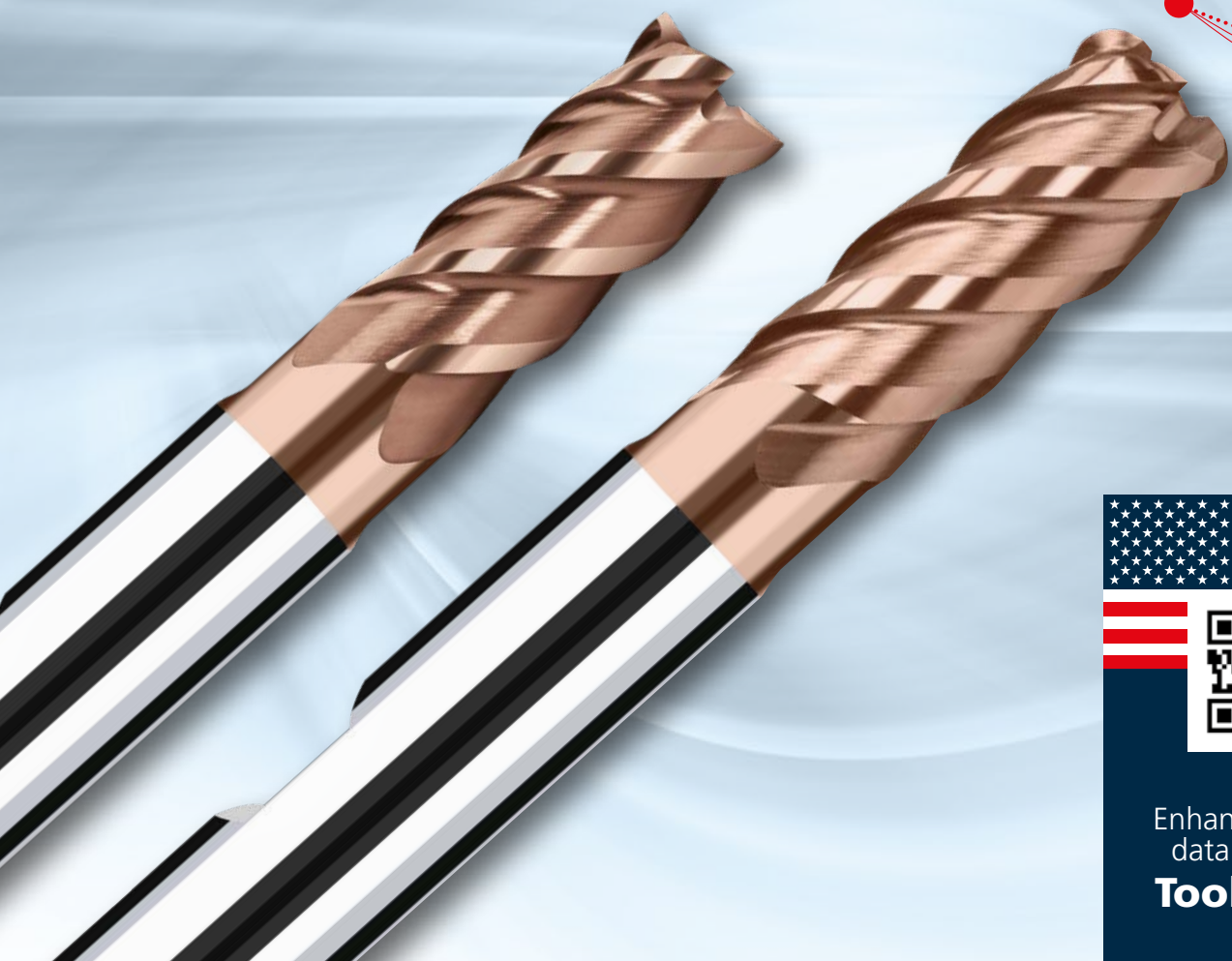


passion
for precision



HX-NVS and HX-RNVS –
new horizons for the machining
of high-hard steels

NEW



Enhanced cutting
data calculator

ToolExpert

Innovations for HPC and HDC machining of hard and high-hard materials

The cylindrical **HX-NVS** roughing mill from FRAISA lets you machine steels with a hardness rating higher than 55 HRC quickly, safely, and efficiently. These tools from the **HX family**, which have been specially developed for HPC and HDC machining in high-hard steels, have excellent penetration properties. Penetration angles of up to 5° are possible, these being 10 times greater than the values of conventional milling cutters.

Tool geometries specially developed for hard machining combined with an extremely hard DuroSi coating guarantee high material removal rates and a long tool life. Significant advantages arise from the perfect coordination of robust, penetration-capable edge geometries and high-hard and wear-resistant coating systems.

