



**HEIDENHAIN**

63 + 3/2016

# Klartext

The magazine for the world of HEIDENHAIN controls



High Processing Safety and

Quality Production with the TNC

Functions for precise and safe  
production—simple and user-friendly

**Simulation models  
for greater safety**

3-D simulation and DCM

# Editorial

Dear Klartext Reader,

Among other topics this year's METAV—The International Exhibition for Metalworking Technologies—will be showcasing measuring and testing technology in the Quality Area. The exhibition's slogan of "We're rethinking quality!" perfectly fits the topics of this new edition of Klartext.

We will be presenting functions that specifically meet the high demands for processing safety in modern manufacturing. See how you can anticipate errors in the NC program using TNC simulation models (Page 4). Be amazed at what happens when you continue machining a workpiece without Adaptive Feed Control (AFC) (Page 10). Benefit from more precise machining results with CTC (Page 12).

Test the HEIDENHAIN functions and discover new horizons for your production.

Read and enjoy, with best wishes from the Klartext staff!



The new after work workshops: speakers from different companies present highlights for the manufacturing chain.



Configuring safe production—with Dynamic Collision Monitoring (DCM)

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The website for TNC operators



[www.klartext-portal.com](http://www.klartext-portal.com)



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Report on the Hirschvogel Automotive Group: High-quality tool manufacturing.



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*Every operator's nightmare:  
How to avoid damage with  
Adaptive Feed Control (AFC).*

## Production

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# Better to Look Forward Than Regret

Use of simulation models in TNC controls

*The simulation models of the HEIDENHAIN TNC controls ensure that production is reliable and safe. On the one hand, the operator has a detailed preview of the machining process, which permits faults on the workpiece to be detected up front and thus avoided. On the other, the control recognizes when collisions are imminent and prevents them in time. Reworking, scrap and machine damage need no longer be feared.*

Two simulation functions make production safer and more efficient—from manually controlled traversing movements when setting up the machine through to complex 5-axis machining at high speed during unattended operation shifts.

The **3-D simulation graphics** function runs NC programs virtually and takes into account the actual machine kinematics and configuration. The operator benefits from a reliable and rapid analysis of errors in NC programs.

The **DCM dynamic collision monitoring** calculates movements in the machine space in advance to avoid collisions. This applies both for setup mode and workpiece machining.

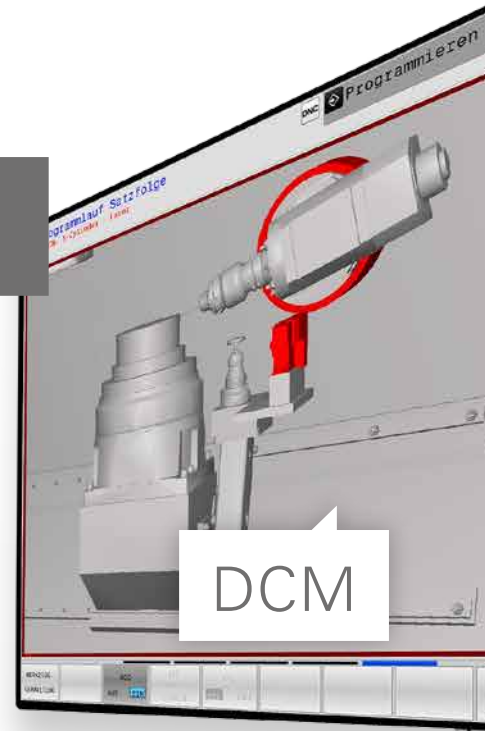
## NC programs with 3-D simulation graphics check for machining errors

The 3-D simulation graphics give the operator an informative preview of the machining process. The detailed simulation shows up irregularities in the program without putting workpiece, tool and machine at risk. It displays the workpiece at random viewing angles and simulates both milling and turning operations in a single view.

The simulation graphics are so rich in detail that the machine operator can recognize in advance problematic surfaces which would be caused by incorrect tool movement, for example. This also applies to CAM-generated programs: at maximum resolution the 3-D simulation graphics can display the tool movement

as 3-D line graphics with block endpoints and block numbers. This makes it easier to analyze the distribution of the points and enables the operator to assess the surface to be expected in advance.

The operator can select many views and perspectives to get a complete picture of the details. To obtain an enhanced spatial image the 3-D simulation graphics can show the workpiece edges as lines. The "transparent workpiece" view option gives a view of inside machining, even with rotationally symmetric workpieces. Color highlighting of the workpiece with a new color used for each new tool helps the operator to identify individual work steps and makes it easi-



## 3-D simulation graphics

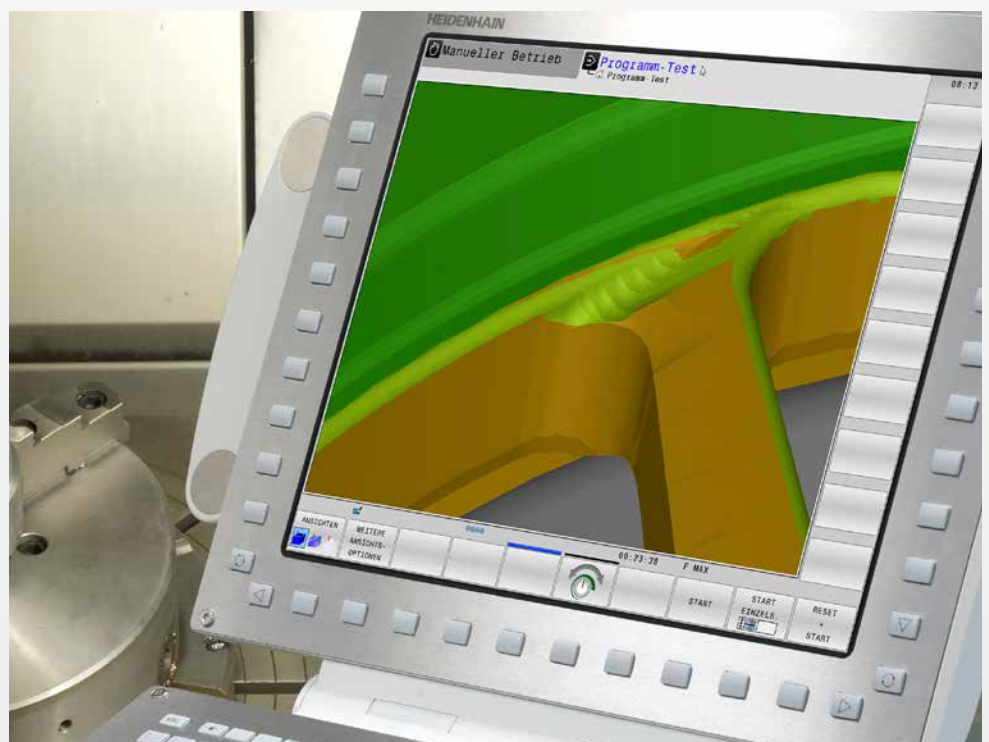
- 3-D simulation graphics
- + DCM dynamic collision monitoring
- = Maximum safety

