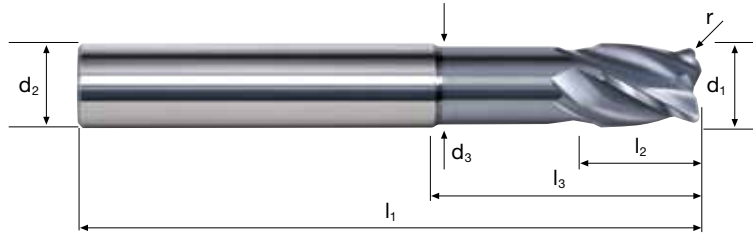
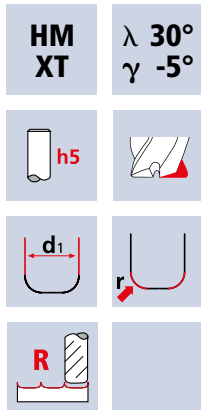


Toro-X corner radius end mills

Tolerance r 0/+0.015, 3xd



	Rm 1100-1300	Rm 1300-1500	HRC 48-56	HRC 56-60	HRC > 60	Ti Titanium	GG(G)
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Example: Order-N°.										Coating		Article-N°.		Ø-Code				X-AL	
										X		7100		.138				X7100	
Ø-Code	d1 0/-0.01	d2 h5	d3	l1	l2	l3	r 0/+0.015	α	Z										
.138	2	6	1.9	57	3	6	0.2	8.5°	4										
.178	3	6	2.8	57	4	9	0.2	5.8°	4										
.218	4	6	3.7	57	5	12	0.2	3.6°	4										
.258	5	6	4.6	57	6	15	0.2	1.7°	4										
.297	6	6	5.5	57	7	20	0.2	0.0°	4										
.385	8	8	7.4	63	9	26	0.2	0.0°	4										
.445	10	10	9.2	72	11	31	0.2	0.0°	4										
.496	12	12	11.0	83	13	37	0.2	0.0°	4										
.140	2	6	1.9	57	3	6	0.5	8.7°	4										
.180	3	6	2.8	57	4	9	0.5	6.0°	4										
.220	4	6	3.7	57	5	12	0.5	3.7°	4										
.260	5	6	4.6	57	6	15	0.5	1.7°	4										
.300	6	6	5.5	57	7	20	0.5	0.0°	4										
.388	8	8	7.4	63	9	26	0.5	0.0°	4										
.448	10	10	9.2	72	11	31	0.5	0.0°	4										
.498	12	12	11.0	83	13	37	0.5	0.0°	4										
.222	4	6	3.7	57	5	12	1.0	3.8°	4										
.262	5	6	4.6	57	6	15	1.0	1.8°	4										
.302	6	6	5.5	57	7	20	1.0	0.0°	4										
.391	8	8	7.4	63	9	26	1.0	0.0°	4										
.450	10	10	9.2	72	11	31	1.0	0.0°	4										
.501	12	12	11.0	83	13	37	1.0	0.0°	4										
.395	8	8	7.4	63	9	26	2.0	0.0°	4										
.455	10	10	9.2	72	11	31	2.0	0.0°	4										
.505	12	12	11.0	83	13	37	2.0	0.0°	4										

Other versions can be found in our "High Performance Milling Tools 2014-15" catalogue



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.

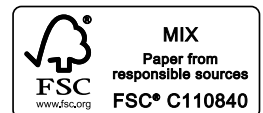
For further information, please refer to fraisa.com



Here, you will be provided with further information on the FRAISA Group.



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



ClimatePartner^o
climate neutral

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The CO2 emissions for this product have been compensated by CO2 emission certificate.

