passion
for precision

fraisa

FRAISA High Dynamic Cutting HDC

High dynamic cutting with
constant cutting edge utilisation

NEW

new
cutting data calculator
ToolExpert
HDC

More productive thanks to FRAISA HDC

FRAISA uses FRAISA HDC to provide the data for the high dynamic cutting strategy.

Most CAM systems allow the calculation of **tool paths for high dynamic cutting**. These **high-speed roughing strategies** are described very differently by CAM system suppliers, but have one important thing in common: during the operation, cutting conditions (machining forces and temperature) are kept constant.

Through the use of high-speed roughing strategies, the **metal removal rate can be increased enormously** (factor of 2 compared to conventional HPC machining). This **reduces** the **machining times**. Furthermore, tool **wear** is significantly **lower** due to the constant cutting conditions. This results in **longer tool life**, when compared to conventional cutting strategies. Process reliability is also positively influenced.

SUMMARY: FRAISA HDC allows efficient milling with high process reliability.

FRAISA provides you with the right tools, cutting data, and the application expertise to suit your machinery, and gives you advice on how to implement the FRAISA HDC high-speed cutting strategy.

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Advantages and comparison of the HPC and HDC roughing processes

For HDC machining, FRAISA provides:

- ToolExpert HDC: Online tool for calculating cutting data for high dynamic cutting
- High-performance tools that fulfil the requirements for HDC machining
- Seminars to teach the implementation of HDC strategies

Machining processes can be accelerated using the HDC strategy, reducing the load on tools and making optimal use of the available machinery.
Result: Greater productivity and increased efficiency, at significantly lower costs.

Work more productively with ToolExpert HDC

Productivity in your company can be significantly increased with the new HDC roughing strategy.

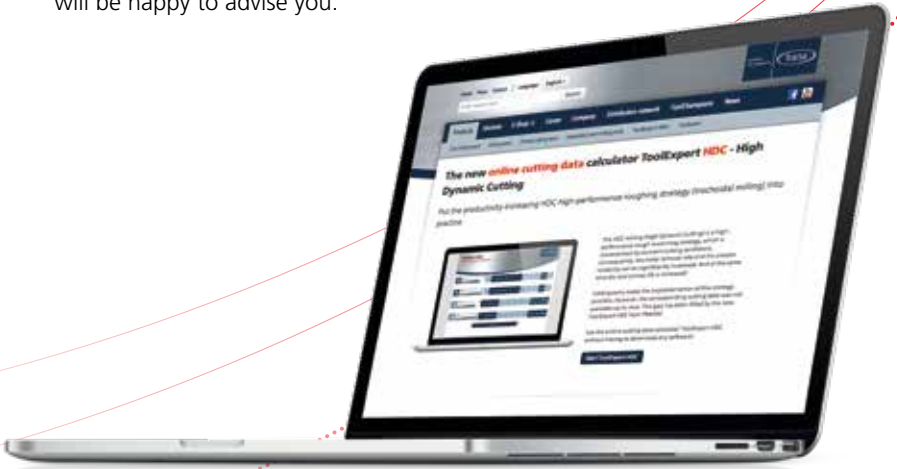
FRAISA provides a new cutting data calculator that enables effective implementation of HDC machining. The use of this online tool makes calculating the cutting data for dynamic machining quick and easy.

Service – we will be happy to advise you

With seminars, training courses and workshops, we can help you integrate high dynamic cutting into your production process. Our application engineers will be happy to advise you.

Tools – designed for HDC

High-performance tools whose special properties make them ideal for dynamic machining.



The following table compares the most frequently used conventional cutting strategy, HPC, with the HDC high dynamic cutting strategy.

