

Solid carbide drills and end mills

Innovations 2024

MEGA-Deep-Drill-Steel

Efficient deep drilling up to 40xD

The new MEGA-Deep-Drill-Steel is a deep drill for highly efficient deep drilling applications on steel and cast-iron materials. Due to its innovative geometrical and cutting material design, the deep drill is ideally adapted to high feed rates and maximum productivity in bore machining up to 40xD.

The convex cutting edge and the optimised core diameter profile result in excellent cutting properties with maximum stability. The cooling channel diameters were enlarged by approx. 20% to ensure optimal cooling of the main cutters and cutting edges as well as improved chip removal.

The deep drill is suitable for emulsion and MQL on machining centres with a coolant pressure of 10–40 bar.

The four margin lands ensure exact boring accuracy and a very low bore runout. The adapted guide length and the widened rear margin lands ensure maximum guiding accuracy even with inclined bore outlets. With its smooth surface, the HiPIMS head coating enables maximum tool life and ensures smooth chip flow.



HIGH WEAR RESISTANCE



Good cutting properties, short chips

- Convex cutting edge shape

Maximum tool life

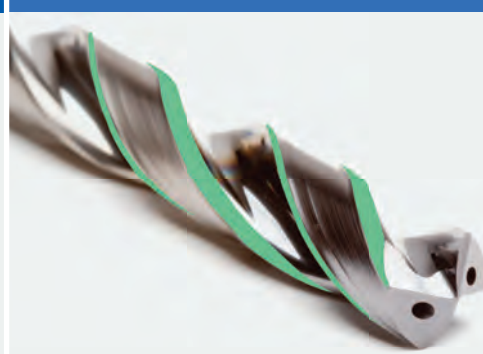
- Innovative cutting material

Maximum stability

- Perfectly adapted core diameter profile



PROCESS RELIABILITY



Exact boring accuracy

- Thanks to four margin lands

Very low bore runout

- Thanks to the larger circumference surface area of the rear margin lands

Maximum guiding accuracy even with inclined bore outlets

- Ideal length of margin lands

P

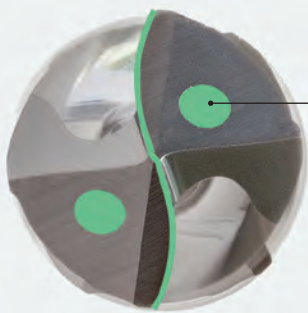
Steel
workpiece
materials

K

Cast-iron
workpiece
materials



MAXIMUM PRODUCTIVITY



Cooling channel Ø **+20%**

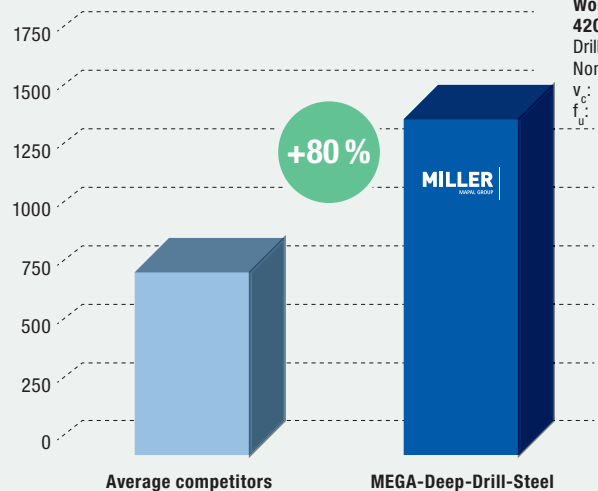
Good cutting properties and maximum feed rates

- Thanks to spherical main cutter
- Maximum cooling capacity
- Maximum cutting stability

Ideal chip removal

- Tightly rolled chips

Maximum tool life according to the number of bores



Workpiece material:
42CrMo4
Drilling depth: 30xD
Nominal Ø: 6.00 mm
 v_c : 80 m/min
 f_r : 0.3 mm/rev

Deep drilling in three steps

1 Making a pilot bore

MEGA-Drill-Steel-Plus

[M2003P, M2103P]

For general drilling conditions



MEGA-Step-Drill-Steel-Plus

[M2303P, M2403P]

For general drilling conditions
incl. 90° countersink



MEGA-Speed-Drill-Steel

[M9923]

For general drilling conditions



Info:

Select nominal \emptyset that is 0.02 mm larger.

Example:

Pilot tool: MEGA-Speed-Drill-Steel,
nominal \emptyset 5.02 mm

Subsequent tool: MEGA-Deep-Drill-Steel,
nominal \emptyset 5.00 mm

MEGA-180°-Drill

[M9185]

For difficult drilling conditions



2 Deep drilling up to 30xD

Entry into the pilot bore:

- Enter at max. 300 rpm and $v_f = 1,000$ mm/min
- Without coolant – drill up to 1 mm before the bottom of the pilot bore
- Switch on coolant →
cooling lubricant = 10–40 bar/MQL
- Spot drilling with specified cutting data according to table

Info:

Further method for spot drilling with the MEGA-Deep-Drill-Steel: Spot drilling with 50% feed, linear acceleration to 100% feed up to drilling depth of 4xD

- **Deep drilling up to 30xD in one shot, without chip removal cycles**

Running out:

- Run out at max. 300 rpm and double the feed ($2x v_f$)
- Switch off coolant

3 Deep drilling up to 40xD

Entry into the 30xD bore:

- Enter at max. 300 rpm and $v_f = 1,000$ mm/min
- Without coolant – up to 1 mm before the bottom of the 30xD bore
- Switch on coolant →
cooling lubricant = 10–40 bar/MQL
- Spot drilling with specified cutting data according to table

Info:

Further method for spot drilling with the MEGA-Deep-Drill-Steel: Spot drilling with 50% feed, linear acceleration to 100% feed up to drilling depth of 32xD

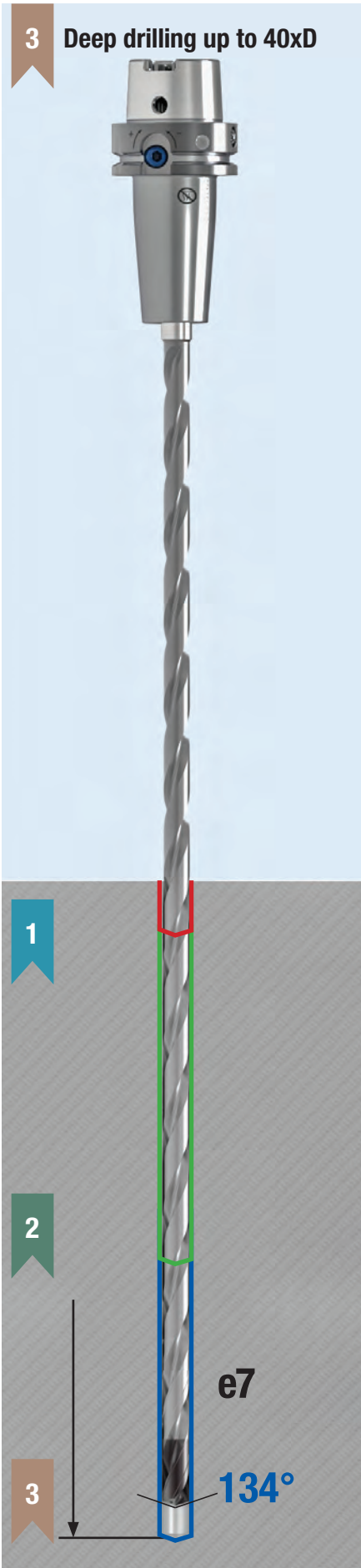
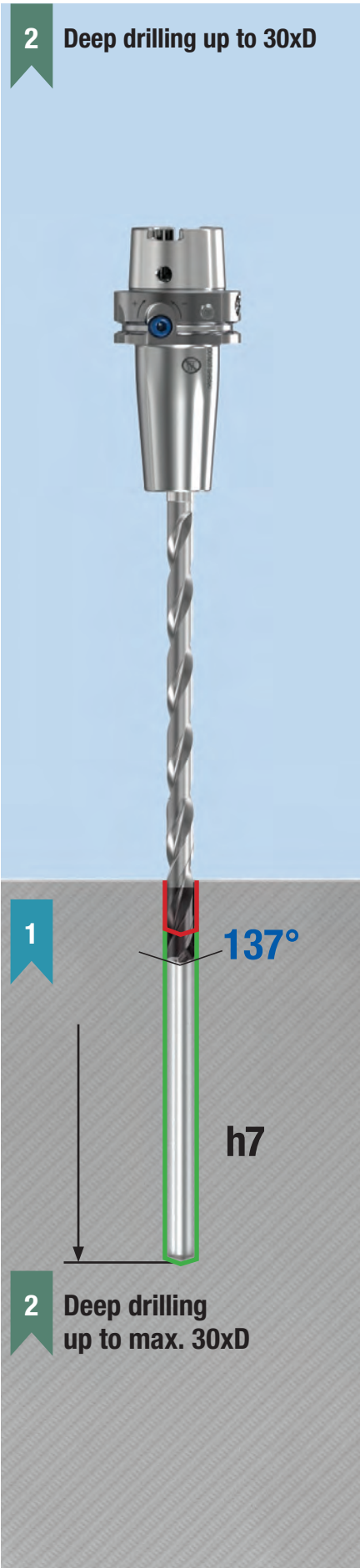
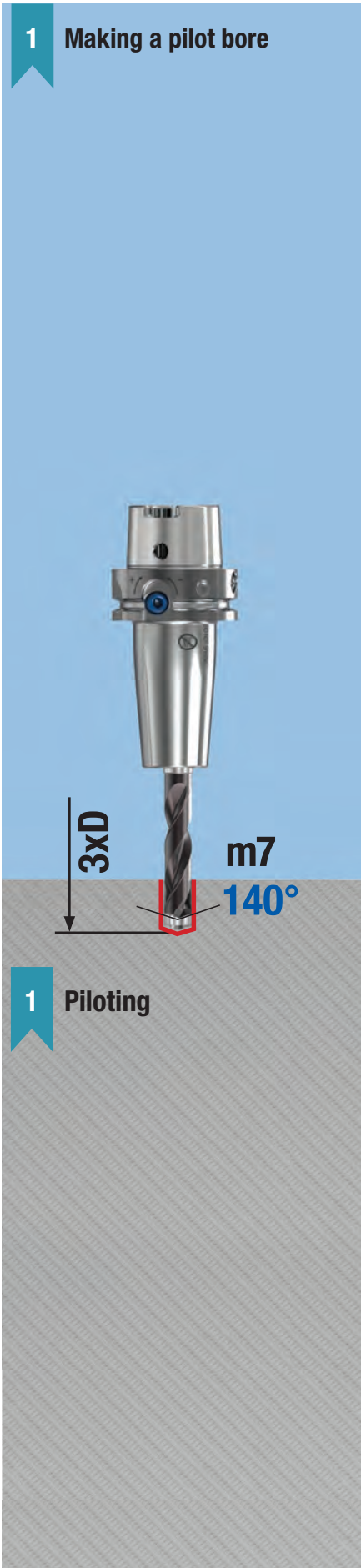
- **Deep drilling up to 40xD in one shot, without chip removal cycles**

