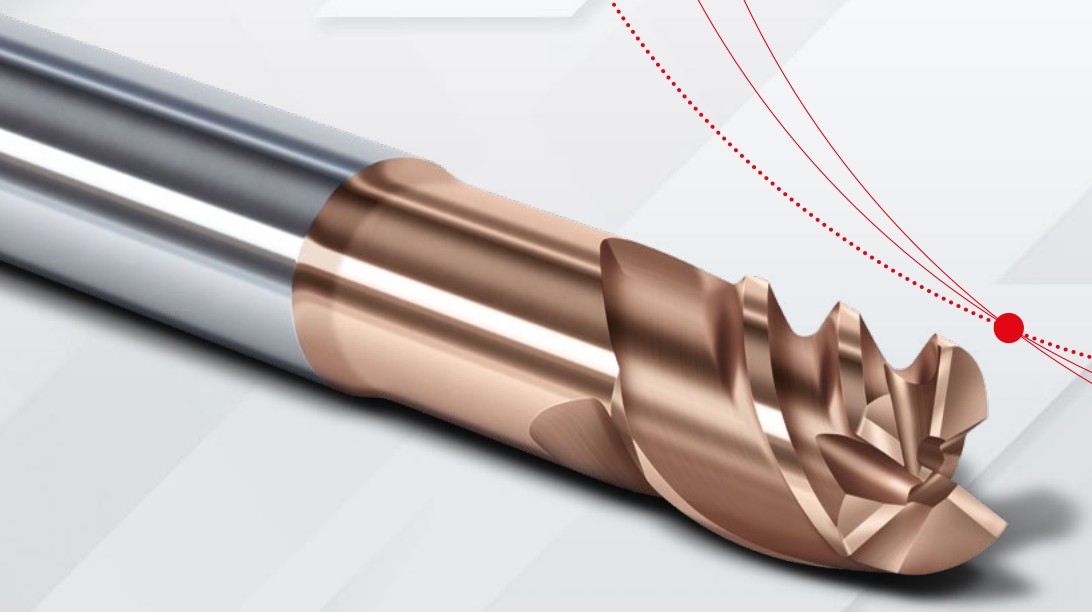
passion
for precision

fraisa

NX face-finishing milling cutter

Finishing plane surfaces to perfection



Available online

FRAISA ToolExpert®

NX technology: For surface qualities below Ra 0.1 µm

FRAISA's **NX face-finishing cutter** is the latest innovation in finishing. The new milling cutter mills plane surfaces that are both visually and measurably of top quality. The secret lies in its axially and radially offset finish-cutting edge. Thanks to this offset, the finish-cutting edge cuts a precisely defined cross-section of chip measuring just a few hundredths of a millimeter. The finish-cutting edge is designed exactly for this chip cross-section and produces brilliant surface qualities.

The **NX face-finishing cutter** enables you to machine parts to surface roughness qualities of **Ra < 0.1 µm**. For many parts, this eliminates any need for a further process step as **grinding is no longer necessary**. The great advantage: The part can be finished in the same process on the same machine, saving considerable cost and time.

