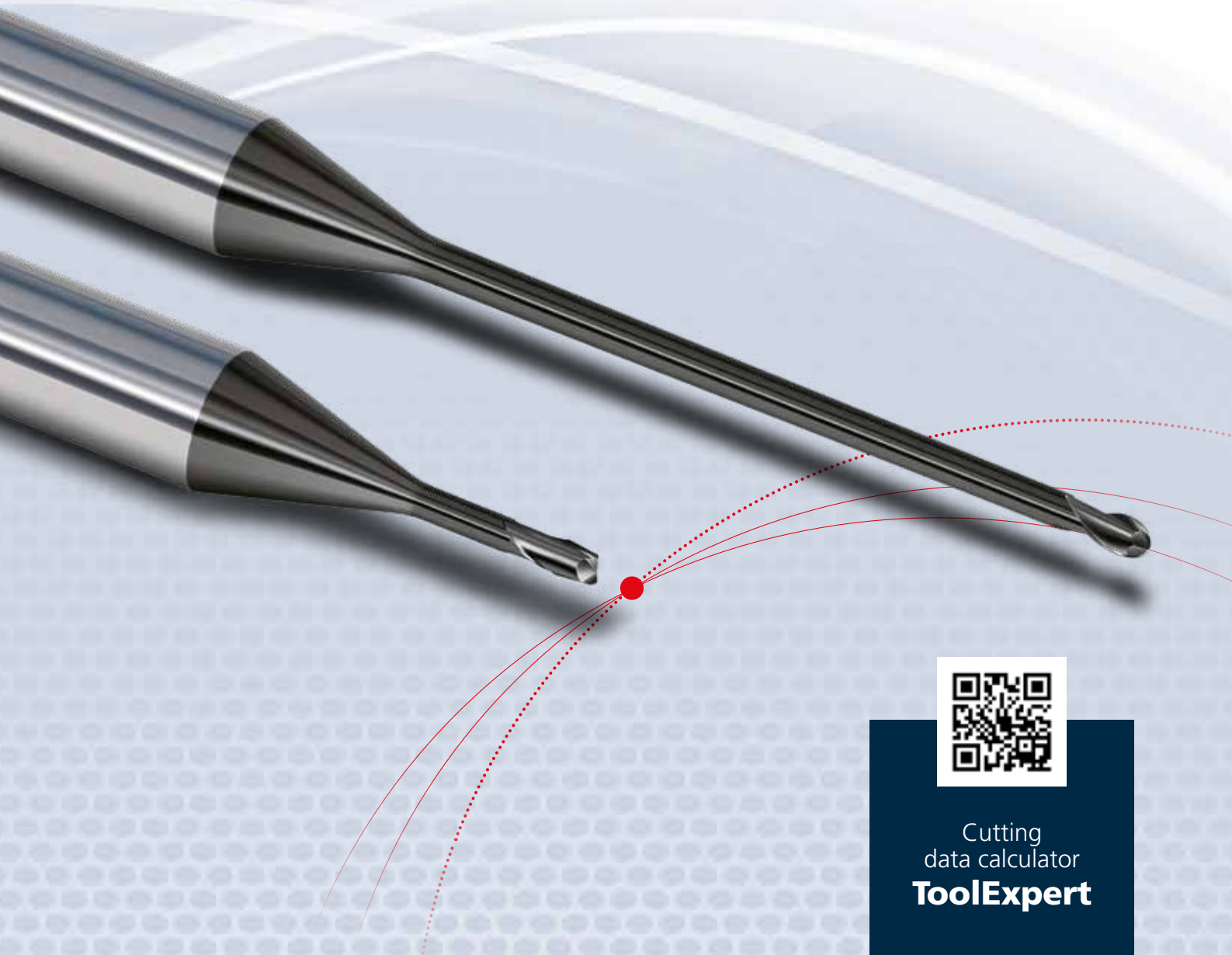


passion  
for precision



## **MicrospheroXG and MicrotoroXG – high precision and ideal for graphite**



Cutting  
data calculator  
**ToolExpert**

# MicrospheroXG and MicrotoroXG – a success story in four dimensions

Our attractive **MicrospheroXG** and **MicrotoroXG** range is more diverse than ever – a success story in four dimensions!