Running out:

- Run out at max. 300 rpm and double the feed ($2x v_f$)
- Switch off coolant

Selecting the right pilot drill

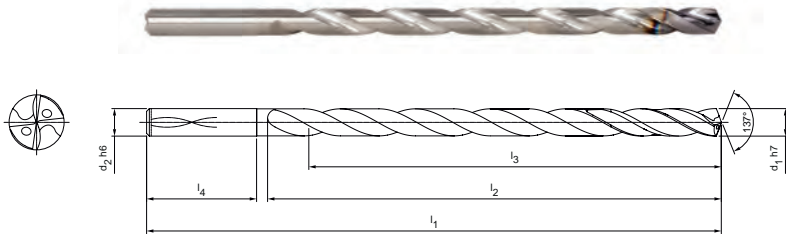
- The nominal diameter of the pilot drill must match the nominal diameter of the MEGA-Deep-Drill-Steel
- The point angle and diameter tolerances are matched for optimal functionality as well as for the interaction of pilot drill and deep drill



MEGA-Deep-Drill-Steel

Solid carbide twist drill
M9115 (15xD), internal coolant supply

Design:
 Drill diameter: 3.00 - 16.00 mm
 Bore tolerance: IT9 (available)
 Shank form: HA
 Coating: Mx18
 Number of cutting edges: 2
 Tip angle: 137°
 Helix angle: 30°
 Special features: Head coating



Preferred series available from stock

Dimensions						Shank form HA	
d ₁ h7	d ₂ h6	l ₁	l ₂	l ₃	l ₄	Specification	Order no.
3.00	4.00	90	58	52	28	M9115-0300A15	31459473
3.50	4.00	98	66	60	28	M9115-0350A15	31459474
4.00	4.00	98	66	60	28	M9115-0400A15	31459475
4.50	5.00	107	75	68	28	M9115-0450A15	31459476
5.00	5.00	115	83	75	28	M9115-0500A15	31459477
5.50	6.00	131	91	83	36	M9115-0550A15	31459478
6.00	6.00	139	99	90	36	M9115-0600A15	31459479
7.00	8.00	156	116	105	36	M9115-0700A15	31459510
8.00	8.00	172	132	120	36	M9115-0800A15	31459511
9.00	10.00	193	149	135	40	M9115-0900A15	31459512
9.50	10.00	209	165	150	40	M9115-0950A15	31459513
10.00	10.00	209	165	150	40	M9115-1000A15	31459514
11.00	12.00	231	182	165	45	M9115-1100A15	31459515
12.00	12.00	247	198	180	45	M9115-1200A15	31459516
13.00	14.00	264	215	195	45	M9115-1300A15	31459517
14.00	14.00	280	231	210	45	M9115-1400A15	31459518
15.00	16.00	300	248	225	48	M9115-1500A15	31459519
16.00	16.00	316	264	240	48	M9115-1600A15	31459520

Configurable features

Diameter:
Diameter in increments of 0.01 mm freely selectable

Specification:
M9115-[diameter]A15

Example:
M9115-0735A15

Tool diameter d₁ = 7.35 mm

Dimensions in mm.
 For recommended pilot drill, see page 4.
 For cutting data recommendation, see end of chapter.

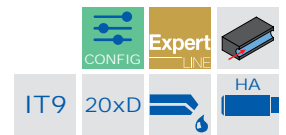
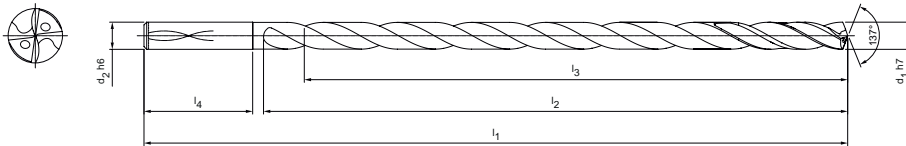
Dimensions of configurable series h7

d, min.	d ₁ max.	d ₂ h6	l ₁	l ₂	l ₃	l ₄
3.00	3.49	4.00	90	58	52	28
3.50	4.00	4.00	98	66	60	28
4.01	4.50	5.00	107	75	68	28
4.51	5.00	5.00	115	83	75	28
5.01	5.50	6.00	131	91	83	36
5.51	6.00	6.00	139	99	90	36
6.01	7.00	8.00	156	116	105	36
7.01	8.00	8.00	172	132	120	36
8.01	9.00	10.00	193	149	135	40
9.01	10.00	10.00	209	165	150	40
10.01	11.00	12.00	231	182	165	45
11.01	12.00	12.00	247	198	180	45
12.01	13.00	14.00	264	215	195	45
13.01	14.00	14.00	280	231	210	45
14.01	15.00	16.00	300	248	225	48
15.01	16.00	16.00	316	264	240	48

MEGA-Deep-Drill-Steel

Solid carbide twist drill
M9120 (20xD), internal coolant supply


Design:
 Drill diameter: 3.00 - 16.00 mm
 Bore tolerance: IT9 (available)
 Shank form: HA
 Coating: Mx18
 Number of cutting edges: 2
 Tip angle: 137°
 Helix angle: 30°
 Special features: Head coating




Preferred series available from stock

Dimensions						Shank form HA	
d ₁ h7	d ₂ h6	l ₁	l ₂	l ₃	l ₄	Specification	Order no.
3.00	4.00	108	76	70	28	M9120-0300A15	31459521
3.50	4.00	118	86	80	28	M9120-0350A15	31459522
4.00	4.00	118	86	80	28	M9120-0400A15	31459523
4.50	5.00	129	97	90	28	M9120-0450A15	31459524
5.00	5.00	140	108	100	28	M9120-0500A15	31459525
5.50	6.00	159	119	110	36	M9120-0550A15	31459526
6.00	6.00	169	129	120	36	M9120-0600A15	31459527
6.50	8.00	191	151	140	36	M9120-0650A15	31459528
7.00	8.00	191	151	140	36	M9120-0700A15	31459529
8.00	8.00	212	172	160	36	M9120-0800A15	31459530
9.00	10.00	238	194	180	40	M9120-0900A15	31459531
10.00	10.00	259	215	200	40	M9120-1000A15	31459532
11.00	12.00	286	237	220	45	M9120-1100A15	31459533
12.00	12.00	307	258	240	45	M9120-1200A15	31459534
13.00	14.00	329	280	260	45	M9120-1300A15	31459535
14.00	14.00	350	301	280	45	M9120-1400A15	31459536
15.00	16.00	375	323	300	48	M9120-1500A15	31459537
16.00	16.00	396	344	320	48	M9120-1600A15	31459538

Configurable features



Diameter:
Diameter in increments of 0.01 mm freely selectable



Specification:
M9120-[diameter]A15

Example:
M9120-0735A15

Tool diameter d₁ = 7.35 mm

Dimensions in mm.
 For recommended pilot drill, see page 4.
 For cutting data recommendation, see end of chapter.

