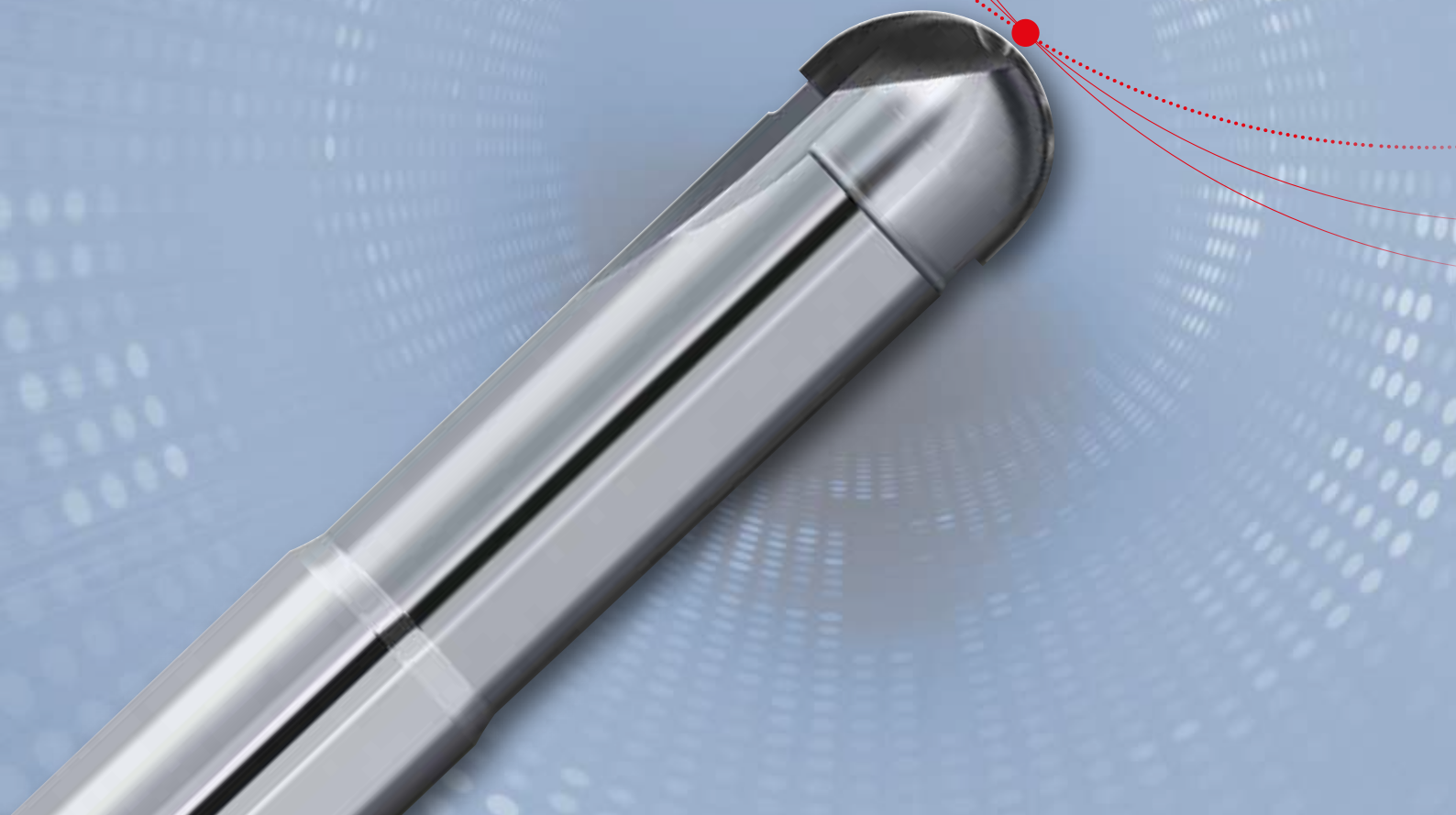
passion
for precision

fraisa

Sphero-CVD – High-performance milling of carbides with diamond milling tools

NEW



Cost-effective milling of carbides with tools made of pure diamond

Thanks to its great durability, carbide is increasingly being used as a feedstock for applications in the tool- and mold-making industry. High-performance, diamond-tipped milling tools are state-of-the-art cutting tools for such applications thanks to the speed, flexibility and cost-effectiveness with which they can be deployed. At the same time, they mark a turning point in the machining of hard metals as they increasingly replace erosion technology (EDM technology).