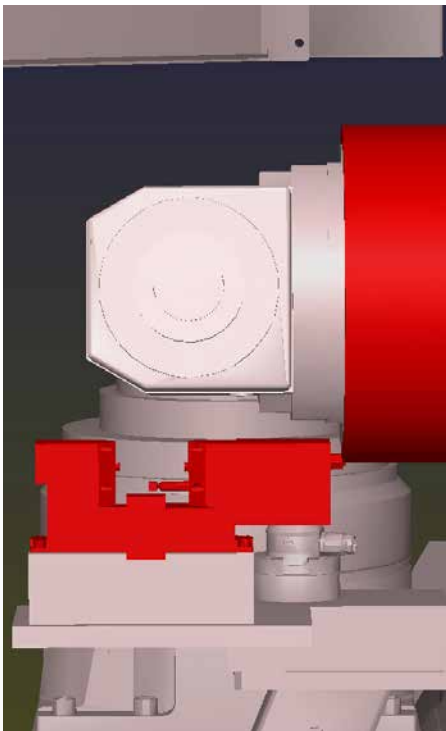
er to assign the tools used. The operator can also display the tools either completely or transparently and of course hide them at any time.

Working with the 3-D simulation graphics of the HEIDENHAIN control the operator can ensure reliable workpiece

machining without damage. This holds both for machining programs created on the machine and those from CAM systems. This is because the 3-D simulation takes into account the kinematics model saved on the TNC which is optimally matched to the actual machine tool geometry and realistically simulates machine movements.

*Easy recognition of errors:  
Using the 3-D simulation graphics  
the operator analyzes the NC  
program prior to machining.*





*Avoiding collisions:  
With the DCM dynamic collision monitoring  
the TNC control displays in red those machine  
components that are on a collision course.*

## DCM dynamic collision monitoring with highly detailed displays of machine components

The complex motions and the normally high traversing speeds of 5-axis machining make axis movements difficult to foresee.

DCM monitors movements in the machine space, both in automatic and set-up mode. The function prevents machine damage and subsequent expensive downtimes, and when collision is imminent, the HEIDENHAIN control halts machining, or in manual mode slows down the feed rate until a complete stop.

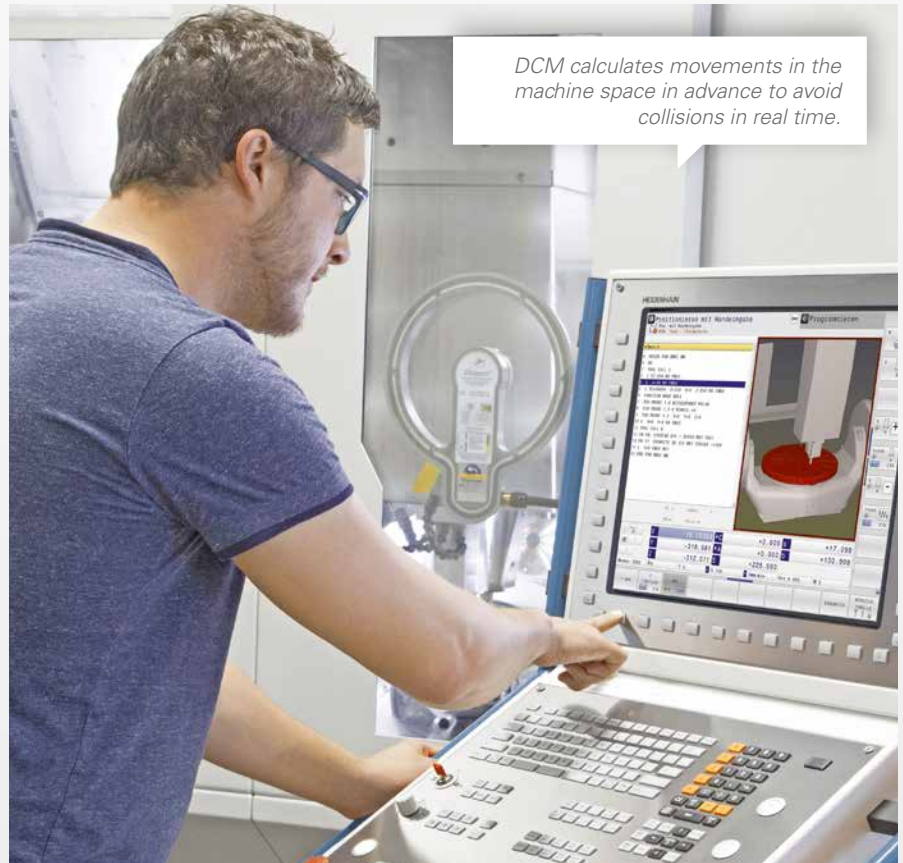
The TNC graphically shows the operator which machine components are on a collision course and issues a message. Because DCM runs in real-time mode, it also takes into account program modifications or manual actions still implemented by the NC program following possible simulation in the CAD system.