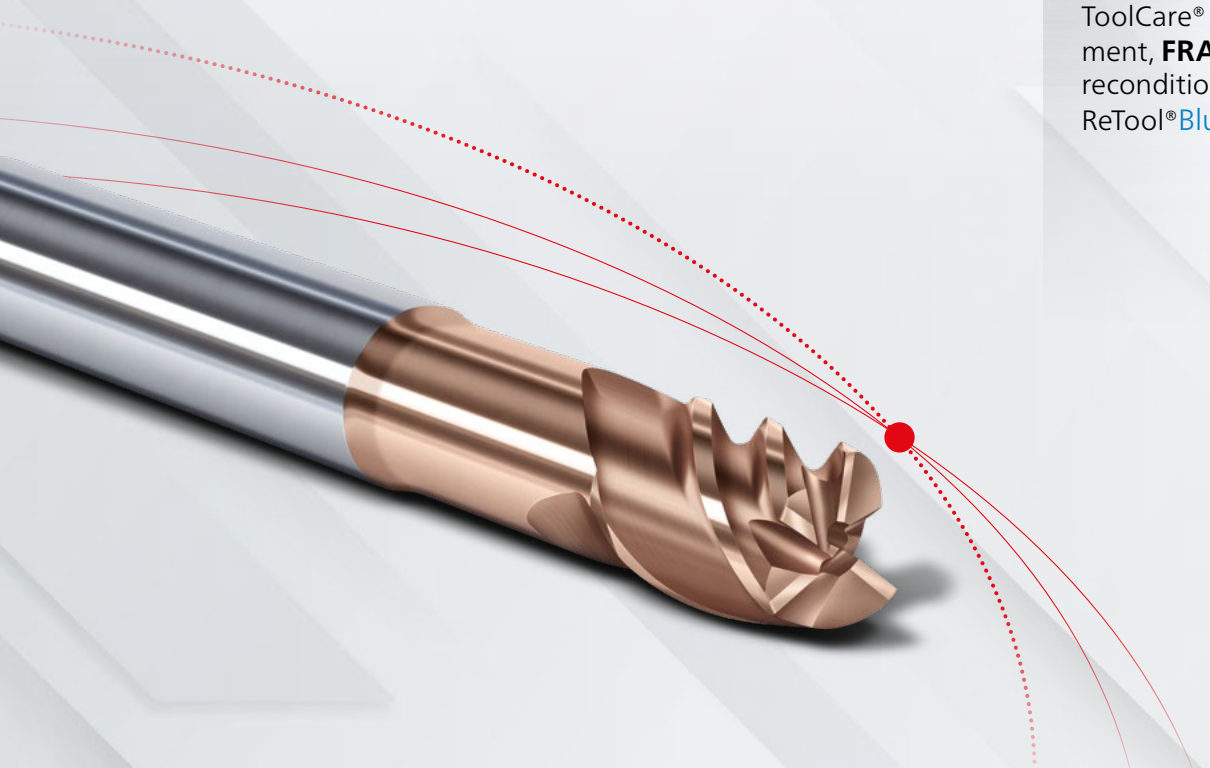
The **NX face-finishing cutter** has been designed so that even small, unavoidable radial deflections of the tool do not affect the machining result.

Since a perfect transition is often desired between the base and the wall, the **NX face-finishing cutter** also has short cutting edges at its circumference, so that step-free transitions can be created.

If you **value** outstanding surface roughness qualities or want to embellish visible components, you will be amazed by what FRAISA's new **NX** technology has to offer.

The advantages:

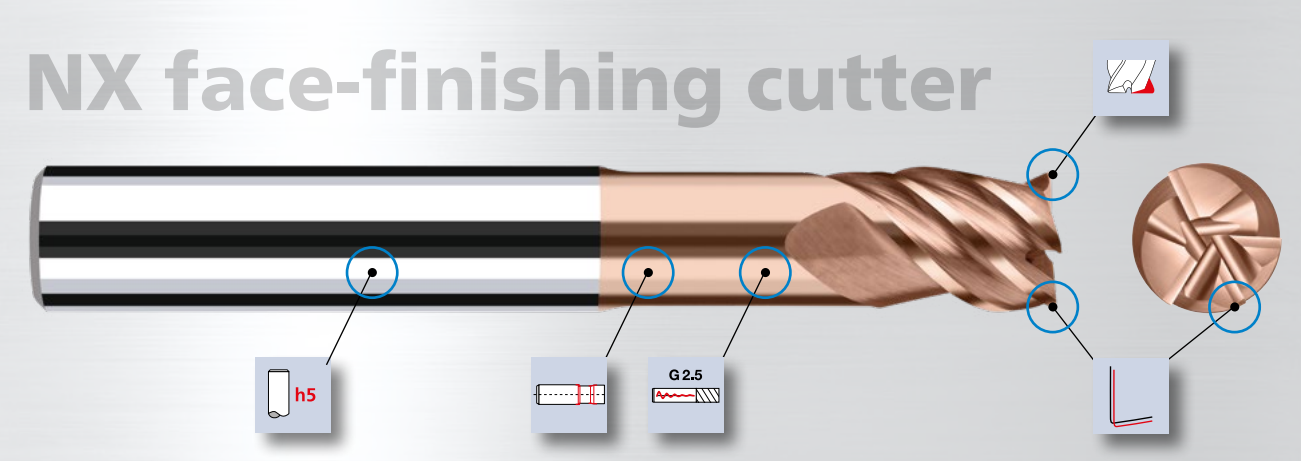
- **Top surface quality**
  Visually and measurably much better surface roughness quality than with conventional tools
- **Reduced process costs**
  Times for finishing processes such as grinding or polishing are cut significantly
- **Easy to use**
  Tools can be used for normal 2D facing or for pocket milling
- **FRAISA ToolExpert® cutting data calculator**
  for quick and easy provision of cutting data
- **Ideal life cycle** with FRAISA ToolCare® tool management, **FRAISA ReTool®** tool reconditioning, and FRAISA ReTool®Blue tool recycling