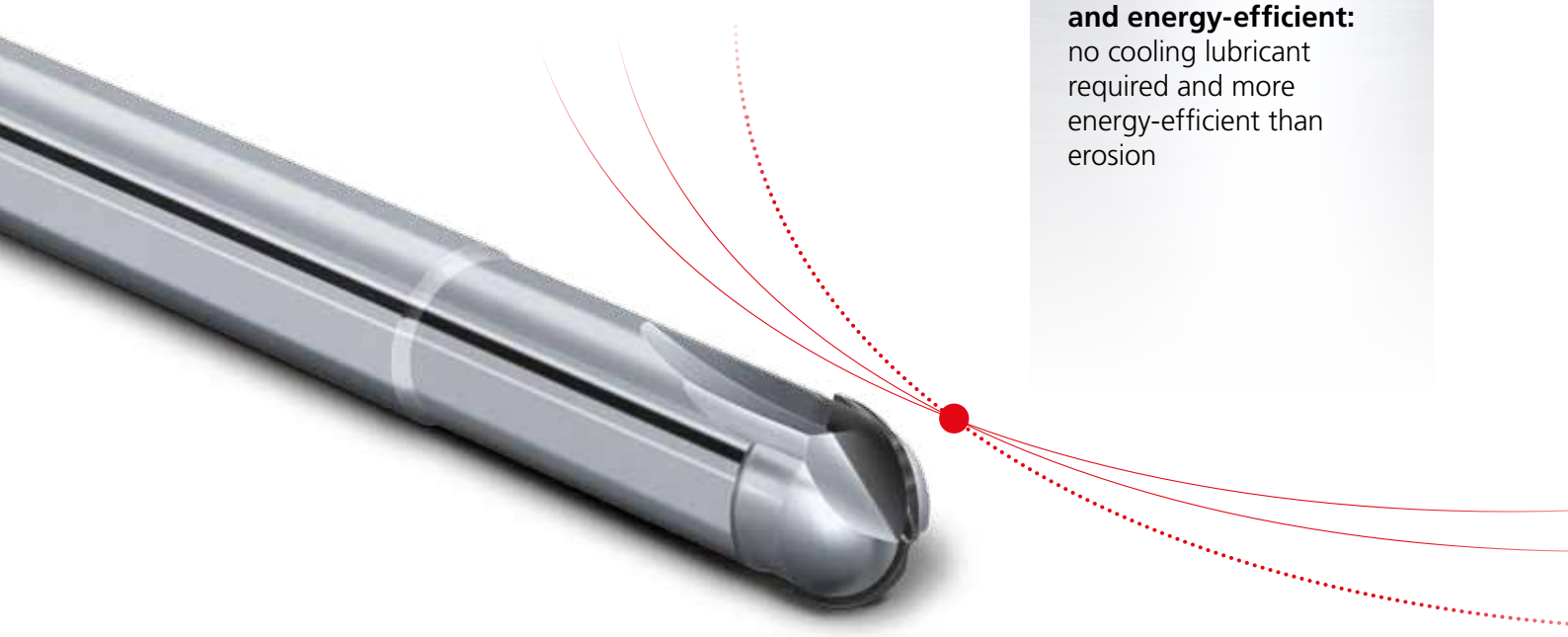
The innovative **Sphero-CVD** diamond tools from FRAISA are rough-milling/finishing tools that have been specially developed for the machining of carbides. They facilitate new and flexible machining strategies in the fields of tool and mold making. The CVD diamonds used are extremely wear-resistant and technologically superior compared with diamond-coated tools when it comes to reliable rough milling and finishing.