DCM takes into account in full detail all components in the working space: this applies to chucking equipment, fixtures, tools and tool holders as well as touch probes and other measuring equipment. A prerequisite here is the M3D format with which the machine manufacturer can also precisely display even complex components in the working space. DCM permits better utilization of the machine space—a great advantage in tight installation spaces.

In addition to repair costs, loss of capacity and rescheduling of deadlines there is also the fact that after a collision the machine might no longer work with the same precision as before thus impairing quality of manufacture. The Dynamic Collision Monitoring of the HEIDENHAIN control provides protection.

## M3D—the format for finely detailed views

The M3D format for imaging the collision objects makes DCM dynamic collision monitoring particularly effective. High-detail 3-D models provide a better view of potential collision objects. Machine manufacturers are thus given the option of using the PC tool M3D Converter to convert collision objects from their standard CAD models into the reliable M3D format and incorporate them in the TNC control.



# HEIDENHAIN touch probes ensure processing safety for critical workpiece machining



High-quality production relies on HEIDENHAIN at all levels

HEIDENHAIN touch probes guarantee reliable measured values even after millions of probes.

*Super alloys are high-temperature-resistant materials of a special composition. These include NIMONIC®, a nickel-based alloy with a history: Already in 1940, Frank Whittle, the English inventor of the jet engine, was using the material for the blades of his prototypes. The alloy was meant to withstand the high thermal and mechanical loads. It helped redefine the frontiers of the feasible in aeronautics. Back to the present: The Franconian contract manufacturer Ottmar Buchberger Mechanische Werkstatt GmbH produces many components for modern power plant turbines. These include power plant components made of NIMONIC®. Buchberger always relies on controls and touch probes from HEIDENHAIN for sophisticated machining.*

## Absolutely reliable

Buchberger designs the production processes to be particularly safe and traceable. Power plant turbine components leave no room for machining errors—even small components can cause enormous damage in heavy fluid flow machines. For example, 14 milling machines equipped with HEIDENHAIN iTNC 530 controls continuously machine power plant components made of the tough NIMONIC® alloy. Automatic measuring with HEIDENHAIN touch probes determines the workpiece dimensions, verifies the dimensional accuracy during machining and finally checks the defined positions on the machined workpiece.

The specialists in contract manufacturing set store by real machining conditions for tool measurement: after a trial cut on the

workpiece a HEIDENHAIN touch probe measures the milled surface. A cycle calculates the measurement values as delta values with the compensation values for the tool (length and radius). This procedure does take more time than direct measuring with a tool touch probe, but on the other hand it reliably takes into account deformations resulting from the high cutting pressure.

The tough, nickel-based alloy allows only small machining feeds and feed rates. Nevertheless, the workpiece is subjected very audibly to strong forces during machining. To prevent tool distortion from affecting the milling accuracy, the machining program calls measuring cycles in between defined machining steps. The control corrects any deviations automatically so that subsequent cuts produce a dimensionally stable contour.

Also being implemented is the latest generation of the HEIDENHAIN workpiece touch probes, the TS 460 with collision protection and blower/flusher jets. For Thomas Bruckbauer, Head of CNC Milling at Buchberger, these are important features when measuring during a running machining process and they were instrumental in the purchase decision. The blower/flusher jets use coolant or compressed air to clean the measuring point for reliable measurement results. The collision protection stops the machine if the touch probe hits the workpiece or chuck. At the same time it protects the touch probe by compensating light collisions. The touch probe is not damaged.

The automatic measuring of workpieces in series production means that the touch probes are frequently used. They resist the stress involved and guarantee reliable measured values after millions of probes thanks to the non-contact sensor. The measuring accuracy also permanently meets the expectations of the milling team. In addition, after a certain time the TNC experts calibrate the touch probes with automatic calibration cycles.

## Strong on communication

From Thomas Bruckbauer's point of view the HEIDENHAIN controls stand out in the machine park: "A great strength of the TNC controls is communication of the production data." For production data acquisition via the DNC interface the TNC provides the CIMCO software with status information, program names, program runtimes, error messages etc. Clearly visible to all concerned, several large screens are mounted throughout the workshop to provide a live machine status display. In series production, just one machine operator is responsible for multiple machines. The display helps the whole team keep an eye on everything. Problems can be recognized immediately, which ensures optimum machine utilization. The production data acquisition system helps document the production process when manufacturing critical parts. This is an essential element for quality control and reduces liability risks.

In series production, the programming specialists appreciate the classic user-friendliness of the HEIDENHAIN

controls: about 30% of the machining programs are still created directly on the control in the universally understood plain language. The NC programmers know all the aspects of sophisticated workpiece machining, such as the precise behavior of machines and tools. The programs created on the iTNC take these details into account and deliver efficient series production with high processing safety.

## High compatibility

In praising the compatibility of the HEIDENHAIN controls, Thomas Bruckbauer emphasized that "a program does not necessarily have to run on the same machine in exactly the same way as the last time". Seeing that all the milling centers are fitted with an iTNC 530 the milling team can use the machines for recurring parts according to availability. Thanks to the consistent equipping with the user-friendly control the machine operators and NC programmers can apply their knowledge and experience equally to all the machines.



Clear display of results: the machine operator can easily see a glance that the machining process has been successfully completed and can log the measured values for the process documentation.



Buchberger is likewise consistent with the touch probes: all iTNC-controlled machines have HEIDENHAIN touch probes. Numerous measuring and testing tasks are fixed features of

the program run. The CAD/CAM-generated programs also use the original HEIDENHAIN touch probe cycles to ensure consistently high quality of machining with automatic measurements.

**"A great strength of the TNC controls is communication of production data."**

Thomas Bruckbauer, Head of CNC Milling

## Demanding tasks

The contract manufacturer Buchberger covers a wide range of production tasks: alongside the series production of power plant components they also manufacture many other components for all sorts of sectors. Here there are practically no limits with workpieces weighing up to 25 tons. All the orders have one thing in common: they are very demanding and require special machining strategies.