The clever solution for high-precision milling of graphite materials now comprises **219** items with diameters ranging from 0.1 to 6.0 mm. The product assortment sets new standards with outstanding **performance**, an

unprecedented **complete product range**, and simple, fast **tool selection**.

With the **four perfectly coordinated dimensions** “**Range**,” “**Technology**,” “**Service**,” and “**Application**,” **MicrospheroXG** and **MicrotoroXG** offer a clever solution for **maximum customer value** in finishing and superfinishing.

## Range

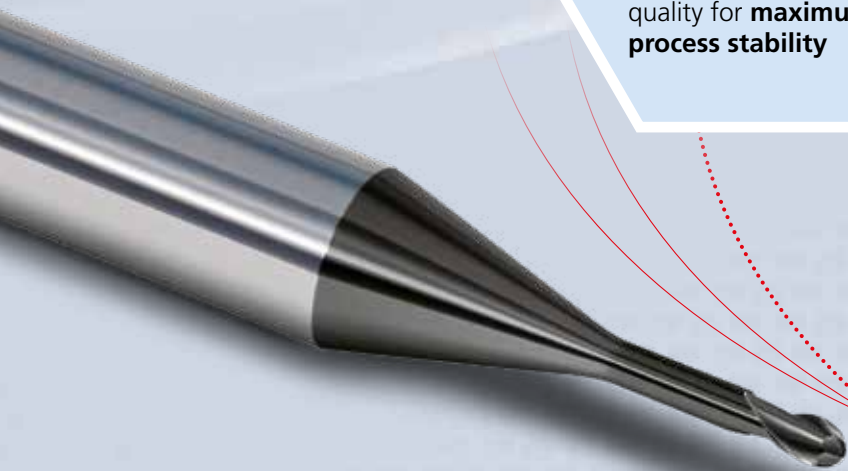
- Top product assortment: **219 different microcutters** from **3xd to 20xd**, available as ball nose end mills and corner-radius mills, with 2 teeth
- **Smart range structure** for simple and quick tool selection in the 0.1 to 6.0 mm dia. range
- Highly automated production with state-of-the-art machine concepts delivers extremely constant high quality for **maximum milling process stability**

## Technology

- **Tolerances** for balls  $\pm 0.005$  mm and corner radii  $0/+ 0.01$  mm
- **6 mm precision shanks** with h5 tolerance for best component qualities
- Extensive options: **Corner radii** with r 0.05/0.1/0.2/0.5 mm
- Optimized suitability for **3-axis, 3+2-axis** and **5-axis** milling

## Service

- **ToolCare 2.1:** management, procurement, and information system for tools
- **ConcepTool:** custom-made special tools
- **ToolSchool:** initial and continuous training
- **FRAISA ReTool®:** Industrial tool reconditioning with performance guarantee



## Maximum customer value

- Maximum **precision** and best **component quality**
- Maximum **performance, process reliability, and reproducibility**
- **Reduced costs**
- Increased **productivity**

## Application

- **High availability and easy ordering**, with next-day delivery throughout Europe
- **ToolExpert**: Accurate and reliable **application data** for every tool available online
- **CAD data** available on website
- Maximum efficiency for **finishing and super-finishing** of graphite

