

passion
for precision

fraisa

AX high-performance milling cutters

New horizons for quality and process reliability



AX: Maximum performance and excellent component quality thanks to innovative technology

The **AX range of aluminum milling cutters** has undergone continuous development by **FRAISA** during the last years. In the field of roughing technology, the **AX-FPS** has set **new standards in terms of maximum performance and low power consumption**. The cutters are equipped with a specially ground roughing profile and an internal cooling channel. Ideal prerequisites for optimum chip removal.

FRAISA ToolExpert® AX-FPS ensures maximum productivity and safety in the respective application thanks to **perfect coordination of the tools and machine environment** – for **cutting depths of up to 5.2xd**.

The basis of these new performance horizons: a **supporting chamfer technology patented by FRAISA**. This involves forming a very highly polished (mirror-finish-ground), very finely coordinated chamfer at the curved and end cutting edges. This dampens any vibrations that occur and improves the milling properties in an impressive manner.

NEW TECHNOLOGY



This technology has now been developed even further for the new **AX high-performance finishing cutters**. The **supporting chamfer width changes variably from the end face to the side face** – when milling thin-walled components, this facilitates minimal deflection while still providing excellent damping.

This **innovative technology from FRAISA is patented and excites even experienced users**. For the first time, **very thin, tall or long aluminum component walls** can now be finished in one shot.

This significantly reduces **machining time** compared to conventional layer-by-layer finishing and raises **component quality** to an unprecedented level. Subsequent manual grinding operations to reduce the milled offsets can be completely eliminated and precise bores of the highest quality can be milled.

With deep and tolerated pockets with small transition radii, high accuracy is also achieved in machine components.



New machining strategy by combining **roughing** and **finishing** tools

Inspiring results can be achieved by **using long roughing and finishing tools in combination with a new machining strategy**. The key elements here are the programming strategy and the cutting data for the relevant component/machine situation.

The new **AX finishing cutters** open up new horizons as regards **quality and performance**. All information on the components depicted in this brochure can also be found in the application video and on our website.



[3]



Discover the new
AX machining strategies
in our video and download all
documentation for the components shown.

Roughing and finishing combined

Roughing with AX-FPS

With **AX-FPS technology**, **productivity and cost efficiency** take absolute top priority. Positive, easy-cut geometries and mirror-finish flutes ensure excellent chip formation and good chip removal that benefits from a central coolant supply. **This guarantees maximum performance.**

Notes on application technology:



- Degrease cylindrical shanks and chucking devices before assembling
- Always fully complete roughing of each plane both inside and outside

HPC roughing

- With normal or medium-long version with neck and with largest possible ap and ae, and normal fz
- Speed n high, depending on dynamics and torque of the machine
- Final pass with ae = 0
- Cutting data acc. to FRAISA ToolExpert® AX-FPS

HDC roughing

- With medium-long and 5.2xd versions
- Avoid vibration by varying the speed in FRAISA ToolExpert® AX-FPS – the volume remains constant
- Programming with constant cutting conditions and dynamic travel range
- For weak components: 2x contour milling with ae = 0.05xd1 and final pass with ae = 0
- No abrupt changes of direction
- Always machine each cut alternately on the inside and outside, working toward the final contour
- Programming of the minimum curvature radius 1.05xd1 or 1.10xr



AX high-performance finishing cutters with revolutionary supporting chamfer technology

Unique and patented by FRAISA:

The innovative supporting chamfer technology facilitates the **finishing of thin-walled, tall and long component walls** and **sturdy components with deep finishing depths and greater radial engagement**.

This unique tool concept is particularly impressive due to the fact that it offers extremely easy cutting with perfectly coordinated **variable supporting chamfers** and mirror-finish flutes and flanks for minimum adhesion.

Notes on application technology:

- Cutting data for **sturdy and weak components**: acc. to cutting data page in catalog and FRAISA ToolExpert® 2.0
- Less dynamic: reduction of speed n in line with the component complexity and machine environment
- The recommended feed rate f_z and speed n can be reduced even further for very thin, tall or long component walls
- Machining begins with prefinishing of the inner and outer sides of the component wall, which is then followed by finishing



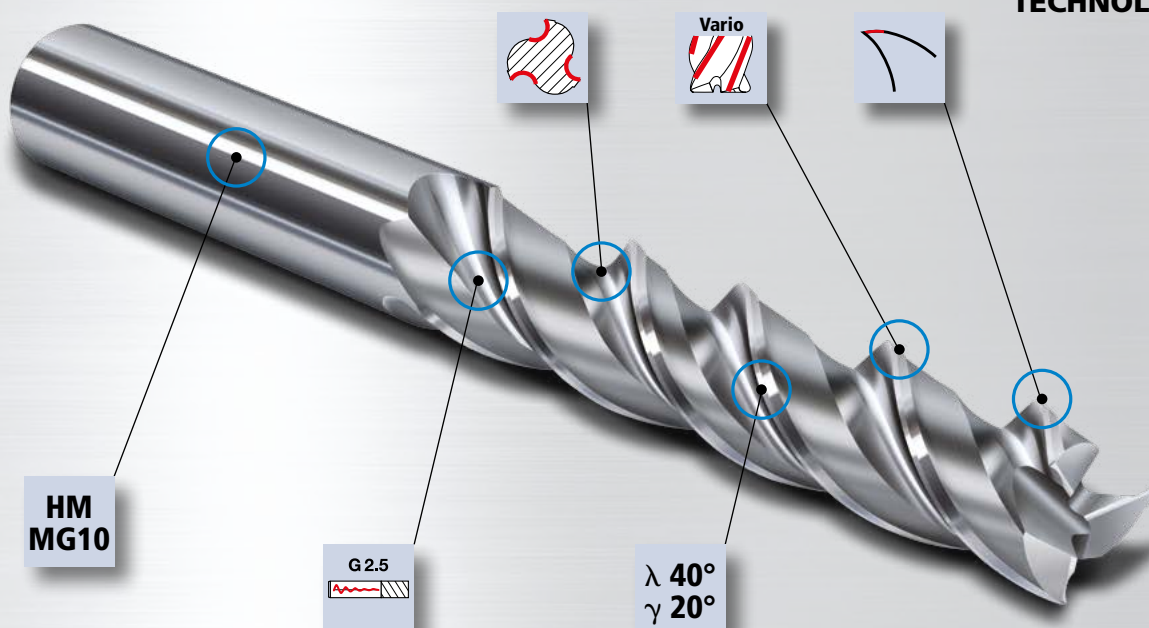
[5]

Technologies built into the AX finishing cutters

AX finishing cutter



**NEW
TECHNOLOGY**



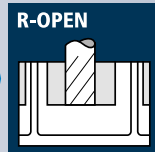
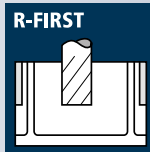
For detailed explanations of the tool technologies, please refer to the information section in the "High-performance Milling Tools" catalog.