The technologies of the NX face-finishing

New feature combines with tried and trusted: The new technology of cutters with a face-finishing cutting edge is characterized by the fact that an additional cutting edge is ground between the existing ones. Thanks to the high-precision shank, the smooth transitions and fine balancing, the tool functions superbly.

The technologies



Milling tool with a partially polished blade

- Reinforcement of the exposed cutting corner
- Absorption of high cutting forces

Smooth transitions

- The shaft-neck-cutting edge transitions are fitted with smooth gradients and radii
- Improved tool rigidity and therefore less radial deflection
- Minimal step formation with several infeed depths
- Higher mechanical load and therefore improved performance

Finely balanced tools

- Finely balanced tools at least G2.5 at n = 20,000 rpm or permissible residual imbalance < 1 gmm
- Reduction or elimination of the balancing process in the case of finely balanced clamping devices
- Improved surface quality as a result of increased running smoothness and fewer vibrations
- Increase in the service life of the machine spindle

Milling tool with shank of h5 tolerance

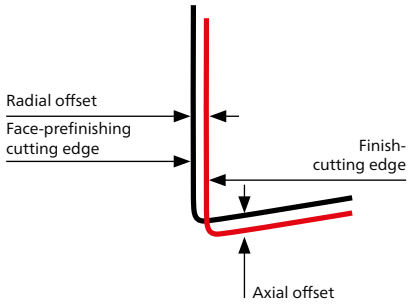
- High concentric and eccentric precision
- Optimal for modern precision chucks

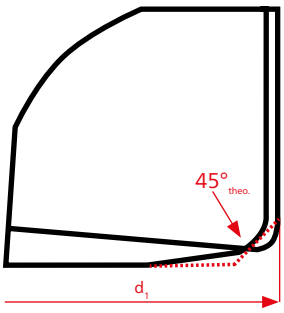
Face-finishing cutting edge

- Tool with special cutting edge for face finishing
- Top quality plane surfaces can be machined

Tools with the face-finishing cutting edge have a theoretical 45° chamfer ($45°_{theo.}$). This value is indicated for each diameter in the data table of the catalog page and is indicated as the tool chamfer for CNC/CAM programming. During machining, however, a minimal amount of rest material is produced due to the difference of $45°_{theo.}$ to the effective tool contour.

(Observe the application related tips.)





NX face-finishing cutter for the very best surface quality – visually and measurably

Choosing the right strategy

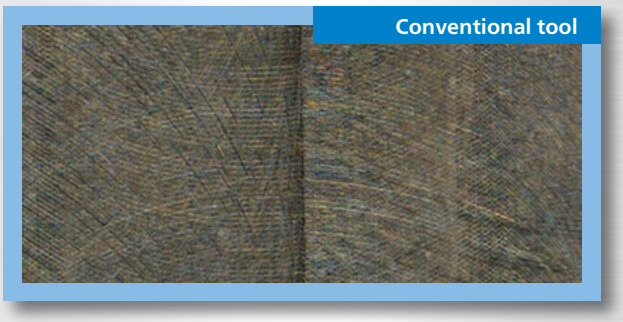
If you want to obtain surface finishes of the highest quality, it is crucial you choose the right strategy. The following requirements should be taken into account:

- ☑ Fluid movements, the tool should never stand still
- ☑ No sharp corners if possible
- ☑ Reduce the feed rate in corners