	Conventional cutting High Performance Cutting – HPC	High Dynamic Cutting High Dynamic Cutting – HDC
Advantages	• High metal removal rate • Chips are simple to remove • High performance on stable, high-performance machines • Use of profiled tools is possible • Short tool paths • Very economical, even at low cutting depths (ADOC<1*d)	• Low tool wear • Large cutting depths possible • Very high metal removal rate • Low thermal loading of tool cutting edges • High process reliability • Low power consumption by the machine spindle • Machining with flexible clamping possible
Disadvantages	• Generally high machining forces • High consumption of spindle power • Suboptimal utilisation of cutting tool potential due to limitation of the application data at the most critical machining areas • High wear over a small portion of the cutting edge	• Programming system (CAM) required

Advantages of FRAISA HDC:

- **Faster machining times and higher productivity** due to higher cutting speeds and feed rates
- Constant metal removal rate and constant cutting conditions during the machining process **increase process reliability**
- Gentle, rounded tool paths and constant machining temperatures at the cutting edge protect the tool against wear, thereby increasing tool life and **reducing tool costs**
- Strategy and application data can be adapted to the machinery available: **optimal utilisation of machinery with optimal machining, even of delicate components**
- **Improved optimisation:** due to high process reliability and longer tool life

Five elements for the successful implementation of FRAISA HDC

The following five elements enable you to successfully implement FRAISA HDC:

1. CAM software
2. Machinery
3. HDC application
4. High-performance tools
5. HDC cutting data

The first element for the use of the HDC roughing strategy is a CAM system, which allows the generation of the tool paths required. In the second and third elements, the HDC application is defined on the basis of the machinery available.

The next elements for the implementation of the HDC strategy are the right tools and the associated cutting data. Consequently, FRAISA provides products that are optimally designed to fulfil the requirements of the HDC strategy. The new ToolExpert HDC cutting data calculator from FRAISA determines the appropriate cutting data on the basis of the material, the application, and the tool.

5 elements for a safe and efficient HDC process

FRAISA HDC

1 CAM software	2 Machinery	3 HDC application	4 High-performance tools	5 HDC cutting data
Generation of tool paths for high dynamic cutting on a CAM system	Evaluation and classification of the existing machinery	Determination of the application on the basis of the machinery available	Selection of the tool for HDC machining	Calculation of the cutting data using FRAISA ToolExpert HDC
User	User	fraisa NEW	fraisa	fraisa NEW

Objectives:

- Increasing productivity
- Reducing tool costs
- Improving process reliability

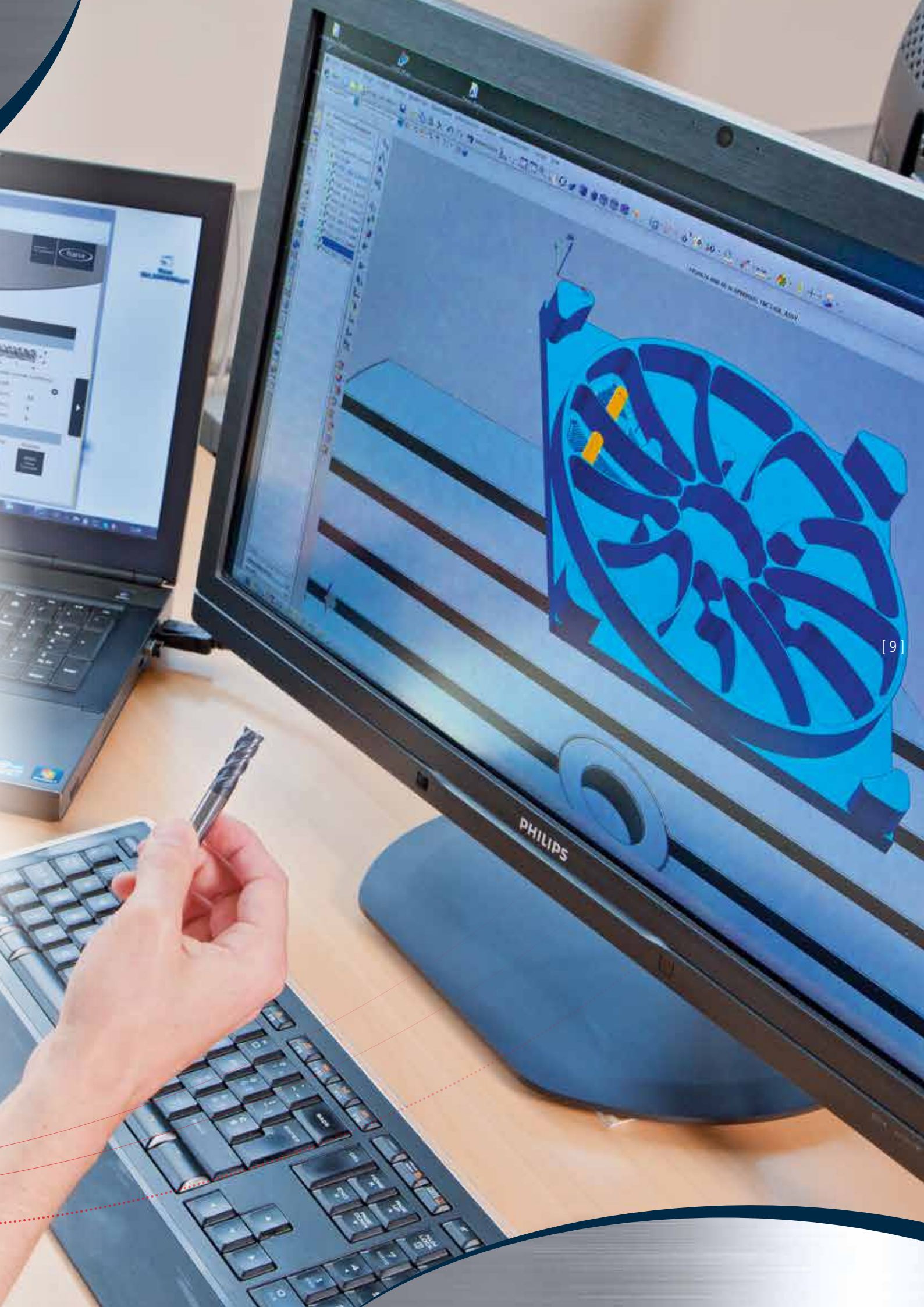
The individual elements in detail

1 CAM software

Most CAM systems have modules for implementing the HDC high dynamic cutting strategy. The names of the modules vary from supplier to supplier.

Overview of CAM suppliers and the names of the modules for the HDC high dynamic cutting strategy*	
AlphaCAM®	*Wave machining*
Celeritive Technologies® (Camworks®, Cimatron®, Gibbscam®, Siemens NX®)	*VoluMill®*
Delcam®	*Vortex®*
EdgeCAM®	*Wave-shaped strategy*
ESPRIT®	*ProfitMilling®*
HSMWorks® / VisiCAM®	*Adaptive Clearing®*
InventorCAM®	*iMachining®*
Mastercam®	*Dynamic Milling (Dynamic Mill®)*
OpenMind®	*HyperMaxx (VoluMill®)*
Siemens NX®	*Adaptive Milling®*
SolidCAM®	*iMachining®*
SurfCam®	*TrueMill®*
Topsolid®	*Boost Milling®*

* This list of product names makes no claim of entirety.


PHILIPS

2 Machinery

High dynamic machines with limited spindle power — Speed

Maximum productivity is achieved in a refined machining environment, in which optimal use can be made of high cutting speeds and feed rates. High-speed machining centres with high machine dynamics and wide spindle speed ranges are therefore suitable. The low cutting forces generated in the machining process permit adaption for machining delicate components and flexible clamping.

Machinery
Wide spindle speed range
High machine dynamics (linear)
Milling spindle with low torque
Delicate machine structure (low mass)

Example	
Machine:	5-axis
Setting:	Flexible system
Clamping system:	Shrinkfit
Projection:	Long

Application

High Speed Dynamic Cutting

Dynamic, high-performance machines — Performance

As with the HPC strategy, maximum productivity is achieved in a machining environment designed for high cutting forces. High-performance machining centres together with robust workpiece clamping and short side-lock tool holding are fundamental.