Machining strategy for weak or thin-walled components

1. HPC roughing of NL & ML neck with AX-FPS up to depth of approx. 4xd

- Penetration w. helical interpolation
- Roughing from the inside to the outside
- Roughing layer by layer
- Cutting data:
FRAISA ToolExpert® AX-FPS
- Alternate both sides of the wall per layer
- Final pass with $ae = 0$
- Allowance per side of wall with $ae = PF+F$

N° 15500 / 15600



N° 15505 / 15605

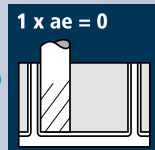
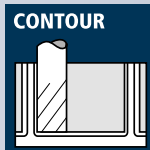


2. HDC roughing of ML & 5.2xd with AX-FPS up to depth of 5.2xd

N° 15506 / 15606



N° 15507 / 15607



- Penetration w. helical interpolation
- Cutting data:
FRAISA ToolExpert® AX-FPS

- Weak: 2x contour milling with $ae = 0.05xd1$ and final track with blank cut $ae = 0$.
Use speed n and feed rate vf from PF application for weak components from AX finishing cutter.

- Allowance per side of wall with $ae = PF+F$

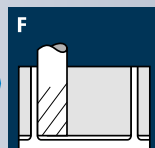
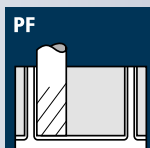
3. Finishing of wall with AX finishing cutter up to depth of 5.2xd

- Prefinishing PF, both sides of wall
- Finishing F, both sides of wall
- Cutting data:
FRAISA ToolExpert® 2.0 or cutting data page for weak components
- Adjust dynamics (vc) to component and machine environment

N° 15510



N° 15512



4. Milling of the base and root radius

- The base can also be milled prior to finishing (wall finishing)
- Milling of the base with AX-RV
- Root radius with AX-RV or AX finishing cutter with corner radius
- Root radius:

Program a small clearance of approx. 0.02 mm from wall and base

N° 1558 X AX-RV3

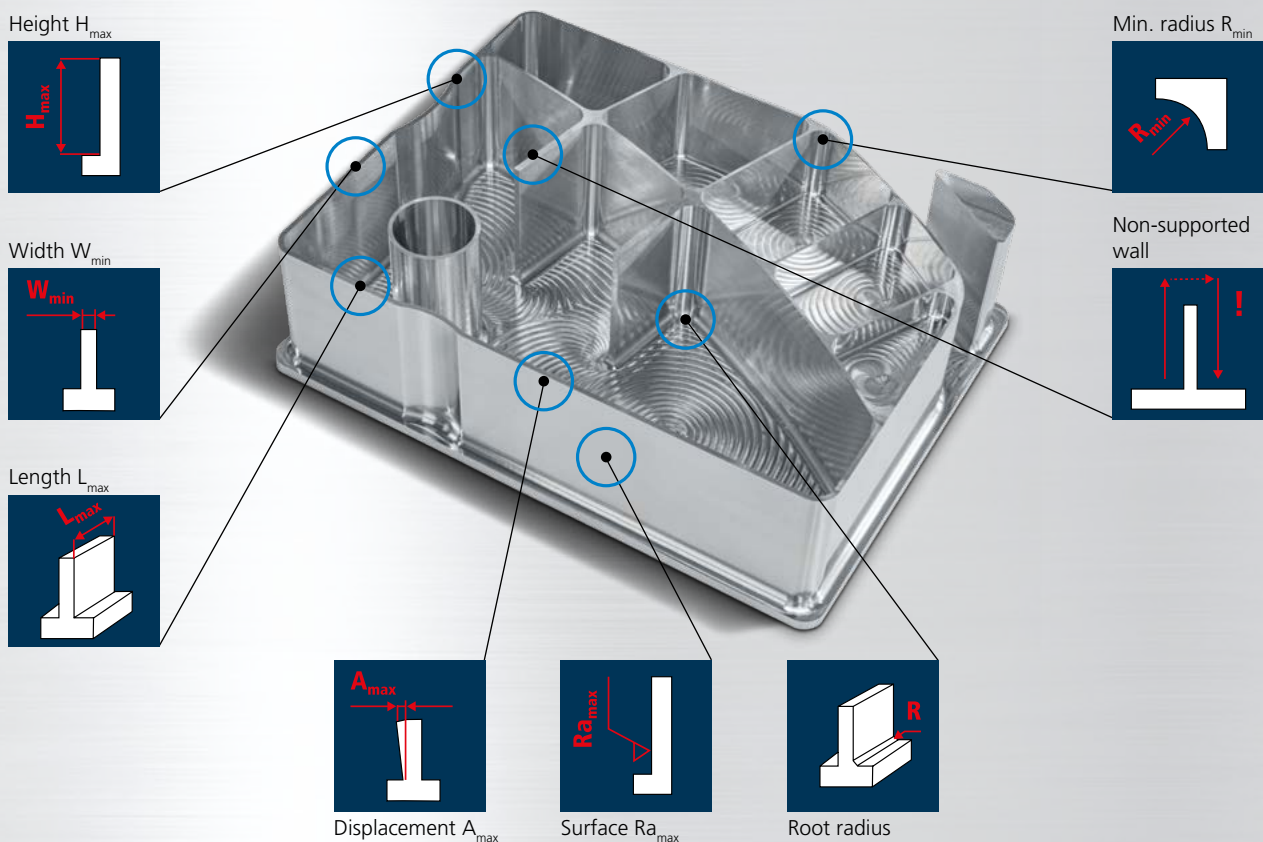


Optimization of the **cutting data** and **machining strategy**

The tool, cutting data, and machining strategy are selected on the basis of the component. The following notes on the individual component properties and

their effect on the machining process can be used to optimize the manufacturing time and improve the manufacturing quality.

Component properties



[7]

Min. radius R_{min} determines the maximum cutter diameter. Rule: $R_{min} \times 0.90 \geq r_{tool}$. In the case of critical radii or high cutting edge utilization, a 60% reduction of the feed rate should be programmed.

