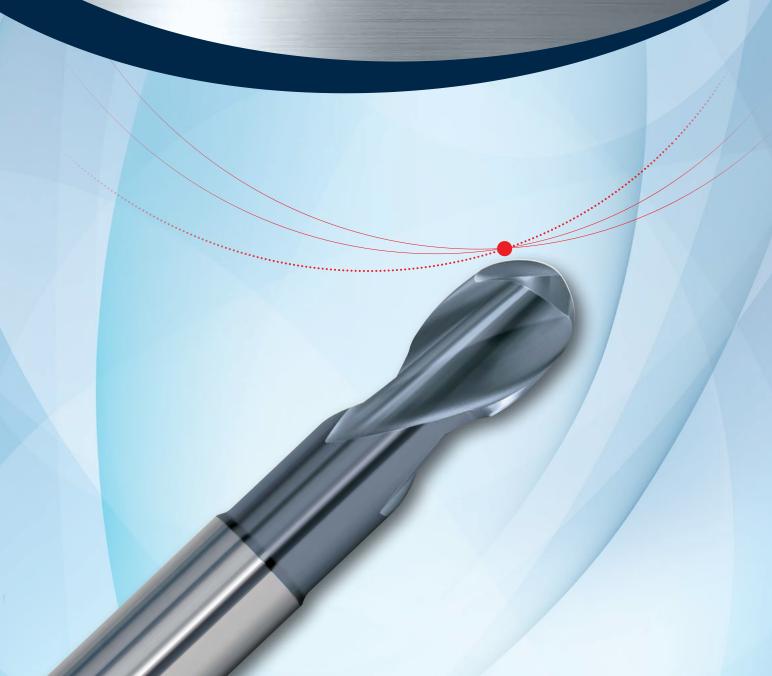




SpheroX with radius tolerance +/-0.003
Superfinishing in hardened steels with the new super-precision ball nose end mill



Finishing in hardened steels with the new super-precision ball nose end mill

The new **SpheroX** ball nose end mill is based on the Sphero-XF finisher and is designed for finishing extremely high-precision components.

The innovation of the super-precision ball nose end mill has created a new class of machining that means a quantum leap for superfinishing in the world of mold making.

This outstanding degree of precision means a great improvement in dimensional accuracy and therefore in the product quality too – and it cuts costs at the same time.

SpheroX opens up a whole new world of potential in superfinishing.

The new high-precision ball nose end mills are primarily used for machining hardened and tempered steels up to 55 HRC. **SpheroX** ball nose end mills are excellently suited for manufacturing molds and dies for the plastics industry, which demand outstanding levels of component quality and surface finishing.

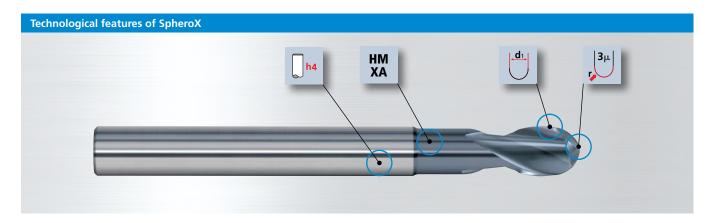
Industries and applications with SpheroX

- Making molds for the plastics industry with exceptional standards of component quality, particularly if high levels of dimensional accuracy are required
- All aspects of tool and mold making in which molds are manufactured for parts with smooth, visible surfaces

The advantages:

- Better quality components:
 - with extremely narrow radius tolerances of +/-0.003 over 180° measurement
 - with optimal concentricity due to the h4 shaft tolerance
- Lower process costs: due to very long tool lives achieved through the combination of a tough, hardened cutting material with a wear-resistant coating
- Outstanding flexibility: the precision radius, which is ground across the entire ball nose, means it can be used on both 3-axis and state-of-the-art 5 axis machine tools

[2]



HM XA

Carbide XA

 Outstanding hardness and a high degree of toughness produces extreme wear resistance in tempered and hardened steel, resulting in long tool life without loss of precision



Super-precision ball nose end mill radius tolerance +/-0.003

- Improves component quality and therefore saves costs because less finishing is required
- Precision across the whole ball nose and therefore flexible for use on all types of machine



High-precision diameter

• Tool is easily adjustable and measureable in the machine



Precision shaft

 Reduces the concentricity error of the tool and improves the accuracy of the component



X-AL coating

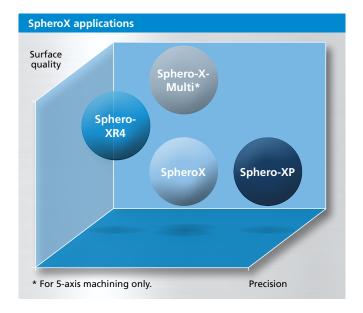
Highly wear-resistant AICr-based coating is ideally suitable for machining hardened steels

Innovation and technology in the X-Generation performance class

Geometry, substrate and coating – the combination of all these elements results in a performance that meets all standards in terms of high component quality and long tool life.

