

passion
for precision



Milling tools **AX**



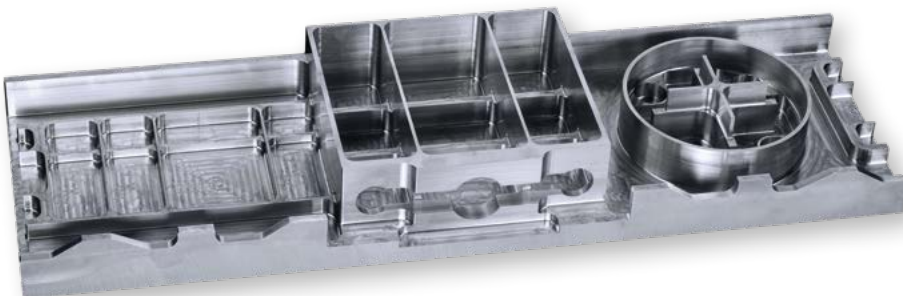
High-performance milling of aluminium with the AX tools

AX sets new benchmarks in matters of high-performance milling of aluminium structural components. The product line **AX** was developed by FRAISA in close cooperation with our industry partners.

Thanks to the technological innovations of **AX**, superior results with regard to productivity, cost reduction, quality and process safety can be achieved. Thanks to the comprehensive selection of length, diameter and corner radius designs, already the basic range offers excellent possibilities for an optimisation.

The advantages:

- **Greatest productivity** and minimal machining costs per workpiece
- **Higher process safety:** thanks to less vibrations and a smooth operation
- **Minimal set-up costs and set-up times:** thanks to already balanced tools
- **High level of optimisation:** reduced control checks and longer tool life
- **Improved component quality:** thanks to a process-secure operation and better transitions at infeed depths
- **Clearly structured and easy-to-use range of corner radius end mills**



FRAISA ToolSchool component made from aerospace aluminium 3.4364 (7075)
AX 3 x d Ø 10; r=1.0 mm / 15583.450

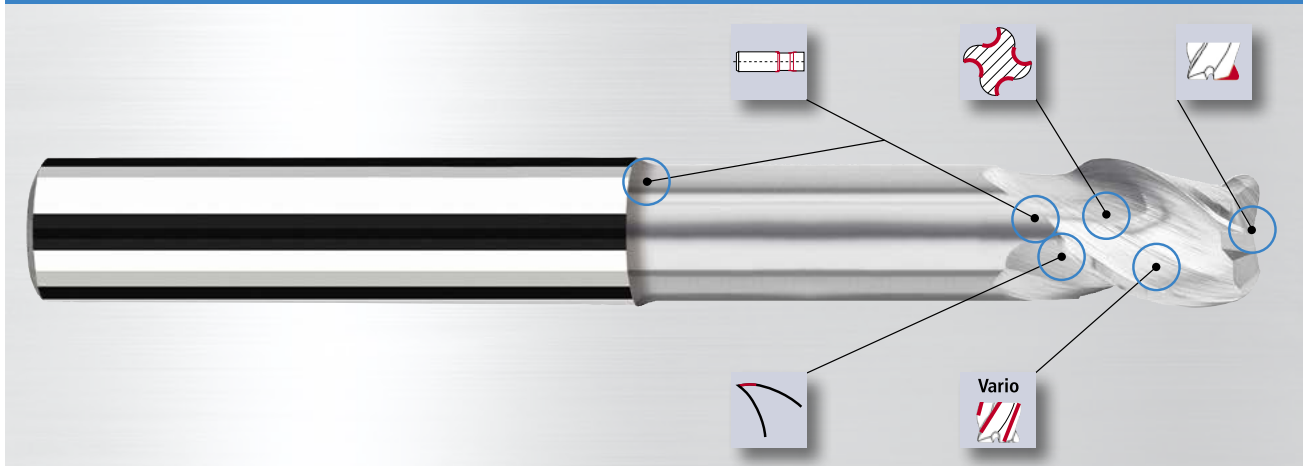
Application data: n=19735 rpm; vf=7400 mm / min; ap up to 8.5 mm; Q up to 370 cm³ / min

AX 5 x d Ø 10; r=1.0 mm / 15583.450

Application data: n=19735 rpm; vf=5900 mm / min; ap up to 5 mm; Q up to 300 cm³ / min