For the **non-supported wall**, synchronization should be achieved by milling the front side first, as long as the web is still sturdy. To prevent the webs from buckling, we recommend you traverse straight over the edge of each web.

The **height H_{max}** , **width W_{min}** and **length L_{max}** together determine how weak the component is at any given point. For extremely thin walls, the speed and feed rate of the PF and F cutting data recommendations should be reduced by a further 30%.

The **displacement A_{max}** is influenced by the machining strategy. In the case of very thin wall thicknesses, the prefinish and finish passes must be carried out. Reduced a_e and f_z values improve the displacement.

The inner and outer sides of the wall should always be machined one after the other with the same application in order to achieve the best homogenization result and uniform qualities.

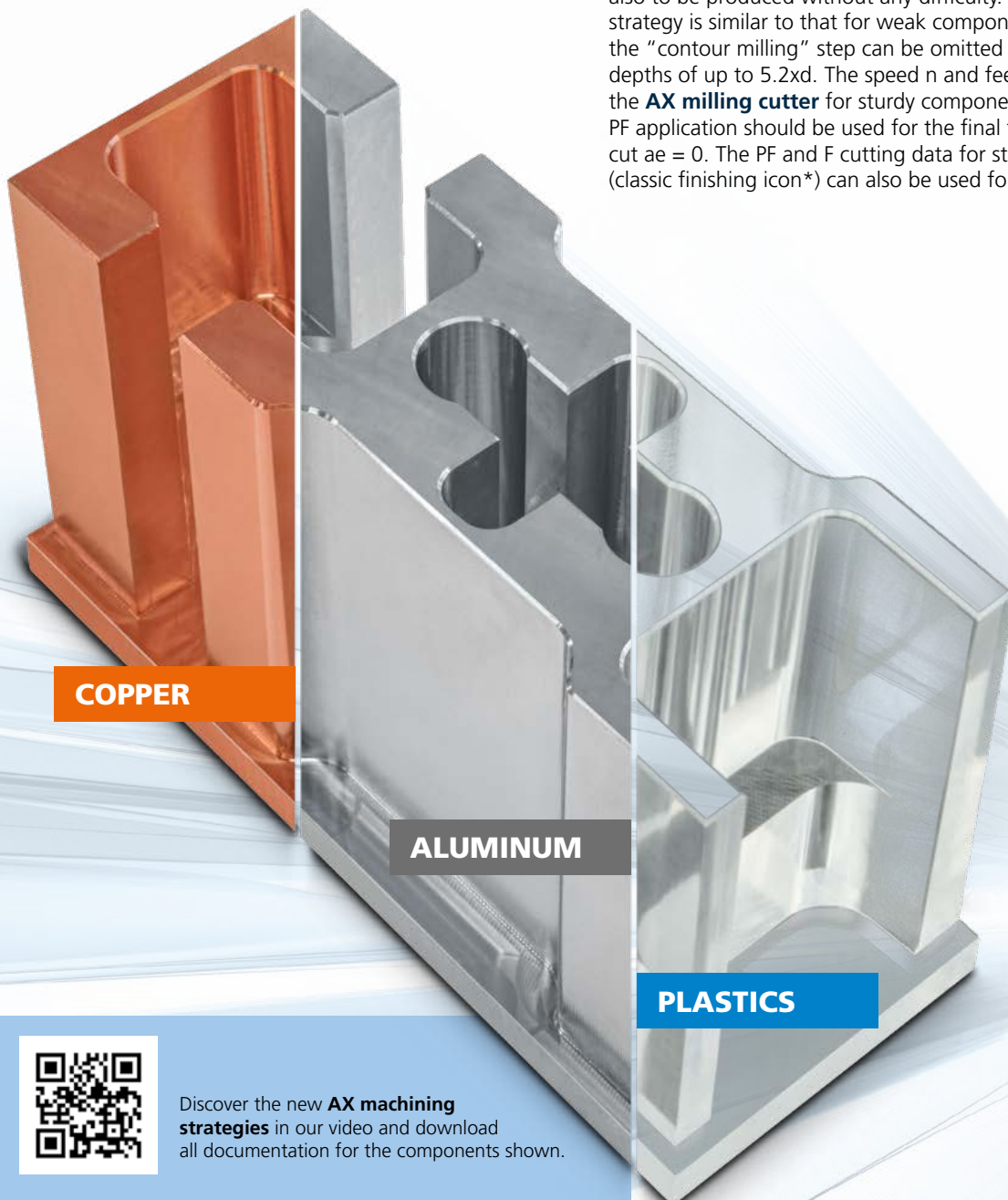
The parameters specified produce a **high surface quality R_a** . The **milling dynamics are the most important control parameter** when it comes to avoiding vibration. The speed should be reduced to achieve excellent finishing results. In addition, the milling cutter needs **time to build up a suitable cutting pressure and provide optimum chip formation**.

AX high-performance milling cutters for stable components and newly added materials

AX-FPS and **AX finishing cutters** are ideal for a range of different materials such as copper, plastics and non-ferrous metals. The relevant cutting data can be found in FRAISA ToolExpert® 2.0 as well as in this brochure.

The advantage when machining sturdy component walls is the very low level of deflection of the **AX finishing cutter** combined with very smooth running. This enables **precise fits with tight tolerances** to be milled along the entire length of the cutting edge and a **very high surface quality** to be achieved.

High cutting edge utilization is also no problem for the **AX finishing cutter** – enabling bores with tight tolerances also to be produced without any difficulty. The machining strategy is similar to that for weak components. However, the “contour milling” step can be omitted when roughing depths of up to $5.2x_d$. The speed n and feed rate v_f from the **AX milling cutter** for sturdy components and from the PF application should be used for the final track with blank cut $a_e = 0$. The PF and F cutting data for sturdy components (classic finishing icon*) can also be used for finishing.



Discover the new **AX machining strategies** in our video and download all documentation for the components shown.

* Classic finishing icon.

AX high-performance milling cutters for aluminum with cutting edge lengths of up to 5.2xd

Milling tools for aluminum
Finishing, cylindrical

new!

5.2xd version

N° 15510

AX



Al
Aluminium
Alloy

Cu
Copper

Finishing, with corner radius

new!

