✓	✓	✓	145	0.021	0.026	0.031	0.035	0.038	0.042	0.043
		C1.3 Plastic matrix (thermoplastic), CFRP/GFRP											
	C2	C2.1 Carbon matrix, carbon fibre-reinforced (CFC)	✓	✓	✓	145	0.018	0.023	0.027	0.031	0.033	0.037	0.038
		C3.1 Metal matrix (MMC)											
	C4	C4.1 Sandwich construction, honeycomb core	✓	✓		195	0.012	0.015	0.017	0.019	0.021	0.023	0.024
C4.2 Sandwich construction, foam core		✓	✓		150	0.019	0.024	0.028	0.032	0.035	0.039	0.041	

* MAPAL machining groups