Years of experience are the solid base for creating the necessary programs. In series production, for example, their own specially developed cycle replaces the tools not according to tool life but the number of workpieces produced on the machine. The criteria for changing the tools are based on practical manufacturing experience. This ensures reliable specification of the availability of tools for the machining tasks in question.

In choosing the machines for machining the nickel-based alloy, the focus was on the essential: a robust and resilient mechanical design and a good cost-benefit ratio. These requirements are met by 14 new machines from MTRent which prove their worth in the demanding series production of power plant components with sustained quality of manufacture. All the machines are equipped with controls and touch probes from HEIDENHAIN—Thomas Bruckbauer knows no compromise!



*Thomas Bruckbauer, Head of CNC Milling at Buchberger, at new machine tools for machining nickel-based alloys.*



*Buchberger utilizes the HEIDENHAIN TS 460 workpiece touch probes, with collision protection and blower/flusher jets, for measuring during a running machining process.*

**Buchberger GmbH**

The Ottmar Buchberger Mechanische Werkstatt GmbH with headquarters in Tuchenbach near Nuremberg meets the challenges of specialized metal machining. 90 skilled workers manufacture complex parts for the gas turbine construction, reactor technology and aerospace sectors. The top priorities are meeting deadlines and customer satisfaction.

**+ buchberger-gmbh.de**

# Glowing enthusiasm for AFC

How does the Dynamic Efficiency function AFC work as an overload protection?

*The functions of Dynamic Efficiency optimize removal rates and thus increase productivity in heavy duty cutting. What happens when the tool is overloaded during heavy duty cutting? How does AFC (Adaptive Feed Control) prevent damage? That is exactly what the HEIDENHAIN engineers wanted to know, so they launched a test. A block of stainless steel 1.4112 was to be cleared out—a typical task in mold making. The impressive results were documented by video and thermographic cameras.*

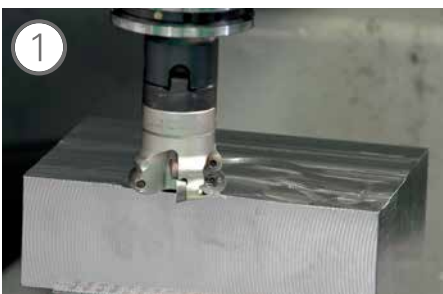
## Machining with AFC

At the beginning of the machining process the new tool shows hardly any heat generation and works completely normally for 58 minutes. Then the AFC stops the machining. The adaptive feed control has detected that the parameterized maximum spindle power has been exceeded. If there is a replacement tool available in the machine's magazine, the AFC would automatically change the tool when it detects an increase in spindle power. A trained and experienced machine operator would also replace the tool

at about the same time. The operator would have noticed the slight noise generation. He would have inspected the tool and clearly seen the wear on the tool.

## Continued machining without AFC

The HEIDENHAIN engineers now switch off AFC and continue machining with the identical cutting data. 72 minutes later the disastrous result becomes clearly apparent: the tool is completely useless, the inserts



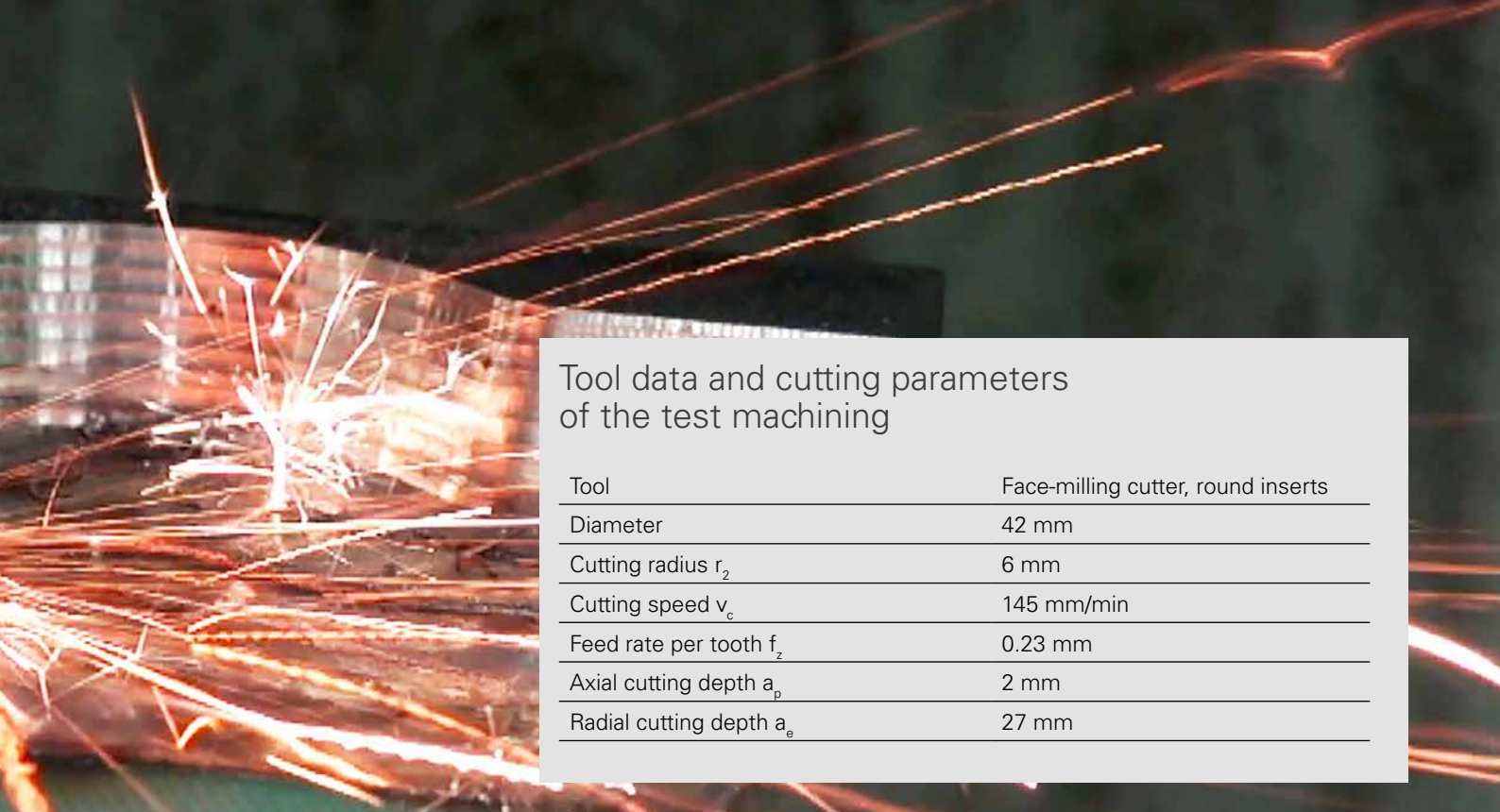
1  
Initial situation:  
Tool and workpiece  
for the AFC test