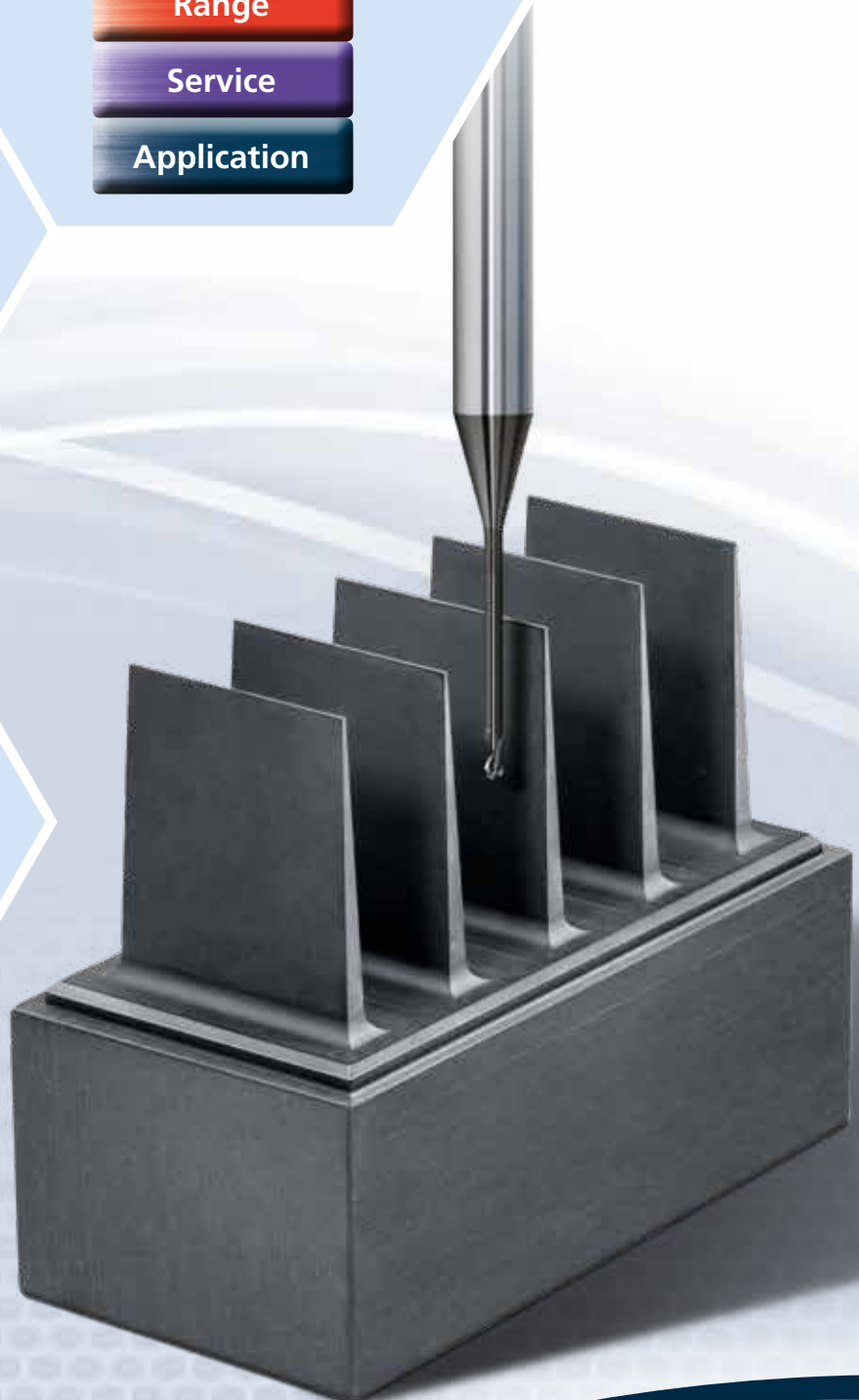
Maximum customer value

Technology

Range

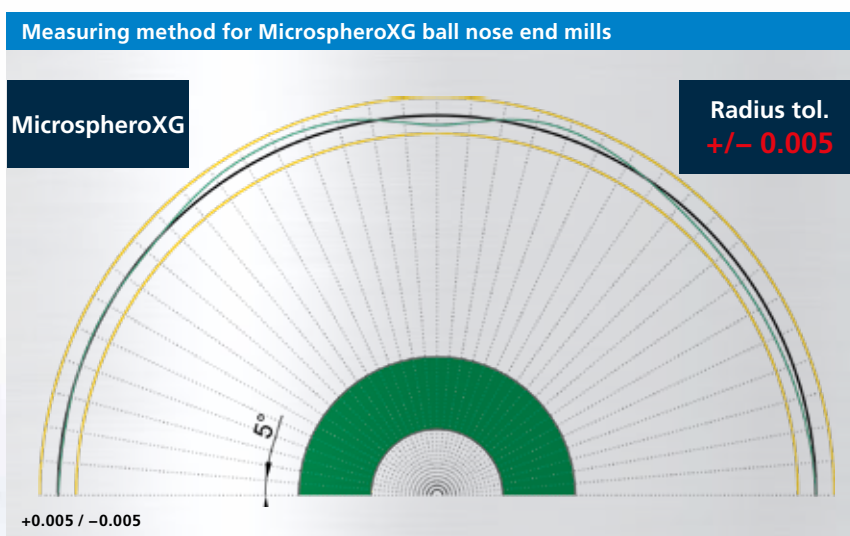
Service

Application



# Maximum **precision** and **efficiency** in finishing and superfinishing

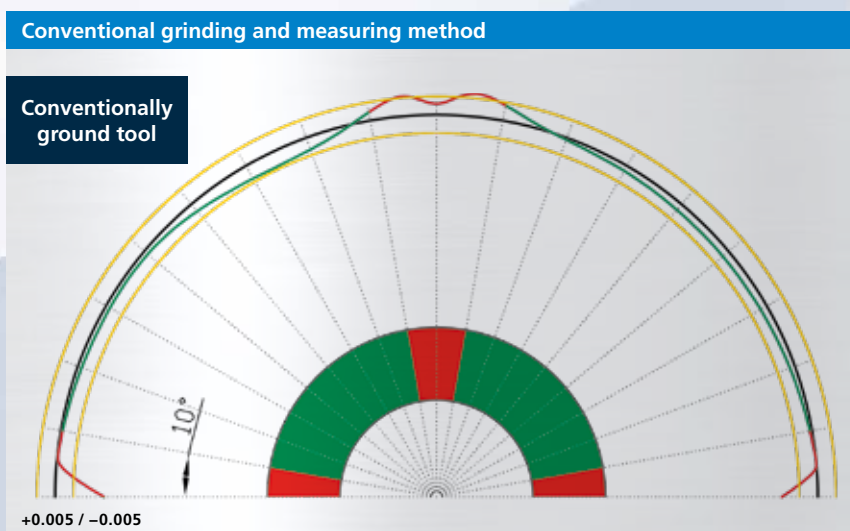
[ 4 ]



**MicrospheroXG ball nose end mills** have a radius tolerance of  $\pm 0.005$  mm.

In order to really achieve this high level of precision, a measuring method is required that can measure the entire cutting edge over 180°. The radius is measured at 5° intervals: from 0° to 180°.

This ensures a level of precision that is within tolerance across the entire ball. The shank ground to tolerance zone h5 also significantly reduces the concentricity error and further increases the precision of the component.