Machinery
High-performance milling spindle
Moderate machine dynamics (Ball screw actuation)
Moderate spindle speed range
Stable machine structure (large mass)

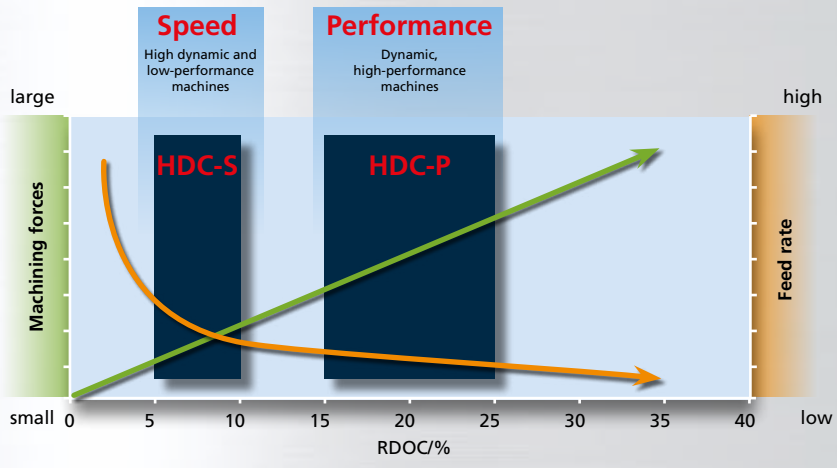
Example	
Machine:	3-axis
Setting:	Vice
Clamping system:	Weldon
Projection:	Short

Application

High Performance Dynamic Cutting

The right machinery for the right application

Cutting force and feed rate depending on lateral infeed at a constant metal removal rate



3 HDC application

On the basis of the machinery, we differentiate between two HDC applications:

High **S**peed **D**ynamic **C**utting – **HDC-S**

High **P**erformance **D**ynamic **C**utting – **HDC-P**

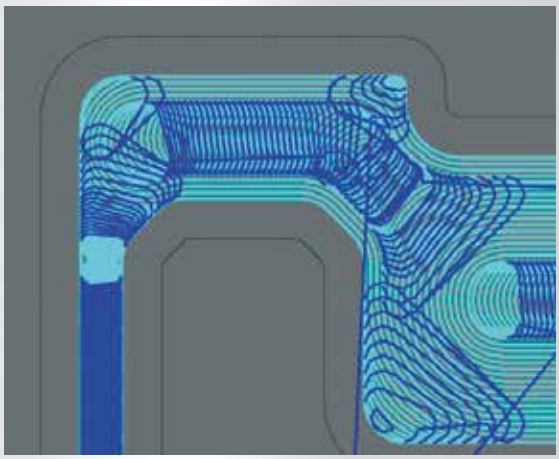
In the case of HDC-P, higher cutting forces are generated with slightly lower milling dynamics. In the case of HDC-S, the high dynamics of the machine are used for high-speed cutting. In both applications, approximately the same metal removal rates can be achieved.

HDC-S Speed

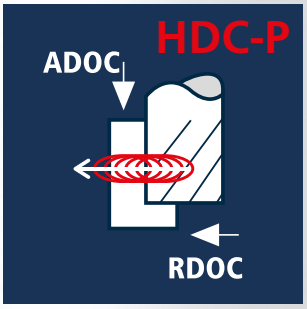
Characteristics
Radial infeed 5% – 10% of the tool diameter
Axial infeed up to 3.5 x tool diameter

The HDC-S application is a combination of HPC and HSC machining strategies.
The high performance of HPC cutting is combined with the very high cutting speeds and feed rates of HSC cutting. HDC-S can therefore be seen as a counterpart to HDC-P, with smaller radial infeed and higher cutting speeds and feed rates.

