passion
for precision

fraisa

SX – High Dynamic Cutting HDC

Boost for machining stainless steels and nickel-based alloys

NEW

SX high-performance milling cutters for HDC – perfectly coordinated and extremely potent

With its multi-tooth **SX high-performance milling cutters**, FRAISA has developed a completely new milling series designed specifically for machining all stainless steels and difficult-to-machine materials. The tool technologies and application data have been specifically configured for penetration and high-performance High Dynamic Cutting (HDC) machining.

The tough, abrasive materials result in the cutting edges being subject to extremely high thermal and mechanical loads. The number of cutting edges has been increased so that the load is distributed over more teeth and the service life of the tools can be significantly extended. As a result, you benefit from high productivity and a long tool life by choosing to use the new **SX tools**.

With the new DURO-XI coating, stainless steels and nickel-based alloys, which effectuate the highest thermal as well as abrasive loads on the cutting edges, are able to be machined. Thanks to their optimized flute geometry and extremely light and low-vibration cut, **SX milling cutters** enable you to achieve the highest stock removal rates. Also new: the high-performance penetration edge for multiple flutes enables rapid penetration – actively supported by the central cooling channel bore at the center of the end face. The new chip breaker concept additionally ensures that no machining zones or machine spaces are blocked by long chips.

Parallel to developing the tools, we also compiled the necessary application knowledge. **FRAISA ToolExpert® 2.0** provides you with perfectly coordinated cutting data to ensure optimum tool use. Prerequisite for utilizing this outstanding tool technology is a CAM system that facilitates HDC programming.

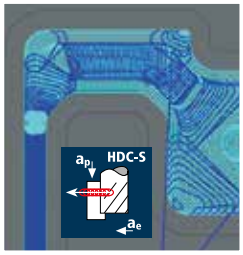
The advantages

- **Outstanding cost-performance ratio**
  - Chip removal rate (+20%), tool life (+30%), repeat accuracy and reliability
  - FRAISA ToolCare® tool management, **FRAISA ReTool®** tool reconditioning, and **FRAISA ReToolBlue tool recycling**
- **Two different lengths with catalog cutting data**
  - Diameters ranging between 6 mm and 20 mm
  - Two different lengths: standard and medium-long, with enlarged cutting edge lengths
- **Wide range of workpiece material applications**
  - For replacing existing applications and as a solution for new applications
  - Low force producing tools for dependable use in demanding applications
- **Perfection – FRAISA ToolExpert® 2.0**
  - Cutting performance data and upgraded material table
  - Quick, simple, and reliable cutting-data search function
  - Automatic data transfer to CAM

High Dynamic Cutting (HDC)
The five building blocks for successful implementation

1 CAM software

2 Machine environment



3 HDC application

4 Tool

5 Cutting data

1 CAM software

Most CAM systems have the modules necessary to implement the High Dynamic Cutting (HDC) strategy. The names of the modules differ depending on the software company.

2 Machine environment

SX high-performance milling cutters achieve maximum productivity on dynamic machines with medium spindle power. Due to the materials, normal cutting speeds and feed rates are achieved. Thanks to the low cutting forces in the machining process, a sophisticated machine design can also compensate for unstable workpiece clamping.

3 HDC application

The **SX tools** have been designed with many cutting edges and are therefore suitable for the High Dynamic Cutting Speed (**HDC-S**) application rather than High Dynamic Cutting Performance (HDC-P). The radial infeed rate is 5–10% of the tool diameter. The axial infeed rate should be as high as possible, at a maximum up to the overall cutting edge length (l2).

4 Tool

The new multi-toothed **SX tools** have been developed specifically for the HDC-S application. This includes the cutting data, too. The tools feature low vibration, reduced cutting forces, excellent chip removal, great performance, and a long tool life.

5 Cutting data

The cutting data for the **SX high-performance milling cutters** are available online, at any time, in **FRAISA ToolExpert®**. This online cutting-data tool delivers perfectly coordinated, tool- and material-specific cutting data, and therefore the perfect basis for optimum usage of the **SX tools** – quick and easy. The CAD and cutting data can be downloaded automatically.

Our tip: When selecting the material, enter the exact material number to obtain the matching cutting data.