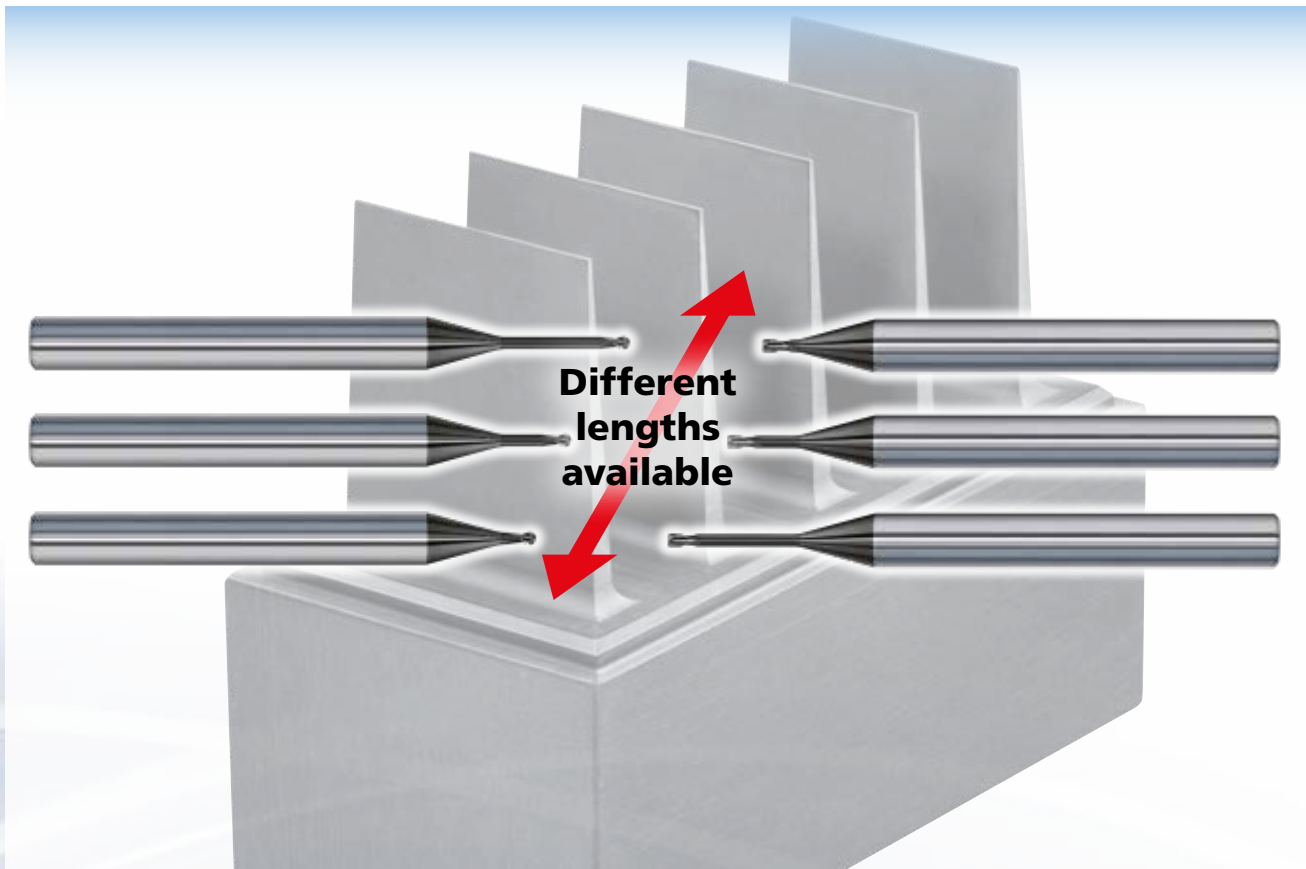


Conventional measuring methods, on the other hand, generally measure only from 10° to 80° and from 100° to 170° in order to exclude the difficult-to-grind transitions between the radius and curved cutting edge and the center errors.

When such tools are used on conventional 3-axis machines, steep tapers and even bottom surfaces cannot be finished with sufficient contour accuracy.

## The right micro cutter for every application

With the extended **MicrospheroXG** and **MicrotoroXG** range, FRAISA offers exactly 219 different options for the precise machining of graphite components – in different lengths and diameters.



[ 5 ]

### Ideal for:

- 3-D form surfaces
- Deep pockets
- Holes
- Narrow cavities
- Rib geometries
- Small corners
- Undercuts

Graphite range		Cylindrical neck Shank dia. 6 mm (h5)
<b>Ball nose end mills</b> No. of teeth: 2 Tol. r +/- 0.005 mm		Ø 0.1–6.0 mm 3xd–20xd <b>No. of items: 82</b>
<b>Corner radius mill</b> No. of teeth: 2 Tol. r 0/+ 0.01 mm		Ø 0.2–6.0 mm 3xd–20xd r 0.05/0.1/0.2/0.5 mm <b>No. of items: 137</b>

# Cutting-edge technology for maximum productivity

**MicrospheroXG** and **MicrotoroXG** milling tools boast superior performance and component quality thanks to the perfect coordination of the carbide substrate, diamond coating, micro and macro geometry, and an optimized CAM milling strategy. They also offer extremely high process reliability and wear resistance. For example, after four hours

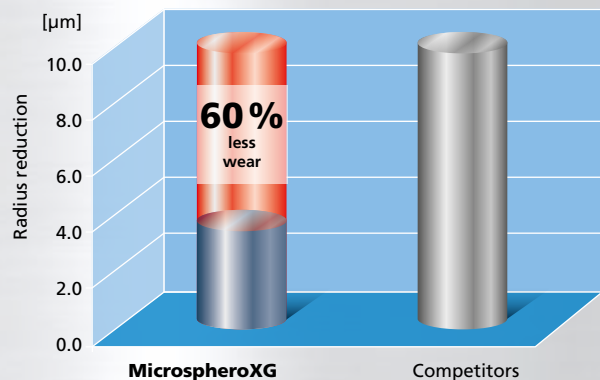
of milling, **MicrospheroXG** tools show a radius reduction of only 4  $\mu\text{m}$ . Thanks to a wide range of products and a smart assortment structure, it is simple to find the ideal tool for every graphite milling application.