This latest addition to the **HX family** enables the HDC milling strategy to gain a foothold in 2.5D and 3D machining of high-hard steels: The four-edged **HX-RNVS** is very robust and develops its maximum performance in 2.5D and 3D machining in the field of mold making. In HDC applications, the contact length of the cutting edges with the material is long. The orbital motion in the case of the HDC strategy guarantees consistent chip thickness and cutting forces, for which the **HX-RNVS** is precisely designed. The result: exceptionally high machining rates and a long service life.

But the **HX-RNVS** also masters HPC applications with ease. Equipped with a high-precision corner radius, this very strong and exact tool is ideal for finishing operations with narrow tolerance bands and optimum surfaces.

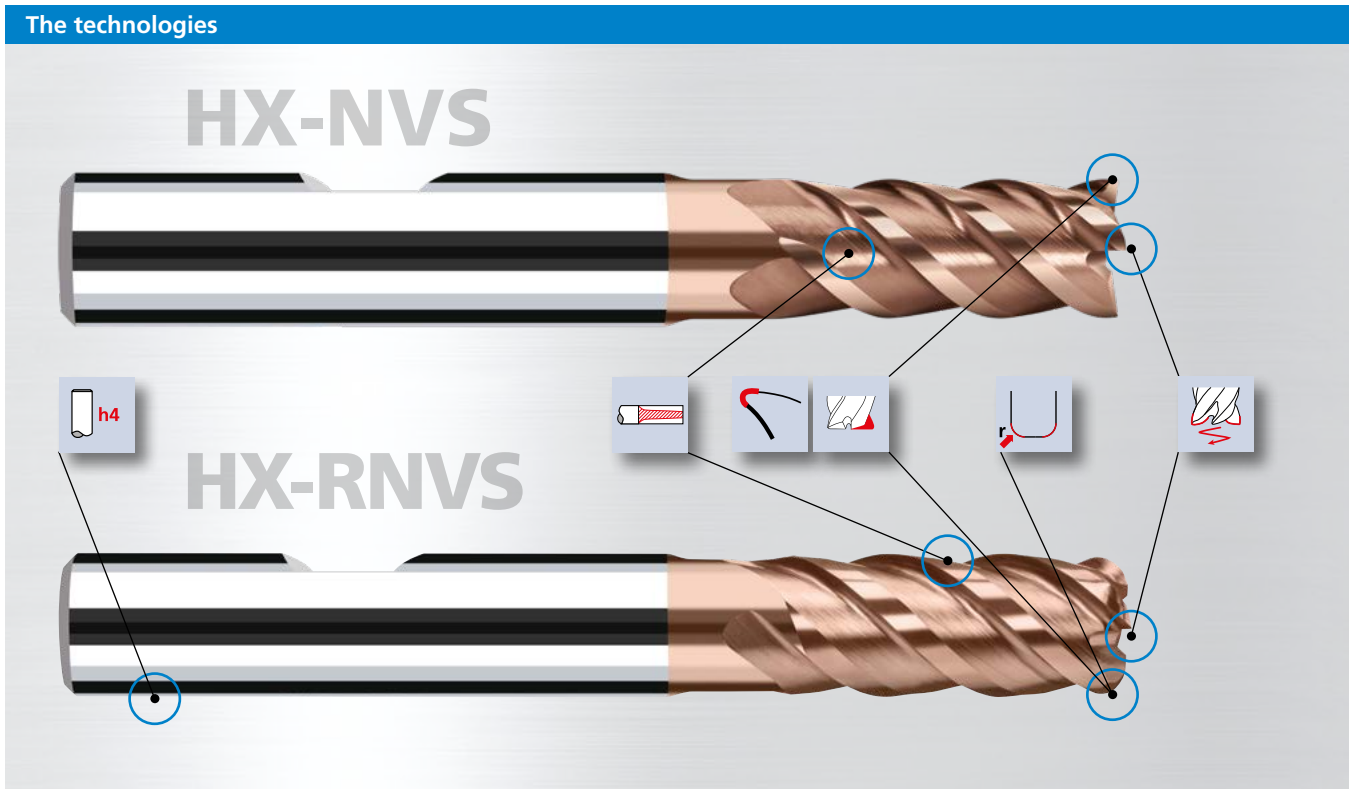
The benefits:

- **Good cost efficiency** through faster milling processes with long tool life and fast feed and cutting rates
- **Increased productivity** through use of the HDC milling strategy now also with 2.5D and 3D machining of hardened steels
- **Maximum component accuracy** thanks to the tool's extreme concentricity, shank accuracy, and resulting precision
- **Greater flexibility** thanks to high infeed rates in the axial and radial direction
- **Lower tool costs** due to reduced wear thanks to Duro-Si hard coating and optimized wear distributions


[2]



The combination of highly innovative features results in a **very powerful overall concept**




[3]




Milling tools with polished teeth

- Reinforcement of the exposed cutting edge
- Absorption of higher cutting forces