2  
At the beginning:  
Hardly any heat generation  
at tool and workpiece



3  
After 58 minutes with AFC:  
Spindle power at the time the  
AFC halts machining



## Tool data and cutting parameters of the test machining

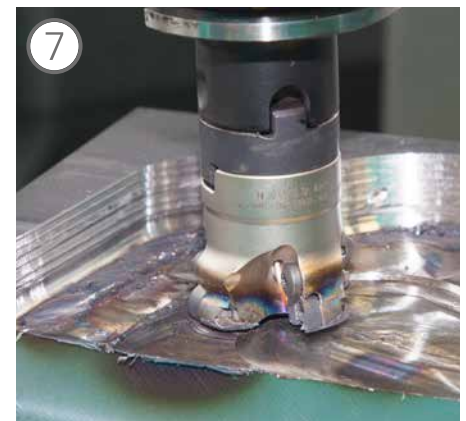
Tool	Face-milling cutter, round inserts
Diameter	42 mm
Cutting radius $r_2$	6 mm
Cutting speed $v_c$	145 mm/min
Feed rate per tooth $f_z$	0.23 mm
Axial cutting depth $a_p$	2 mm
Radial cutting depth $a_e$	27 mm

almost entirely destroyed, parts of the holder burned and the tool badly damaged. There is an emergency stop with the error message "Following error too great" because the drive is overloaded

The immense heat generation led to a glowing, sparking tool. The thermographic pictures show temperatures that are way too high both at the face-milling cutter and the workpiece. The evaluation of the spindle utilization produces values that are up to three times higher than at the time the AFC halted the machining.

## Result

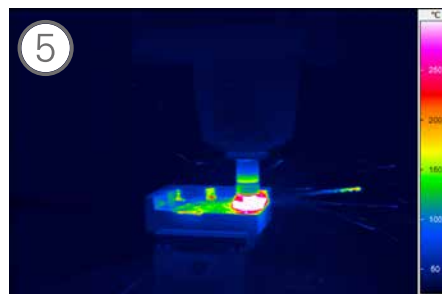
In an unmanned shift without AFC monitoring there would have been substantial damage and costs incurred. The AFC makes things a lot easier for the machine operator, because the AFC immediately recognizes an increase in spindle power as the tool wears and automatically changes to a replacement tool. The machine then continues with the machining task. On returning Monday morning after an unmanned weekend, the machine operator actually finds the desired result in the machine, without any nasty surprises.



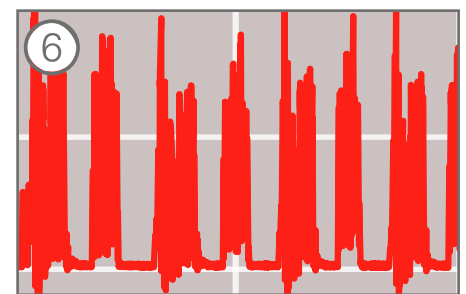
Result: Heavy damage to tool and workpiece



After a further 72 minutes without AFC: Machining continues until the tool and workpiece glow



Outside the measuring range: The temperatures at the face-milling cutter are over 300 °C



Just before the emergency stop: Spindle power with AFC switched off

## FUNCTIONS

# With the Dynamic Precision function CTC you have double benefits in manufacturing: higher speeds and greater accuracy

## Practical example: Interpolation turning with the TNC 640

*Here Klartext shows you a practical example of how the Dynamic Precision function CTC (Cross Talk Compensation) compensates position errors during interpolation turning. Interpolation turning with the TNC 640 is an interesting solution for obtaining exceptionally good surface quality for rotationally symmetric machining surfaces on a milling machine or machining center.*

Interpolation turning requires high machining feed rates involving rapid acceleration of the axes. This exerts great forces on the feed axes which in turn leads to position errors on the TCP. The result is deviation from contour on the workpiece: radius deviations and deviations of roundness. Taking the example of a stud we show how the CTC function improves the manufacturing results.

### Interpolation turning with the TNC 640 — Turning in milling mode

Interpolation turning is a machining procedure you can employ to perform rotationally symmetric machining on non-symmetrical parts. For this the turning process is executed in the milling mode of the machining center. The advantage here is that turning operations on workpieces can now be done entirely in the milling center. Rechucking to a lathe is not necessary. Previously the production of recesses, for example, or circular grooves or plane surfaces had to

### Conclusion

In practice the machine operator decides between higher accuracy and shorter machining times. CTC greatly expands the decision-making scope: if the accuracy achieved without CTC is adequate, the operator can increase the feed rate with CTC and shorten the machining time. Or, by keeping to the same machining time, CTC can be used to significantly improve accuracy.

