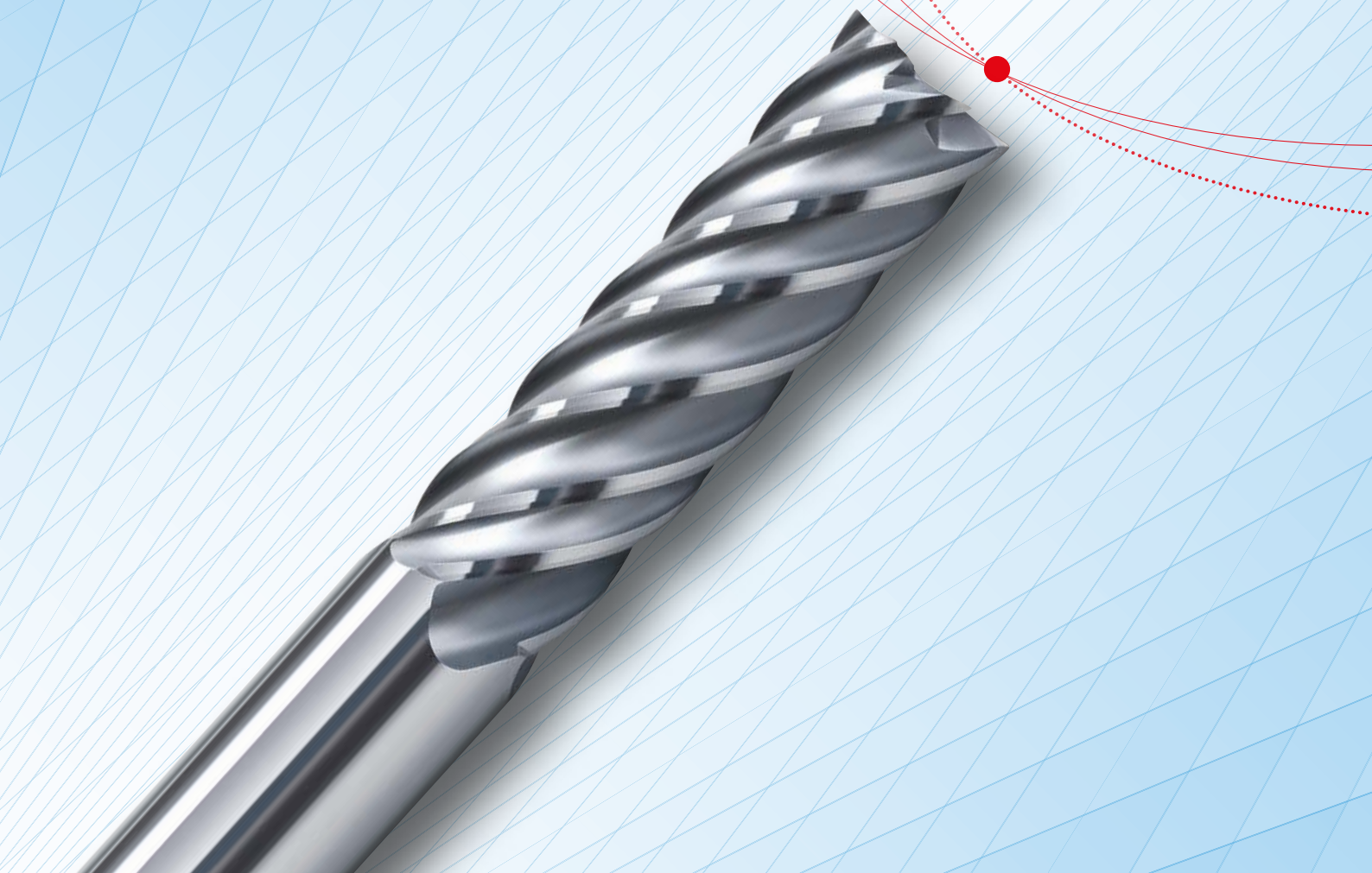
passion
for precision

fraisa

Multicut XA – The new finishing cutter for aluminum



Multicut XA – Productivity and quality for aluminum finish-cutting

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.