High-performance penetration edge

- Easy-cutting, high-performance penetration edge for high penetration angles of up to 5° in all hardened steels
- Better performance, longer tool life, and greater process reliability during penetration




Milling tools with increasing core diameter

- Improved tool rigidity and less deflection of the tool
- Superior performance for infeeds $a_{p,r}$, a_e , and the feed rate f_z
- Better component accuracy and less vibration
- Allows even heavy roughing steps




Milling tools with special edge conditioning

- Conditioning of the main cutting edge for greater cutting-edge stability
- Increased mechanical and thermal loading of the cutting edge
- Overall lengthening of tool life



High-precision radius tolerance of 0/+0.015 mm (0/+0.0006 inch)

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



Milling tools with H4 shank


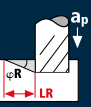


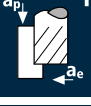


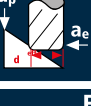



- High concentricity and accuracy of eccentricity
- Higher clamping force in nonpositive chucks (hot shrinking, hydraulic expansion chuck)

i • **Important:** Degrease the tool and chucking device before assembly in order to increase the holding force and prevent tool slippage!

Impressive thanks to wide range of applications

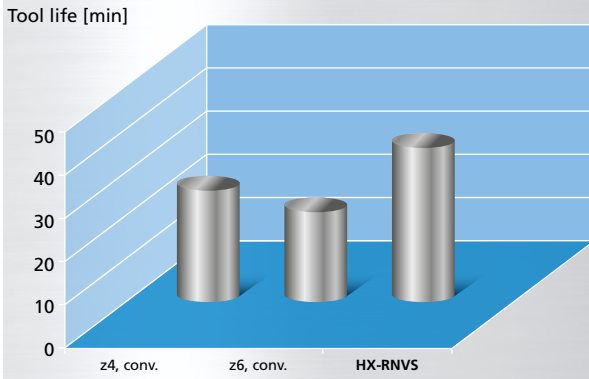
[4]

Application	HX-NVS
 Penetration w. helical interpolation	++
 Penetration with ramping	++
 HDC-S Roughing in HDC-S	+
 PF Pre-finishing	+
 F Finishing	+
 R Side Milling in HPC	++
 Slotting in HPC	++

Application	HX-RNVS
 Penetration w. helical interpolation	++
 Penetration with ramping	++
 HDC-S Roughing in HDC-S	+
 PF Pre-finishing	+
 F Finishing	+
 R Plane roughing in HSC	++
 PF Plane finishing in HSC	+
 PF Pre-finishing steep sections in HSC	+
 F Finishing steep sections in HSC	+
 R Side milling in HPC	++
 Slotting in HPC	++

The two new milling cutters in the **HX family** – the **HX-NVS** and the **HX-RNVS** – complement each other excellently in all fields of machining hardened steels, especially in mold making. In particular, high-hard steels can be machined efficiently.

Tool life with HDC milling in 1.2379



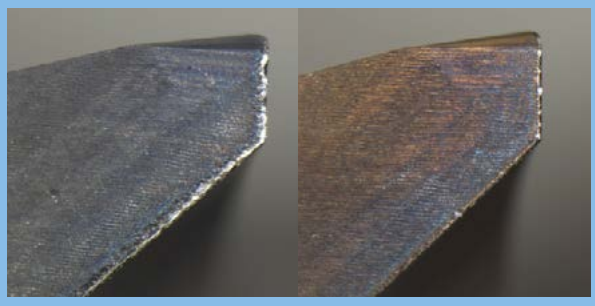
HX-RNVS: for HPC and HDC strategy

Long tool life

What's more, the cutting edges suffer from very little wear and retain extremely good cutting performance even after a long time in use.

This very high resistance to wear means the lifespan of the tools can be extended considerably.

Comparative wear: in 1.2379 material (60 HRC)

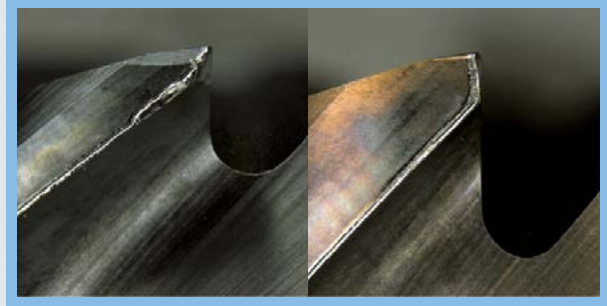


Conventional

HX-NVS Duro-Si

Material: 1.2379 (60 HRC), $V_c = 100$ m/min, $n = 3000$ rpm, $v_f = 2000$ mm/min, $a_p = 9$ mm, $a_e = 0.3$ mm, tool dia. = 10 mm, $t = 85$ min

Comparative wear: in HSS material (65 HRC)