5.2xd version

N° 15512

AX



Al
Aluminium
Alloy

Cu
Copper

Contoured, cylindrical

Normal version

N° 15500 / 15600

AX-FPS

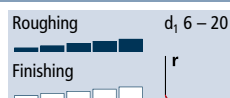


Al
Aluminium
Alloy

Medium length version

N° 15506 / 15606

AX-FPS

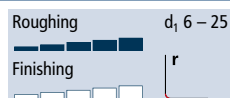


Al
Aluminium
Alloy

Medium length version with neck

N° 15505 / 15605

AX-FPS

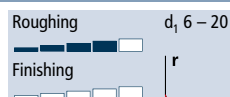


Al
Aluminium
Alloy

Medium length version

N° 15507 / 15607

AX-FPS



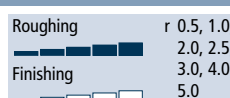
Al
Aluminium
Alloy

Contoured, with corner radius

Normal version

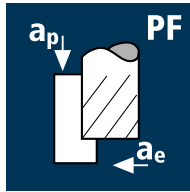
N° 15502

AX-RFPS



Al
Aluminium
Alloy

Application



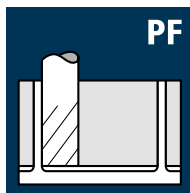
Material

Wrought aluminium
Construction aluminium

Cast aluminium

Wrought aluminium
Construction aluminium

Cast aluminium



Wrought aluminium
Construction aluminium

Unalloyed copper



Wrought aluminium
Construction aluminium

Unalloyed copper

d1 [mm]	z	v _c [m/min]	f _t [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	v _f [mm/min]
6.00	3	300	0.025	32.000	0.080	15915	1195
8.00	3	300	0.030	42.000	0.100	11935	1075
10.00	3	350	0.030	53.000	0.120	11140	1005
12.00	3	350	0.030	63.000	0.120	9285	835
16.00	3	400	0.035	84.000	0.150	7960	835
20.00	3	400	0.035	105.000	0.150	6365	670
6.00	3	270	0.025	32.000	0.080	14325	1075
8.00	3	270	0.030	42.000	0.100	10745	965
10.00	3	315	0.030	53.000	0.120	10025	900
12.00	3	315	0.030	63.000	0.120	8355	750
16.00	3	360	0.035	84.000	0.150	7160	750
20.00	3	360	0.035	105.000	0.150	5730	600
6.00	3	200	0.020	32.000	0.030	10610	635
8.00	3	200	0.025	42.000	0.050	7960	595
10.00	3	250	0.025	53.000	0.050	7960	595
12.00	3	250	0.025	63.000	0.050	6630	495
16.00	3	300	0.030	84.000	0.050	5970	535
20.00	3	300	0.030	105.000	0.050	4775	430
6.00	3	180	0.020	32.000	0.030	9550	575
8.00	3	180	0.025	42.000	0.050	7160	535
10.00	3	225	0.025	53.000	0.050	7160	535
12.00	3	225	0.025	63.000	0.050	5970	450
16.00	3	270	0.030	84.000	0.050	5370	485
20.00	3	270	0.030	105.000	0.050	4295	385
6.00	3	200	0.025	32.000	0.060	10610	795
8.00	3	200	0.030	42.000	0.060	7960	715
10.00	3	250	0.030	53.000	0.080	7960	715
12.00	3	250	0.030	63.000	0.080	6630	595
16.00	3	300	0.035	84.000	0.100	5970	625
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8.00	3	120	0.030	42.000	0.060	4775	430
10.00	3	150	0.030	53.000	0.080	4775	430
12.00	3	150	0.030	63.000	0.080	3980	360
16.00	3	180	0.035	84.000	0.100	3580	375
20.00	3	180	0.035	105.000	0.100	2865	300
6.00	3	150	0.020	32.000	0.030	7960	475
8.00	3	150	0.025	42.000	0.030	5970	450
10.00	3	200	0.025	53.000	0.040	6365	475
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10.00	3	120	0.025	53.000	0.040	3820	285
12.00	3	120	0.025	63.000	0.040	3185	240
16.00	3	150	0.030	84.000	0.050	2985	270
20.00	3	150	0.030	105.000	0.050	2385	215

Cylindrical end mills AX

Finishing, extra-long version 5.2xd



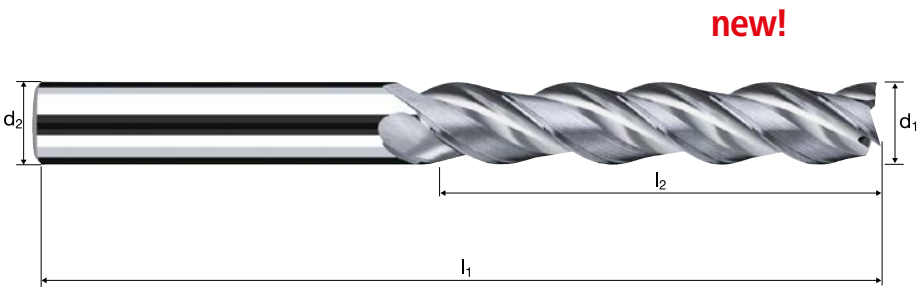
HM
MG10

λ 40°
 γ 20°

r

G 2.5

Vario



Roughing

Finishing

Al
Aluminium
> 99%

Al
Aluminium
Alloy

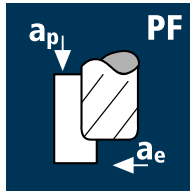
Al
Aluminium
Cast

Cu
Copper

Plastic
Thermoplast

Example: Order-N°.								
							15510	
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501	12.00	12.00	117	63.00	0.200	3	●	
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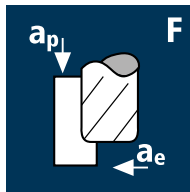
Application



Material

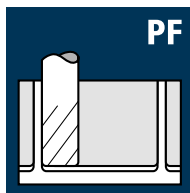
Wrought aluminium
Construction aluminium

Cast aluminium



Wrought aluminium
Construction aluminium

Cast aluminium



Wrought aluminium
Construction aluminium

Unalloyed copper

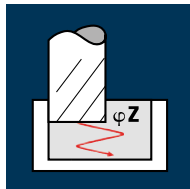
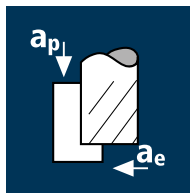