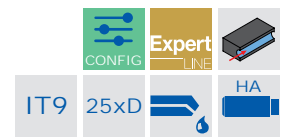
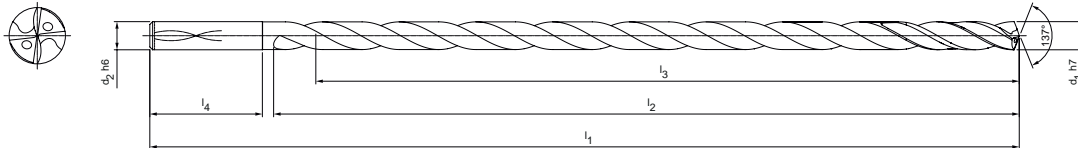
Dimensions of configurable series h7

d, min.	d ₁ max.	d ₂ h6	l ₁	l ₂	l ₃	l ₄
3.00	3.49	4.00	108	76	70	28
3.50	4.00	4.00	118	86	80	28
4.01	4.50	5.00	129	97	90	28
4.51	5.00	5.00	140	108	100	28
5.01	5.50	6.00	159	119	110	36
5.51	6.00	6.00	169	129	120	36
6.01	7.00	8.00	191	151	140	36
7.01	8.00	8.00	212	172	160	36
8.01	9.00	10.00	238	194	180	40
9.01	10.00	10.00	259	215	200	40
10.01	11.00	12.00	286	237	220	45
11.01	12.00	12.00	307	258	240	45
12.01	13.00	14.00	329	280	260	45
13.01	14.00	14.00	350	301	280	45
14.01	15.00	16.00	375	323	300	48
15.01	16.00	16.00	396	344	320	48

MEGA-Deep-Drill-Steel

Solid carbide twist drill
M9125 (25xD), internal coolant supply


Design:
 Drill diameter: 3.00 - 14.00 mm
 Bore tolerance: IT9 (available)
 Shank form: HA
 Coating: Mx18
 Number of cutting edges: 2
 Tip angle: 137°
 Helix angle: 30°
 Special features: Head coating



Preferred series available from stock

Dimensions						Shank form HA	
d ₁ h7	d ₂ h6	l ₁	l ₂	l ₃	l ₄	Specification	Order no.
3.00	4.00	125	93	87	28	M9125-0300A15	31459539
3.50	4.00	138	106	100	28	M9125-0350A15	31459540
4.00	4.00	138	106	100	28	M9125-0400A15	31459541
4.50	5.00	152	120	113	28	M9125-0450A15	31459542
5.00	5.00	165	133	125	28	M9125-0500A15	31459543
5.50	6.00	186	146	137	36	M9125-0550A15	31459544
6.00	6.00	199	159	150	36	M9125-0600A15	31459545
7.00	8.00	226	186	175	36	M9125-0700A15	31459546
8.00	8.00	252	212	200	36	M9125-0800A15	31459547
9.00	10.00	283	239	225	40	M9125-0900A15	31459548
10.00	10.00	309	265	250	40	M9125-1000A15	31459549
11.00	12.00	341	292	275	45	M9125-1100A15	31459550
12.00	12.00	367	318	300	45	M9125-1200A15	31459551
13.00	14.00	394	345	325	45	M9125-1300A15	31459552
14.00	14.00	420	371	350	45	M9125-1400A15	31459553

Configurable features



Diameter:
Diameter in increments of 0.01 mm freely selectable

Specification:
M9125-[diameter]A15

Example:
M9125-0735A15

Tool diameter d₁ = 7.35 mm

Dimensions of configurable series h7

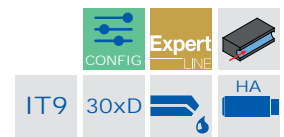
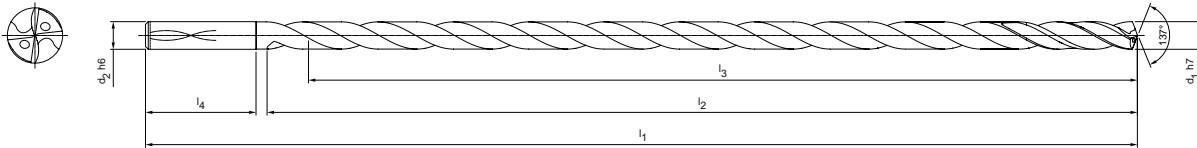
d ₁ min.	d ₁ max.	d ₂ h6	l ₁	l ₂	l ₃	l ₄
3.00	3.49	4.00	125	93	87	28
3.50	4.00	4.00	138	106	100	28
4.01	4.50	5.00	152	120	113	28
4.51	5.00	5.00	165	133	125	28
5.01	5.50	6.00	186	146	138	36
5.51	6.00	6.00	199	159	150	36
6.01	7.00	8.00	226	186	175	36
7.01	8.00	8.00	252	212	200	36
8.01	9.00	10.00	283	239	225	40
9.01	10.00	10.00	309	265	250	40
10.01	11.00	12.00	341	292	275	45
11.01	12.00	12.00	367	318	300	45
12.01	13.00	14.00	394	345	325	45
13.01	14.00	14.00	420	371	350	45

Dimensions in mm.
 For recommended pilot drill, see page 4.
 For cutting data recommendation, see end of chapter.

MEGA-Deep-Drill-Steel

Solid carbide twist drill
M9130 (30xD), internal coolant supply


Design:
 Drill diameter: 3.00 - 12.00 mm
 Bore tolerance: IT9 (available)
 Shank form: HA
 Coating: Mx18
 Number of cutting edges: 2
 Tip angle: 137°
 Helix angle: 30°
 Special features: Head coating



Preferred series available from stock

Dimensions						Shank form HA	
d ₁ h7	d ₂ h6	l ₁	l ₂	l ₃	l ₄	Specification	Order no.
3.00	4.00	143	111	105	28	M9130-0300A15	31459554
3.50	4.00	158	126	120	28	M9130-0350A15	31459555
4.00	4.00	158	126	120	28	M9130-0400A15	31459556
4.50	5.00	174	142	135	28	M9130-0450A15	31459557
5.00	5.00	190	158	150	28	M9130-0500A15	31459558
5.50	6.00	214	174	165	36	M9130-0550A15	31459559
6.00	6.00	229	189	180	36	M9130-0600A15	31459560
6.50	8.00	261	221	210	36	M9130-0650A15	31459561
7.00	8.00	261	221	210	36	M9130-0700A15	31459562
8.00	8.00	292	252	240	36	M9130-0800A15	31459563
9.00	10.00	328	284	270	40	M9130-0900A15	31459564
10.00	10.00	359	315	300	40	M9130-1000A15	31459565
11.00	12.00	396	347	330	45	M9130-1100A15	31459566
12.00	12.00	427	378	360	45	M9130-1200A15	31459567

Configurable features



Diameter:
Diameter in increments of 0.01 mm freely selectable

Specification:
M9130-[diameter]A15

Example:
M9130-0735A15

Tool diameter d₁ = 7.35 mm

Dimensions of configurable series h7

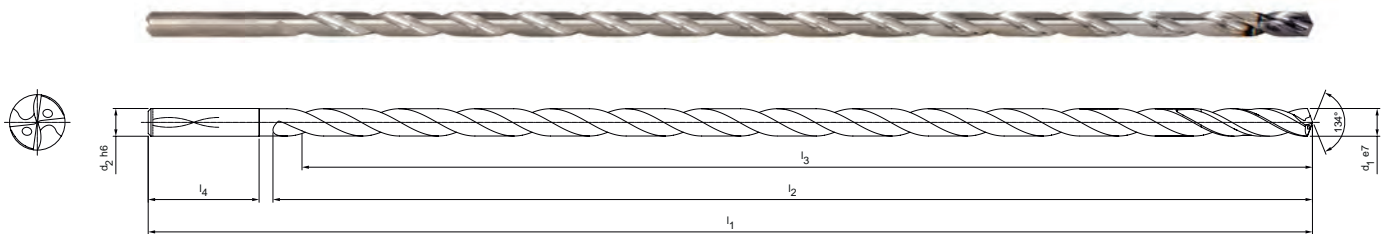
d ₁ min.	d ₁ max.	d ₂ h6	l ₁	l ₂	l ₃	l ₄
3.00	3.49	4.00	143	111	105	28
3.50	4.00	4.00	158	126	120	28
4.01	4.50	5.00	174	142	135	28
4.51	5.00	5.00	190	158	150	28
5.01	5.50	6.00	214	174	165	36
5.51	6.00	6.00	229	189	180	36
6.01	7.00	8.00	261	221	210	36
7.01	8.00	8.00	292	252	240	36
8.01	9.00	10.00	328	284	270	40
9.01	10.00	10.00	359	315	300	40
10.01	11.00	12.00	396	347	330	45
11.01	12.00	12.00	427	378	360	45

Dimensions in mm.
 For recommended pilot drill, see page 4.
 For cutting data recommendation, see end of chapter.

MEGA-Deep-Drill-Steel

Solid carbide twist drill
M9140 (40xD), internal coolant supply

Design:
 Drill diameter: 3.00 - 9.00 mm
 Bore tolerance: IT9 (available)
 Shank form: HA
 Coating: Mx18
 Number of cutting edges: 2
 Tip angle: 134°
 Helix angle: 30°
 Special features: Head coating



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IT9

40xD

HA

Preferred series available from stock

Dimensions						Shank form HA	
d ₁ h7	d ₂ h6	l ₁	l ₂	l ₃	l ₄	Specification	Order no.
3.00	4.00	178	146	140	28	M9140-0300A15	31459568
3.50	4.00	198	166	160	28	M9140-0350A15	31459569
4.00	4.00	198	166	160	28	M9140-0400A15	31459570
4.50	5.00	219	187	180	28	M9140-0450A15	31459571
5.00	5.00	240	208	200	28	M9140-0500A15	31459572
6.00	6.00	289	249	240	36	M9140-0600A15	31459573
7.00	8.00	331	291	280	36	M9140-0700A15	31459574
8.00	8.00	372	332	320	36	M9140-0800A15	31459575
9.00	10.00	418	374	360	40	M9140-0900A15	31459576

Configurable features

Diameter:
Diameter in increments of 0.01 mm freely selectable

Specification:
M9140-[diameter]A15

Example:
M9140-0735A15

Tool diameter d₁ = 7.35 mm

Dimensions of configurable series h7

d ₁ min.	d ₁ max.	d ₂ h6	l ₁	l ₂	l ₃	l ₄
3.00	3.49	4.00	178	146	140	28
3.50	4.00	4.00	198	166	160	28
4.01	4.50	5.00	219	187	180	28
4.51	5.00	5.00	240	208	200	28
5.01	5.50	6.00	269	229	220	36
5.51	6.00	6.00	289	249	240	36
6.01	7.00	8.00	331	291	280	36
7.01	8.00	8.00	372	332	320	36
8.01	9.00	10.00	418	374	360	40

Dimensions in mm.
 For recommended pilot drill, see page 4.
 For cutting data recommendation, see end of chapter.