Conventional

HX-NVS Duro-Si

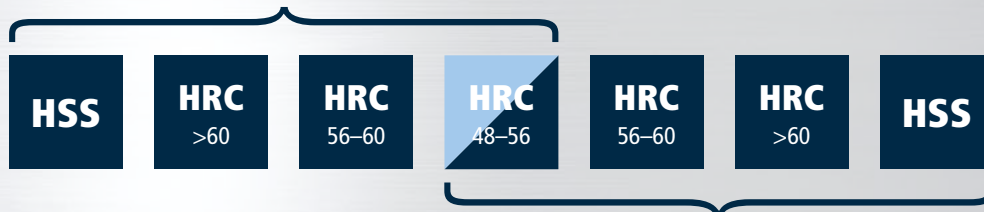
Material: HSS (65 HRC), $V_c = 80$ m/min, $n = 2600$ rpm, $v_f = 900$ mm/min, $a_p = 9$ mm, $a_e = 0.2$ mm, tool dia. 10 mm, $t = 45$ min

[5]

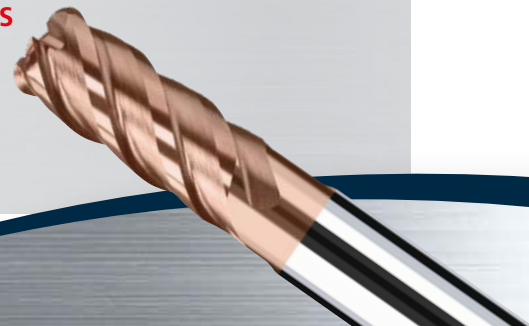
Range of materials



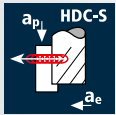
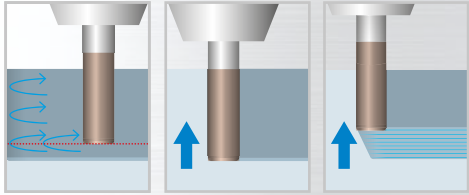
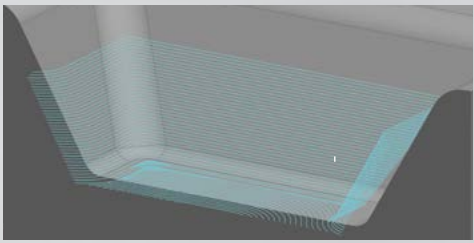
HX-NVS

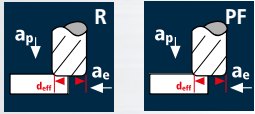
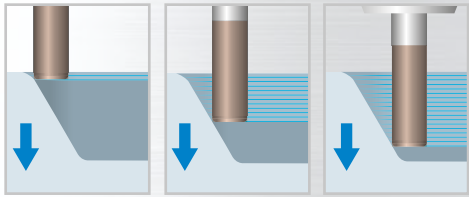
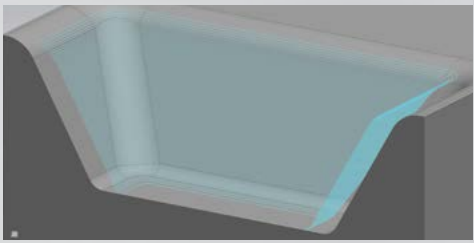


HX-RNVS



All-round talents: Versatile

Application	Milling strategy	Tool path
High Dynamic Cutting – HDC 	Bottom-up strategy 	
<p>[6] With the high-speed HDC roughing strategy, productivity can be increased even more significantly compared to HPC milling. Machining processes are speeded up, tools are gone easy on and the machine environment can be put to optimum use at lower costs.</p>		

High Speed Cutting – HSC 	Top-down strategy 	
<p>For HSC milling, tools with a large number of cutting edges are used. The cutting and feed rates are much higher than for normal machining. In particular, HSC is used for finishing in tool and mold making.</p>		

Our tool in action – get to know our all-round talent



ToolExpert 2.0 – the innovative online tool for your production

In the age of Industry 4.0, it's all about working productively and precisely at all times. To achieve this, FRAISA develops not only high-quality and versatile tools, but also innovative software solutions, such as the new **ToolExpert 2.0**.

This user-friendly online tool delivers perfectly coordinated, tool- and material-specific cutting data for production purposes – and the perfect basis for optimum usage of FRAISA tools: quick and easy.

To this end, FRAISA experts determine the optimum operating points in comprehensive tests carried out at the company's own application centers. All factors involved are taken into account

and the optimal data is then bundled in the new **ToolExpert 2.0** and continuously expanded.