Tool paths



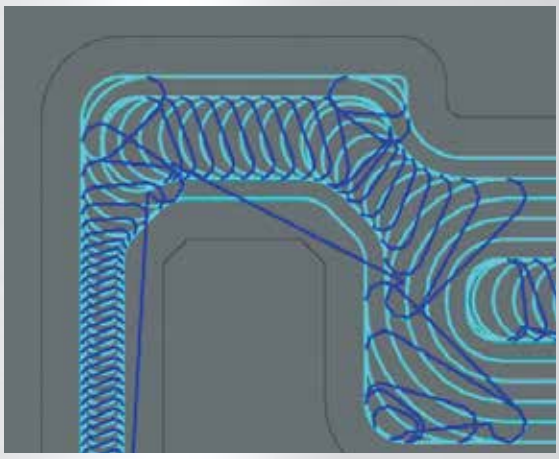
HDC-P Performance



Characteristics
Radial infeed 15% – 25% of the tool diameter
Axial infeed up to 2.5 x tool diameter

This application is similar to HPC. However, during HDC-P the tool paths are generated by a CAM system and the machining conditions are precisely defined and kept constant. This enables higher cutting speeds and feed rates to be used with smaller radial infeeds.

Tool paths

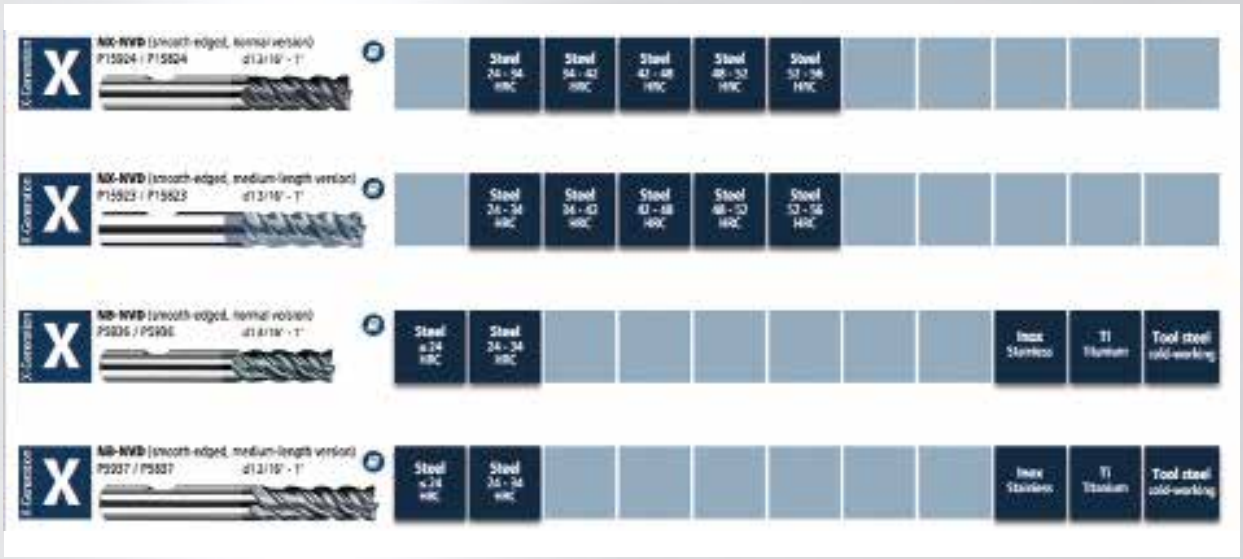


4 High-performance tools

For HDC applications, tool selection is very important. The tool needs to have a high level of stability and a normal or medium-length cutting edge to be suitable for this process. The NVD tool group NX-NVD and NB-NVD is ideally suited for HDC applications, particularly because of the following characteristics.

- High rigidity and stability due to tapered core
- High resistance to fracture
- Vibrations avoided because of the variable helix
- Good chip evacuation because of the double groove geometry