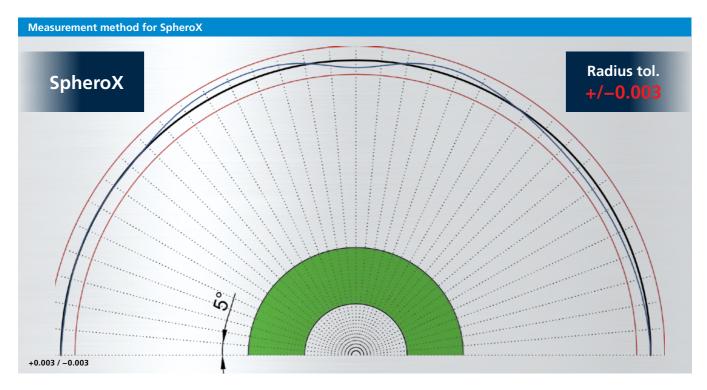
The radius tolerance of +/-0.003 enables high-precision free-form machining

The new **SpheroX** extremely high-precision tools were developed for superfinishing work in which exceptionally high standards are required in terms of contour accuracy. The very narrow radius tolerance of +/-0.003 along the entire cutting edge also enables its use on conventional 3-axis machines, making it unnecessary to tilt the tool.



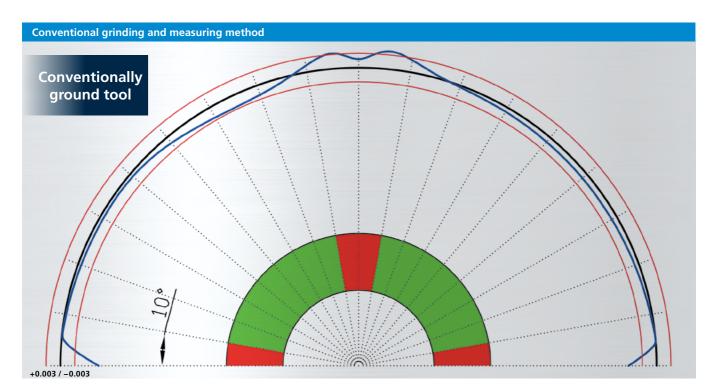
h4 shaft tolerance

The new **SpheroX** milling cutters are manufactured with h4 shaft tolerance. The high degree of accuracy enables outstanding concentricity of < 0.003, which also has a positive impact on the quality of the component.



In order to really achieve this high degree of precision, a method of measurement is required that covers the entire cutting edge across 180°. The radius is measured every 5°: from 0° to 180°. This method therefore guarantees a degree

of precision that is within the tolerance across the entire ball nose. Moreover, the shaft, which has been ground to within the h4 field of tolerance, significantly reduces the concentricity error, thus further increasing the accuracy of the component.



By contrast, conventional methods of measurement usually only measure from 10° to 80° and from 100° to 170° in order to exclude the transitions between the radius and the cutting edge and/or the centering errors, which are difficult to grind.

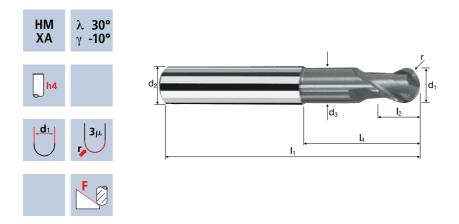
When using these types of tool on conventional 3-axis machines, steep mold inclines and also bottom surfaces cannot be finished with a satisfactory degree of contour accuracy.

[5]

Ball nose end mills SpheroX (Sphero-XP)