When it comes to using the tools, this means you:

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



FRAISA ToolExpert offers many advantages:

- **Precise:** Find perfectly coordinated, tool- and material-specific cutting data
- **Simple:** Access data online at any time and from anywhere without software downloads
- **Quick:** Find application parameters with a just few clicks and without registering
- **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

[7]



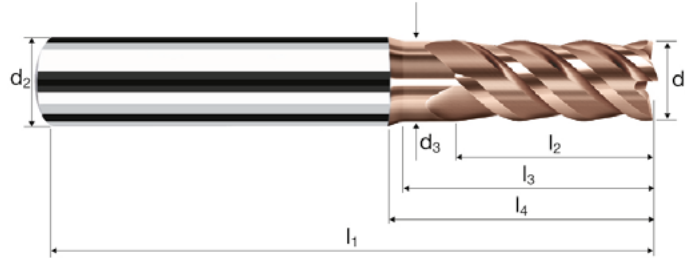
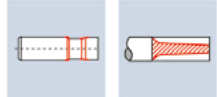
ToolExpert 2.0
cutting data
calculator

Square end mills HX-NVS

Smooth-edged, standard length with short neck
High-performance penetration edge



**HM
XA** λ 45°
 γ -10°



Roughing HPC



Roughing HDC



Finishing



				HRC 48-56	HRC 56-60	HRC > 60				HSS
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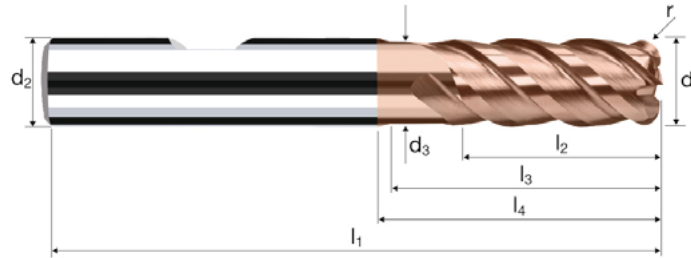
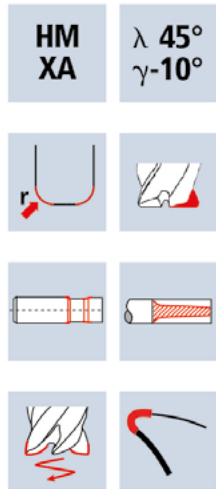
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H98504252	3/16	1/4	0.170	2 1/4	3/8	0.625	0.800	0.004	2.5°		4	●
H98504312	1/4	1/4	0.225	2 1/4	1/2	0.670	0.750	0.006	0.0°		4	●
H98504372	5/16	5/16	0.290	2 1/2	5/8	0.905	1.000	0.006	0.0°		4	●
H98504432	3/8	3/8	0.345	2 3/4	3/4	1.010	1.125	0.008	0.0°		4	●
H98504530	1/2	1/2	0.460	3 1/4	1	1.225	1.375	0.008	0.0°		4	●
H98504605	5/8	5/8	0.585	3 1/2	1 1/8	1.395	1.565	0.008	0.0°		4	●
H98504652	3/4	3/4	0.710	4	1 3/8	1.695	1.875	0.008	0.0°		4	●
H98604432	3/8	3/8	0.345	2 3/4	3/4	1.010	1.125	0.008	0.0°		4	●
H98604530	1/2	1/2	0.460	3 1/4	1	1.225	1.375	0.008	0.0°		4	●
H98604605	5/8	5/8	0.585	3 1/2	1 1/8	1.395	1.565	0.008	0.0°		4	●
H98604652	3/4	3/4	0.710	4	1 3/8	1.695	1.875	0.008	0.0°		4	●

Corner radius end mills HX-RNVS



Smooth-edged, normal version with short neck
High-performance penetration edge

new!



Roughing HPC

Roughing HDC

Finishing



Order-N°	d ₁ 0/-0.01	d ₂ h4	d ₃	l ₁	l ₂	l ₃	l ₄	r 0/+0.015	α	fl	DURO-Si
H8507178	3	6	2.8	57	8	14.00	20.37	0.2	4.5°	4	●
H8507218	4	6	3.7	57	11	16.00	20.82	0.2	3.0°	4	●
H8507258	5	6	4.6	57	13	18.00	21.27	0.2	1.5°	4	●
H8507297	6	6	5.5	57	13	18.15	20.00	0.2	0.0°	4	●
H8507385	8	8	7.4	63	19	23.63	26.00	0.2	0.0°	4	●
H8507445	10	10	9.2	72	22	27.99	31.00	0.2	0.0°	4	●
H8507496	12	12	11.0	83	26	33.29	37.00	0.2	0.0°	4	●
H8507605	16	16	15.0	92	32	38.73	43.00	0.2	0.0°	4	●
H8507180	3	6	2.8	57	8	14.00	20.37	0.5	4.5°	4	●
H8507220	4	6	3.7	57	11	16.00	20.82	0.5	3.0°	4	●
H8507260	5	6	4.6	57	13	18.00	21.27	0.5	1.5°	4	●
H8507300	6	6	5.5	57	13	18.15	20.00	0.5	0.0°	4	●
H8507388	8	8	7.4	63	19	23.63	26.00	0.5	0.0°	4	●
H8507448	10	10	9.2	72	22	27.99	31.00	0.5	0.0°	4	●
H8507498	12	12	11.0	83	26	33.29	37.00	0.5	0.0°	4	●
H8507606	16	16	15.0	92	32	38.73	43.00	0.5	0.0°	4	●
H8507302	6	6	5.5	57	13	18.15	20.00	1.0	0.0°	4	●
H8507391	8	8	7.4	63	19	23.63	26.00	1.0	0.0°	4	●
H8507450	10	10	9.2	72	22	27.99	31.00	1.0	0.0°	4	●
H8507501	12	12	11.0	83	26	33.29	37.00	1.0	0.0°	4	●
H8507608	16	16	15.0	92	32	38.73	43.00	1.0	0.0°	4	●
H8507304	6	6	5.5	57	13	18.15	20.00	1.5	0.0°	4	●