Cutting data recommendations for deep drills

Feed and cutting speed

MEGA-Deep-Drill-Steel | M9115, M9120, M9125, M9130, M9140

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cutting speed v_c [m/min]		Feed f [mm] for drill diameter					
				Internal cooling	MQL	3.00	4.00	6.00	8.00	12.00	16.00
P	P1.1	Structural, machining, case hardened and tempering steels, unalloyed	< 700	100	90	0.16	0.19	0.24	0.30	0.40	0.48
	P1.2	Structural, machining, case hardened and tempering steels, unalloyed	< 1,200	90	75	0.20	0.24	0.31	0.38	0.48	0.60
	P2.1	Nitriding, hardening and tempering steels, alloyed	< 900	100	85	0.19	0.23	0.29	0.36	0.46	0.57
	P2.2	Nitriding, hardening and tempering steels, alloyed	< 1,400	70	60	0.16	0.19	0.24	0.29	0.39	0.45
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	75	65	0.17	0.20	0.26	0.32	0.42	0.51
	P3.2	Tool, bearing, spring and high-speed steels**	< 1,000	60	55	0.14	0.17	0.22	0.27	0.35	0.42
	P3.3	Tool, bearing, spring and high-speed steels**	< 1,500	60	50	0.12	0.14	0.18	0.21	0.28	0.32
P5	P5.1	Cast steel		100	85	0.19	0.23	0.29	0.36	0.46	0.57
K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	120	85	0.21	0.28	0.37	0.48	0.62	0.80
	K2.1	Cast iron with spheroidal graphite, GJS	< 500	160	120	0.22	0.27	0.35	0.45	0.58	0.74
	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	100	75	0.20	0.24	0.31	0.39	0.52	0.63
	K2.3	Cast iron with spheroidal graphite, GJS	> 800	60	50	0.14	0.17	0.22	0.27	0.35	0.42
	K3.1	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	< 500	90	80	0.21	0.26	0.34	0.42	0.55	0.68
	K3.2	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	> 500	80	70	0.18	0.22	0.28	0.34	0.45	0.54



Hydraulic chucks - the latest clamping technology

WTE hydraulic chucks guarantee optimum workpiece surfaces and long tool lives due to the high vibration damping. The simple operation without additional devices is also convincing. These robust and low maintenance chucks are available from stock in different designs. They are excellently suited for drilling or for fine bore machining.

ADVANTAGES

- Radial or axial length adjustment to the μ
- No reduction in the clamping forces at high spindle speeds
- Extended tool life due to maximum radial-runout and repetition accuracy
- Tool change in seconds without peripheral devices



Find out more about WTE clamping technology at:
wte.mapal.com

* MILLER machining groups

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

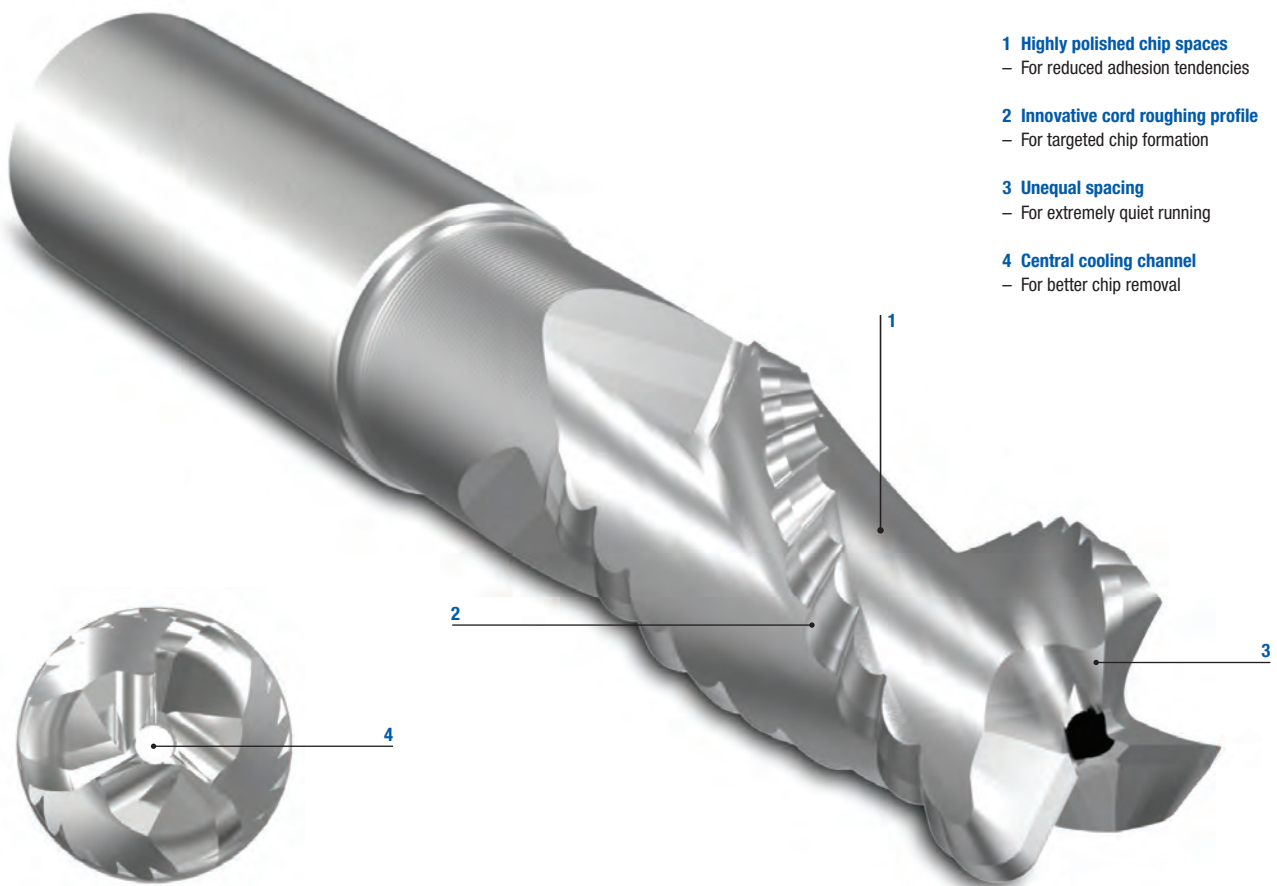
The optimum data for the respective machining task should be determined during the test or machining.

OptiMill®-Alu-Wave

A new dimension of high-volume aluminium machining

The OptiMill-Alu-Wave is a newly developed roughing cutter for machining aluminium materials. It produces short chips and ensures smooth cutting behaviour thanks to its unique cord roughing geometry. The milling cutter has a central cooling channel that minimises the formation of built-up edges and safely removes chips. It also offers configurable corner radii for precise near-contour roughing.

Due to its high machining volume, the OptiMill-Alu-Wave allows efficient material removal and, in this way, increases productivity. Available in various lengths, it adapts perfectly to the individual requirements of any roughing task.



- 1 Highly polished chip spaces**
– For reduced adhesion tendencies
- 2 Innovative cord roughing profile**
– For targeted chip formation
- 3 Unequal spacing**
– For extremely quiet running
- 4 Central cooling channel**
– For better chip removal

Features

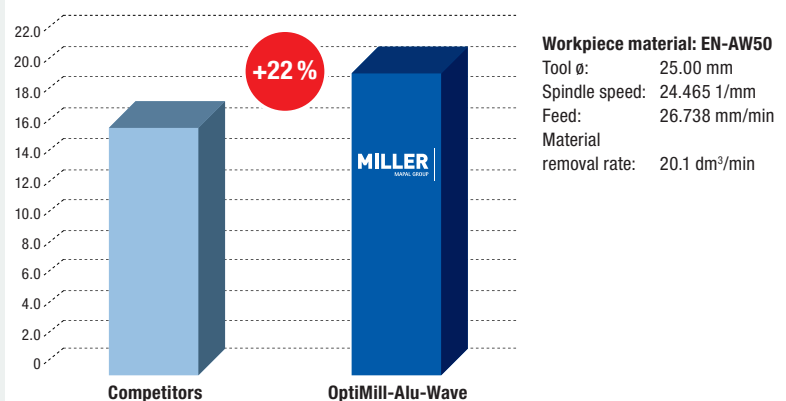
Configurable features:

- \varnothing area: 12.00 - 25.00 mm
- Shank form: HB | Safe-lock®
- Cutting edge design: Radius | Chamfer 45° of \varnothing 12.00 – 25.00 mm | 0.40 – 1.00 mm
- Coating: Available as DLC coating with cutting material HP910

Dimensions:

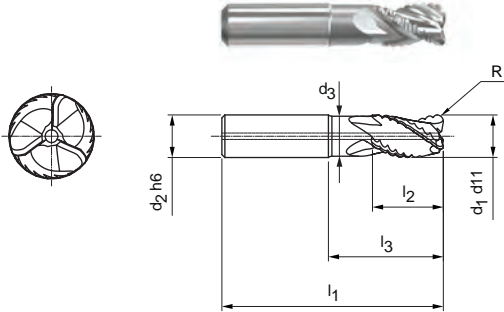
- Short, medium and long projection length with neck
- \varnothing area: 12.00 - 25.00 mm

MATERIAL REMOVAL RATE [dm³/min]



OptiMill®-Alu-Wave

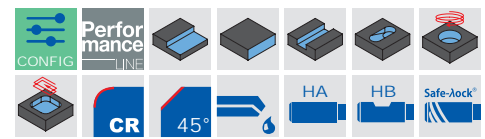
Shoulder milling cutter, short projection length with neck, with internal coolant supply
M3582



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	G	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: 12.00 - 25.00 mm
 Shank form: HA (DIN 6535)
 Coating: Uncoated
 Number of cutting edges: 3
 Point geometry: Specific geometry
 Helix angle: 36°
 Dimensions: Factory standard
 Special feature: With central internal cooling

Application:
 Before using in the machine, check the cutting data according to machine performance (see cutting data).