MicrospheroXG after 4 h machining time  
Optical microscope image



Tool: X6062180  
Material: Poco GF XL-1, grain size 1  $\mu\text{m}$ ,  $v_f = 959 \text{ mm/min}$ ,  
 $n = 23'979 \text{ min}^{-1}$ , 1.35 mm,  $a_e = 0.6 \text{ mm}$ ,  
Tool diameter 3.0 mm / 3xd

Radius reduction [ $\mu\text{m}$ ] after 4 h machining time  
with dry machining (compressed air)



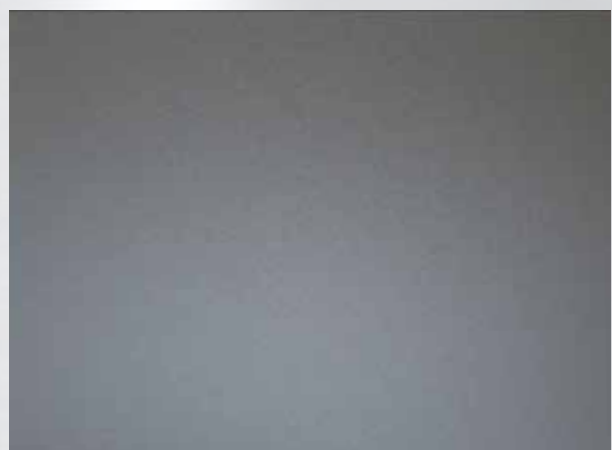
[ 6 ]



**FRAISA is one of the Top 3 milling tool manufacturers in the German-speaking tool and mold making industry.**

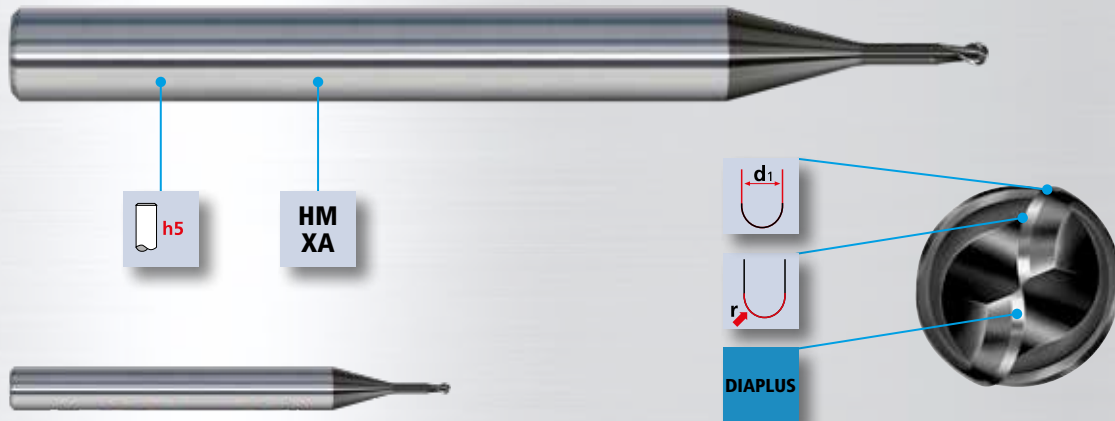
This is based on a study carried out in Germany, Switzerland, and Austria in 2017 by the Werkzeugbau Akademie Aachen (WBA), in which more than 200 tool and mold makers took part.

Milled plane with excellent surface quality



MicrospheroXG graphite ball nose end mill

## MicrospheroXG graphite ball nose end mill



Graphite ball nose end mill MicrospheroXG in original size 1 : 1



h5

**6 mm precision shank with h5 tolerance**

- High concentricity for best component qualities
- Ideal for modern precision tool holders



**High-precision radius tolerance of +/- 0.005 mm**

- Specially configured position tolerances simplify programming and safe completion of the final contour
- High-precision tolerance zone for great dimensional accuracy

DIAPLUS

**High-performance DIAPLUS coating**

- Highly wear-resistant diamond-based coating, ideal for graphite machining
- Characterized by above average thickness, evenness, and nano surface structure
- Tolerance zone for coat thickness: +/- 1 µm



**High-precision diameter**

- High-precision tolerance zone across 180° of the ball for great dimensional accuracy
- Easy adjustability and exact measurement of the tool in the machine

[ 7 ]

HM XA

**XA carbide**

- Excellent ductility with a very high hardness reduces the risk of chipping and increases process reliability