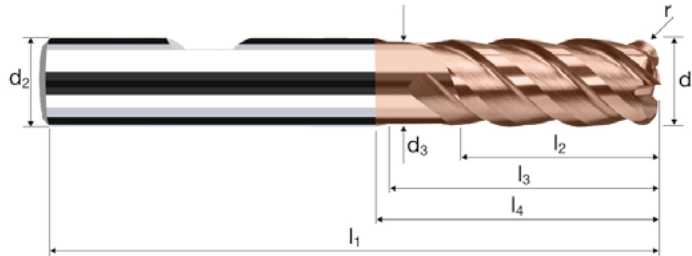
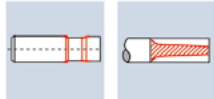
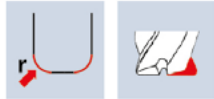
Corner radius end mills HX-RNVS



Smooth-edged, normal version with short neck
High-performance penetration edge

**HM
XA** λ 45°
 γ -10°

new!



Roughing HPC

Roughing HDC

Finishing



				HRC 48-56	HRC 56-60	HRC > 60				HSS
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[12]

Order-N°	d ₁ 0/-0.01	d ₂ h4	d ₃	l ₁	l ₂	l ₃	l ₄	r 0/+0.015	α	fl	DURO-Si	
H8507395	8	8	7.4	63	19	23.63	26.00	2.0	0.0°	4	●	
H8507457	10	10	9.2	72	22	27.99	31.00	2.5	0.0°	4	●	
H8507507	12	12	11.0	83	26	33.29	37.00	3.0	0.0°	4	●	
H8607178	3	6	2.8	57	8	14.00	20.37	0.2	4.5°	◆	4	●
H8607218	4	6	3.7	57	11	16.00	20.82	0.2	3.0°	◆	4	●
H8607258	5	6	4.6	57	13	18.00	21.27	0.2	1.5°	◆	4	●
H8607297	6	6	5.5	57	13	18.15	20.00	0.2	0.0°	◆	4	●
H8607385	8	8	7.4	63	19	23.63	26.00	0.2	0.0°	◆	4	●
H8607445	10	10	9.2	72	22	27.99	31.00	0.2	0.0°	◆	4	●
H8607496	12	12	11.0	83	26	33.29	37.00	0.2	0.0°	◆	4	●
H8607605	16	16	15.0	92	32	38.73	43.00	0.2	0.0°	◆	4	●
H8607180	3	6	2.8	57	8	14.00	20.37	0.5	4.5°	◆	4	●
H8607220	4	6	3.7	57	11	16.00	20.82	0.5	3.0°	◆	4	●
H8607260	5	6	4.6	57	13	18.00	21.27	0.5	1.5°	◆	4	●
H8607300	6	6	5.5	57	13	18.15	20.00	0.5	0.0°	◆	4	●
H8607388	8	8	7.4	63	19	23.63	26.00	0.5	0.0°	◆	4	●
H8607448	10	10	9.2	72	22	27.99	31.00	0.5	0.0°	◆	4	●
H8607498	12	12	11.0	83	26	33.29	37.00	0.5	0.0°	◆	4	●
H8607606	16	16	15.0	92	32	38.73	43.00	0.5	0.0°	◆	4	●

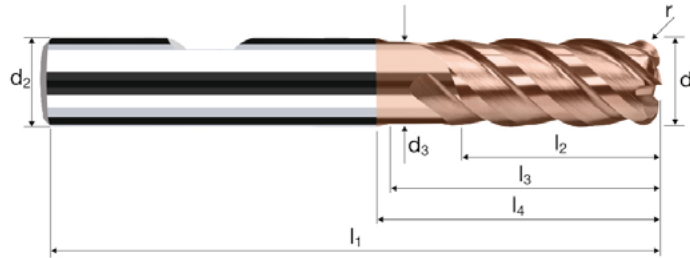
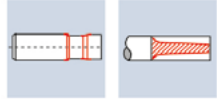
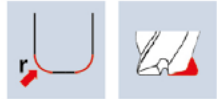
Corner radius end mills HX-RNVS



Smooth-edged, normal version with short neck
High-performance penetration edge

new!