Overview of application suitability



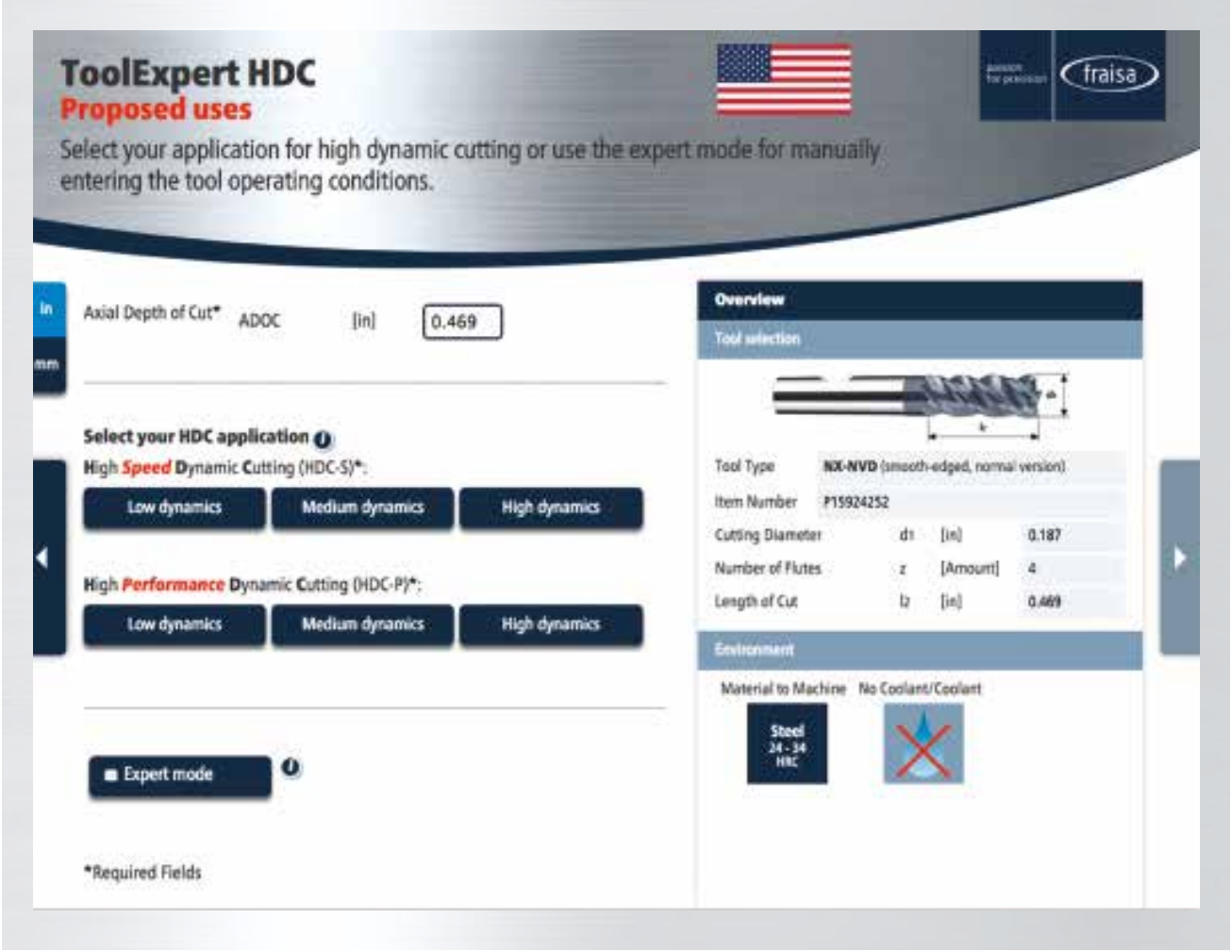
Our E-Shop can be found at fraisadirect.com.

Further information on individual tools can be found in the catalogue, or in the product brochure at fraisa.com/us/products/end-milling-tools.

