passion
for precision

fraisa

FRAISA High Dynamic Cutting HDC

High dynamic cutting with constant cutting edge utilization

Available online

FRAISA ToolExpert®

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-dynamic 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-dynamic 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-dynamic cutting strategy-

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Advantages and comparison of the HPC and HDC roughing processes

For HDC machining, FRAISA provides:

- FRAISA ToolExpert®: Online tool for calculating cutting data for high dynamic cutting
- High-performance tools that fulfill 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 FRAISA ToolExpert®

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

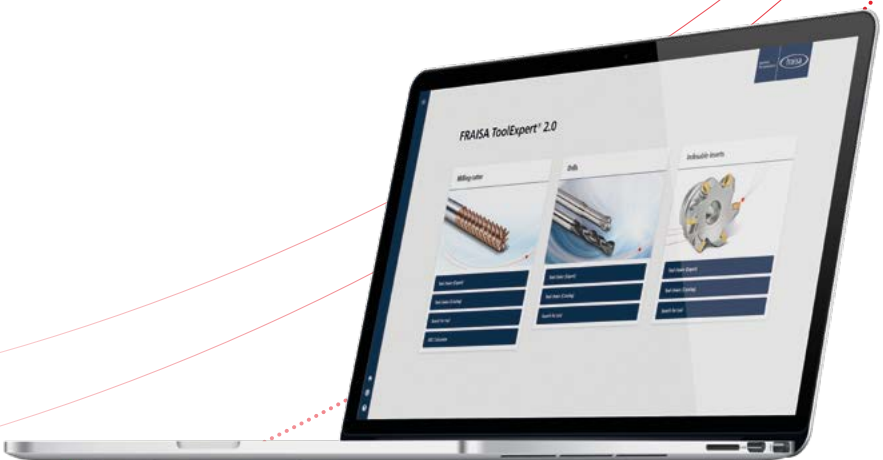
FRAISA provides a new cutting data calculator that enables effective implementation of HDC machining. The use of this online tool makes calculating the cutting data for dynamic machining quick and easy.

Service – we will be happy to advise you

With seminars, on-site training, and webinars, 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 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 utilization 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

Benefits 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 utilization of machinery with optimal machining, even of delicate components**
- **Improved optimization:** 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 fulfill the requirements of the HDC strategy. The new FRAISA ToolExpert® cutting data calculator from FRAISA determines the appropriate cutting data on the basis of the material, the application, and the tool.

FRAISA HDC

User

5 elements for a safe and efficient HDC process

CAM software
Generation of tool paths for high dynamic cutting on a CAM system

Machinery
Evaluation and classification of the existing machinery

FRAISA

HDC application
Determination of the application on the basis of the machinery available

High-performance tools
Selection of the tool for HDC machining

HDC cutting data
Calculation of the cutting data using FRAISA ToolExpert®

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.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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 centers 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
Workpiece clamping:	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 centers 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)

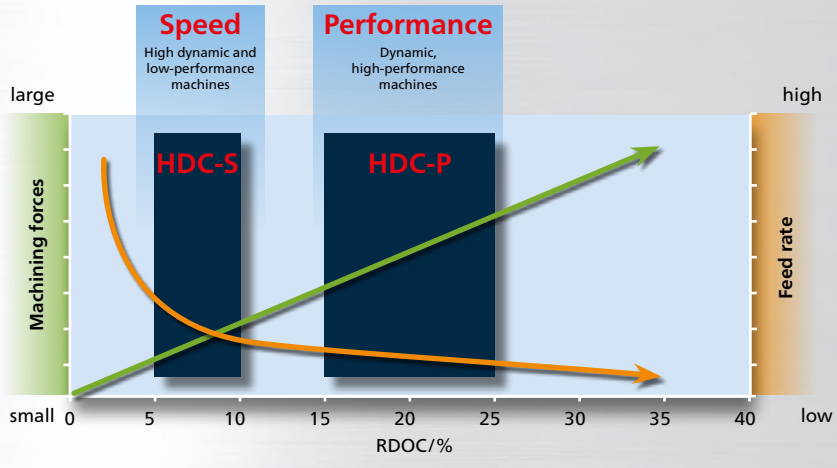
Example	
Machine:	3-axis
Workpiece clamping:	Vice
Clamping system:	Weldon
Projection:	Short

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

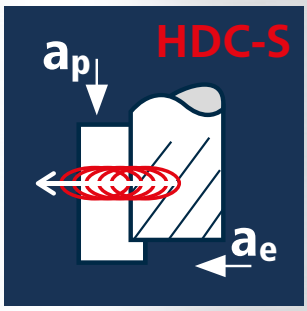
On the basis of the machinery, we differentiate between two HDC applications:

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-dynamic cutting. In both applications, approximately the same metal removal rates can be achieved.