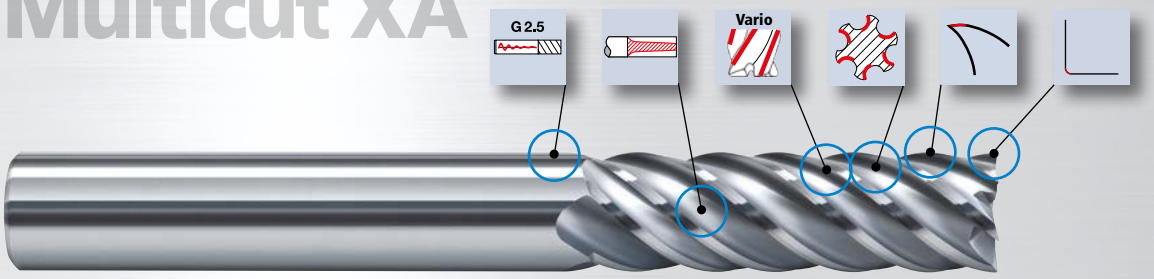
The high cutting speeds when finishing aluminum also often result in unwanted vibration when machining. Special consideration has been taken while developing **Multicut XA.** The concept of this new aluminum finishing cutter facilitates outstanding and reproducible surface quality for the workpiece and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

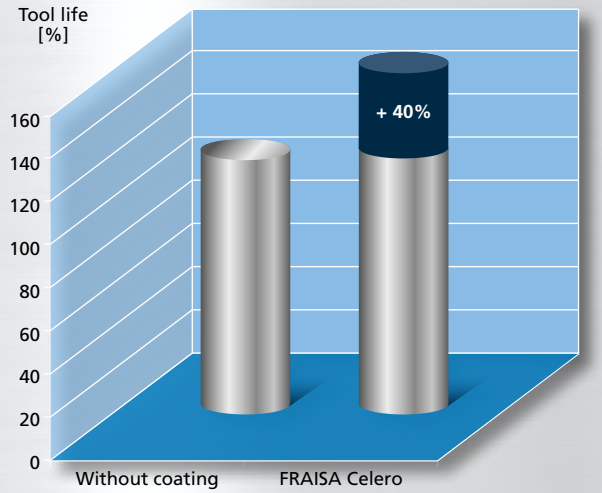
- Outstanding balance of hardness and ductility – maximum performance capability
- Micrograin carbide with a homogenous structure – better performance and safety
- Optimum coating adhesion – for steady wear and process reliability

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!

Extended tool life



Substrate

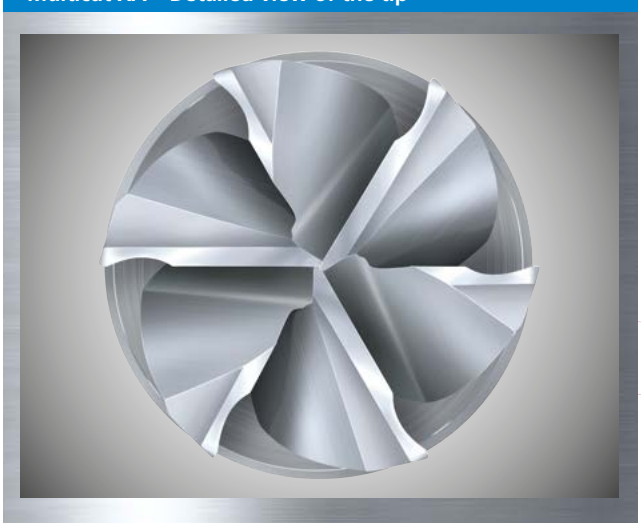
The carbide grade is crucial to the tool offering great performance.

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.

Multicut XA – Detailed view of the tip



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.

Multicut XA data

Multicut XA Ø 12	**15590.501 (3xD)**
Machining	**Super-fine finishing**
Material	AlMgSi1 / EN AW-6082
Cutting speed v_c	700 m/min
Feed rate f_z	0.03 mm
Speed n	18570 min^{-1}
Infeed rate v_f	3342 mm/min
a_p (axial infeed)	36 mm (3xD)
a_e (radial infeed)	0.3 mm
Cooling lubricant	8% emulsion

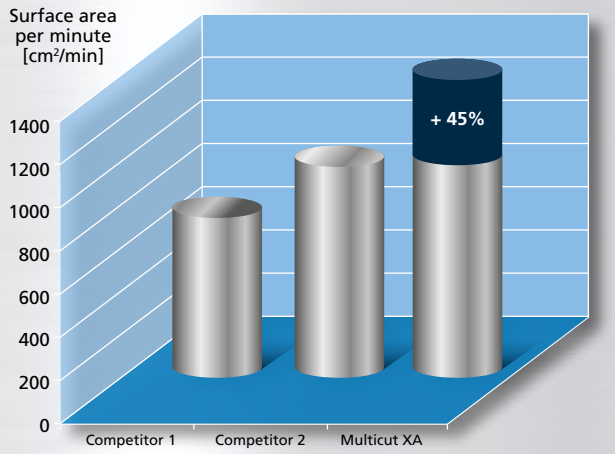
Tool life or surface area per minute?