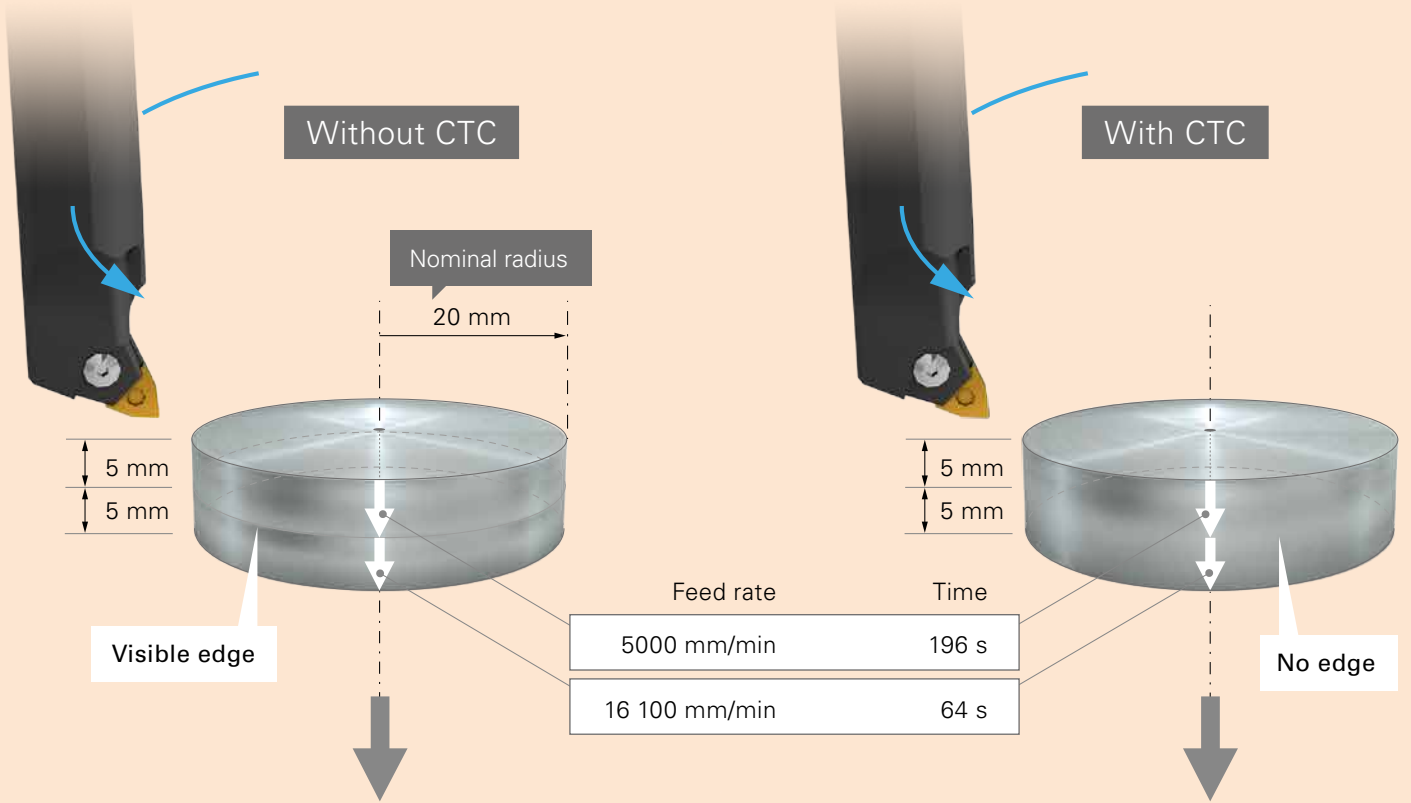
There are very many possible variations that can be employed to meet the demands of custom manufacturing tasks with regard to dimensional accuracy, roundness and machining time. Whatever solution is chosen, the workpiece is more accurate and the machining more efficient.

be done with expensive special tools or by circular milling.

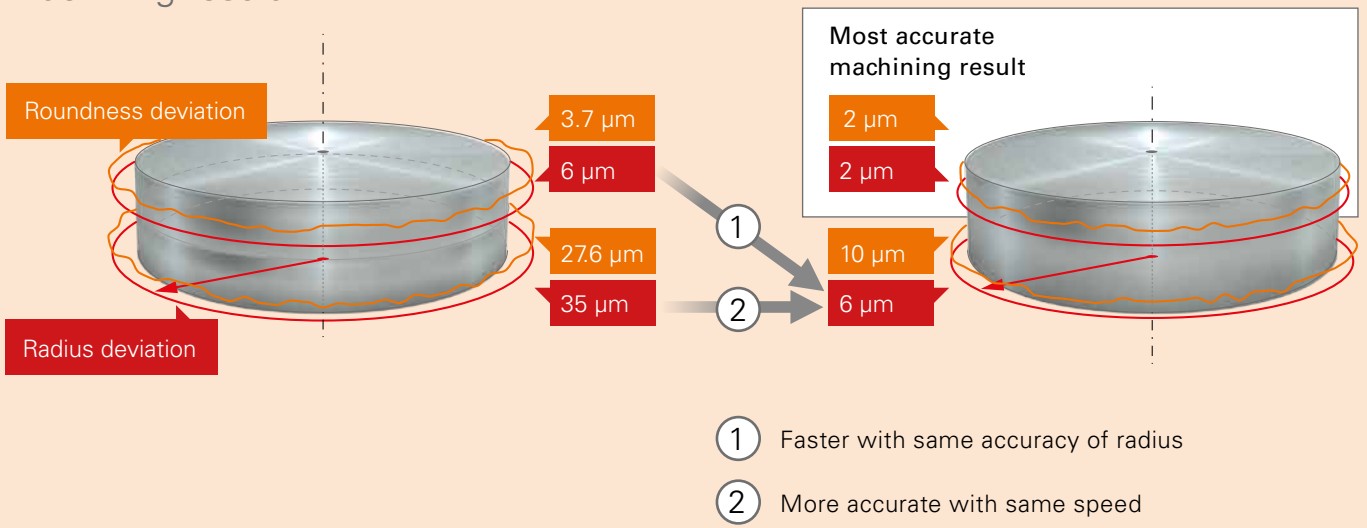
The main spindle of the machine is operated as a position controlled axis, i.e. synchronous C axis. The tool operates in a circular motion, the tooth points towards the center for external machining and away from the center for internal machining. The programming is done quite simply via a cycle.