**HM
XA** λ 45°
 γ -10°



Roughing HPC

Roughing HDC

Finishing



Order-N°	d ₁ 0/-0.01	d ₂ h4	d ₃	l ₁	l ₂	l ₃	l ₄	r 0/+0.015	α		fl	DURO-Si
H8607302	6	6	5.5	57	13	18.15	20.00	1.0	0.0°	◆	4	●
H8607391	8	8	7.4	63	19	23.63	26.00	1.0	0.0°	◆	4	●
H8607450	10	10	9.2	72	22	27.99	31.00	1.0	0.0°	◆	4	●
H8607501	12	12	11.0	83	26	33.29	37.00	1.0	0.0°	◆	4	●
H8607608	16	16	15.0	92	32	38.73	43.00	1.0	0.0°	◆	4	●
H8607304	6	6	5.5	57	13	18.15	20.00	1.5	0.0°	◆	4	●
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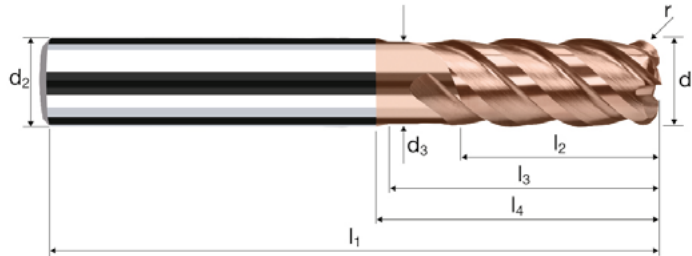
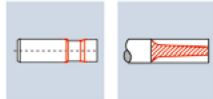
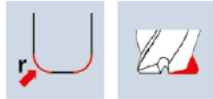
Corner radius end mills HX-RNVS

Smooth-edged, standard length with short neck
High-performance penetration edge



**HM
XA** λ 45°
 γ -10°

new!



Roughing HPC

Roughing HDC

Finishing



[14]

Order-N°	d ₁ 0/-0.01	d ₂ h4	d ₃	l ₁	l ₂	l ₃	l ₄	r	α	fl	DURO-Si
											●
H98507188	1/8	1/4	0.115	2 1/4	1/4	0.375	0.645	0.010	6.0°	4	●
H98507196	1/8	1/4	0.115	2 1/4	1/4	0.375	0.645	0.020	6.0°	4	●
H98507254	3/16	1/4	0.170	2 1/4	3/8	0.625	0.800	0.020	2.5°	4	●
H98507256	3/16	1/4	0.170	2 1/4	3/8	0.625	0.800	0.030	2.5°	4	●
H98507314	1/4	1/4	0.225	2 1/4	1/2	0.670	0.750	0.020	0.0°	4	●
H98507316	1/4	1/4	0.225	2 1/4	1/2	0.670	0.750	0.030	0.0°	4	●
H98507372	5/16	5/16	0.290	2 1/2	5/8	0.905	1.000	0.020	0.0°	4	●
H98507376	5/16	5/16	0.290	2 1/2	5/8	0.905	1.000	0.060	0.0°	4	●
H98507432	3/8	3/8	0.345	2 3/4	3/4	1.010	1.125	0.020	0.0°	4	●
H98507436	3/8	3/8	0.345	2 3/4	3/4	1.010	1.125	0.060	0.0°	4	●
H98507530	1/2	1/2	0.460	3 1/4	1	1.225	1.375	0.030	0.0°	4	●
H98507534	1/2	1/2	0.460	3 1/4	1	1.225	1.375	0.090	0.0°	4	●
H98507605	5/8	5/8	0.585	3 1/2	1 1/8	1.395	1.565	0.030	0.0°	4	●
H98507609	5/8	5/8	0.585	3 1/2	1 1/8	1.395	1.565	0.090	0.0°	4	●
H98507652	3/4	3/4	0.710	4	1 3/8	1.695	1.875	0.030	0.0°	4	●
H98507656	3/4	3/4	0.710	4	1 3/8	1.695	1.875	0.120	0.0°	4	●
H98607432	3/8	3/8	0.345	2 3/4	3/4	1.010	1.125	0.020	0.0°	◆ 4	●
H98607436	3/8	3/8	0.345	2 3/4	3/4	1.010	1.125	0.060	0.0°	◆ 4	●
H98607530	1/2	1/2	0.460	3 1/4	1	1.225	1.375	0.030	0.0°	◆ 4	●
H98607534	1/2	1/2	0.460	3 1/4	1	1.225	1.375	0.090	0.0°	◆ 4	●
H98607605	5/8	5/8	0.585	3 1/2	1 1/8	1.395	1.565	0.030	0.0°	◆ 4	●
H98607609	5/8	5/8	0.585	3 1/2	1 1/8	1.395	1.565	0.090	0.0°	◆ 4	●
H98607652	3/4	3/4	0.710	4	1 3/8	1.695	1.875	0.030	0.0°	◆ 4	●
H98607656	3/4	3/4	0.710	4	1 3/8	1.695	1.875	0.120	0.0°	◆ 4	●