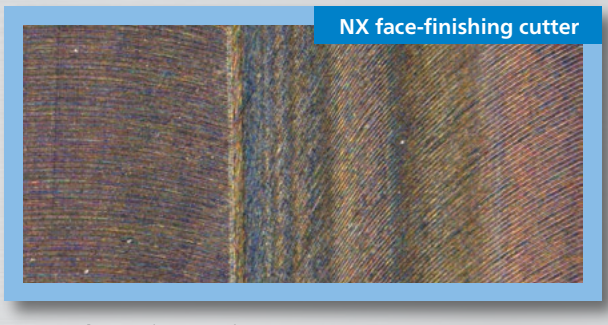
Can be used flexibly for various applications:
All marked surfaces were machined using the NX face-finishing cutter.

Material: Aluminum 3.2315 (EN AW 6082)

Comparison of surfaces



Material: Stainless steel 1.4301, Ra: 0.35 µm, Rz: 1.73 µm



Material: Stainless steel 1.4301, Ra: 0.11 µm, Rz: 0.62 µm

Application tips for tools with a face-finishing cutting edge

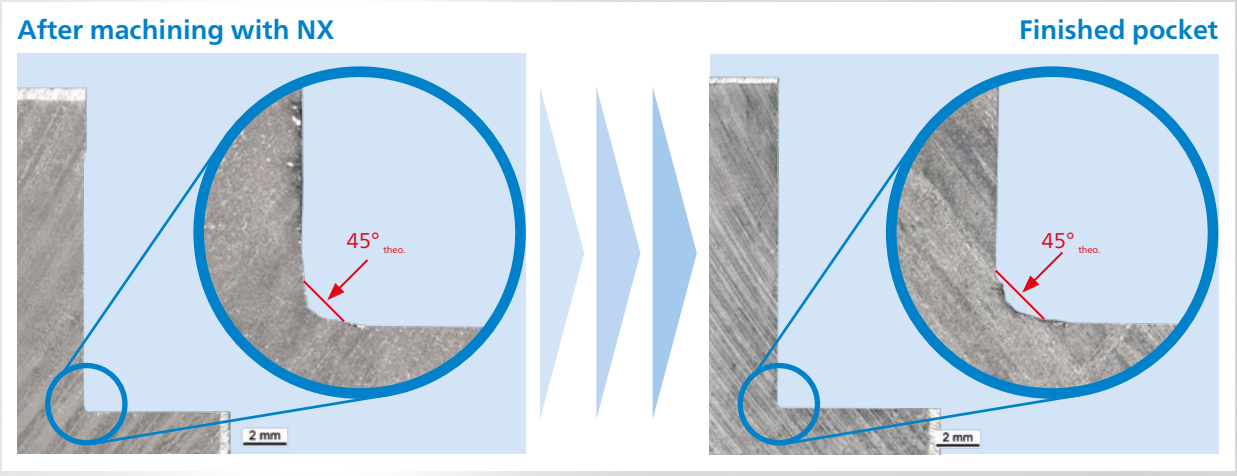
Pocket machining

The right workflow is important to minimize the amount of rest material in the corners of a pocket or step. Our product developers therefore recommend prefinishing after roughing and then finishing the base first before the wall.

The **NX face-finishing cutter** will mill the base and the wall together. Machining of the base is then complete. The wall still has a minimal allowance and is then finished with a finishing tool.

Example workflow

	Tool	Wall allowance	Base allowance
Roughing	P8201.450 (MFC)	+0.25 mm	+0.25 mm
Pre-finishing	P8201.450 (MFC)	+0.10 mm	+0.10 mm
Finishing base/wall	P8502.450 (NX face-finishing cutter)	+0.02 mm	+0.00 mm
Super-finishing wall	P15250.450 (Multicut XF)	+0.00 mm	+0.02 mm