The technologies of the SX high-performance milling cutters for HDC machining

SX high-performance tools are made of a strong-edged, ultrafine-grain carbide with excellent wear properties. The positive, easy-cut geometry with reinforced cutting-edge corners facilitates optimum chip formation, good chip removal, and excellent tool stability.

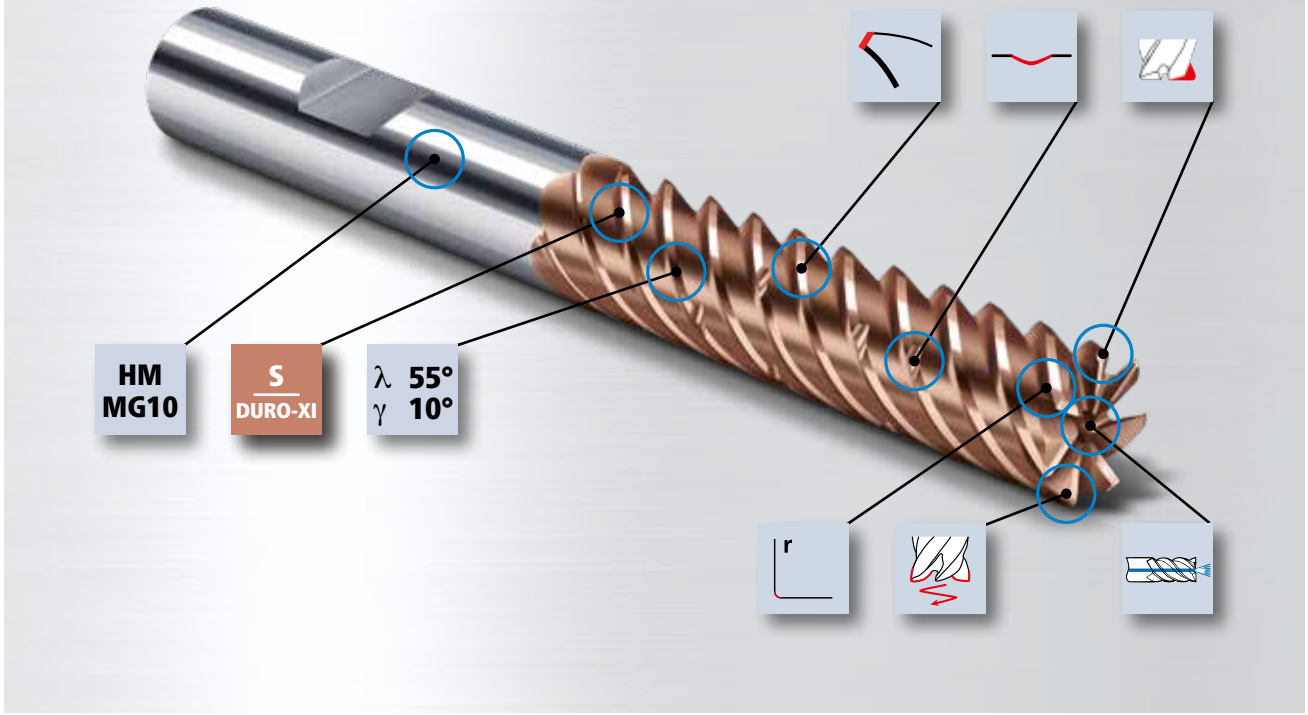
The coating plays a crucial role with respect to wear resistance. The PVD coating, which contains elements that make it a perfect match for the intended range of applications, protects the substrate from extreme thermal and abrasive stresses. FRAISA's development engineers also recognized early on that chip breakers are essential.

The long chips and their removal place considerable demands on the machine environment – the tools can therefore have up to 24 chip breakers.

To ensure reliable and rapid penetration of the multi-toothed tools, our engineers have developed a new high-performance penetration edge with an internal cooling channel.

SX – all in all, a **perfectly coordinated tool technology** for HDC machining.