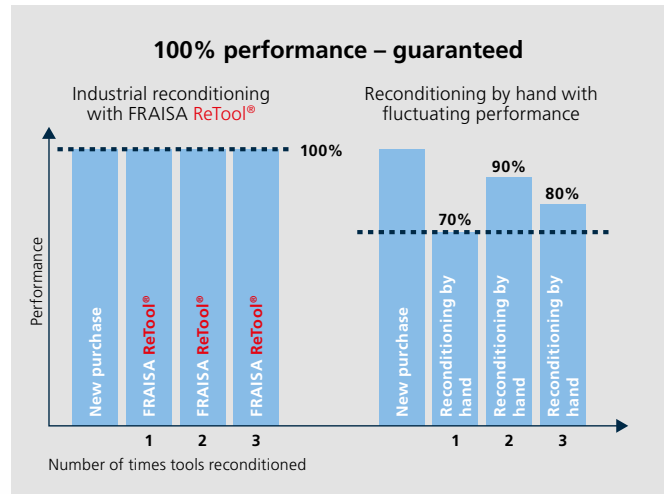
FRAISA ReTool® – Industrial tool reconditioning with performance guarantee

FRAISA ReTool® offers an all-round service that restores your used tools to their original performance level and optimizes your processes. FRAISA and third-party tools are reconditioned using the very latest technology – and in a resource-friendly way. The outcome: mint-condition tools as productive as they were the first day they were used. And to make things even better, your level of investment is lower than if you were to buy new tools, you increase your productivity and you save costs.

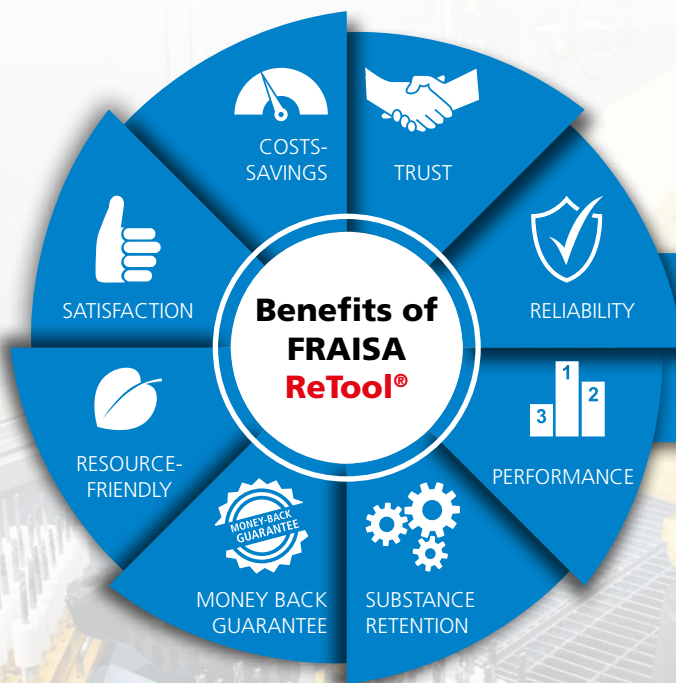
FRAISA ReTool® – a performance guarantee founded on integrated development of the tools and the reconditioning process

We guarantee that following their reconditioning with FRAISA ReTool®, your used tools will be restored to the original performance level they had when new. Our ability to provide this performance guarantee is a priority of our team of experts right from very early on in product development.

That's why the development of the reconditioning process is an integral part of the development phase, alongside the actual product tests and calculating the cutting data. Strict rules apply: the FRAISA ReTool® process is approved only if we are able to fulfil our performance guarantee 100%.



[15]



FRAISA ReToolBlue – recycle rather than throw away

With our FRAISA ReToolBlue service, we recycle the valuable carbide from tools that can no longer be reconditioned.

FRAISA ReTool® makes economic sense for you, too: After reconditioning them, we return your tools to you in mint condition. We restore them to their original performance level at a price that's more cost-effective for you than purchasing new ones or reconditioning them by hand.



FRAISA USA has been resharping tools for 14 years.

Video on our service product: FRAISA ReTool®



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for precision

