Multicut XA – The new finishing cutter for aluminum
Multicut XA is our redesigned finishing cutter for machining aluminum. It completes FRAISA’s successful Multicut line by adding a cutter specifically designed for use with aluminum alloys.

With the innovative Multicut XA finishing cutter, FRAISA sets a new benchmark for finishing in the lightweight construction material aluminum.

Thanks to the new XA concept, it is now possible to achieve levels of productivity, process reliability, quality and cost reduction that are second to none.

The basic assortment comprising Multicut XA 2xD and Multicut XA 3xD offers excellent potential and a wide variety of possibilities for optimization.

Multicut XA makes the job of finishing in aluminum more cost-effective!

Aluminum alloys have special mechanical and thermal characteristics. The distinctive ductility of the aluminum and the associated adhesive effects between the cutting material and the material being cut can, in exactly the same way as with strain hardening, lead to built-up edges. The resulting change in the cutting edge geometry, coupled with an increase in the energy generated in the working zones due to friction, can lead to a decrease in the surface quality that can be achieved.

The high cutting speeds when finishing aluminum also often result in unwanted vibration when machining. Special consideration has been taken while developing Multicut XA. The concept of this new aluminum finishing cutter facilitates outstanding and reproducible surface quality for the workpiece and maximum productivity.

The advantages:

- **Increased productivity:** through maximum removal rate per workpiece
- **Greater process reliability:** reduces vibration levels even under critical loads with a balance quality of G 2.5
- **Better component quality:** thanks to better tool rigidity and minimal tool deflection at the workpiece
- **Outstanding tool life:** thanks to greater resistance to wear and reproducible working time
- **Increased automation:** thanks to reduced control intervals and highly stable performance
- **Extensive range:** for a wide spectrum of workpieces and applications
Innovation and technology in the X-Generation performance class

Multicut XA

Geometry, substrate and coating – all elements of the XA concept are tuned to provide maximum performance. It is the effort put into coordinating the various technologies to create an overall concept that ensures the great performance capability of FRAISA tools.

The combination of the individual features, such as the number of cutting edges, variable helix angle, unequal spacing, increasing core diameter, special chip space geometry, high balance quality and polish-ground functional surfaces, currently constitutes a unique type of tool.

Variable helix angle and variable tooth spacing

- Axial and radial vibration damping with gentle and steady cutting
- Better workpiece surfaces and less noise
- Reduced spindle load and tool wear despite the high removal rate

Increasing core diameter

- Improved tool rigidity and less deflection of the tool
- Superior performance for infeed \( a_n \), \( a_s \) and the feed rate \( f_z \)
- Better workpiece accuracy and less vibration

Special support land

- Significant strengthening of the cutting blade – less torsion, less deflection and lower deflection forces
- Superior performance, less vibration and improved component quality
- Longer tool life and greater process reliability – increased automation

Optimized groove geometry

- Coordinated with the chip formation process when finishing aluminum alloys
- The polished functional surfaces produce better workpiece surfaces thanks to less friction and also reduce heat input
- Greater process reliability with reproducible surfaces

Protection radius

- Greater edge stability thanks to attachment of a protection radius
- Increased mechanical and thermal load capacity of the cutting edge
- Better performance thanks to increased tooth feed rate
- Longer tool life and greater process reliability – increased automation

Balanced tools

- Balancing performed during the production process ensures maximum smoothness of operation
- Optimum surface qualities and significantly extended tool life
- Longer service life for the machine spindle

Celero heavy-duty coating

- Wide application range with very good tribological characteristics in various aluminum alloys
- High thermal and mechanical resistance – high degree of process reliability
- Outstanding coating adhesion – longer tool life and performance capability

HM MG10 carbide

- Outstanding balance of hardness and ductility – maximum performance capability
- Micrograin carbide with a homogenous structure – better performance and safety
- Optimum coating adhesion – for steady wear and process reliability
Multicut XA
The features

FRAISA Celero – The most capable coating for aluminum alloys
During their development, XA tools were tested both with and without coating. The Celero heavy-duty coating has been verified to be the most capable and most universal coating available for tools used to machine aluminum alloys. In abrasive aluminum alloys, the improved wear resistance of the tools thanks to the Celero coating leads to a much longer tool life!