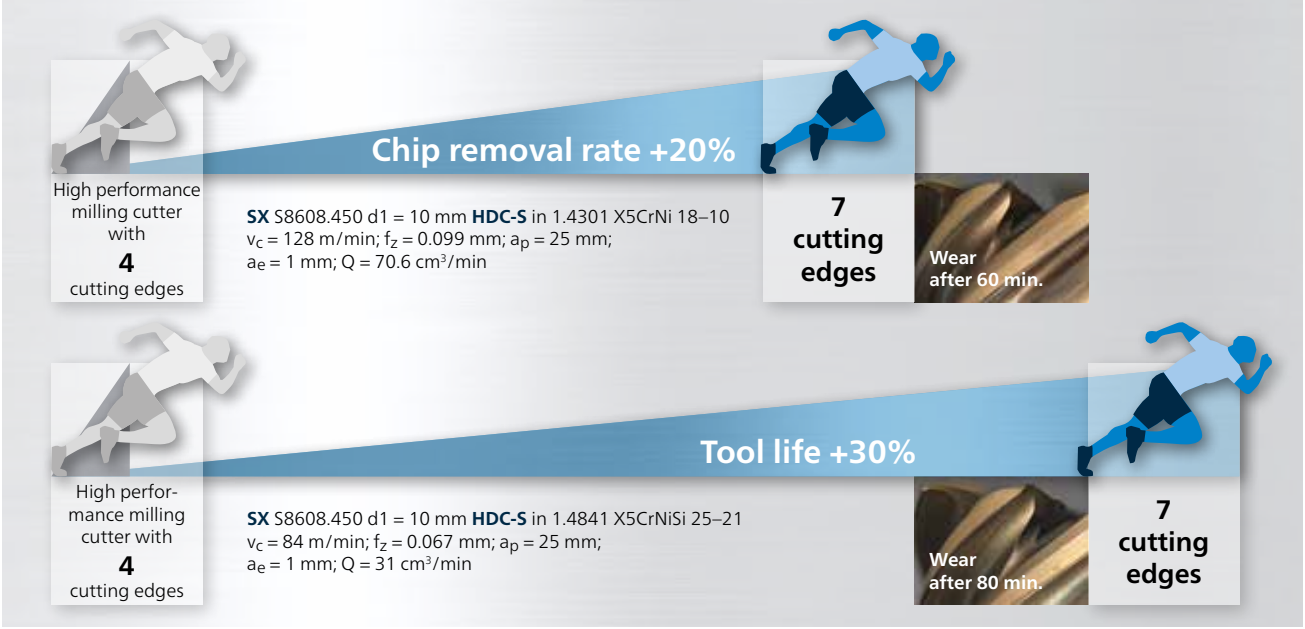
The technologies



Detailed descriptions of each technology can be found in our "High-performance milling tools" catalog.

Higher productivity and a longer tool life thanks to multiple high-performance cutting edges

Increase in productivity or tool life thanks to multiple cutting edges and HDC-S



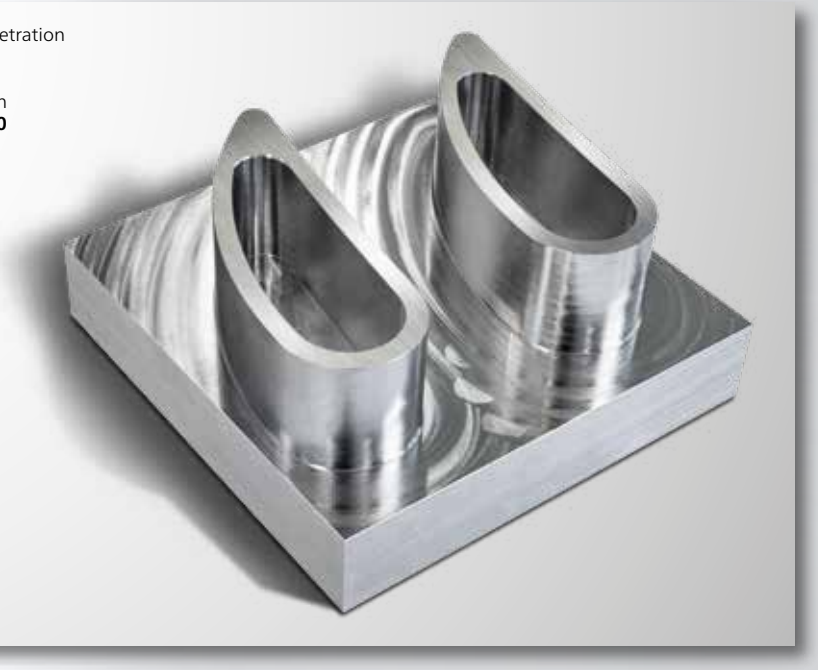
Due to the significantly lower thermal conductivity (λ) of stainless and acid-resistant steels (λ = 21 [W/(m · K)]) compared to steel (λ = 46 [W/(m · K)]), the temperatures at the cutting edge rise rapidly, which means that the cutting speed can be increased to only a very limited extent.
It therefore makes sense to use tools with multiple cutting edges and the HDC-S machining strategy in these materials. In this way, wear can be spread over more cutting edges.