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

5 HDC cutting data

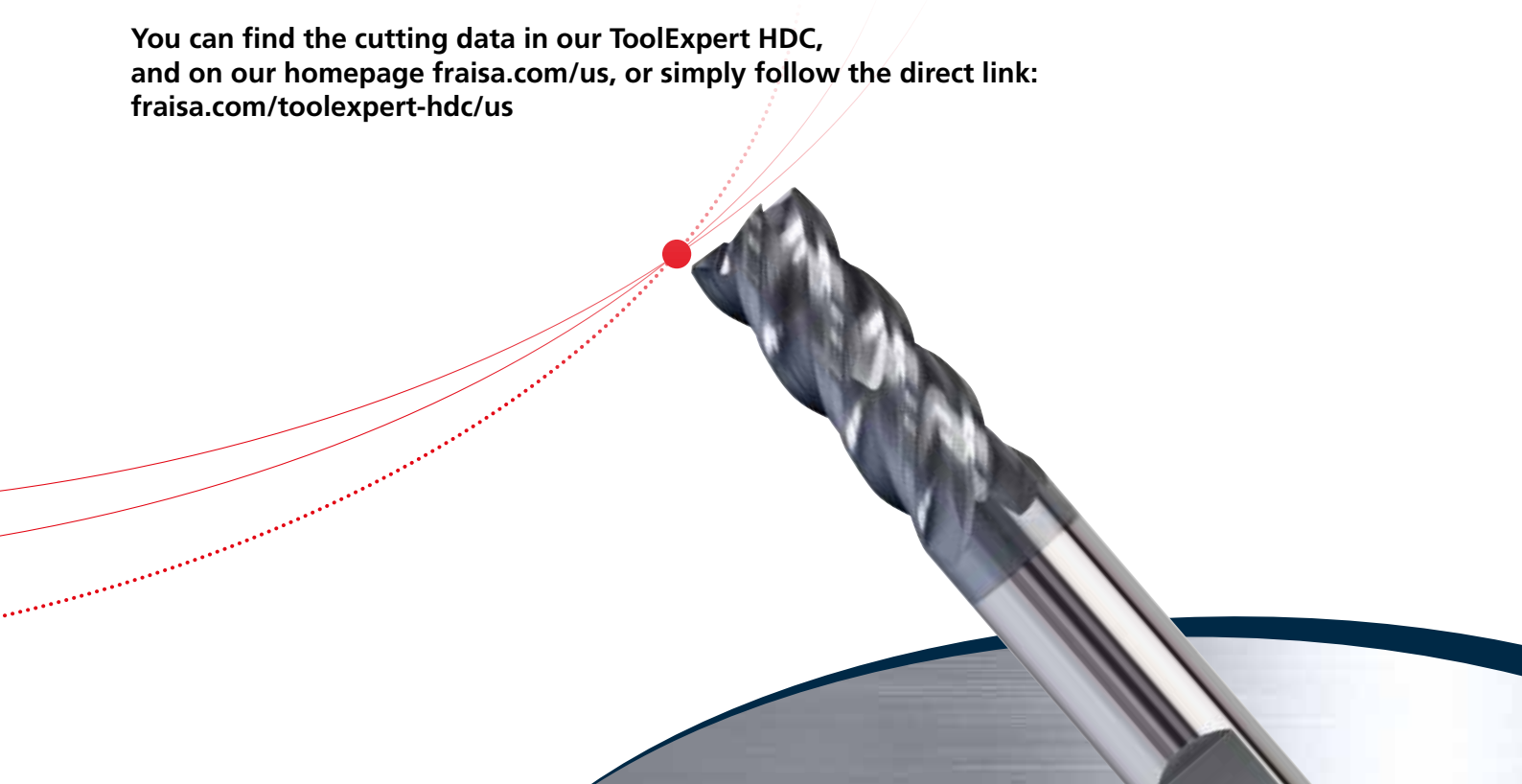
FRAISA ToolExpert HDC



In the fifth element, HDC cutting data is calculated. FRAISA has developed ToolExpert HDC and made the calculation program available online.

ToolExpert HDC enables the user to calculate cutting data for the HDC strategy in a simple manner. Success is guaranteed.

You can find the cutting data in our ToolExpert HDC, and on our homepage fraisa.com/us, or simply follow the direct link: fraisa.com/toolexpert-hdc/us



FRAISA machining seminars
Learn more about HDC machining at ToolSchool

FRAISA machining seminars

We will be happy to provide you with information about our yearly FRAISA machining seminars. As always, the machining seminars are held in the United States (Minnesota).

In the FRAISA technology seminars, highly qualified engineers train the technical and management staff of specific industries. At the end of the seminar a personal certificate is presented to confirm your participation.

You can find additional information about the seminars here.

We are happy to advise you, and provide you with further information on the seminars and registration process at **info@fraisausa.com** or online at **fraisa.com/us/services/toolschool**.

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

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

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