Preferred series available from stock | Short projection length

Dimensions							z	Specification	Order no.
d ₁ d ₁₁	d ₂ h ₆	d ₃	l ₁	l ₂	l ₃	R			
12.00	12	11.2	83	22	36	2.00	3	M3582-1200AU-R0200	31430485
16.00	16	15.1	92	26	42	3.00	3	M3582-1600AU-R0300	31430488
20.00	20	18.8	104	32	54	3.00	3	M3582-2000AU-R0300	31430551
20.00	20	18.8	104	32	54	4.00	3	M3582-2000AU-R0400	31430552
25.00	25	23.5	114	40	58	3.00	3	M3582-2500AU-R0300	31430559
25.00	25	23.5	114	40	58	4.00	3	M3582-2500AU-R0400	31430560

Configurable features

Shank form:
Shank form: HB | Safe-lock®

Cutting edge design:
Configurable radius
Configurable chamfer 45°

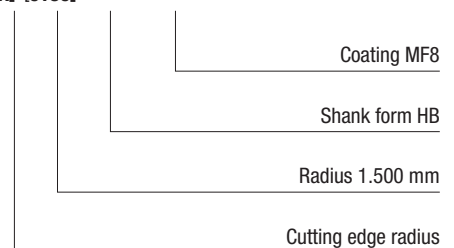
Coating:
Available as DLC coating with coating MF8

Specification:
M3582-2500[shank form][coating][cutting edge]-[size]

Dimensions of configurable radii and corner chamfers

d ₁	Radius		Chamfer 45°	
	Rmin.	Rmax.	Fmin.	Fmax.
12.00	0.4	3.00	0.40	1.00
16.00	0.5	4.00	0.40	1.00
20.00	0.6	5.20	0.40	1.00
25.00	0.75	6.50	0.40	1.00

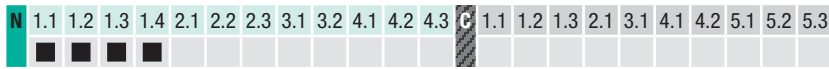
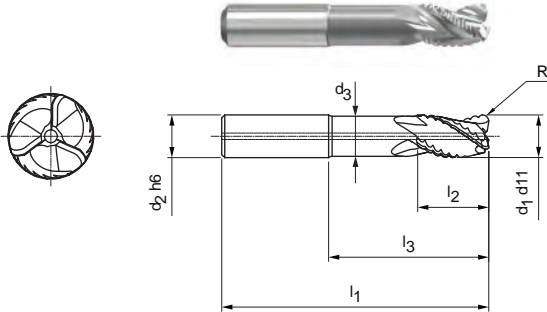
Example:
M3582-2500[B][02][R]-[0150]



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

OptiMill®-Alu-Wave

Shoulder milling cutter, medium projection length with neck, with internal coolant supply
M3582

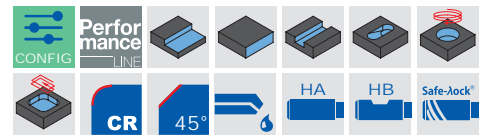


Design:

Diameter of milling cutter: 12.00 - 25.00 mm
 Shank form: HA (DIN 6535)
 Coating: Uncoated
 Number of cutting edges: 3
 Point geometry: Specific geometry
 Helix angle: 36°
 Dimensions: Factory standard
 Special feature: With central internal cooling

Application:

Before using in the machine, check the cutting data according to machine performance (see cutting data).



Preferred series available from stock | Medium projection length

Dimensions							z	Specification	Order no.
d ₁ d ₁₁	d ₂ h ₆	d ₃	l ₁	l ₂	l ₃	R			
12.00	12	11.2	95	26	50	2.00	3	M3582-1200AU-R0200	31430486
16.00	16	15.1	115	32	65	3.00	3	M3582-1600AU-R0300	31430489
20.00	20	18.8	125	32	75	3.00	3	M3582-2000AU-R0300	31430553
20.00	20	18.8	125	32	75	4.00	3	M3582-2000AU-R0400	31430556
25.00	25	23.5	136	50	80	3.00	3	M3582-2500AU-R0300	31430561
25.00	25	23.5	136	50	80	4.00	3	M3582-2500AU-R0400	31430562

Configurable features

Shank form:
Shank form: HB | Safe-lock®

Cutting edge design:
Configurable radius
Configurable chamfer 45°

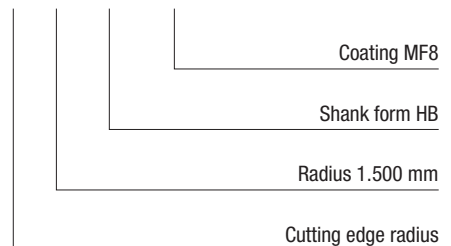
Coating:
Available as DLC coating with coating MF8

Specification:
M3582-2500[shank form][coating][cutting edge]-[size]

Dimensions of configurable radii and corner chamfers

d ₁	Radius		Chamfer 45°	
	Rmin.	Rmax.	Fmin.	Fmax.
12.00	0.4	3.00	0.40	1.00
16.00	0.5	4.00	0.40	1.00
20.00	0.6	5.20	0.40	1.00
25.00	0.75	6.50	0.40	1.00

Example:
M3582-2500[B][02][R]-[0150]



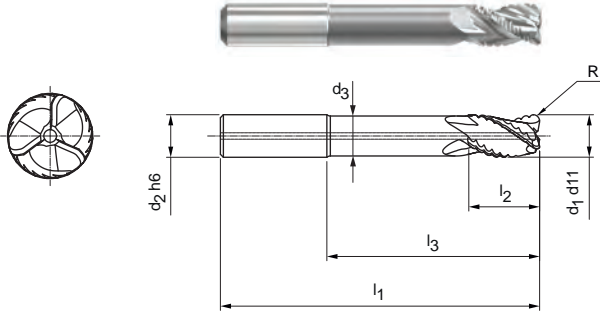
Dimensions in mm.

For cutting data recommendation, see end of chapter.

Special designs and other coatings available upon request.

OptiMill®-Alu-Wave

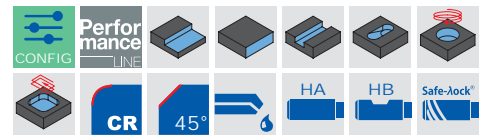
Shoulder milling cutter, long projection length with neck, with internal coolant supply
M3582



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
---	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	---	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Design:
 Diameter of milling cutter: 12.00 - 25.00 mm
 Shank form: HA (DIN 6535)
 Coating: Uncoated
 Number of cutting edges: 3
 Point geometry: Specific geometry
 Helix angle: 36°
 Dimensions: Factory standard
 Special feature: With central internal cooling

Application:
 Before using in the machine, check the cutting data according to machine performance (see cutting data).



Preferred series available from stock | Long projection length

Dimensions							z	Specification	Order no.
d ₁ d ₁₁	d ₂ h ₆	d ₃	l ₁	l ₂	l ₃	R			
12.00	12	11.2	106	16	60	2.00	3	M3582-1200AU-R0200	31430487
16.00	16	15.1	129	24	80	3.00	3	M3582-1600AU-R0300	31430550
20.00	20	18.8	150	32	100	3.00	3	M3582-2000AU-R0300	31430557
20.00	20	18.8	150	32	100	4.00	3	M3582-2000AU-R0400	31430558
25.00	25	23.5	163	42	107	3.00	3	M3582-2500AU-R0300	31430563
25.00	25	23.5	163	42	107	4.00	3	M3582-2500AU-R0400	31430564

Configurable features

Shank form:
Shank form: HB | Safe-lock®

Cutting edge design:
Configurable radius
Configurable chamfer 45°

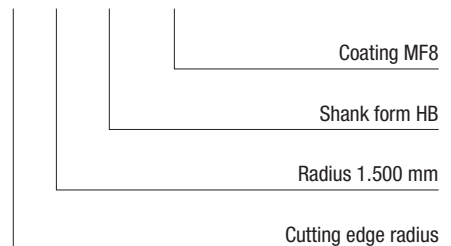
Coating:
Available as DLC coating with coating MF8

Specification:
M3582-2500[shank form][coating][cutting edge]-[size]

Dimensions of configurable radii and corner chamfers

d ₁	Radius		Chamfer 45°	
	Rmin.	Rmax.	Fmin.	Fmax.
12.00	0.4	3.00	0.40	1.00
16.00	0.5	4.00	0.40	1.00
20.00	0.6	5.20	0.40	1.00
25.00	0.75	6.50	0.40	1.00

Example:
M3582-2500[B][02][R]-[0150]



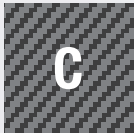
Dimensions in mm.
 For cutting data recommendation, see end of chapter.
 Special designs and other coatings available upon request.

OptiMill®-Composite-Speed-Plus

A new dimension of process reliability

The OptiMill-Composite-Speed-Plus features a new diamond coating developed by MAPAL with even distribution and higher coating thickness. The bigger core diameter increases fracture strength by 50 percent. The improved groove profile ensures efficient, reliable removal of dust and process heat even when machining large volumes. The cutting wedge has been specially optimised to meet the requirements of brittle workpiece material. The special cutting-edge serration causes double compression so that fibre fraying on the workpiece edges of the upper and lower sides are reliably separated.

This allows the OptiMill-Composite-Speed-Plus to attain a new dimension in process reliability. Compared to the OptiMill-Composite-Speed, 20 percent longer tool life is achieved.