Machine: Mikron HPM800U; Emulsion, external

Technology features of AX



Smooth transitions

- Less radial deflection
- Minimal step formation with several infeed depths



Flute geometry

- Improved chip removal
- High degree of tool stability



Partially polished edge

- Absorption of high cutting forces



Protective chamfer (patent pending)

- Reduced vibrations
- Improved surface quality as a result of increased running smoothness



Variable helix angle

- Minimisation of oscillations and vibrations

[3]

Greatest productivity and minimal machining costs per workpiece

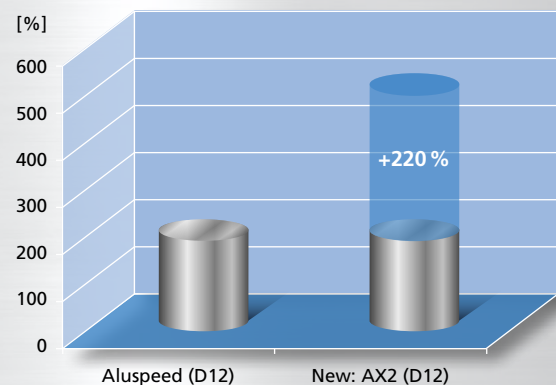
The high capacity of the new **AX** is a result of the above-mentioned technological elements, which are all aligned with one another. As a result, the removal capacity can be at least doubled in a suitable machine environment compared to current standard tools. Thus, machining costs are reduced and the output capacity can be significantly increased.

Higher process safety

The technological elements not only increase the productivity but also the process safety.

Thanks to the stable tool design with vibration-reducing features, the tool is less prone to unfavourable influences during the machining process.

Productivity [cm³/min]



The cutting performance during the machining of aluminium 7075 for structural components from the field of aviation. Tool diameter of 12 mm, pocket machining.

Minimal set-up costs and set-up times

The balancing of fast-rotating aluminium tools is necessary to comply with the quality of balancing required by the spindle manufacturer and to not damage the spindle. Additionally, non-balanced systems have a negative influence on the surface quality and the process performance.

FRAISA produces all new **AX** series tools in a finely balanced condition with a quality of balancing of G2.5 at $n=20,000$ rpm or an admissible residual unbalance $U_{adm} < 1\text{gmm}$. The process of balancing for **AX** tools is thus no longer required. As a result, set-up costs are considerably reduced, the handling, safety and reproducibility are distinctively increased, a better surface quality is achieved thanks to an increased running smoothness and the service life of the machine spindle is extended.

Improved component quality

Due to the cutting edge design and the smooth transitions, the new **AX** achieves a better surface quality at a higher performance level. Moreover, the cutting edge end design enables a reduced step formation with several infeed depths.

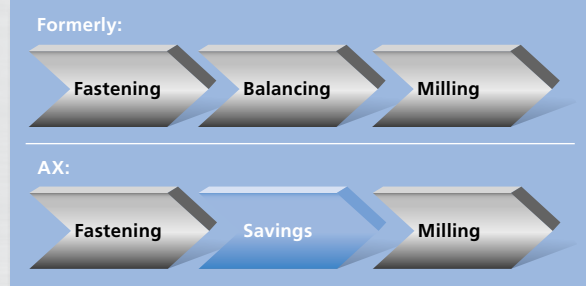
Clearly structured and easy-to-use range of corner radius end mills

The **AX** users are offered an extensive standard range with over 270 items in a coated or uncoated version. By means of a clear and simple structure of the l_3/d_1 ratio and the assigned corner radii, it is possible for the customer to effortlessly select the tool.

Field of application of AX

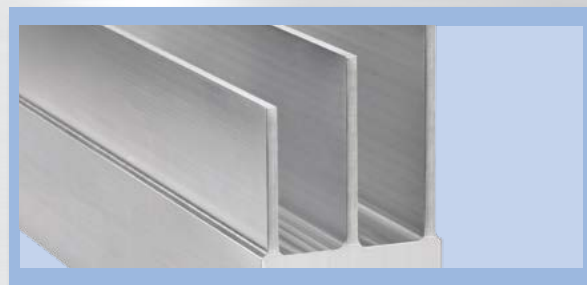
The **AX** range is particularly suitable for the manufacture of aluminium structural components for the sector of aviation. Furthermore, all wrought aluminium alloys, but also copper alloys and thermoplastics, can be machined by using **AX**.