With the data specified in **FRAISA ToolExpert®**, it is possible to increase the chip removal rate by 20%.
To increase tool life by 30%, the same feed rate (as for a z4 tool) can be used. This reduces the feed rate per tooth and increases tool life. The extended cutting edge also allows higher a_p values to be realized, further increasing performance.

High-temperature alloys – no problem for SX high-performance milling cutters

HDC-S roughing operation with HPC penetration
Inconel 625; Rm = 820 N/mm²
d 12 mm, S8608.501; standard version
d 8 mm, S8618.391; medium-long version
Cutting data per **FRAISA ToolExpert® 2.0**

Wear pattern d 8 mm
after 58 min operating time



Cylindrical end mills SX

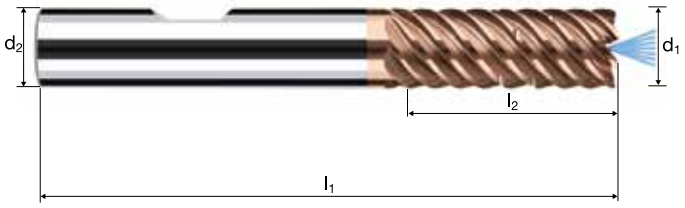
Smooth-edged, chip breaker, normal version
High-performance penetration edge, central air/cooling channel

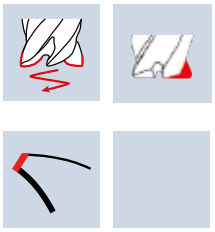
X-Generation

HM
MG10

λ 55°
γ 10°

new!





Roughing HPC | Roughing HDC | Finishing

Inox Stainless | **Ti** Titanium | **Nickel-Alloys**

Example: **Order-N°.** Coating **S** | Article-N°. **8608** | ø-Code **300**

Ø Code	d_1 e8	d_2 h6	l_1	l_2	r	z	DURO-XI S8608	DURO-XI S8508
300	6.00	6.00	57	16.00	0.100	6		●
391	8.00	8.00	63	21.00	0.150	6		●
450	10.00	10.00	72	25.00	0.200	7		●
501	12.00	12.00	83	31.00	0.200	7		●
610	16.00	16.00	92	36.00	0.200	8		●
682	20.00	20.00	104	46.00	0.250	8		●

Cylindrical end mills SX

Smooth-edged, chip breaker, medium length version
High-performance penetration edge, central air/cooling channel

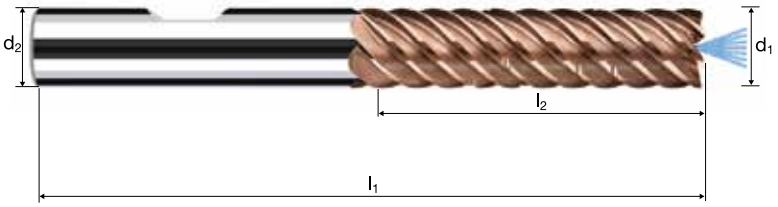
X-Generation X

HM MG10

λ 55°
γ 10°

r

new!



Roughing HPC | Roughing HDC | Finishing

Inox Stainless | **Ti** Titanium | **Nickel-Alloys**

Example: **Order-N°.** Coating **S** | Article-N°. **8618** | ø-Code **300**

Ø Code	d_1 e8	d_2 h6	l_1	l_2	r	z	DURO-XI S8618	DURO-XI S8518
300	6.00	6.00	63	22.00	0.100	6		●
391	8.00	8.00	72	31.00	0.150	6		●
450	10.00	10.00	84	39.00	0.200	7		●
501	12.00	12.00	97	46.00	0.200	7		●
610	16.00	16.00	108	53.00	0.200	8		●
682	20.00	20.00	122	63.00	0.250	8		●

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FRAISA SA
Gurzelenstr. 7 | CH-4512 Bellach | Switzerland |
Tel.: +41 (0) 32 617 42 42 |
mail.ch@fraisa.com | fraisa.com |

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