Composite materials



Graphites, thermosets

PROCESS RELIABILITY

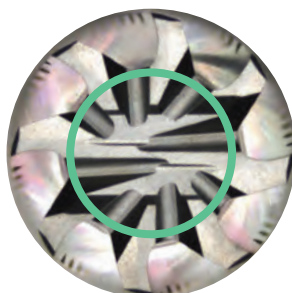


Increased fracture strength

NEW



OptiMill®-Composite-Speed-Plus

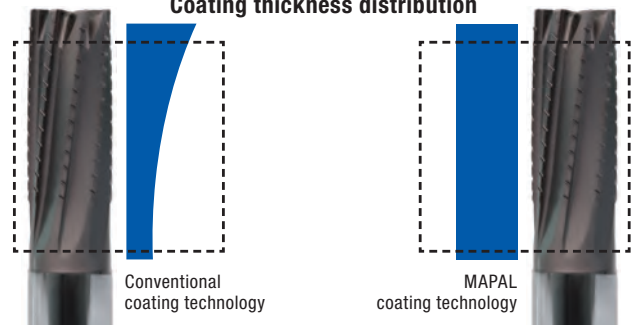


OptiMill®-Composite-Speed

- Bigger core diameter
- New dimensions with adjusted cutting length in accordance with DIN6527

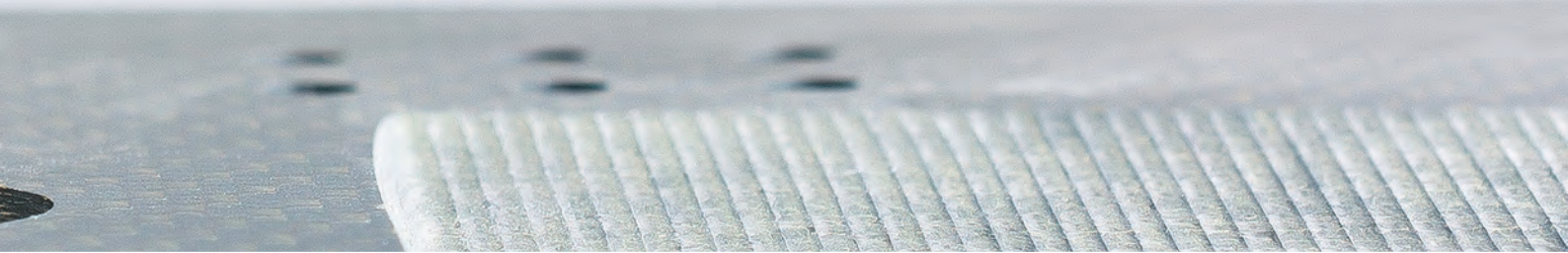
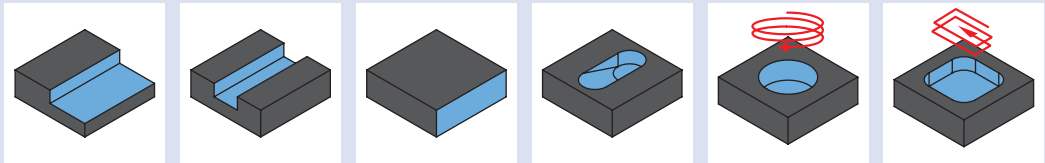
MAPAL coating

Coating thickness distribution



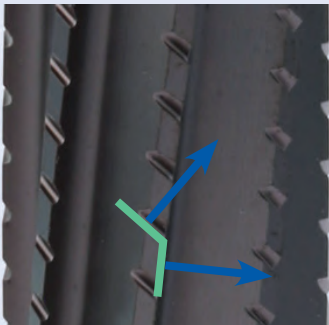
- Optimized distribution of coating thickness
- Increased diamond coating for maximum tool life

WIDE RANGE OF APPLICATIONS



QUALITY

Excellent cutting quality



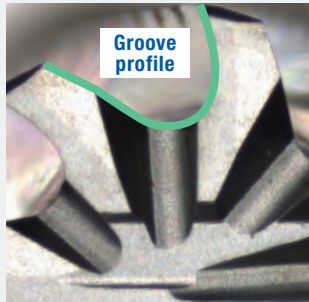
- Special cutting-edge serration causes double compression
- Reliable separation of fibre fraying on workpiece edges
- Extremely sharp cutting edges

WEAR AND TEAR

Maximum tool life



OptiMill®-Composite-Speed-Plus



OptiMill®-Composite-Speed

- High cutting stability due to reinforced cutting wedge
- Optimised groove profile and double point thinning for better dust removal
- Improved coating adhesion properties

Available from
NOW ON!

OptiMill®-Composite-Speed-Plus

Uncoated



Performance
LINE

Performance Line:
High-performance tools, broad field of application, greater productivity in series manufacturing

NEW TOOL DESIGN FOR MORE PRODUCTIVITY

Compared to previous router tools, the OptiMill-Composite-Speed-Plus markedly improves quiet running and increases tool life.

NEW



OptiMill-Composite MT I Router tools

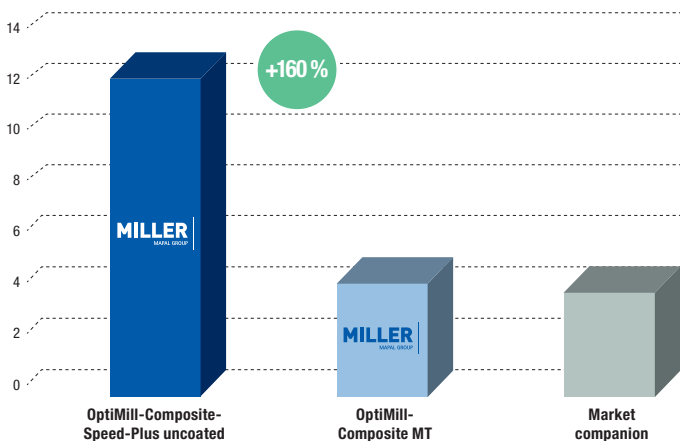


Increased productivity



OptiMill-Composite-Speed-Plus, uncoated

COMPARISON TOOL LIFE [m]



Material:
CFRP unidirectional with thermoset matrix
n: 7,958 1/min
f_z: 0.028 mm/z
v_c: 200 m/min
v_f: 1,783 mm/min
a_p: 10 mm
a_e: 8 mm

AT A GLANCE

- First choice in unfavourable process conditions
- Extremely sharp cutting edge for optimum cutting quality
- Ideal for workpiece material with low abrasiveness

Available from
NOW ON!

MILLER | Innovations 2024

OptiMill®-Composite-Speed-Plus

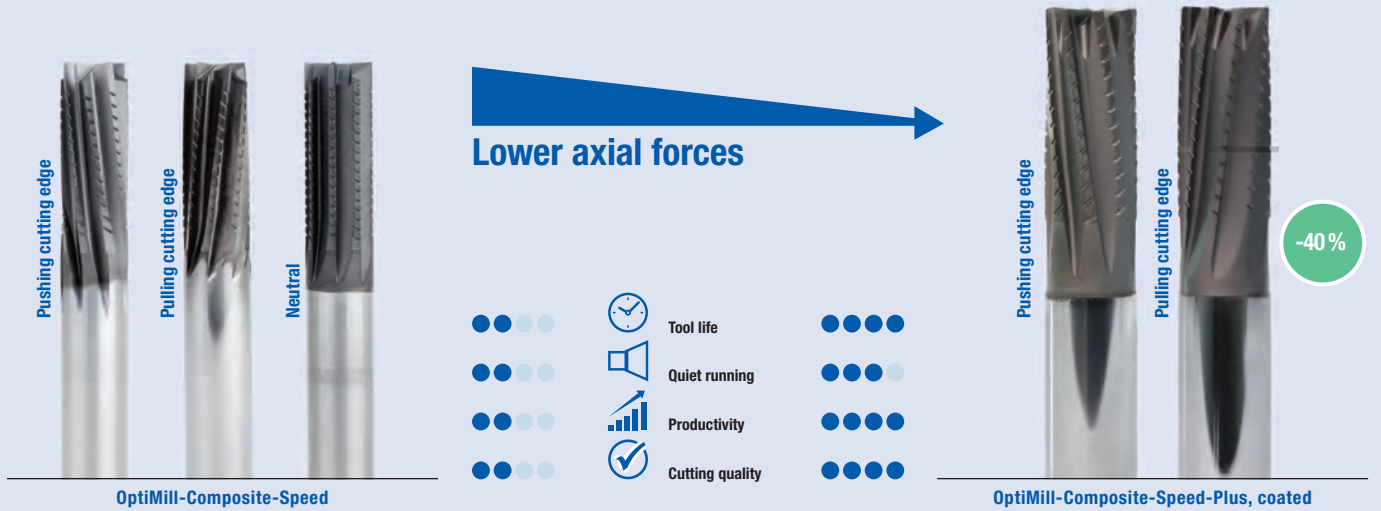
Coated



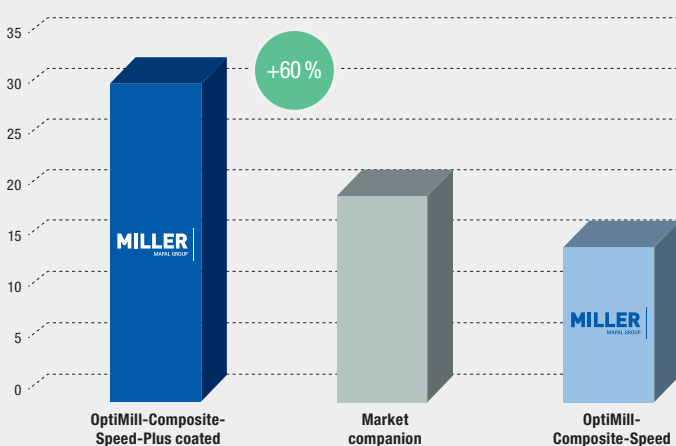
Expert Line:
Specialist tools for selected applications,
maximum precision and productivity

FURTHER DEVELOPMENT REDUCES AXIAL FORCES

Axial forces for the OptiMill-Composite-Speed-Plus are reduced by 40 percent compared to the OptiMill-Composite-Speed. A neutral series is not required for this reason.