HDC-S Speed



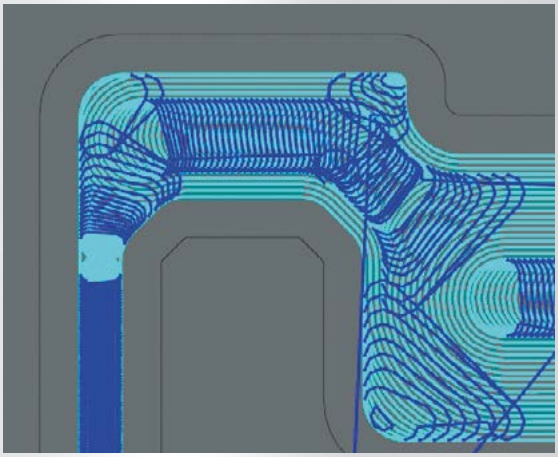
Characteristics

Radial infeed 5% – 10% of the tool diameter

Axial infeed over 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

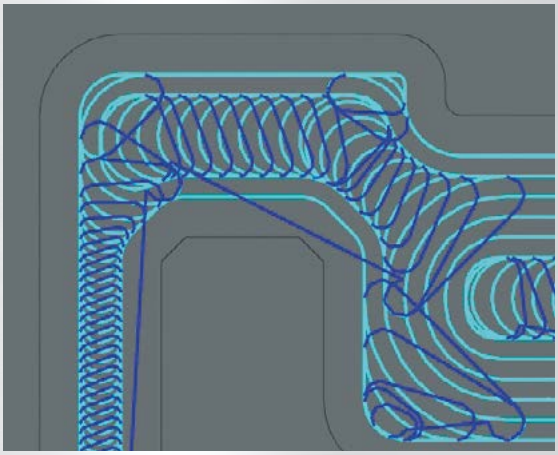
Characteristics

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

In HDC machining, tool selection is very important. To be suitable for this process, the tools must have high stability and a normal or medium-length cutting edge.

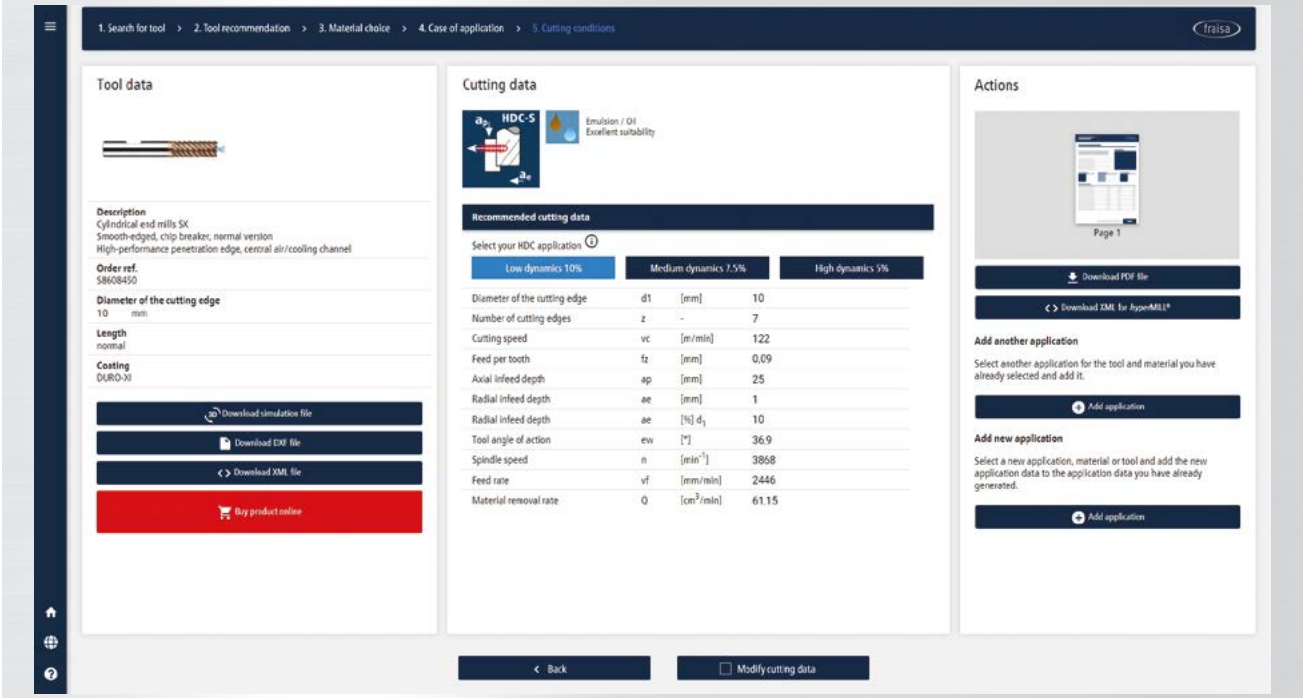
Our development team is continuously working on the creation of new tools as well as the enhancement of existing tools, which are ideally suited for HDC machining due to the following properties:

- 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

FRAISA tools for HDC machining

5 HDC cutting data

FRAISA ToolExpert®



In the fifth stage, the application data are calculated. To do this, FRAISA makes the ToolExpert cutting data calculator available online, so that the user can easily calculate the cutting data for the HDC strategy.
Success is guaranteed.

You can find the cutting data in our FRAISA ToolExpert®, and on our homepage **fraisa.com/us,** or simply follow the direct link: **http://www.fraisa.com/qr/enw24**

Available online

FRAISA ToolExpert®

FRAISA machining seminars
Learn more about HDC machining at ToolSchool

FRAISA Machining Seminars

Successful use of the FRAISA HDC strategy depends on application knowledge. FRAISA ToolSchool application seminars in Bellach, Switzerland and Minneapolis, MN and online, provide the opportunity to learn this valuable knowledge.

Our digital seminars have been steadily expanded and developed over the last few months. Thanks to our highly developed video technology customers have the feeling that they are attending the tool demos live in Bellach.

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**.

Scan this QR code to find more information on the FRAISA Group.

The fastest way to our E-Shop.

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