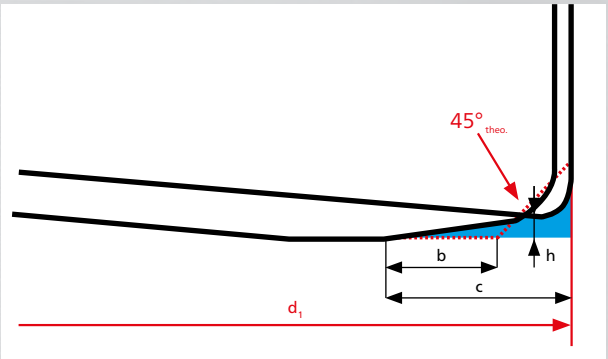
Measuring the tools

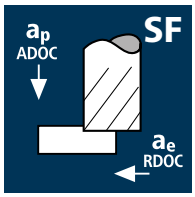
When measuring the tool on the machine using a laser, it is very important to specify the correct tool offset. To measure the diameter, a length offset $\mathbf{L_{off}}$ of at least **h** must be specified – FRAISA recommends an $\mathbf{L_{off}}$ of 1–2 mm.

Machining precision also requires taking a close look at the radius offset. Why? The lowest point of the tool is not at the cutting-edge corner, but a few tenths of a millimeter towards the center. A radial offset $\mathbf{R_{off}}$ of **c** must therefore be specified in the tool table.

Radial cutting depth ae_{max} for plane surfaces with tools with a face-finishing cutting edge

d_1 [mm]	h [mm]	b [mm]	c [mm]	ae_{max} [mm]
3	**0.02**	**0.10**	**0.20**	**2.60**
4	**0.02**	**0.10**	**0.20**	**3.60**
5	**0.02**	**0.10**	**0.20**	**4.60**
6	**0.02**	**0.10**	**0.20**	**5.60**
8	**0.03**	**0.20**	**0.35**	**7.30**
10	**0.03**	**0.20**	**0.35**	**9.30**
12	**0.04**	**0.30**	**0.50**	**11.00**
16	**0.04**	**0.30**	**0.50**	**15.00**



Application	Material	d_1 [mm]	z	v_c [m/min]	f_z [mm]	a_p [mm]	a_e [mm]	n [min⁻¹]	v_f [mm/min]
	Hardened tool steel 42 - 48 HRC	3.00	4	180	0.005	0.050	1.800	19100	382
		4.00	4	180	0.006	0.050	2.400	14325	344
		5.00	4	180	0.007	0.075	3.000	11460	321
		6.00	4	180	0.008	0.075	3.600	9550	306
		8.00	4	180	0.009	0.100	4.800	7160	258
		10.00	4	180	0.010	0.100	6.000	5730	229
		12.00	4	180	0.011	0.150	7.200	4775	210
		16.00	4	180	0.013	0.150	9.600	3580	186
	Hardened tool steel 48 - 52 HRC	3.00	4	180	0.005	0.050	1.800	19100	382
		4.00	4	180	0.006	0.050	2.400	14325	344
		5.00	4	180	0.007	0.075	3.000	11460	321
		6.00	4	180	0.008	0.075	3.600	9550	306
		8.00	4	180	0.009	0.100	4.800	7160	258
		10.00	4	180	0.010	0.100	6.000	5730	229
		12.00	4	180	0.011	0.150	7.200	4775	210
		16.00	4	180	0.013	0.150	9.600	3580	186
	Hardened tool steel 52 - 56 HRC	3.00	4	160	0.005	0.050	1.800	16975	340
		4.00	4	160	0.006	0.050	2.400	12730	306
		5.00	4	160	0.007	0.075	3.000	10185	285
		6.00	4	160	0.008	0.075	3.600	8490	272
		8.00	4	160	0.009	0.100	4.800	6365	229
		10.00	4	160	0.010	0.100	6.000	5095	204
		12.00	4	160	0.011	0.150	7.200	4245	187
		16.00	4	160	0.013	0.150	9.600	3185	166
	Titanium alloys > 300 HB [Ti6Al4V]	3.00	4	125	0.005	0.050	1.800	13265	265
		4.00	4	125	0.006	0.050	2.400	9945	239
		5.00	4	125	0.007	0.075	3.000	7960	223
		6.00	4	125	0.008	0.075	3.600	6630	212
		8.00	4	125	0.009	0.100	4.800	4975	179
		10.00	4	125	0.010	0.100	6.000	3980	159
		12.00	4	125	0.011	0.150	7.200	3315	146
		16.00	4	125	0.013	0.150	9.600	2485	129
	Inox normal [Cr-Ni/1.4301] [Cr-Ni-Mo/1.4571]	3.00	4	250	0.005	0.050	1.800	26525	531
		4.00	4	250	0.006	0.050	2.400	19895	478
		5.00	4	250	0.007	0.075	3.000	15915	446
		6.00	4	250	0.008	0.075	3.600	13265	425
		8.00	4	250	0.009	0.100	4.800	9945	358
		10.00	4	250	0.010	0.100	6.000	7960	318
		12.00	4	250	0.011	0.150	7.200	6630	292
		16.00	4	250	0.013	0.150	9.600	4975	259
	Wrought aluminium Construction aluminium	3.00	4	280	0.006	0.050	1.800	29710	713
		4.00	4	370	0.007	0.050	2.400	29445	825
		5.00	4	400	0.008	0.075	3.250	25465	815
		6.00	4	400	0.010	0.075	3.900	21220	849
		8.00	4	450	0.012	0.100	5.600	17905	859
		10.00	4	450	0.015	0.100	7.000	14325	860
		12.00	4	500	0.018	0.150	8.400	13265	955
		16.00	4	500	0.020	0.150	11.200	9945	796