Wrought aluminium
Construction aluminium

Unalloyed copper

d1 [mm]	z	v _c [m/min]	f _t [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	v _f [mm/min]
6.00	3	300	0.025	32.000	0.080	15915	1195
8.00	3	300	0.030	42.000	0.100	11935	1075
10.00	3	350	0.030	53.000	0.120	11140	1005
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8.00	3	270	0.030	42.000	0.100	10745	965
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12.00	3	315	0.030	63.000	0.120	8355	750
16.00	3	360	0.035	84.000	0.150	7160	750
20.00	3	360	0.035	105.000	0.150	5730	600
6.00	3	200	0.020	32.000	0.030	10610	635
8.00	3	200	0.025	42.000	0.050	7960	595
10.00	3	250	0.025	53.000	0.050	7960	595
12.00	3	250	0.025	63.000	0.050	6630	495
16.00	3	300	0.030	84.000	0.050	5970	535
20.00	3	300	0.030	105.000	0.050	4775	430
6.00	3	180	0.020	32.000	0.030	9550	575
8.00	3	180	0.025	42.000	0.050	7160	535
10.00	3	225	0.025	53.000	0.050	7160	535
12.00	3	225	0.025	63.000	0.050	5970	450
16.00	3	270	0.030	84.000	0.050	5370	485
20.00	3	270	0.030	105.000	0.050	4295	385
6.00	3	200	0.025	32.000	0.060	10610	795
8.00	3	200	0.030	42.000	0.060	7960	715
10.00	3	250	0.030	53.000	0.080	7960	715
12.00	3	250	0.030	63.000	0.080	6630	595
16.00	3	300	0.035	84.000	0.100	5970	625
20.00	3	300	0.035	105.000	0.100	4775	500
6.00	3	120	0.025	32.000	0.060	6365	475
8.00	3	120	0.030	42.000	0.060	4775	430
10.00	3	150	0.030	53.000	0.080	4775	430
12.00	3	150	0.030	63.000	0.080	3980	360
16.00	3	180	0.035	84.000	0.100	3580	375
20.00	3	180	0.035	105.000	0.100	2865	300
6.00	3	150	0.020	32.000	0.030	7960	475
8.00	3	150	0.025	42.000	0.030	5970	450
10.00	3	200	0.025	53.000	0.040	6365	475
12.00	3	200	0.025	63.000	0.040	5305	400
16.00	3	250	0.030	84.000	0.050	4975	450
20.00	3	250	0.030	105.000	0.050	3980	360
6.00	3	90	0.020	32.000	0.030	4775	285
8.00	3	90	0.025	42.000	0.030	3580	270
10.00	3	120	0.025	53.000	0.040	3820	285
12.00	3	120	0.025	63.000	0.040	3185	240
16.00	3	150	0.030	84.000	0.050	2985	270
20.00	3	150	0.030	105.000	0.050	2385	215

Application



Material

Wrought aluminium
Construction aluminium



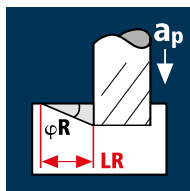
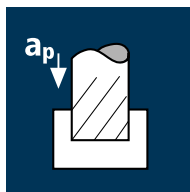
Cast aluminium



Unalloyed copper



Application



Material

Wrought aluminium
Construction aluminium



Cast aluminium



Unalloyed copper



d1 [mm]	z	v _c [m/min]	f _t [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	v _f [mm/min]	Q [cm ³ /min]	φZ [°]
6.00	3	500	0.080	9.000	4.800	26525	6365	275.0	20°
8.00	3	500	0.100	12.000	6.400	19895	5970	458.4	20°
10.00	3	500	0.120	15.000	8.000	15915	5730	687.5	20°
12.00	3	500	0.140	18.000	9.600	13265	5570	962.6	20°
16.00	3	500	0.160	24.000	12.800	9945	4775	1466.8	20°
20.00	3	500	0.180	30.000	16.000	7960	4295	2062.6	20°
25.00	3	500	0.200	37.500	20.000	6365	3820	2864.8	20°

6.00	3	450	0.080	9.000	4.800	23875	5730	247.5	20°
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12.00	3	450	0.140	18.000	9.600	11935	5015	866.3	20°
16.00	3	450	0.160	24.000	12.800	8950	4295	1320.1	20°
20.00	3	450	0.180	30.000	16.000	7160	3865	1856.4	20°
25.00	3	450	0.200	37.500	20.000	5730	3440	2578.3	20°

6.00	3	400	0.072	9.000	4.800	21220	4585	198.0	12°
8.00	3	400	0.090	12.000	6.400	15915	4295	330.0	12°
10.00	3	400	0.108	15.000	8.000	12730	4125	495.0	12°
12.00	3	400	0.126	18.000	9.600	10610	4010	693.0	12°
16.00	3	400	0.144	24.000	12.800	7960	3440	1056.1	12°
20.00	3	400	0.162	30.000	16.000	6365	3095	1485.1	12°
25.00	3	400	0.180	37.500	20.000	5095	2750	2062.6	12°

d1 [mm]	z	v _c [m/min]	f _t [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	v _f [mm/min]	Q [cm ³ /min]	φR [°]	LR [mm]
6.00	3	450	0.072	9.000	6.000	23875	5155	278.5	25°	19.3
8.00	3	450	0.090	12.000	8.000	17905	4835	464.1	25°	25.7
10.00	3	450	0.108	15.000	10.000	14325	4640	696.1	25°	32.2
12.00	3	450	0.126	18.000	12.000	11935	4510	974.6	25°	38.6
16.00	3	450	0.144	24.000	16.000	8950	3865	1485.1	25°	51.5
20.00	3	450	0.162	30.000	20.000	7160	3480	2088.4	25°	64.3
25.00	3	450	0.180	37.500	25.000	5730	3095	2900.6	25°	80.4

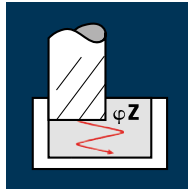
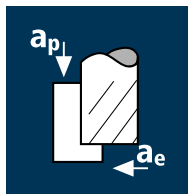
6.00	3	405	0.072	9.000	6.000	21485	4640	250.6	25°	19.3
8.00	3	405	0.090	12.000	8.000	16115	4350	417.7	25°	25.7
10.00	3	405	0.108	15.000	10.000	12890	4175	626.5	25°	32.2
12.00	3	405	0.126	18.000	12.000	10745	4060	877.1	25°	38.6
16.00	3	405	0.144	24.000	16.000	8055	3480	1336.6	25°	51.5
20.00	3	405	0.162	30.000	20.000	6445	3135	1879.6	25°	64.3
25.00	3	405	0.180	37.500	25.000	5155	2785	2610.5	25°	80.4