Tolerance r ±0.003, 3xd







Example: Order-N°.		Coating	Article-N°. 7500	ø-Code								X-AL X7500
		X			٦							
d ₁	d ₂ h4	d ₃		I ₁	l ₂	l ₃	I ₄	r ±0.003	α	z		
1.00	6.00	0.95		57	1.50	3.00	13.08	0.500	11.8°	2		•
2.00	6.00	1.90		57	3.00	6.00	14.31	1.000	9.0°	2		•
3.00	6.00	2.80		57	4.00	9.00	15.63	1.500	6.4°	2		•
4.00	6.00	3.70		57	5.00	12.00	16.95	2.000	4.0°	2		•
5.00	6.00	4.60		57	6.00	15.00	18.27	2.500	2.0°	2		•
6.00	6.00	5.50		57	7.00	19.34	20.00	3.000	0.0°	2		•
8.00	8.00	7.40		63	9.00	25.29	26.00	4.000	0.0°	2		•
10.00	10.00	9.20		72	11.00	30.20	31.00	5.000	0.0°	2		•
12.00	12.00	11.00		83	13.00	36.13	37.00	6.000	0.0°	2		•
	1.00 2.00 3.00 4.00 5.00 6.00 8.00 10.00	d1 d2 h4 1.00 6.00 2.00 6.00 3.00 6.00 4.00 6.00 5.00 6.00 6.00 6.00 8.00 8.00 10.00 10.00		Example: \mathbf{X} 7500 \mathbf{X} 7	d1 d2 d3 l1 1.00 6.00 0.95 57 2.00 6.00 1.90 57 3.00 6.00 2.80 57 4.00 6.00 3.70 57 5.00 6.00 4.60 57 6.00 6.00 5.50 57 8.00 8.00 7.40 63 10.00 10.00 9.20 72	d₁ d₂ h4 d₃ l₁ l₂ 1.00 6.00 0.95 57 1.50 2.00 6.00 1.90 57 3.00 3.00 6.00 2.80 57 4.00 4.00 6.00 3.70 57 5.00 5.00 6.00 4.60 57 6.00 6.00 6.00 5.50 57 7.00 8.00 8.00 7.40 63 9.00 10.00 10.00 9.20 72 11.00	Example: Order-N°. X 7500 100 d1 d2 h4 d3 l1 l2 l3 1.00 6.00 0.95 57 1.50 3.00 2.00 6.00 1.90 57 3.00 6.00 3.00 6.00 2.80 57 4.00 9.00 4.00 6.00 3.70 57 5.00 12.00 5.00 6.00 4.60 57 6.00 15.00 6.00 6.00 5.50 57 7.00 19.34 8.00 7.40 63 9.00 25.29 10.00 10.00 9.20 72 11.00 30.20	Example: Order-N°. X 7500 100 d1 d2 1/14 l2 l3 l4 1.00 6.00 0.95 57 1.50 3.00 13.08 2.00 6.00 1.90 57 3.00 6.00 14.31 3.00 6.00 2.80 57 4.00 9.00 15.63 4.00 6.00 3.70 57 5.00 12.00 16.95 5.00 6.00 4.60 57 6.00 15.00 18.27 6.00 6.00 5.50 57 7.00 19.34 20.00 8.00 8.00 7.40 63 9.00 25.29 26.00 10.00 10.00 9.20 72 11.00 30.20 31.00	Example: Order-N°. X 7500 100 d₁ d₂ h₄ d₃ l₁ l₂ l₃ l₄ r ±0.003 1.00 6.00 0.95 57 1.50 3.00 13.08 0.500 2.00 6.00 1.90 57 3.00 6.00 14.31 1.000 3.00 6.00 2.80 57 4.00 9.00 15.63 1.500 4.00 6.00 3.70 57 5.00 12.00 16.95 2.000 5.00 6.00 4.60 57 6.00 15.00 18.27 2.500 6.00 6.00 5.50 57 7.00 19.34 20.00 3.000 8.00 7.40 63 9.00 25.29 26.00 4.000 10.00 10.00 9.20 72 11.00 30.20 31.00 5.000	Example: Order-N·. X 7500 100 d₁ d₂ h₄ d₃ l₁ l₂ l₃ l₄ r 2 000 α 1.00 6.00 0.95 57 1.50 3.00 13.08 0.500 11.8° 2.00 6.00 1.90 57 3.00 6.00 14.31 1.000 9.0° 3.00 6.00 2.80 57 4.00 9.00 15.63 1.500 6.4° 4.00 6.00 3.70 57 5.00 12.00 16.95 2.000 4.0° 5.00 6.00 4.60 57 6.00 15.00 18.27 2.500 2.0° 6.00 5.50 57 7.00 19.34 20.00 3.000 0.0° 8.00 7.40 63 9.00 25.29 26.00 4.00 0.0° 10.00 10.00 9.20 72 11.00 30.20 31.00 5.00 0.0°	Example: Order-N°. X 7500 100 d₁ d₂ h₄ d₃ l₁ l₂ l₃ l₃ l₄ r cools α z 1.00 6.00 0.95 57 1.50 3.00 13.08 0.500 11.8° 2 2.00 6.00 1.90 57 3.00 6.00 14.31 1.000 9.0° 2 3.00 6.00 2.80 57 4.00 9.00 15.63 1.500 6.4° 2 4.00 6.00 3.70 57 5.00 12.00 16.95 2.000 4.0° 2 5.00 6.00 4.60 57 6.00 15.00 18.27 2.500 2.0° 2 6.00 5.50 57 7.00 19.34 20.00 3.000 0.0° 2 8.00 7.40 63 9.00 25.29 26.00 4.000 0.0° 2 10.00 10.00 9.20 7	Example: Order-N°. X 7500 100 d ₁ d ₂ d ₃ d ₃

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.

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