AX-FPS New performance horizons for high-performance milling of aluminum
Productivity gains thanks to perfect coordination of the tool and machine environment
Maximum performance and minimal power consumption = extreme cost reduction!

With AX-FPS, FRAISA is presenting a groundbreaking tool concept for aluminum machining. The all-new AX-FPS milling cutter opens up new performance horizons in the field of aluminum machining. The perfect coordination between damping and cutting ability ensures reduced power consumption and torque input by the spindle and guarantees a long service life and maximum process reliability.

In combination with the new ToolExpert AX-FPS, the cutting parameters can be ideally matched to the spindle characteristics. This makes it possible to achieve not only productivity gains but also massive cost reductions as the tool can work at the ideal operating point of the spindle and machine environment.

AX-FPS is a contoured roughing tool with a 20° cutting angle and a helix angle of 30°. The specially designed flutes are ground to a mirror finish and precisely designed damping surfaces are attached at the curved and end cutting edges.

These geometric features form a very easy-cut tool concept and guarantee a low-vibration and safe milling process with previously unattained material removal rates per unit of time.

AX-FPS tools are equipped with the FRAISA high-performance penetration edge and central cooling channel bore. The tools are finely balanced and have a short shank with smooth transitions.

All of these technologies increase the reliability and productivity of the AX-FPS tools to an unparalleled level of performance!

The ToolExpert AX-FPS specially developed for the AX-FPS tools enables you to determine the machine environment and to optimize the performance of the tools and the system utilization of the spindle and machine.

The benefits

- **Maximum performance with minimal spindle load**
  Maximum productivity – low costs

- **High process reliability**
  Guaranteed chip removal thanks to mirror-finish grinding, a central cooling channel and contoured cutting edge

- **Lower energy consumption per area of material milled**
  Extremely easy cutting

- **New ToolExpert AX-FPS**
  Cutting data that matches the machine spindle and machine environment

- **At least 2xd length of cutting edge**
  High infeed rates, reliable chip removal and low axial extraction force

- **Ideal life cycle**
  with ToolCare® tool management, ReTool® tool reconditioning and ReToolBlue recycling
**Key factors:** Machine spindle and machine environment

When milling aluminum, the machine tool is all too often the limiting factor. This is due to the

- reduced spindle torque at high speeds
- active axial spindle preload and the spindle interface (e.g. HSK-63)
- cooling lubrication and maximum coolant pressure
- tool throats and the stability of the chucking
- active spindle power
- reliable chip removal

**Spindle torque and spindle power characteristics**

The torque of a machine spindle decreases significantly as the speed increases. As aluminum is machined in the very highest speed range ($n_{IST}$), the active torque in the operational area ($M_{IST}$) is usually crucial with respect to the spindle’s performance.

One aspect that is often not taken into account but is very relevant is the bearing pretensioning of the spindle. This is why the axial tensile force must be kept as low as possible in order not to damage the spindle.

Since FRAISA has measured the power and torque requirements of the AX-FPS tools, the application data in ToolExpert AX-FPS can be optimally positioned on the spindle characteristic so as to obtain maximum performance without overloading the spindle motor.
The *technologies* of the AX-FPS tools
A groundbreaking X-Generation tool concept

The new AX-FPS technology is systematically designed for *productivity* and *cost effectiveness*. Very positive, easy-cut geometries paired with mirror-finish flutes ensure excellent chip formation and good chip removal, supported by a central coolant supply. Small, radially mounted surfaces on the tool circumference act as vibration dampers and result in a very smooth and reliable cut. Of course, AX-FPS cutter also has a high-performance penetration edge that further enhances the tool’s range of applications.

Description and benefits of the AX-FPS technologies

- Smaller loads: low torque, lower power consumption, minimal axial forces
- Vibration-free operation with maximum performance
- More technologies: FRAISA high-performance penetration edge, central cooling channel – great chip removal, finely balanced tools with HA version, powerful corner radii with special tools
The aim of AX-FPS tool development was to reduce machining forces, power consumption and torque input:

- **Smaller loads**  
  low torque, lower power consumption, minimal axial forces

- **Vibration-free operation**  
  with maximum performance

- **More technologies:** FRAISA high-performance penetration edge, central cooling channel – great chip removal, finely balanced tools with HA version, powerful corner radii with special tools

Descriptions of all FRAISA technologies can be found in the main FRAISA catalog.
Use ToolExpert AX-FPS to determine the best possible cutting data for your machine environment!