Substrate
The carbide grade is crucial to the tool offering great performance.
When it came to the Multicut XA milling cutters, FRAISA decided to fall back on a proven carbide substrate, HM MG10. This micrograin carbide features an outstanding balance of ductility and hardness. The resulting resistance to wear of the tool allows high cutting speeds, which in turn ensure great productivity when finishing.

6 teeth for more surface area per minute
Whenever slow lateral infeed rates have to be selected for finishing, Multicut XA reveals one of its main benefits. Thanks to its 6 cutting edges, finishing can be carried out with a high infeed rate without any negative effect on component quality or contour accuracy. The 3 center cutting edges also permit efficient finishing.
Maximum productivity per workpiece

The great performance capability of Multicut XA is the result of a whole set of technological features. The main factors when it comes to finish-cutting aluminum alloys are surface quality and productivity.

The high removal rate results from an ideal length-to-diameter (L/D) ratio combined with the total of 6 cutting edges.

Tool life or surface area per minute?

The new Multicut XA stands out compared with other finishing tools owing to its ability to remove a far larger area of material with the same tool life. The concept of the multi-cut tool facilitates high infeed rates and perfect surface quality.

The chip space geometry has been designed for controlled chip removal. Thanks to the special shape of the groove, the chips are removed faster and more reliably. And thanks to the support land, the lateral forces that arise are optimally reduced and the cutting pressure minimized. At these very high cutting speeds and with the resulting process heat generated, the edge sharpness and polished functional surfaces reduce sticking to the tool.

This leads to a significant improvement in component quality and maximum productivity.

Greater energy efficiency

The design of the chip formation and chip removal areas of the tool facilitate smooth cutting and chip flow.

The tool operates more smoothly and calmly and requires less energy per area of material removed.

Stabilized cutting edges with protection radius

The microgeometry stabilizes the cutting edges, preventing uncontrolled chipping of the edges. The protective edge radius also improves the stability of the edges.

Compared with conventional aluminum cutting tools, process reliability and the tool life, too, have been significantly improved.
A new standard of process reliability

Process reliability declines in the case of complex, difficult machining operations. Even the smallest of deviations from the normal condition of the material, peripherals or strategy can induce the typical vibration behavior that arises during super-fine finishing – a catastrophe when finishing expensive components.

### Integral component

#### Multicut XA data

<table>
<thead>
<tr>
<th>Material</th>
<th>Machining</th>
<th>Super-fine finishing</th>
</tr>
</thead>
<tbody>
<tr>
<td>AlMgSi1 / EN AW-6082</td>
<td>Cutting speed $v_c$</td>
<td>700 m/min</td>
</tr>
<tr>
<td></td>
<td>Feed rate $f_z$</td>
<td>0.03 mm</td>
</tr>
<tr>
<td></td>
<td>Speed $n$</td>
<td>18570 min$^{-1}$</td>
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<tr>
<td></td>
<td>Infeed rate $v_i$</td>
<td>3342 mm/min</td>
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<tr>
<td>$a_p$ (axial infeed)</td>
<td>36 mm (3xD)</td>
<td>36 mm (3xD)</td>
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<tr>
<td>$a_e$ (radial infeed)</td>
<td>0.3 mm</td>
<td>0.3 mm</td>
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<tr>
<td>Cooling lubricant</td>
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<td>8% emulsion</td>
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</table>

### Vibration

Super-fine finishing in delicate integral components, with high cutting speeds that can lead to the development of high frequencies and slight vibrations.