# Milling a stud via interpolation turning:



## Machining result:





TRAINING

# After work workshops inject new enthusiasm into production

***User workshops are the hit. The last workshop specially for contract manufacturers was no exception. Speakers from various manufacturers gave presentations on two evenings to over 70 participants. The topics included the latest features and highlights for the manufacturing chain. The response: all round enthusiasm.***

"We just wanted to know what is possible and what's going on in our sector," said three employees from HF Zerspanungstechnik GmbH explaining why they were there. The attraction was the combination of different topics each dealing with tasks from the manufacturing chain. An easily digestible combination of theory and practice—presented on a HERMLE C42 MT with TNC 640, a Zoller tool presetter and other fixtures in the machine hall of the HEIDENHAIN Training Center—made the visit an interesting and worthwhile experience.

After introduction of all the speakers, HERMLE made a start by presenting the latest series of their machine tools and

demonstrating their solutions for status monitoring, production data monitoring, pallet handling and predictive maintenance.

HEIDENHAIN presented a whole range of the latest functions:

- For setup: the DCM Dynamic Collision Monitoring and touch probe cycles
- For programming: cycle programming and the DXF converter
- For machining: the Dynamic Efficiency and Dynamic Precision function packages

Zoller presented a universal concept for efficient tool management from the drawing to the finished workpiece and Hoffmann demonstrated GARANT 360° TOOLING, its extensive combined service package.

In the machine hall of the HEIDENHAIN Training Center the workshop participants were able to get a good idea of the practical application of the functions and solutions presented, backed up by the answers to any questions they had.

On two machine tools HEIDENHAIN demonstrated how the AFC adaptive feed control and the DCM dynamic collision monitoring work in practice. The CAD viewer and manual touch probe cycles were also shown.

HEIDENHAIN showed the Cycle 292: INTERPOLATION TURNING and CONTOUR FINISHING in full operation. This permits you to achieve rotationally symmetric contours in the active working plane. The cycle can also be used in the swiveled plane.

The participants experienced live the camera-based inspection of the setup with VSC (Visual Setup Control) on one of the mobile demonstration units.

The workshop got manufacturers and users talking. The participants benefited from the opportunity of seeing for themselves what the new functions and products can do. The evening was rounded off with a bite to eat together and a lively exchange of information.

## Participants' reactions



"What pleased me in particular was the new interpolation turning cycle. We often have this task and until now have had to solve it with form tools. I was interested in quite a few of the workshop topics like tools, tool gauging and the like—I was very satisfied with everything offered."

Siegfried Laubenbacher, Maschinenbau Eggerstorfer GmbH

"We didn't know what to expect ... but there were many interesting components included. With Zoller we definitely saw some ingenious solutions for tool gauging. It is also always interesting to see what others are doing."

Josef Unterlinner, EMED GmbH



"The combination of topics caught our attention, in particular because the workshop was announced specially for contract manufacturers. We found the offering attractive and we will definitely use a lot of what we've seen."

Max Heiland, Max und Franz Heiland GmbH

*The Zoller presentation awoke the workshop participants' interest in professional tool management.*



User workshops—  
close to you.

The workshop series for users will be continued at various locations in 2016. Workshops in 2015 were held in Kassel, Gosheim, Velbert and Traunreut among other places.


Take a look at what the courses have to offer: impressions of a workshop captured on video in Kassel.

+ [www.klartext-portal.com](http://www.klartext-portal.com) > Media Library > HEIDENHAIN on YouTube

The next workshop "MAXXimum Performance" with the topic of "How can I get the best out of my machine?" will take place in Traunreut on June 1, 2016.

Registration:

+ [www.klartext-portal.com](http://www.klartext-portal.com)



# TNC ensures excellent surfaces with hard machining

TNC controls master dynamic performance in HSC milling for toolmaking

Surface imperfections not tolerated: tools for drop forging

*In car manufacturing, the power transmission components—like crankshafts and gear parts—are usually produced from hot-formed blanks. Processes like drop forging and extrusion make these components tougher and more resistant to be able to withstand high dynamic loads. The lightweight construction trend greatly increases the significance of massive forming. The Hirschvogel Automotive Group is outstanding in its enormous experience in combined forming processes for the automotive industry. The Klartext editors visited the toolmaking facility of*

*Hirschvogel at their headquarters in Denklingen in Upper Bavaria. Here, small lot sizes of tools and forging dies are produced for manufacturing on Mikron high-speed machining centers from GF Machining Solutions, controlled with high accuracy by HEIDENHAIN TNC controls.*

"High accuracy at high speeds is our greatest challenge," says Manfred Dunderer, Head of HSC milling at Hirschvogel-Werkzeugbau. In the case of forming tools made of tempered tool steel the demands are constantly rising: when forming they are subjected to temperatures of up to almost 1200 °C;

they have to withstand sudden loads and at the same time produce the exact forms. Surface imperfections are simply not tolerated. For toolmaking at Hirschvogel the HSM machining centers from GF Machining Solutions are utilized for HSC milling because of their high rigidity at high dynamic performance. Precisely with continuously increasing degrees of hardness—at Hirschvogel they mill hardnesses of up to 66 HRC—these machines, combined with the highly accurate motion control of the HEIDENHAIN TNC controls, achieve outstanding surface quality.





A powerful team:  
HEM 500 U machining centers from GF Machining Solutions with TNC control

## Hirschvogel parts in practically every car

With sites throughout the world, the Hirschvogel Automotive Group is one of the largest suppliers to the automotive industry. Each of their own developments is optimum in its own right with regard to function, strength and size. A wealth of experience in massive forming processes makes it easy for Hirschvogel to take new developments into account and implement combined processes. In this way Hirschvogel succeeds in manufacturing parts in large numbers at an economically viable price. On the topic of lightweight construction, forming processes—with the corresponding part design—have a great potential for saving weight.