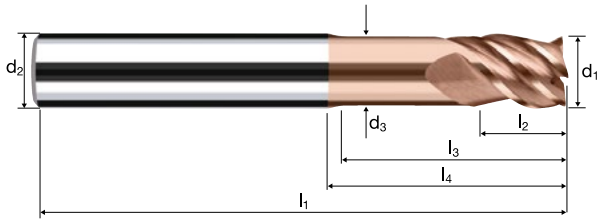
Cylindrical/Square end mills NX

Face finishing, normal version, neck

HM
XA

λ 45°
γ 10°

h5



G 2.5

Roughing

Finishing

ReTool®

Rm 1300-1500
HRC 42-48

HRC 48-56

Inox Stainless

Ti Titanium

Aluminium
Copper

DURO-Si

Example:
Order-N°. Coating **H** Article-N°. **8502** ø-Code **180**

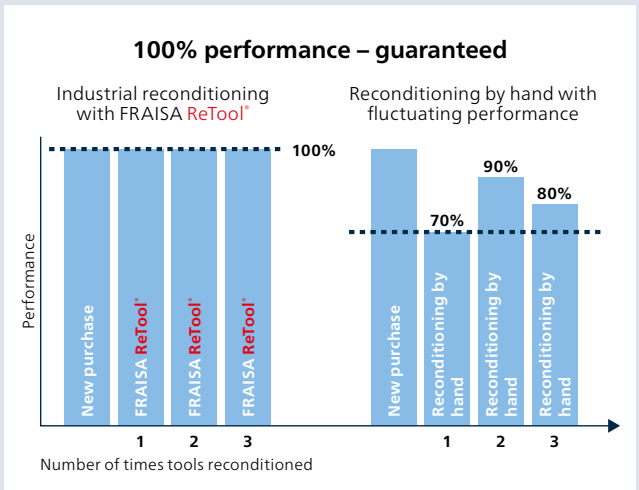
H8502

Ø Code	d_1 e8	d_2 h5	d_3	l_1	l_2	l_3	l_4	45°$_{theo.}$	α	z		
180	3.00	6.00	2.80	57	4.00	14.00	20.37	0.10	4.5°	4		●
220	4.00	6.00	3.70	57	5.00	16.00	20.82	0.10	3.0°	4		●
260	5.00	6.00	4.60	57	6.00	18.00	21.27	0.10	1.5°	4		●
300	6.00	6.00	5.50	57	7.00	18.15	20.00	0.10	0.0°	4		●
391	8.00	8.00	7.40	63	9.00	23.63	26.00	0.15	0.0°	4		●
450	10.00	10.00	9.20	72	11.00	27.99	31.00	0.15	0.0°	4		●
501	12.00	12.00	11.00	83	13.00	33.29	37.00	0.20	0.0°	4		●
610	16.00	16.00	15.00	92	17.00	38.73	43.00	0.20	0.0°	4		●

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%.



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