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passion
for precision

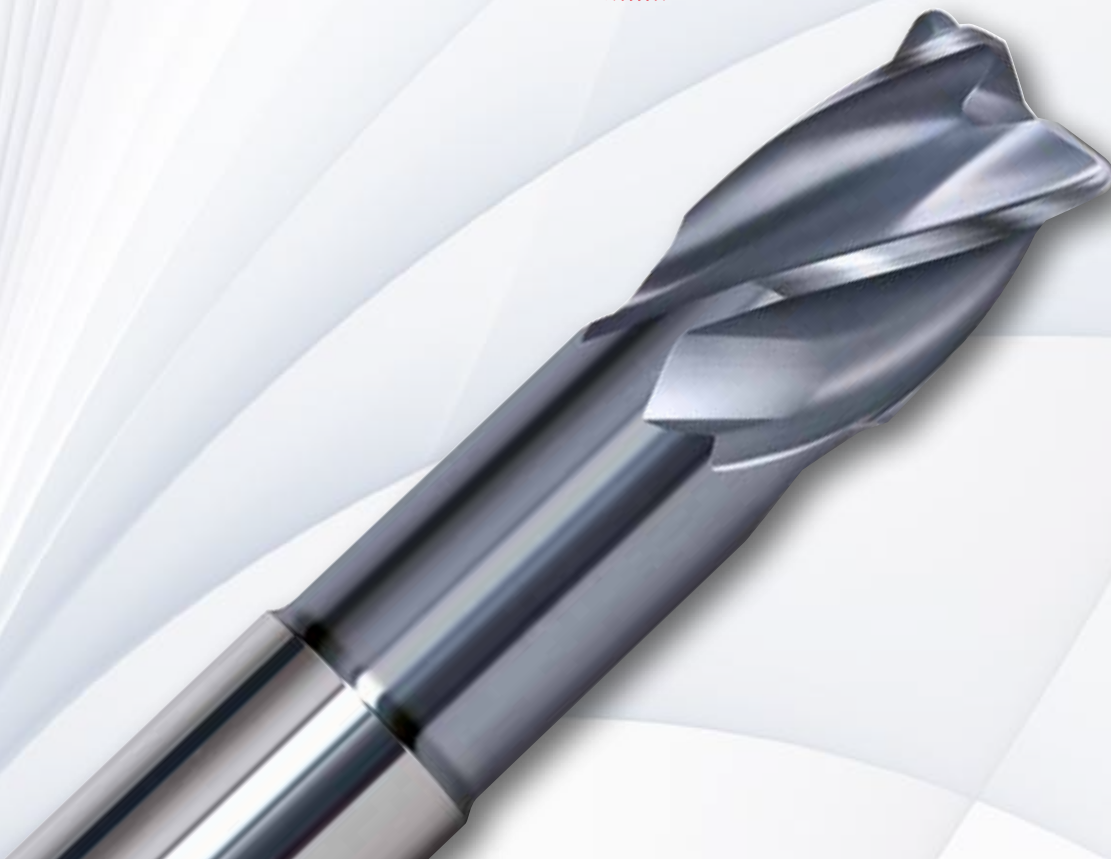


passion
for precision



Toro-X roughing end mill

NEW



Toro-X

Specialist in 3-D milling processes with an HSC strategy

The **Toro-X** milling tools were developed for 3-D milling processes in which the HSC strategy is used. In this way in particular, **Toro-X** tools can demonstrate their high level of performance potential.

The **Toro-X** milling tools are used when special requirements are placed on the metal removal rate with increased width of cut or higher feed rate. Performance that conventional tools cannot provide.

[2] **Toro-X** tools are particularly suitable for roughing and prefinishing operations in mould and die making. They are also able to perform fine machining with the highest possible accuracy. The range of materials includes all hardened steels from 42 HRC to 60 HRC. The near-net-shape roughing can be performed by **Toro-X** with maximum efficiency.

Therefore, a suitable field of application in addition to mould and die making is precision engineering when machining of components made of high-strength and hard steels is required.

The advantages over conventional tools lie in productivity gains, in lower tool costs and therefore an improved price-performance ratio for roughing applications in mould and die manufacturing. The slightly higher costs compared with conventional Corner Radius tools are more than offset by longer tool life.

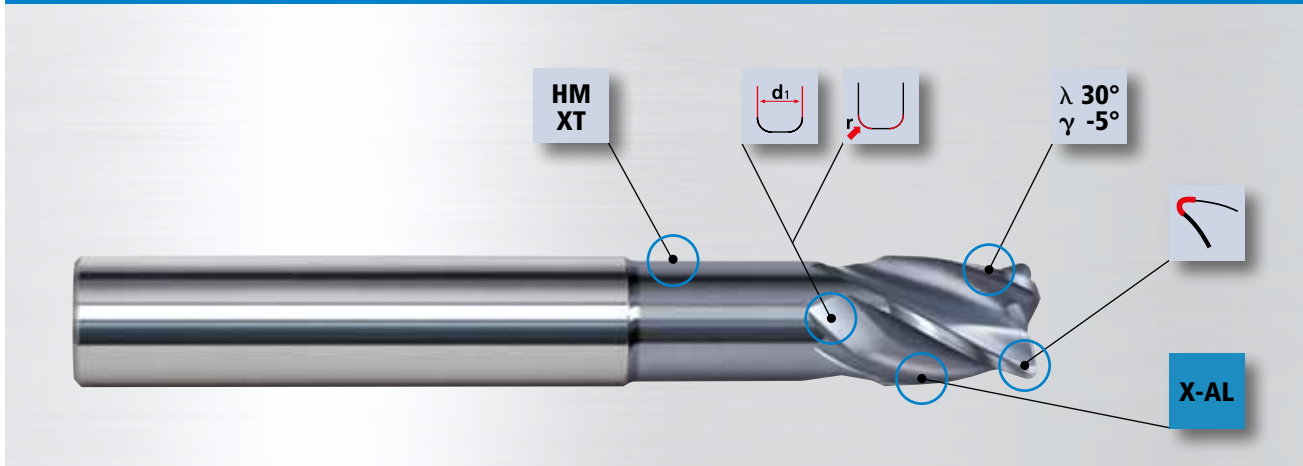
With the new high-performance tools of the **Toro-X** group, a new generation of milling tools has been developed, which is characterised by perfectly matched elements such as the coating, carbide substrate and geometry.