COMPARISON TOOL LIFE [m]



Material:
CFRP unidirectional
with thermoset matrix
n: 7,962 1/min
f_z: 0.028 mm/z
v_c: 200 m/min
v_f: 1,783 mm/min
a_p: 10 mm
a_e: 8 mm

AT A GLANCE

- First choice in good process conditions
- Even MAPAL uniform diamond coating thickness distribution for increased process reliability
- Increased coating thickness for maximum tool life
- Highest productivity

OptiMill®-Composite-Speed-Plus

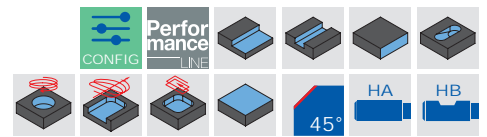
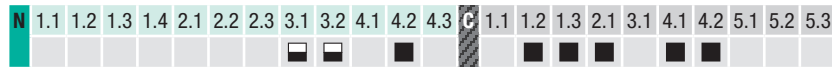
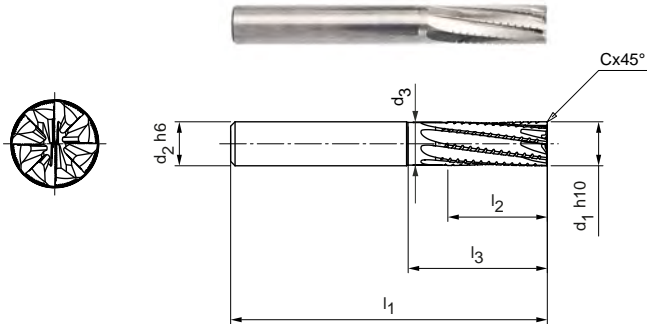
Shoulder milling cutter, design with pulling cutting edge
M7248P

Design:

Diameter of milling cutter: 4.00 - 20.00 mm
Coating: Uncoated
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 available from stock

Dimensions							z	Specification	Order no.
d ₁ h10	d ₂ h6	d ₃	l ₁	l ₂	l ₃	Cx45°			
4.00	6	3.90	57	11	—	0.08	8	M7248P-0400AU-C0008	31237383
5.00	6	4.90	57	13	—	0.10	8	M7248P-0500AU-C0010	31237384
6.00	6	5.80	57	13	19	0.12	8	M7248P-0600AU-C0012	31237385
6.00	6	5.80	65	21	27	0.12	8	M7248P-0600AU-C0012	31237386
8.00	8	7.80	63	19	25	0.16	8	M7248P-0800AU-C0016	31237387
8.00	8	7.80	70	22	32	0.16	8	M7248P-0800AU-C0016	31237388
10.00	10	9.70	72	22	30	0.20	8	M7248P-1000AU-C0020	31237389
12.00	12	11.60	83	26	36	0.24	8	M7248P-1200AU-C0024	31237390
16.00	16	15.50	92	32	42	0.32	8	M7248P-1600AU-C0032	31237391


Available on request

20.00	20	19.40	104	38	52	0.40	8	M7248P-2000AU-C0040	31237392
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Configurable features



Shank form:
Shank form: HB



Specification:
M7248P-1200[shank form]-C0024

Example:

M7248P-1200BU-C0024

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

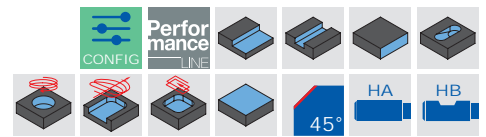
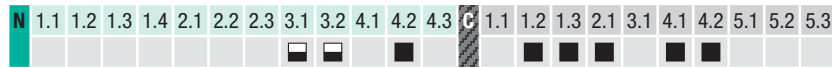
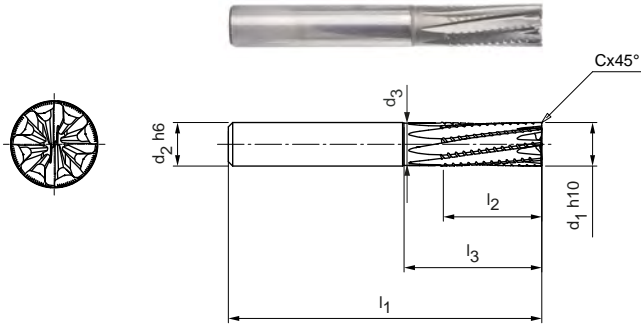
Shoulder milling cutter, design with pushing cutting edge
M7258P

Design:

Diameter of milling cutter: 4.00 - 20.00 mm
Coating: Uncoated
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 available from stock

Dimensions							z	Specification	Order no.
d ₁ h10	d ₂ h6	d ₃	l ₁	l ₂	l ₃	Cx45°			
4.00	6	3.90	57	11	—	0.08	8	M7258P-0400AU-C0008	31242565
5.00	6	4.90	57	13	—	0.10	8	M7258P-0500AU-C0010	31242566
6.00	6	5.80	57	13	19	0.12	8	M7258P-0600AU-C0012	31242567
6.00	6	5.80	65	21	27	0.12	8	M7258P-0600AU-C0012	31242568
8.00	8	7.80	63	19	25	0.16	8	M7258P-0800AU-C0016	31242569
8.00	8	7.80	70	22	32	0.16	8	M7258P-0800AU-C0016	31242580
10.00	10	9.70	72	22	30	0.20	8	M7258P-1000AU-C0020	31242581
12.00	12	11.60	83	26	36	0.24	8	M7258P-1200AU-C0024	31242582
16.00	16	15.50	92	32	42	0.32	8	M7258P-1600AU-C0032	31242583

Available on request

20.00	20	19.40	104	38	52	0.40	8	M7258P-2000AU-C0040	31242584
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Configurable features

Shank form:
Shank form: HB

Specification:
M7258P-1200[shank form]U-C0024

Example:

M7258P-1200BU-C0024

Shank form HB

Dimensions in mm.

For cutting data recommendations, see end of chapter.

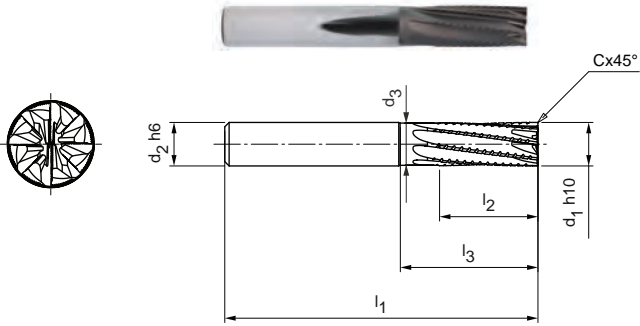
Special designs and other coatings available upon request.

OptiMill®-Composite-Speed-Plus

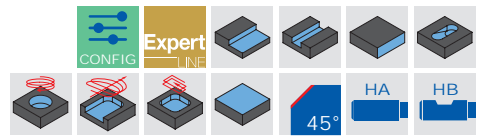
Shoulder milling cutter, design with pulling cutting edge
M7228P, follow-up product of M7228

Design:
 Diameter of milling cutter: 4.00 - 20.00 mm
 Coating: Diamond-coated
 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.



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 available from stock

Dimensions							z	Specification	Order no.
d ₁ h10	d ₂ h6	d ₃	l ₁	l ₂	l ₃	Cx45°			
4.00	6	3.90	57	11	–	0.08	8	M7228P-0400AQ-C0008	31223317
5.00	6	4.90	57	13	–	0.10	8	M7228P-0500AQ-C0010	31223318
6.00	6	5.80	57	13	19	0.12	8	M7228P-0600AQ-C0012	31223319
6.00	6	5.80	65	21	27	0.12	8	M7228P-0600AQ-C0012	31223330
8.00	8	7.80	63	19	25	0.16	8	M7228P-0800AQ-C0016	31223331
8.00	8	7.80	70	22	32	0.16	8	M7228P-0800AQ-C0016	31223332
10.00	10	9.70	72	22	30	0.20	8	M7228P-1000AQ-C0020	31223333
12.00	12	11.60	83	26	36	0.24	8	M7228P-1200AQ-C0024	31223334
16.00	16	15.50	92	32	42	0.32	8	M7228P-1600AQ-C0032	31223335


Available on request

20.00	20	19.40	104	38	52	0.40	8	M7228P-2000AQ-C0040	31223336
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Configurable features



Shank form:
Shank form: HB



Specification:
M7228P-1200[shank form]Q-C0024

Example:
M7228P-1200BQ-C0024

Shank form HB

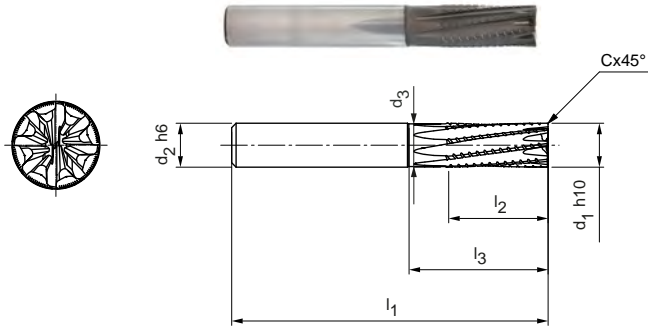
Dimensions in mm.
 For cutting data recommendations, see end of chapter.
 Special designs and other coatings available upon request.

OptiMill®-Composite-Speed-Plus

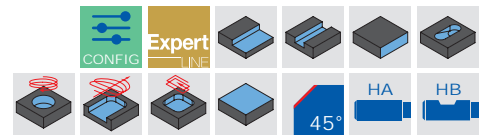
Shoulder milling cutter, design with pushing cutting edge
M7238P, follow-up product of M7238

Design:
 Diameter of milling cutter: 4.00 - 20.00 mm
 Coating: Diamond-coated
 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.