6.00	3	320	0.058	9.000	6.000	16975	2935	158.4	15°	33.6
8.00	3	320	0.072	12.000	8.000	12730	2750	264.0	15°	44.8
10.00	3	320	0.086	15.000	10.000	10185	2640	396.0	15°	56.0
12.00	3	320	0.101	18.000	12.000	8490	2565	554.4	15°	67.2
16.00	3	320	0.115	24.000	16.000	6365	2200	844.9	15°	89.6
20.00	3	320	0.130	30.000	20.000	5095	1980	1188.1	15°	112.0
25.00	3	320	0.144	37.500	25.000	4075	1760	1650.1	15°	140.0



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Application



Material

Wrought aluminium
Construction aluminium

Cast aluminium

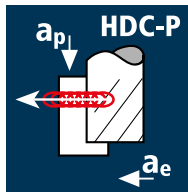
Unalloyed copper

d1 [mm]	z	v _c [m/min]	f _z [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	v _f [mm/min]	Q [cm ³ /min]	φZ [°]
6.00	3	450	0.064	9.000	3.600	23875	4585	148.5	15°
8.00	3	450	0.080	12.000	4.800	17905	4295	247.5	15°
10.00	3	450	0.096	15.000	6.000	14325	4125	371.3	15°
12.00	3	450	0.112	18.000	7.200	11935	4010	519.8	15°
16.00	3	450	0.128	24.000	9.600	8950	3440	792.1	15°
20.00	3	450	0.144	30.000	12.000	7160	3095	1113.8	15°

6.00	3	405	0.064	9.000	3.600	21485	4125	133.7	15°
8.00	3	405	0.080	12.000	4.800	16115	3865	222.8	15°
10.00	3	405	0.096	15.000	6.000	12890	3715	334.1	15°
12.00	3	405	0.112	18.000	7.200	10745	3610	467.8	15°
16.00	3	405	0.128	24.000	9.600	8055	3095	712.9	15°
20.00	3	405	0.144	30.000	12.000	6445	2785	1002.4	15°

6.00	3	360	0.058	9.000	3.600	19100	3300	106.9	9°
8.00	3	360	0.072	12.000	4.800	14325	3095	178.2	9°
10.00	3	360	0.086	15.000	6.000	11460	2970	267.3	9°
12.00	3	360	0.101	18.000	7.200	9550	2890	374.2	9°
16.00	3	360	0.115	24.000	9.600	7160	2475	570.3	9°
20.00	3	360	0.130	30.000	12.000	5730	2230	802.0	9°

Application



Material

Wrought aluminium
Construction aluminium

Cast aluminium

Unalloyed copper

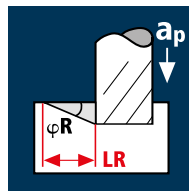
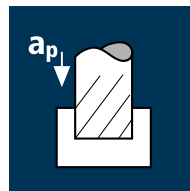
d1 [mm]	z	v _c [m/min]	f _z [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	v _f [mm/min]	Q [cm ³ /min]
6.00	3	300	0.104	19.000	1.800	15915	4965	169.8
8.00	3	350	0.134	28.000	2.400	13925	5600	376.2
10.00	3	400	0.181	34.000	3.000	12730	6915	705.2
12.00	3	400	0.259	40.000	3.600	10610	8245	1187.2
16.00	3	500	0.300	48.000	4.800	9945	8950	2062.6
20.00	3	500	0.340	56.000	6.000	7960	8115	2727.3

6.00	3	270	0.104	19.000	1.800	14325	4470	152.8
8.00	3	315	0.134	28.000	2.400	12535	5040	338.6
10.00	3	360	0.181	34.000	3.000	11460	6220	634.7
12.00	3	360	0.259	40.000	3.600	9550	7420	1068.5
16.00	3	450	0.300	48.000	4.800	8950	8055	1856.4
20.00	3	450	0.340	56.000	6.000	7160	7305	2454.6

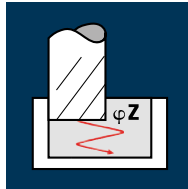
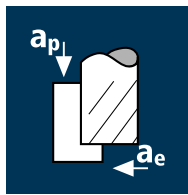
6.00	3	240	0.083	19.000	1.800	12730	3180	108.7
8.00	3	280	0.107	28.000	2.400	11140	3585	240.8
10.00	3	320	0.145	34.000	3.000	10185	4425	451.3
12.00	3	320	0.207	40.000	3.600	8490	5275	759.8
16.00	3	400	0.240	48.000	4.800	7960	5730	1320.1
20.00	3	400	0.272	56.000	6.000	6365	5195	1745.5



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Application



Material

Wrought aluminium
Construction aluminium



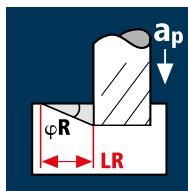
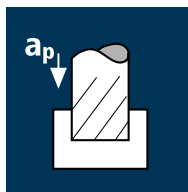
Cast aluminium



Unalloyed copper



Application



Material

Wrought aluminium
Construction aluminium



Cast aluminium



Unalloyed copper



d1 [mm]	z	v _c [m/min]	f _t [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	v _f [mm/min]	Q [cm ³ /min]	Z [°]
6.00	3	450	0.064	9.000	3.600	23875	4585	148.5	15°
8.00	3	450	0.080	12.000	4.800	17905	4295	247.5	15°
10.00	3	450	0.096	15.000	6.000	14325	4125	371.3	15°
12.00	3	450	0.112	18.000	7.200	11935	4010	519.8	15°
16.00	3	450	0.128	24.000	9.600	8950	3440	792.1	15°
20.00	3	450	0.144	30.000	12.000	7160	3095	1113.8	15°
25.00	3	450	0.160	37.500	15.000	5730	2750	1547.0	15°

6.00	3	405	0.064	9.000	3.600	21485	4125	133.7	15°
8.00	3	405	0.080	12.000	4.800	16115	3865	222.8	15°
10.00	3	405	0.096	15.000	6.000	12890	3715	334.1	15°
12.00	3	405	0.112	18.000	7.200	10745	3610	467.8	15°
16.00	3	405	0.128	24.000	9.600	8055	3095	712.9	15°
20.00	3	405	0.144	30.000	12.000	6445	2785	1002.4	15°
25.00	3	405	0.160	37.500	15.000	5155	2475	1392.3	15°