Thanks to FRAISA's concept whereby a CVD diamond is positioned at and beyond the center of the tool tip, the machining process is exceedingly stable with **Sphero-CVD**. The minimal amount of material loss of the CVD diamond maintains the tool's mechanical integrity, so that carbides with hardness grades of up to 1600 HV (approx. 92 HRA) can be machined. The spherical and radius accuracies achieved result in evenly distributed wearing of the CVD cutting edge and also minimize the amount of work involved in the subsequent finishing process.

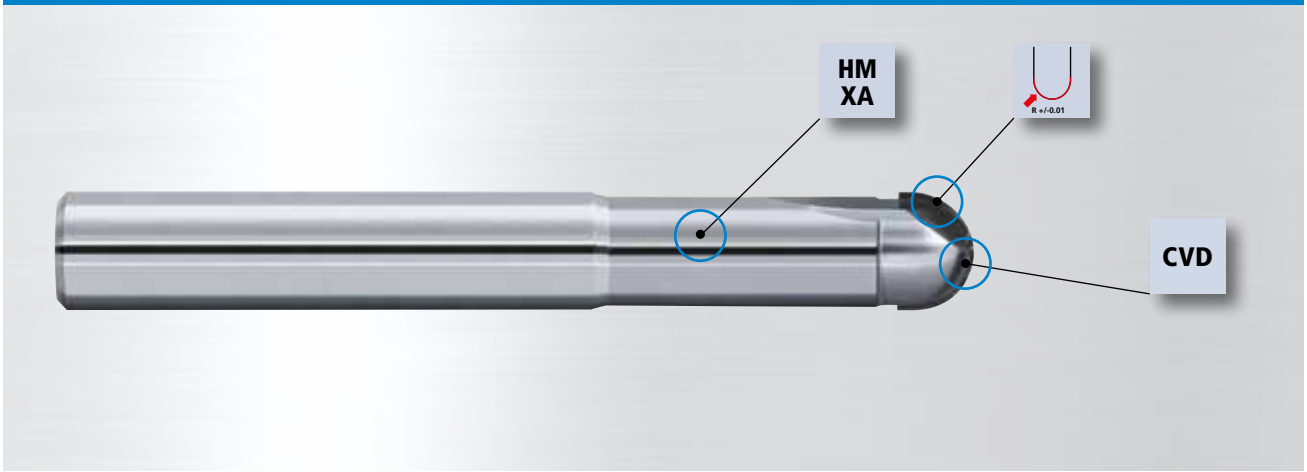
The combination of these properties makes the new **Sphero-CVD** ball nose end mill a reliable and cost-effective tool for the production-line roughing of hard metals.

The advantages:

- **Wear-resistant cutting material:** thanks to the pure CVD diamond
- **High machining capacity:** high material removal rate with high feed and infeed rates
- **Long tool life:** by the use of the use of state-of-the-art laser technology
- **Low costs:** reduced tool and inventory costs
- **Maximum flexibility:** more cost-effective than EDM technology
- **Environment-friendly and energy-efficient:** no cooling lubricant required and more energy-efficient than erosion



Technology features of Sphero-CVD



High spherical accuracy
- Precise radius tolerance
- Precise circularity

CVD **Ultra-hard cutting material**
- Pure synthetic CVD diamond features outstanding hardness and pressure resistance

Gentle reconditioning of the cutting edge by means of ultrashort-pulse laser technology
- Precise machining of the cutting edge
- Facilitates evenly distributed absorption of process forces during roughing and finishing

λ 0°
γ 0°
Helix angle and cutting angle
- Precise cutting edge geometry facilitates stable machining of carbides
- Cutting edge configured specifically for machining carbides

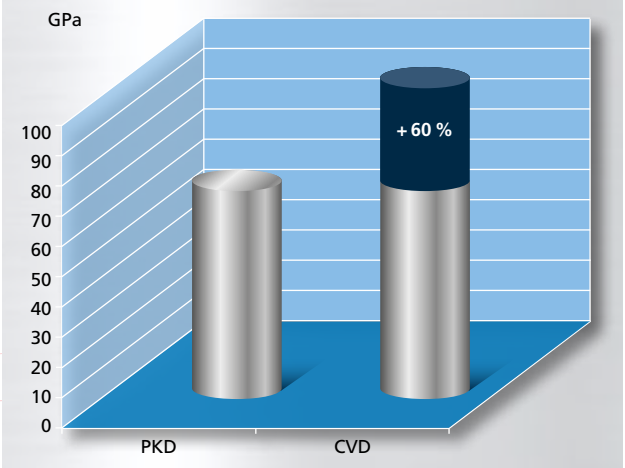
Al	Cu	CuZn		C		HM	HM		
Aluminium Cast	Copper	Brass		Graphite		< 1200 HV	< 1600 HV		