MicrotoroXG graphite corner-radius mill

## MicrotoroXG graphite corner-radius mill



**High-precision radius tolerance of 0/+ 0.01 mm**

- Specially configured position tolerances simplify programming and safe completion of the final contour
- High-precision tolerance zone for great dimensional accuracy



**High-precision diameter**

- Specially configured position tolerances simplify programming and safe completion of the final contour
- Easy adjustability and exact measurement of the tool in the machine

# ToolExpert – the innovative online tool for your production

In the age of industry 4.0, it is essential to work productively and precisely at all times. FRAISA not only develops high-quality, high-performance tools, but also innovative software solutions such as the new ToolExpert.

The user-friendly online tool provides perfectly coordinated, tool and material-specific cutting data for production quickly and easily – the optimum basis for the precise use of the FRAISA tools.

FRAISA experts thoroughly test the optimum operating points at in-house application centers.

All factors involved are considered and the optimal data is then bundled, collated, and permanently extended in the new ToolExpert.

#### For the use of tools this means:

- ✓ find the optimum application parameters quickly and reliably
- ✓ use perfectly coordinated, tool- and material-specific cutting data
- ✓ download CAD data for selected tools



#### FRAISA ToolExpert offers numerous advantages:

- **Precise:** find perfectly coordinated, tool and material-specific cutting data
- **Simple:** access data online at any time and from anywhere without software downloads
- **Fast:** find application parameters with just a few clicks without having to register
- **Order function:** order the selected tool directly in the e-shop via a link
- **Flexible:** search for tools or materials to be machined as required
- **Comprehensive:** call up cutting data for FRAISA tools from a database of more than 10,000 materials
- **User-friendly:** work intuitively thanks to the new, responsive design



Cutting data calculator  
ToolExpert

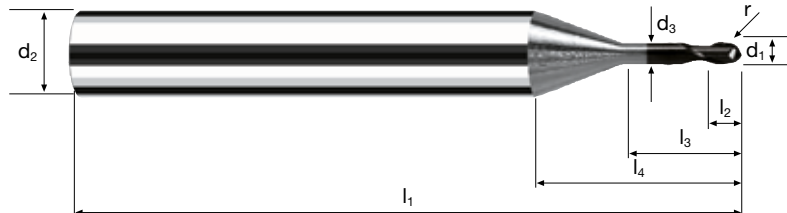
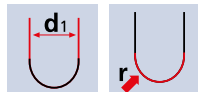


# MicrospheroXG ball nose end mill

6 mm dia. shank, cylindrical neck, 2 teeth



**HM**  $\lambda$  30°  
**XA**  $\gamma$  15°

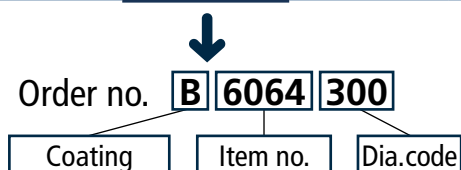


**C** Graphite **CF/GF** Fiber Reinforced Plastics

d <sub>1</sub> ↓	l/d ratio (l <sub>3</sub> /d <sub>1</sub> ) →						
	3	5	8	10	12	15	20
	<b>B6062</b>	<b>B6064</b>	<b>B6066</b>	<b>B6068</b>	<b>B6070</b>	<b>B6072</b>	<b>B6074</b>
0.1		010	010				
0.15		015	015				
0.2		020	020	020	020		
0.3		030	030	030	030	030	030
0.4		040	040	040	040	040	040
0.5		050	050	050	050	050	050
0.6		060	060	060	060	060	060
0.8		080	080	080	080	080	080
1.0		100	100	100	100	100	100
1.5	120	120	120	120	120	120	120
2.0	140	140	140	140	140	140	140
3.0	180	180	180	180	180	180	180
3.0		182					
4.0	220	220	220	220	220	220	220
4.0		222					
5.0	260	260	260	260			
6.0	300	300	300	300			

[ 9 ]

All tools are coated with DIAPLUS.



The fastest way to get more information is to scan this QR code.