### No vibration

Multicut XA is able to finish workpieces without generating any vibration even under the most difficult of conditions. As usual, FRAISA supplies reliable application data for every tool.
Unequal spacing of cutting edges, with variable helix angle
To reduce its tendency to vibrate at high speeds, the tool has a variable helix angle and the cutting edges are unequally spaced. With this specially developed combination of features, cutting is smoother and the component surface qualities obtained are perfect.

These vibration damping measures also reduce the spindle load and eliminate unpleasant vibration noise.

The Multicut XA concept improves process reliability and reproducibility
- Robust tool with sufficient reserves to compensate for process fluctuations
- Reliable and low-vibration even under unfavorable conditions
- Polished functional surfaces and protection radius for strengthening the cutting blade
- Tough but flexible carbide substrate for maximum wear resistance
- Heavy-duty Celero carbide coating for aluminum alloys
- High balance quality for optimum surface qualities

Where is it possible to ask questions concerning the product?
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.
Due to the large number of cutting edges, FRAISA recommends that the finishing cutter is operated at the fastest possible infeed rate. The aim is to improve productivity and lower overall machining costs. As long as a few extra, related pieces of information and tips are taken into account, the Multicut XA concept will be able to develop its full potential.

**Application-related tips regarding finishing in aluminum alloys**

<table>
<thead>
<tr>
<th>Smooth running</th>
<th>Cutting data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make sure that the tool runs smoothly (approx. &lt;0.015 mm) and used good-quality chucks.</td>
<td>The feed rate per tooth is the most influential parameter in the finishing process and care must be taken to ensure that the rate selected is not too high with respect to the surface roughness to be achieved for the component.</td>
</tr>
<tr>
<td>Good clamping of the tool increases its service life and produces ideal surface qualities.</td>
<td>When beginning the process, follow the information given in the catalog or ToolExpert.</td>
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<tr>
<td>Cooling lubrication</td>
<td>Cutting strategy</td>
</tr>
<tr>
<td>The cooling lubrication is one of the factors with the biggest impact! As lubrication is particularly important when machining aluminum, the concentration of the emulsion should be between 6 and 10%.</td>
<td>Multicut XA is suitable not only for super-fine finishing but also for pre-finishing. The tool's geometry is such that both strategies achieve the best-possible level of productivity. Even when cutting edge utilization is high, the tool runs particularly smoothly. This maximum performance of the tool still produces optimum surface qualities.</td>
</tr>
<tr>
<td>Perfect alignment of the cutting edges extends tool life and process reliability.</td>
<td>It's worthwhile investing slightly more time to ensure accurate programming in order to create engagement conditions that are as constant as possible.</td>
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<table>
<thead>
<tr>
<th>Stability/vibration</th>
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<tr>
<td>The excellent rigidity of this tool prevents excessive deflection, allowing the L/D ratio to be exploited to the full when finishing.</td>
<td></td>
</tr>
<tr>
<td>The Multicut XA concept also prevents vibration from arising during the finishing process at high cutting speeds.</td>
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Cylindrical end mills  Multicut XA

Finishing, normal version

**Example:**

Order-N°. ø-Code

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**New!**

**CELERO**

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**Cooling**

- Aluminium > 99%
- Aluminium Alloy
- Aluminium Cast
- Copper
- Plastic Thermoplastic

**Materials**

- Aluminium
- Copper
- Plastic

**Features**

- Cylindrical end mills
- Multicut XA
- Finishing, normal version

**Specifications**

- HM MG10
- λ 40° γ 20°
- r 0.2
- 60° 80°
- 90° 45°

**Applications**

- Aluminium
- Copper
- Plastic
Cylindrical end mills  Multicut XA
Finishing, medium length version

**Example:**
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**New!**

**Material**

- Aluminium > 99%
- Aluminium Alloy
- Aluminium Cast
- Copper
- Plastic ThermoPlast
Here, you will be provided with further information on the FRAISA Group.

The fastest way to our E-Shop can be found here.

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youtube.com/fraisagroup