ZrO2 (Zirconium oxide)
Si3N4 (Silicon nitride)
Al2O3 (Aluminium oxide)

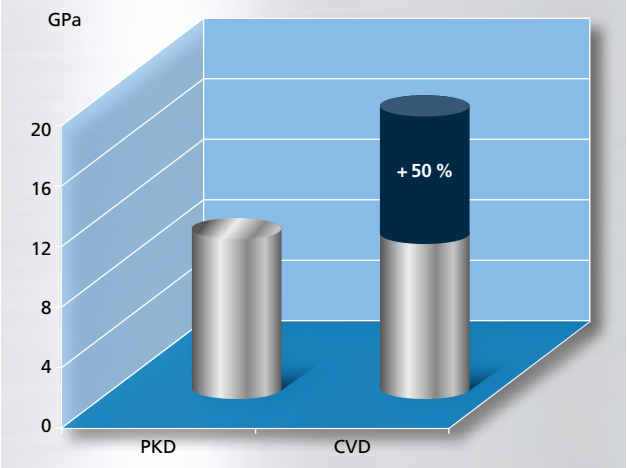
Ultra-hard cutting material – CVD

Thanks to their purity, the synthetic CVD diamonds feature outstanding hardness and pressure resistance and are therefore an excellent and ideal material for machining carbides.

Comparison: CVD vs. PCD hardness



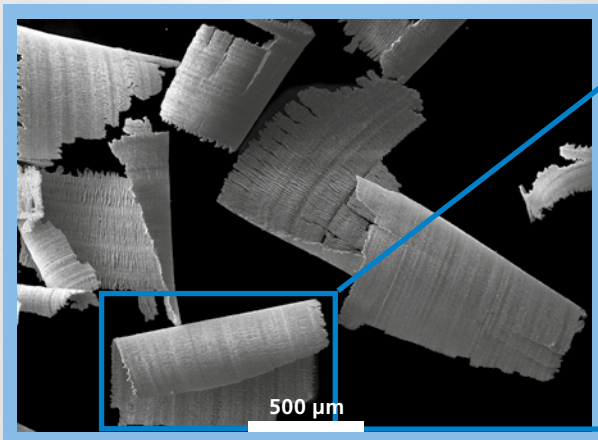
Comparison: CVD vs. PCD pressure resistance



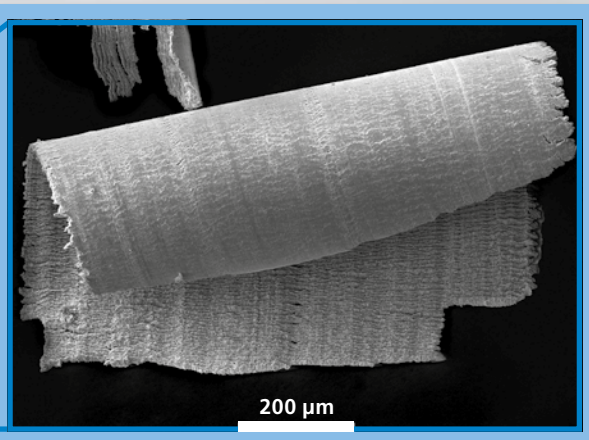
High machining capacity

The incredibly robust combination of diamond and carbide enables optimum force absorption and consequently maximum machining capacities. As a result, the **Sphero-CVD** facilitates efficient and cost-effective roughing of both simple and complex geometries. This elevates carbide to the group of economically machinable materials in the tool- and mold-making industry, opening up new prospects for a multitude of applications old and new.