The advantages:

- **Greater productivity:** Significantly lower processing costs per workpiece through high feed rates with greater infeeds in the axial and radial directions
- **Lower proportion of tooling costs** through reduced wear
- **Versatile use** in the fields of roughing, prefinishing and finishing
- **Increased efficiency** and therefore reduced inspection intervals and fewer tool changes



Innovation and technology in the Toro-X group



**HM
XT**

HM-XT ultra hard cutting material

- increases resistance to tool wear
- provides good toughness to resist edge chipping

**λ 30°
γ -5°**

Stable cutting wedge

- reduces the risk of edge chipping

d₁

High-precision polished geometry

- also allows near-net-shape finishing processes

r

r

Cutting edge rounding

- stabilises the cutting edge
- avoids unfavorable stresses on the cutting edge

X-AL

Proven X-AL coating

- provides increased resistance to abrasive wear
- protects the substrate from thermal damage

[3]

The **Toro X** group of tools differs from conventional Toric tools through:

- their smaller helix angle
- the harder carbide substrate
- a coating designed for greater hardnesses
- specific cutting edge conditioning

The geometry of the **Toro-X** elements guarantees the greatest possible stability of the tool.



Lower tool costs

The special hardness of the substrate used and the specific hard coating designed for the HSC processing of hardened steel materials effectively arrest the growth in abrasive wear. The risk of edge chipping is significantly reduced through the additional cutting edge conditioning. As a result, the tool life is increased by at least 100%.

Improving component quality

The very robust and rigid geometry enables more exact dimensional accuracy for the workpiece. The very precise corner radius (tolerance $0/+0.015$) allows for near-net-shape roughing. In addition, the tools in the **Toro-X** family are also suitable for prefinishing and finishing processes.

Greater productivity

The small helix angle creates an increase in the tooth width without reducing the chip space. By strengthening the tooth, the stability is increased and the tooth is able to withstand larger forces. Compared to conventional milling cutters, the infeeds can therefore be easily increased in the radial and axial directions.

The achievable feed values for roughing are 100% higher than conventional tools.

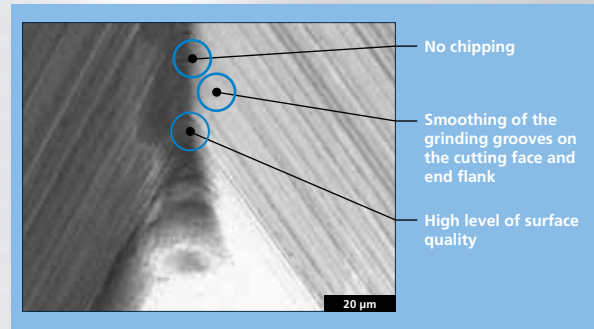
Increased efficiency

Due to the high reliability of the process together with the maximum removal rate, larger shapes can also be produced in one continuous cut. This reduces the frequency of inspections of the cutting edges and reduces the number of tool changes required.

Toro-X Series

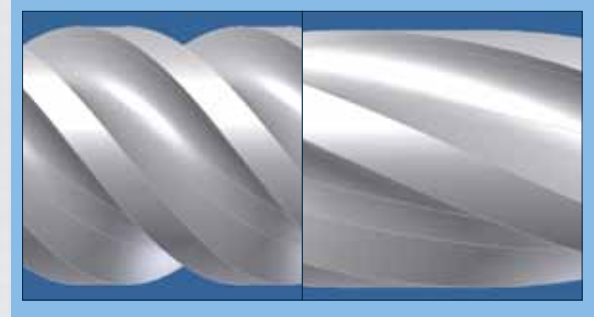
The **Toro-X** family of tools includes 2 length versions that include 3xd and 6xd projecting lengths. The tools are offered with corner radii, starting at R0.2 and ending at R2. For the sake of precision, the tools in this family are only available with a smooth shaft.

Cutting edge of the new conditioned tool



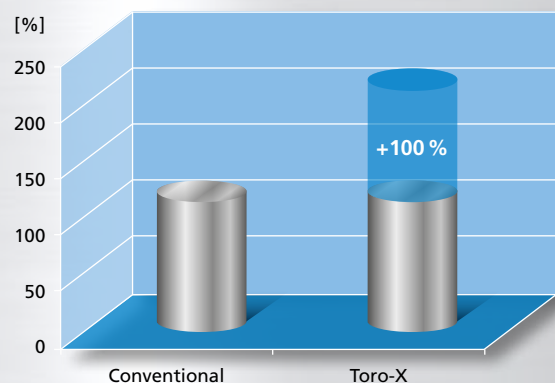
Effect of cutting edge stabilisation

Comparison of tooth widths



Difference in tooth width for different helix angles and the same flute geometry

Feed rate comparison *



* In the machining of hardened steel (54 HRC).