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 available from stock

Dimensions							z	Specification	Order no.
d ₁ h10	d ₂ h6	d ₃	l ₁	l ₂	l ₃	Cx45°			
4.00	6	3.90	57	11	–	0.08	8	M7238P-0400AQ-C0008	31223337
5.00	6	4.90	57	13	–	0.10	8	M7238P-0500AQ-C0010	31223338
6.00	6	5.80	57	13	19	0.12	8	M7238P-0600AQ-C0012	31223339
6.00	6	5.80	65	21	27	0.12	8	M7238P-0600AQ-C0012	31223340
8.00	8	7.80	63	19	25	0.16	8	M7238P-0800AQ-C0016	31223341
8.00	8	7.80	70	22	32	0.16	8	M7238P-0800AQ-C0016	31223342
10.00	10	9.70	72	22	30	0.20	8	M7238P-1000AQ-C0020	31223343
12.00	12	11.60	83	26	36	0.24	8	M7238P-1200AQ-C0024	31223344
16.00	16	15.50	92	32	42	0.32	8	M7238P-1600AQ-C0032	31223345


Available on request

20.00	20	19.40	104	38	52	0.40	8	M7238P-2000AQ-C0040	31223346
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Configurable features



Shank form:
Shank form: HB



Specification:
M7238P-1200[shank form]Q-C0024

Example:
M7238P-1200BQ-C0024

_____ 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

OptiMill-Alu-Wave | M3582 | Machine performance 25 kW to ≤40 kW

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

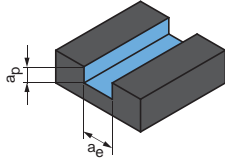
OptiMill-Alu-Wave | M3582 | Machine performance 40 kW to ≤80 kW

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

OptiMill-Alu-Wave | M3582 | Machine performance >80 kW

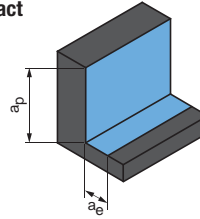
MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling		
			MQL/Air	Dry	Wet
N N1	N1.1 Aluminium, unalloyed and alloyed < 3% Si				✓
	N1.2 Aluminium, alloyed ≤ 7% Si				✓
	N1.3 Aluminium, alloyed > 7 - 12% Si				✓
	N1.4 Aluminium, alloyed > 12% Si				✓

Full cutting



Short projection length
 $a_p = 1xD \mid a_e = 1xD$
Medium projection length
 $a_p = 1xD \mid a_e = 1xD$
Long projection length
 $a_p = 0.5xD \mid a_e = 1xD$

Part-contact cutting



Short projection length
 $a_p = 1.5xD \mid a_e = 0.6xD$
Medium projection length
 $a_p = 1.5xD \mid a_e = 0.4xD$
Long projection length
 $a_p = 1.5xD \mid a_e = 0.25xD$

Full cutting					Part-contact cutting				
	Feed per tooth [f _z] [mm/tooth] for diameter of milling cutter					Feed per tooth [f _z] [mm/tooth] for diameter of milling cutter			
∅	12.00	16.00	20.00	25.00	∅	12.00	16.00	20.00	25.00
v _c	600 - 900	600 - 900	300 - 600	300 - 600	v _c	600 - 900	600 - 900	400 - 700	300 - 600
Factor v _c					Factor v _c				
1	0.1 - 0.18	0.12 - 0.2	0.15 - 0.2	0.15 - 0.2	1	0.12 - 0.22	0.15 - 0.22	0.15 - 0.22	0.15 - 0.22
0.95	0.1 - 0.18	0.12 - 0.2	0.15 - 0.2	0.15 - 0.2	0.95	0.12 - 0.22	0.15 - 0.22	0.15 - 0.22	0.15 - 0.22
0.85	0.1 - 0.18	0.12 - 0.2	0.15 - 0.2	0.15 - 0.2	0.85	0.12 - 0.22	0.15 - 0.22	0.15 - 0.22	0.15 - 0.22
0.75	0.1 - 0.18	0.12 - 0.2	0.15 - 0.2	0.15 - 0.2	0.75	0.12 - 0.22	0.15 - 0.22	0.15 - 0.22	0.15 - 0.22

Full cutting					Part-contact cutting				
	Feed per tooth [f _z] [mm/tooth] for diameter of milling cutter					Feed per tooth [f _z] [mm/tooth] for diameter of milling cutter			
∅	12.00	16.00	20.00	25.00	∅	12.00	16.00	20.00	25.00
v _c	900 - 1200	1100 - 1400	1100 - 1400	900 - 1200	v _c	900 - 1200	1100 - 1400	1100 - 1400	900 - 1200
Factor v _c					Factor v _c				
1	0.1 - 0.18	0.12 - 0.2	0.14 - 0.21	0.15 - 0.22	1	0.1 - 0.22	0.15 - 0.25	0.15 - 0.25	0.15 - 0.25
0.95	0.1 - 0.18	0.12 - 0.2	0.14 - 0.21	0.15 - 0.22	0.95	0.1 - 0.22	0.15 - 0.25	0.15 - 0.25	0.15 - 0.25
0.85	0.1 - 0.18	0.12 - 0.2	0.14 - 0.21	0.15 - 0.22	0.85	0.1 - 0.22	0.15 - 0.25	0.15 - 0.25	0.15 - 0.25
0.75	0.1 - 0.18	0.12 - 0.2	0.14 - 0.21	0.15 - 0.22	0.75	0.1 - 0.22	0.15 - 0.25	0.15 - 0.25	0.15 - 0.25

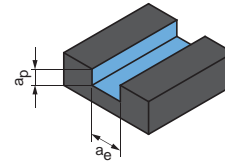
Full cutting					Part-contact cutting				
	Feed per tooth [f _z] [mm/tooth] for diameter of milling cutter					Feed per tooth [f _z] [mm/tooth] for diameter of milling cutter			
∅	12.00	16.00	20.00	25.00	∅	12.00	16.00	20.00	25.00
v _c	900 - 1200	1100 - 1400	1300 - 1600	1700 - 2500	v _c	900 - 1200	1100 - 1400	1300 - 1600	1700 - 2500
Factor v _c					Factor v _c				
1	0.1 - 0.18	0.12 - 0.2	0.15 - 0.23	0.15 - 0.23	1	0.1 - 0.22	0.13 - 0.25	0.15 - 0.27	0.15 - 0.27
0.95	0.1 - 0.18	0.12 - 0.2	0.15 - 0.23	0.15 - 0.23	0.95	0.1 - 0.22	0.13 - 0.25	0.15 - 0.27	0.15 - 0.27
0.85	0.1 - 0.18	0.12 - 0.2	0.15 - 0.23	0.15 - 0.23	0.85	0.1 - 0.22	0.13 - 0.25	0.15 - 0.27	0.15 - 0.27
0.75	0.1 - 0.18	0.12 - 0.2	0.15 - 0.23	0.15 - 0.23	0.75	0.1 - 0.22	0.13 - 0.25	0.15 - 0.27	0.15 - 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

Groove milling



$$a_p = 1xD$$

$$a_e = 1xD$$

OptiMill-Composite-Speed-Plus, uncoated | M7248P, M7258P

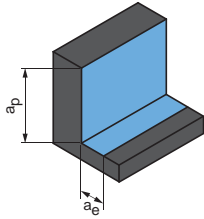
MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v _c [m/min]	f _z [mm]							
			MQL/Air	Dry	KSS		Diameter of milling cutter [mm]							
							4.00	6.00	8.00	10.00	12.00	16.00	20.00	
N N4	N4.1 Plastic, thermoplastics		✓	✓	✓									
	N4.2 Plastic, duroplastics		✓	✓	✓	125	0.020	0.029	0.038	0.045	0.052	0.063	0.072	
	N4.3 Plastic, foam materials		✓	✓										
G C1 C2 C4	C1.1 Plastic range, reinforced with aramid fibre (AFK)		✓	✓	✓									
	C1.2 Plastic range (duroplastic), CFK/GFK		✓	✓	✓	120	0.021	0.026	0.031	0.035	0.038	0.042	0.043	
	C1.3 Plastic range (thermoplastic), CFK/GFK		✓	✓	✓	80	0.021	0.026	0.031	0.035	0.038	0.042	0.043	
	C2.1 Carbon range, reinforced with carbon fibre (CFC)		✓	✓	✓	120	0.018	0.023	0.027	0.031	0.033	0.037	0.038	
	C4.1 Sandwich construction, honeycomb core (Honeycomb)		✓	✓		165	0.012	0.015	0.017	0.019	0.021	0.023	0.024	
	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 | M7228P, M7238P

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			v _c [m/min]	f _z [mm]						
			MQL/Air	Dry	KSS		Diameter of milling cutter [mm]						
							4.00	6.00	8.00	10.00	12.00	16.00	20.00
C C1 C2 C4	C1.1 Plastic range, reinforced with aramid fibre (AFK)		✓	✓	✓								
	C1.2 Plastic range (duroplastic), CFK/GFK		✓	✓	✓	145	0.021	0.026	0.031	0.035	0.038	0.042	0.043
	C1.3 Plastic range (thermoplastic), CFK/GFK		✓	✓	✓	100	0.021	0.026	0.031	0.035	0.038	0.042	0.043
	C2.1 Carbon range, reinforced with carbon fibre (CFC)		✓	✓	✓	145	0.018	0.023	0.027	0.031	0.033	0.037	0.038
	C4.1 Sandwich construction, honeycomb core (Honeycomb)		✓	✓		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

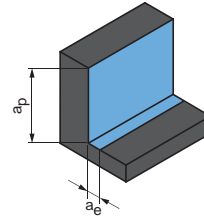
* MILLER machining groups

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]							
	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		

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

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