Carbide chips after machining with the new Sphero-CVD



SEM image of carbide chips
(CTM30 - HV10 1130/87.6 HRA)



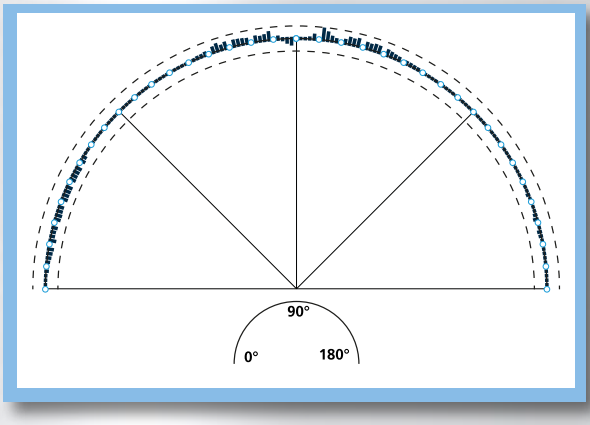
Detailed SEM image of a single contiguous carbide chip

Long lifetime thanks to great precision

Through the use of state-of-the-art ultrashort-pulse laser technology and a machining strategy developed specifically for CVD diamond tools, excellent radius and spherical accuracies can be obtained across the center of the tool tip.

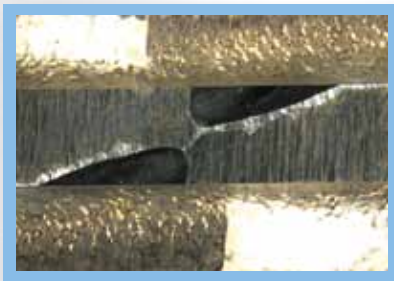
Because of this characteristic of the Sphero-CVD the load exerted by the individual cutting edges is distributed equally, extending the tool life in the process.

Effective radius of Sphero-CVD



Sphero CVD 10 mm dia.

Cutting edge wear



Parameters:

t = 30 min
n = 12 000 U/min
v_f = 960 mm/min
a_p = 0.3 mm
a_e = 0.3 mm

Material:
Carbide, CTM 30,
1130 HV (87.6 HRA)
10 mm tool

Wear after 30 min in the center of the tool tip

Parameters:

t = 60 min
n = 12 000 U/min
v_f = 960 mm/min
a_p = 0.3 mm
a_e = 0.3 mm

Material:
Carbide, CTM 30,
1130 HV (87.6 HRA)
10 mm tool

Wear after 60 min in the center of the tool tip

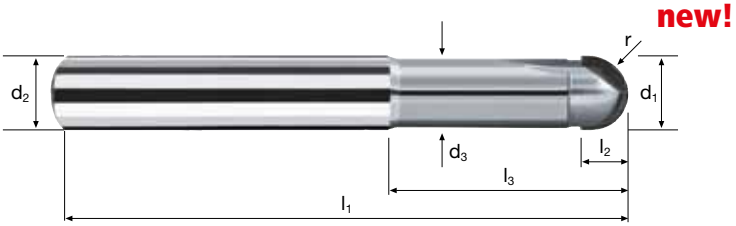
Ball nose end mills Sphero-CVD

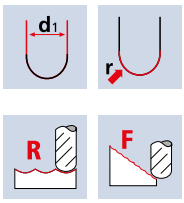
Tolerance r ±0.01, 3xd

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

CVD

λ 0°
γ 0°





Al Aluminium Cast	**Cu** Copper	**CuZn** Brass		**C** Graphite		**HM** < 1200 HV	**HM** < 1600 HV		**ZrO2** (Zirconium oxide) **Si3N4** (Silicon nitride) **Al2O3** (Aluminium oxide)

Example: **Order-N°.** Coating **35700** ø-Code **.300**

ø Code	d1 ±	d2 h6	d3	l1	l2	l3	r ±0.01	z	35700
.300	6	6	5.5	57	4.5	20	3.0	2	●
.391	8	8	7.4	63	5.5	26	4.0	2	●
.450	10	10	9.2	72	6.5	31	5.0	2	●
.501	12	12	11.0	83	7.5	37	6.0	2	●

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**

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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