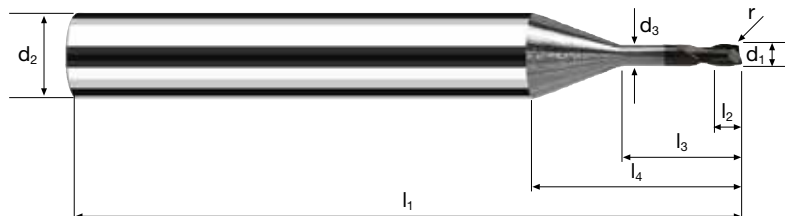
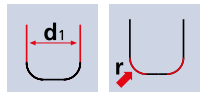
For detailed information, see catalog.

# MicrotoroXG corner radius mill

6 mm dia. shank, cylindrical neck, 2 teeth



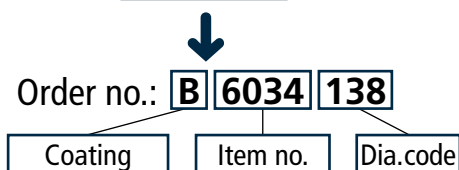
**HM**  $\lambda$  30°  
**XA**  $\gamma$  15°



**C** Graphite **CF/GF** Fiber Reinforced Plastics

d <sub>1</sub> ↓	l/d ratio (l <sub>3</sub> /d <sub>1</sub> ) →						
	3	5	8	10	12	15	20
	B6032	B6034	B6036	B6038	B6040	B6042	B6044
0.2		020	020				
0.3		030	030				
	<b>r 0.05</b>						
0.2		018	018	018			
0.3		028	028	028	028		
0.4		040	040	040	040	040	040
0.5		048	048	048	048	048	048
0.6		058	058	058	058	058	058
0.8		078	078	078	078	078	078
1.0		096	096	096	096	096	096
	<b>r 0.1</b>						
0.5		050	050	050	050	050	050
0.6		060	060	060	060	060	060
0.8		080	080	080	080	080	080
1.0		098	098	098	098	098	098
2.0		138	138	138	138	138	138

All tools are coated with DIAPLUS.



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For detailed information, see catalog.

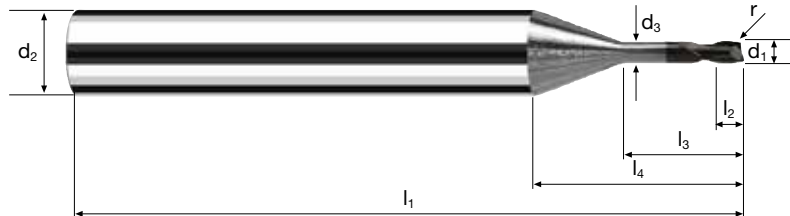
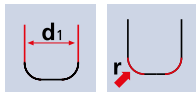
[ 10 ]

# MicrotoroXG corner radius mill

6 mm dia. shank, cylindrical neck, 2 teeth



**HM**  $\lambda$  30°  
**XA**  $\gamma$  15°



**C** Graphite **CF/GF** Fiber Reinforced Plastics

d <sub>1</sub> ↓	l/d ratio (l <sub>3</sub> /d <sub>1</sub> ) →						
	3	5	8	10	12	15	20
	<b>B6032</b>	<b>B6034</b>	<b>B6036</b>	<b>B6038</b>	<b>B6040</b>	<b>B6042</b>	<b>B6044</b>
<b>r 0.2</b>							
0.8		082	082	082	082	082	082
1.0		100	100	100	100	100	100
1.5	120	120	120	120	120	120	120
2.0	140	140	140	140	140	140	140
3.0	180	180	180	180	180	180	180
3.0		182					
4.0	215	215	215	215			
4.0		217					
5.0	255	255	255	255			
6.0	295	295	295	295			
<b>r 0.5</b>							
3.0		185	185	185	185	185	185
4.0	220	220	220	220			
4.0		222					
5.0	260	260	260	260			
6.0	300	<b>300</b>	300	300			

All tools are coated with DIAPLUS.

Order no.: **B 6034 300**

Coating    Item no.    Dia.code



The fastest way to get more information is to scan this QR code.

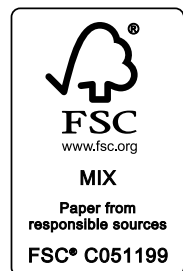
For detailed information, see catalog.



Scan this QR code to access more information about the FRAISA GROUP.



The fastest way to our E-Shop.



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**youtube.com/fraisagroup**

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