6.00	3	360	0.058	9.000	3.600	19100	3300	106.9	9°
8.00	3	360	0.072	12.000	4.800	14325	3095	178.2	9°
10.00	3	360	0.086	15.000	6.000	11460	2970	267.3	9°
12.00	3	360	0.101	18.000	7.200	9550	2890	374.2	9°
16.00	3	360	0.115	24.000	9.600	7160	2475	570.3	9°
20.00	3	360	0.130	30.000	12.000	5730	2230	802.0	9°
25.00	3	360	0.144	37.500	15.000	4585	1980	1113.8	9°

d1 [mm]	z	v _c [m/min]	f _t [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	v _f [mm/min]	Q [cm ³ /min]	R [°]	LR [mm]
6.00	3	315	0.051	9.000	6.000	16710	2565	138.6	15°	33.6
8.00	3	315	0.064	12.000	8.000	12535	2405	231.0	15°	44.8
10.00	3	315	0.077	15.000	10.000	10025	2310	346.5	15°	56.0
12.00	3	315	0.090	18.000	12.000	8355	2245	485.1	15°	67.2
16.00	3	315	0.102	24.000	16.000	6265	1925	739.3	15°	89.6
20.00	3	315	0.115	30.000	20.000	5015	1735	1039.6	15°	112.0
25.00	3	315	0.128	37.500	25.000	4010	1540	1443.9	15°	140.0

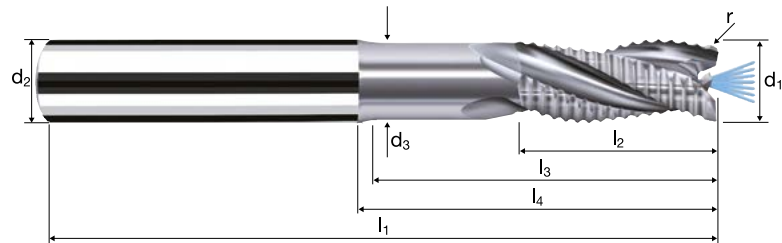
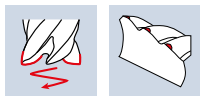
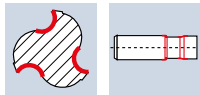
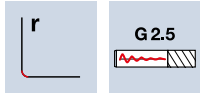
6.00	3	285	0.051	9.000	6.000	15120	2320	125.4	15°	33.6
8.00	3	285	0.064	12.000	8.000	11340	2175	209.0	15°	44.8
10.00	3	285	0.077	15.000	10.000	9070	2090	313.5	15°	56.0
12.00	3	285	0.090	18.000	12.000	7560	2030	438.9	15°	67.2
16.00	3	285	0.102	24.000	16.000	5670	1740	668.8	15°	89.6
20.00	3	285	0.115	30.000	20.000	4535	1570	940.6	15°	112.0
25.00	3	285	0.128	37.500	25.000	3630	1395	1306.3	15°	140.0

6.00	3	216	0.040	9.000	6.000	11460	1385	74.8	9°	56.8
8.00	3	216	0.050	12.000	8.000	8595	1300	124.7	9°	75.8
10.00	3	216	0.060	15.000	10.000	6875	1245	187.1	9°	94.7
12.00	3	216	0.071	18.000	12.000	5730	1215	262.0	9°	113.6
16.00	3	216	0.081	24.000	16.000	4295	1040	399.2	9°	151.5
20.00	3	216	0.091	30.000	20.000	3440	935	561.4	9°	189.4
25.00	3	216	0.101	37.500	25.000	2750	830	779.7	9°	236.8



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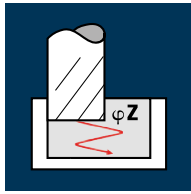
HM MG10	30° 20°
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Finishing

[19]

Application



Material

Wrought aluminium
Construction aluminium



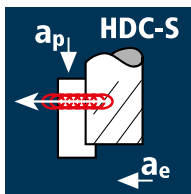
Cast aluminium



Unalloyed copper



Application



Material

Wrought aluminium
Construction aluminium



Cast aluminium



Unalloyed copper



d1 [mm]	z	v _c [m/min]	f _z [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	v _f [mm/min]	φZ [°]
6.00	3	300	0.065	32.000	5.400	15915	3105	5°
8.00	3	300	0.080	42.000	7.200	11935	2865	5°
10.00	3	350	0.095	53.000	9.000	11140	3175	5°
12.00	3	350	0.110	63.000	10.800	9285	3065	5°
16.00	3	400	0.130	84.000	14.400	7960	3105	5°
20.00	3	400	0.145	105.000	18.000	6365	2770	5°

6.00	3	270	0.065	32.000	5.400	14325	2795	5°
8.00	3	270	0.080	42.000	7.200	10745	2580	5°
10.00	3	315	0.095	53.000	9.000	10025	2860	5°
12.00	3	315	0.110	63.000	10.800	8355	2755	5°
16.00	3	360	0.130	84.000	14.400	7160	2795	5°
20.00	3	360	0.145	105.000	18.000	5730	2490	5°

6.00	3	240	0.052	32.000	5.400	12730	1985	4°
8.00	3	240	0.064	42.000	7.200	9550	1835	4°
10.00	3	280	0.076	53.000	9.000	8915	2030	4°
12.00	3	280	0.088	63.000	10.800	7425	1960	4°
16.00	3	320	0.104	84.000	14.400	6365	1985	4°
20.00	3	320	0.116	105.000	18.000	5095	1770	4°

d1 [mm]	z	v _c [m/min]	f _z [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	v _f [mm/min]	Q [cm ³ /min]
6.00	3	300	0.106	32.000	0.600	15915	5060	97.2
8.00	3	350	0.153	42.000	0.800	13925	6390	214.8
10.00	3	400	0.174	53.000	1.000	12730	6645	352.3
12.00	3	400	0.211	63.000	1.200	10610	6715	507.8
16.00	3	500	0.214	84.000	1.600	9945	6385	858.3
20.00	3	500	0.241	105.000	2.000	7960	5755	1208.2