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.

Increase in productivity



Even if productivity is higher compared with other concepts, **Multicut XA** produces components with very good surface quality.

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

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a_e (radial infeed)	0.3 mm
Cooling lubricant	8% emulsion

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.

Exceptionally good tool rigidity

The technological innovations of this new finishing cutter also result in exceptionally good tool rigidity.

This is a must if the fast cutting speeds while finishing aluminum alloys are to be absorbed. In combination with a very strong and yet smooth-cutting blade, **Multicut XA** is a true innovation when it comes to the absorption of very high loads.

Advantage of good tool rigidity

- Less tool deflection – better component quality
- Absorption of higher mechanical loads – higher material removal rate
- Less vibration – longer tool life and less noise

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**.

Application technology
Tips and influencing factors

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

Smooth running

Make sure that the tool runs smoothly (approx. <0.015 mm) and used good-quality chucks.

▶ Good clamping of the tool increases its service life and produces ideal surface qualities.

Cooling lubrication

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%.

▶ Perfect alignment of the cutting edges extends tool life and process reliability.

Stability/vibration

The excellent rigidity of this tool prevents excessive deflection, allowing the L/D ratio to be exploited to the full when finishing.

▶ The **Multicut XA** concept also prevents vibration from arising during the finishing process at high cutting speeds.

Cutting data

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.

▶ When beginning the process, follow the information given in the catalog or ToolExpert.

Cutting strategy

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.

▶ It's worthwhile investing slightly more time to ensure accurate programming in order to create engagement conditions that are as constant as possible.


num
sF1
sF2
sF3
sF4
sF5
sF6
sF7
sF8
sF9
sF10
F3
F4
F5
F6
F7
F8
F9
F10
F11
F12
num

Cylindrical end mills Multicut XA

Finishing, normal version

HSS | Favora® | Base-X | X-Generation X

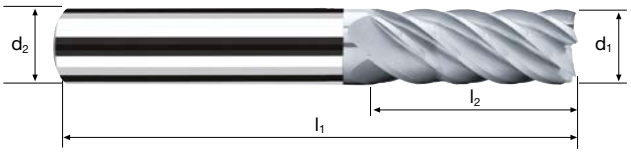
HM MG10

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°.** Coating **C** | Article-N°. **15589** | ø-Code **.300**

ø Code	d_1 e8	d_2 h6	l_1	l_2	r	z	15589	CELERO C15589
.300	6	6	57	13	0.15	6	●	●
.391	8	8	63	19	0.15	6	●	●
.450	10	10	72	22	0.20	6	●	●
.501	12	12	83	26	0.20	6	●	●
.610	16	16	92	32	0.20	6	●	●
.682	20	20	104	40	0.20	6	●	●

Cylindrical end mills Multicut XA

Finishing, medium length version

HSS | Favora® | Base-X | X-Generation X

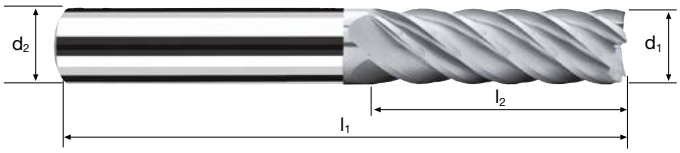
HM
MG10

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°.** Coating **C** | Article-N°. **15590** | ø-Code **.300**

ø Code	d1 e8	d2 h6	l1	l2	r	z	15590	CELERO C15590
.300	6	6	63	18	0.15	6	●	●
.391	8	8	72	24	0.15	6	●	●
.450	10	10	84	30	0.20	6	●	●
.501	12	12	97	36	0.20	6	●	●
.610	16	16	108	48	0.20	6	●	●
.682	20	20	122	60	0.20	6	●	●

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