The new ToolExpert AX-FPS calculator is an innovative solution to determining cutting data that match your machine environment. Material removal rates of up to 18,000 cm³/min can be achieved with the new AX-FPS technology! High-performance roughing of wrought aluminum alloys is not limited by the tool, but by the machine spindle being used and the actual machine environment.

Consequently, ToolExpert AX-FPS lets you describe your machine environment clearly, so that you can determine the cutting data that is most efficient and reliable for your application. This option is unique and new and shows that FRAISA is continuing to “digitalize” its application know-how. The outcome is genuine customer benefit in respect to cutting production costs and reducing machining times.

Working together to hone ToolExpert!

ToolExpert AX-FPS includes a function that enables you to send us feedback regarding the cutting data recommended by FRAISA. In this way, we can work together to further perfect the knowledge we share and to enhance the benefits we gain from the cutting data recommendations. FRAISA is looking forward to these discussions with its users!
How does ToolExpert AX-FPS work and what influencing factors are considered?

The functions built into ToolExpert were developed from more than a thousand recorded measuring points. Highly productive and reliable system utilization comes about when the degree of capacity utilization of the milling cutter, the machine spindle and the machine environment is as close as possible to maximum utilization.

Utilization of the milling cutter:
The optimum is the maximum possible chip removal rate of the cutter at the speed selected. The blue bar represents the chip removal rate with the set or recommended cutting data.

Utilization of the spindle:
The maximum is the active spindle power and the spindle torque at the corresponding speed. The blue bar shows the power and torque required by the tool in relation to the active spindle power and spindle torque.

Utilization of the machine environment:
The maximum represents the cutting data recommended by FRAISA to ensure process reliability. This were derived from the entries made with respect to the machine environment. The blue bar shows the difference when the operator adjusts the cutting data.

The aim is to utilize the system as efficiently as possible in order to achieve maximum productivity. ToolExpert AX-FPS reveals when too large a diameter has been selected; while utilization of the spindle can be optimally adjusted by setting reduced cutting data, the performance potential of the cutter is far from being fully utilized. Smaller diameters are therefore recommended for less powerful machines or spindle interfaces.
FRAISA’s AX-FPS tool concept provides tools and cutting data that enable you to machine aluminum workpieces perfectly in your own particular machine environment. Thanks to the function built into the software that allows for interaction between FRAISA and our customers, we can share experiences and work together to continually improve the concept.

### The AX-FPS tool concept

<table>
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<tr>
<th>Tools</th>
<th>Machine environment</th>
<th>Cutting data</th>
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### Aims:
- Maximize productivity of your machine environment
- Massive cost reductions
- Perfecting by sharing experiences
Cylindrical end mills  AX-FPS

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

HM MG10 λ 30° γ 20°

Roughing
Finishing

Aluminium
Alloy
Cast
Copper
Plastic
THERMOPLAST

Example:
Order-N°. Coating Article-N°. ø-Code

Example:
Order-N°. Coating Article-N°. ø-Code

15500 15600

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* Cylindrical shank HA, shank length = 50 mm
** Shank with side clamping according to DIN 6535 HB

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 fraisa.com
Cylindrical end mills  AX-FPS
Profiled, medium length version with neck
High-performance penetration edge with central cooling channel

**HM MG10**
\[ \lambda = 30^\circ \]
\[ \gamma = 20^\circ \]

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**Aluminium** > 99%

**Aluminium Alloy**

**Aluminium Cast**

**Copper**

**Plastic Thermoplast**

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### Example:

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* Cylindrical shank HA, shank length = 50 mm
** Shank with side clamping according to DIN 6535 HB
Corner radius end mills  AX-RFPS

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

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new!

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Articles can only be ordered as special execution tools. Different radii available on request.