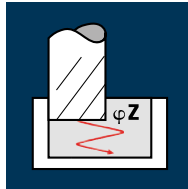
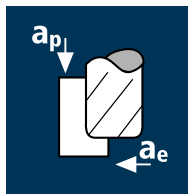
6.00	3	270	0.106	32.000	0.600	14325	4555	87.5
8.00	3	315	0.153	42.000	0.800	12535	5755	193.3
10.00	3	360	0.174	53.000	1.000	11460	5980	317.0
12.00	3	360	0.211	63.000	1.200	9550	6045	457.0
16.00	3	450	0.214	84.000	1.600	8950	5745	772.5
20.00	3	450	0.241	105.000	2.000	7160	5180	1087.4

6.00	3	240	0.085	32.000	0.600	12730	3240	62.2
8.00	3	280	0.122	42.000	0.800	11140	4090	137.5
10.00	3	320	0.139	53.000	1.000	10185	4255	225.4
12.00	3	320	0.169	63.000	1.200	8490	4300	325.0
16.00	3	400	0.171	84.000	1.600	7960	4085	549.3
20.00	3	400	0.193	105.000	2.000	6365	3680	773.3



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Application



Material

Wrought aluminium
Construction aluminium

Cast aluminium

Unalloyed copper

Material

Wrought aluminium
Construction aluminium

Cast aluminium

Unalloyed copper

d1 [mm]	z	v _c [m/min]	f _t [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	v _f [mm/min]	Q [cm ³ /min]	φZ [°]
12.00	3	500	0.140	18.000	9.600	13265	5570	962.6	12°
16.00	3	500	0.160	24.000	12.800	9945	4775	1466.8	12°
20.00	3	500	0.180	30.000	16.000	7960	4295	2062.6	12°
25.00	3	500	0.200	37.500	20.000	6365	3820	2864.8	12°

12.00	3	450	0.140	18.000	9.600	11935	5015	866.3	12°
16.00	3	450	0.160	24.000	12.800	8950	4295	1320.1	12°
20.00	3	450	0.180	30.000	16.000	7160	3865	1856.4	12°
25.00	3	450	0.200	37.500	20.000	5730	3440	2578.3	12°

12.00	3	400	0.126	18.000	9.600	10610	4010	693.0	7°
16.00	3	400	0.144	24.000	12.800	7960	3440	1056.1	7°
20.00	3	400	0.162	30.000	16.000	6365	3095	1485.1	7°
25.00	3	400	0.180	37.500	20.000	5095	2750	2062.6	7°

d1 [mm]	z	v _c [m/min]	f _t [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	v _f [mm/min]	Q [cm ³ /min]	φR [°]	LR [mm]
12.00	3	450	0.126	18.000	12.000	11935	4510	974.6	15°	67.2
16.00	3	450	0.144	24.000	16.000	8950	3865	1485.1	15°	89.6
20.00	3	450	0.162	30.000	20.000	7160	3480	2088.4	15°	112.0
25.00	3	450	0.180	37.500	25.000	5730	3095	2900.6	15°	140.0

12.00	3	405	0.126	18.000	12.000	10745	4060	877.1	15°	67.2
16.00	3	405	0.144	24.000	16.000	8055	3480	1336.6	15°	89.6
20.00	3	405	0.162	30.000	20.000	6445	3135	1879.6	15°	112.0
25.00	3	405	0.180	37.500	25.000	5155	2785	2610.5	15°	140.0

12.00	3	320	0.101	18.000	12.000	8490	2565	554.4	9°	113.6
16.00	3	320	0.115	24.000	16.000	6365	2200	844.9	9°	151.5
20.00	3	320	0.130	30.000	20.000	5095	1980	1188.1	9°	189.4
25.00	3	320	0.144	37.500	25.000	4075	1760	1650.1	9°	236.8



Use
ToolExpert AX-FPS
to determine the best
possible cutting data
for your machining
environment!

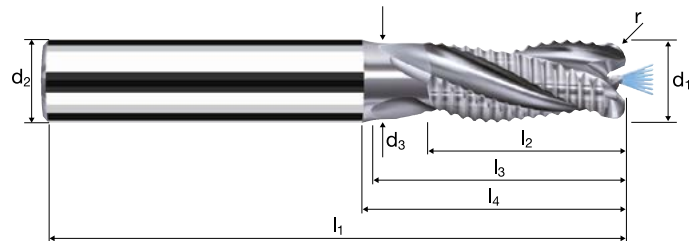
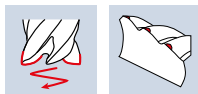
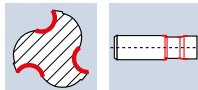
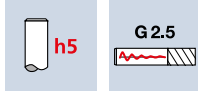
Corner radius end mills AX-FPS (AX-RFPS)

Profiled, normal version with short neck
High-performance penetration edge with central cooling channel



HM
MG10

λ 30°
 γ 20°



Roughing Finishing

			Al Aluminium > 99%	Al Aluminium Alloy	Al Aluminium Cast		Cu Copper	Plastic Thermoplast	
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Example: Order-Nº. Coating Article-Nº. ø-Code 15502 498										15502	
Ø Code	d ₁ e8	d ₂ h5	d ₃	l ₁	l ₂	l ₃	l ₄	r 0/+0.03	z		
498	12.00	12.00	11.00	83	26.00	33.29	37.00	0.500	3	●	I
606	16.00	16.00	15.00	95	32.00	41.73	46.00	0.500	3	●	I
501	12.00	12.00	11.00	83	26.00	33.29	37.00	1.000	3	●	I
608	16.00	16.00	15.00	95	32.00	41.73	46.00	1.000	3	●	I
680	20.00	20.00	19.00	104	40.00	48.23	53.00	1.000	3	●	I
770*	25.00	25.00	24.00	121	50.00	64.68	70.00	1.000	3	●	I
505	12.00	12.00	11.00	83	26.00	33.29	37.00	2.000	3	●	I
611	16.00	16.00	15.00	95	32.00	41.73	46.00	2.000	3	●	I
683	20.00	20.00	19.00	104	40.00	48.23	53.00	2.000	3	●	I
772*	25.00	25.00	24.00	121	50.00	64.68	70.00	2.000	3	●	I
506	12.00	12.00	11.00	83	26.00	33.29	37.00	2.500	3	●	I
612	16.00	16.00	15.00	95	32.00	41.73	46.00	2.500	3	●	I
684	20.00	20.00	19.00	104	40.00	48.23	53.00	2.500	3	●	I
774*	25.00	25.00	24.00	121	50.00	64.68	70.00	2.500	3	●	I
* Cylindrical shank HA, shank length = 50 mm											
I Availability and delivery dates on request.											



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