Reduction in terms of time and costs



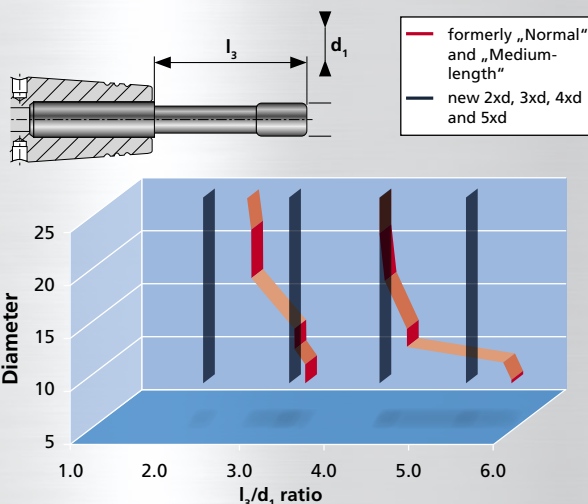
Savings in terms of costs and time thanks to the fact that the balancing of the tools is no longer required with AX.

Example: component quality



Test workpiece made from aerospace aluminium 7075
 l_3/d_1 ratio up to $5x d_1$
 Step formation between two machining levels < 0.006 mm
 Surface quality $R_a < 0.25$ μm

Diameter to neck length design







Constant L/D ratios with AX.

Examples for types of aluminium that can be machined perfectly by using AX.




Material desig. EN AW	Material no. EN AW	Aviation Mat. no.	Tensile strength Rm in [N/mm ²]	Yield point Rp0.2 in [N/mm ²]	Elongation A ₅ in [%]
AlMg1SiCu	6061	3.3214	195–315	100–255	6–18
AlCu4MgSi	2017	3.1324	375–410	215–275	8–14
Al Cu4Mg1(Zr)	2024/2124	3.1354	430–490	290–360	6–12
AlCu2Mg1,5Ni	2618	3.1924	390–430	305–375	3–8
AlZn5,5MgCu	7075/7175	3.4364	420–530	355–460	5–8
AlZn6CuMgZr	7050/7150	3.4144	430–500	360–440	3–9

AX range

AX smooth-edged, with corner radius, number of teeth = 2

N°15572 	Diameter: 10 bis 25 mm Radii: 1.5, 2.5, 4.0	X-Generation X	HM MG10	2xd
N°15573 	Diameter: 6 to 25 mm Radii: 1.0, 2.5, 4.0	X-Generation X	HM MG10	3xd
N°15574 	Diameter: 6 to 25 mm Radii: 1.0, 2.5, 4.0	X-Generation X	HM MG10	4xd
N°15575 	Diameter: 6 to 25 mm Radii: 1.0, 2.5, 4.0	X-Generation X	HM MG10	5xd

AX smooth-edged, with corner radius, number of teeth = 3

N°15582 	Diameter: 10 to 25 mm Radii: 2.5, 4.0	X-Generation X	HM MG10	2xd
N°15583 	Diameter: 10 to 25 mm Radii: 1.0, 2.5, 4.0	X-Generation X	HM MG10	3xd
N°15584 	Diameter: 10 to 25 mm Radii: 1.0, 2.5, 4.0	X-Generation X	HM MG10	4xd
N°15585 	Diameter: 10 to 25 mm Radii: 1.0, 2.5, 4.0	X-Generation X	HM MG10	5xd

FRAISA recommends:

We recommend using different length versions during the component manufacture in order to achieve the most productive cutting process.

This way, the performance of a tool from length group 5 x d₁ can be doubled compared to a tool from length group 3 x d₁.

The number of the cutting edges selected is primarily subject to the machining strategy. High radial and axial infeeds argue in favour of the application of double-edged tools.

Strategies with high feed rates at a low or medium radial and axial infeed argue in favour of three-edged tools. The economically optimal strategy must be determined in accordance with the machine capability, the cooling lubricant supply and optimal chip evacuation.

For detailed application recommendations, please refer to the complete catalogue and our cutting data software FRAISA ToolExpert®.

If you have any question, please send an email to mail.ch@fraisa.com. You may also directly contact our local customer consultant.

The FRAISA application engineers will be happy to advise you.

For further information, please refer to www.fraisa.com

Where is it possible to ask questions concerning the product?



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passion
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