## Forging die quality is decisive for good workpieces

"For milling, we use HEIDENHAIN controls across the board," explains Ralph Schramme, Production Manager for Tool-making. "This makes us very flexible." Operators change the machine or an order changes the machine: with the same control everywhere this is a simple process. Here the TNC is accurate and—de-

pending on the machining job—particularly fast. This is thanks to the Operator Support System (OSS) that Hirschvogel uses, a function which GF Machining Solutions provides as an extension of the HEIDENHAIN Cycle 32. The machine operator simply has to set the dynamic ma-

pressures make it expedient to minimize set-up times. Georg Gebler, Director of Hirschvogel-Werkzeugbau explains: "We have to have a new tool ready in 3 to 4 weeks, which means that we have to drastically reduce our run times." The pallet changing sys-

**" We achieve the hard machining with HSC milling using a combination of machines from GF Machining Solutions and controls from HEIDENHAIN."**

Ralph Schramme, Production Manager, Hirschvogel-Werkzeugbau

chine behavior as required: more accurate or faster despite the high dynamic performance. The CTC and AVD functions from HEIDENHAIN's Dynamic Precision package come into play here to reduce the dynamic deviations of the machine.

## Small lot sizes with short run times

At Hirschvogel-Werkzeugbau the lot sizes are typically from 1 to 10—and a challenge too. Cost and deadline

tems from GF Machining Solutions are essential for this. This compact and integrated automation solution permits machine operators to prepare the next jobs outside the machine in zero-point clamping systems. The pallet changer can take up to 20 workpieces—with its own access to make loading easier. The familiar user-friendly TNC control from HEIDENHAIN handles the management. The machine operator has a clear overview of the jobs to be processed thanks to convenient table views.

*Fast machining with lot sizes of 1 to 10:  
increased throughput with pallet changers.*



Hirschvogel has problems filling unmanned shifts because the typical machining operations do not take long. The solution was the idea of switching to two shifts with 4 hours between each of them: from 6:00 a.m. to 2:00 p.m. and from 6:00 p.m. to 2:00 a.m. "We can easily fill the 4 unmanned hours with the pallet changers and we keep the big jobs for the weekend," says Manfred Donderer.

## The best of support from GF Machining Solutions and HEIDENHAIN

"We enjoy excellent support from GF who are well in tune with our needs and requirements," Ralph Schramme says in praise of the good cooperation with the Swiss machine makers. Customer-specific solutions are also made possible because the control manufacturer



*Massive forming processes are the specialties of the Hirschvogel Automotive Group.*

HEIDENHAIN readily joins in and actively supports the machine manufacturer. For example, a custom cycle was created specially for Hirschvogel-Werkzeugbau for a travel range limitation. This was done using CycleDesign, the HEIDENHAIN software for creating cycle structures. On request it is even possible to define a special soft key.

In this way the Mikron high-speed machining centers from GF Machining Solutions fit perfectly into the spectrum of parts and machining tasks. Furthermore there is the good unit productivity rate including automation solutions—the best choice for Hirschvogel in combination with HEIDENHAIN controls.

## Hirschvogel Automotive Group

As a premium partner of the automotive industry the Hirschvogel Automotive Group develops and produces parts for engines, injection systems, gears, power trains and chassis. As a specialist in massive forming and cutting processes Hirschvogel has over 4000 employees worldwide.

+ [www.hirschvogel.com](http://www.hirschvogel.com)

*HSC professionals: Ralph Schramme,  
Production Manager for Toolmaking, with  
machine operators Norbert Teicht and  
Alexander Raabe as well as Manfred Donderer,  
Head of HSC milling (left to right)*



SERVICE

Stay

productive!



*The HEIDENHAIN Service warehouse holds replacement parts and devices ready for immediate delivery—even 20 years from now!*

***Have you already been using HEIDENHAIN products for years? Or would you like to start using new devices and controls from HEIDENHAIN? In both cases, HEIDENHAIN Service ensures that you can rely on the function, performance and quality of HEIDENHAIN products now and in the long term.***

For HEIDENHAIN Service it is important that you stay productive and do not have to wait long for replacements. For its products HEIDENHAIN holds replacement devices and parts in stock for up to 20 years. Alongside the current components the Service team ensures that as-new parts remain available for older devices over long periods of time.

To keep this exceptional promise HEIDENHAIN maintains a service warehouse at its headquarters in Traunreut. Regional service points complement the central warehouse. In this way, Service ensures that the required parts and devices are on site mostly within 24 hours in Europe, North America and many Asian countries.

And, if necessary, you can also expect spontaneous action from the HEIDENHAIN help line. A competent team of helpers works together with you to identify the problems and provide the best possible remedies. But that's not enough. Many more topics are covered:

- How to operate devices
- How to implement and program HEIDENHAIN controls
- How to program and modify PLCs
- How to apply HEIDENHAIN encoders
- Machine inspection and calibration

We are also there for you even outside regular business hours: on weekdays up to 8:00 p.m. and on Saturdays through the on-call duty from 8:00 a.m. to 6:00 p.m.

Find your local competent service partner:

+ [heidenhain.services](https://www.heidenhain.com/services)



Your satisfaction matters—long term.



# HEIDENHAIN



## CNC PILOT 640 – With TURN PLUS for an NC Program at the Stroke of a Key

The CNC PILOT 640 is the powerful control for lathes and turning-milling machines. Thanks to its multifaceted programming capabilities, it always offers you the right support and needs very little time for teaching and learning. With its powerful TURN PLUS automatic program generation, the control brings you on the fast lane from the drawing to the finished workpiece. After you have graphically entered the geometry of the workpiece blank and finished contour, or imported it from a DXF file, you simply select the material and fixtures. TURN PLUS does everything else automatically. Your result is a complete and comprehensively commented NC program in smart. Turn format, and that with up to 80% time savings in comparison with manual DIN programming.

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Angle Encoders + Linear Encoders + Contouring Controls + Position Displays + Length Gauges + Rotary Encoders