

# GÜHRING

## 2023 BEST PRACTICE



**Costs down, tool life up.** Three Gühring milling cutters are helping to achieve this at Hennecke GmbH. Each of them offers clear advantages over the competition: double the tool life with the same cutting values, four times the cutting speed in heat-resistant material and nine minutes of time saved per component in stainless steel. This proves that tool changeovers can still make sense even if there is no technical problem. Ask your sales representative.



30 solutions for day-to-day machining



11 cutting values and parameters for you



8 genuine success stories

### CHIPS & TRICKS

#### Easy-peasy videos

Not keen on flipping through specialist books page by page? Using simple tutorials, Gühring solves the most common problems when drilling, milling, turning, clamping or threading. You'll find it all in our new YouTube series Chips & Tricks.

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#### HSS, SC or PCD?

Every material has its own individual advantages in different applications. Our quiz provides you with an easy way to find out which tool can offer you the most cost efficiency.

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#### Is the tool search getting on your nerves? Not with us!

Still got room for improvement in your tool management solution, but lack the time to make changes alongside your day-to-day business? With tool management from Gühring, you can concentrate completely on the tasks that generate value for you.

p. 24/25

Dear customers, dear readers,

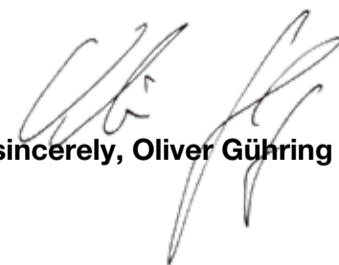
This year Gühring is celebrating its 125th anniversary. 125 years in which we helped to shape the machining industry. We will continue to take on this role in the future; a future that poses new and increasingly complex challenges for businesses. Some of them will take us into brand new territory: For instance, Gühring is now available as a YouTube series that regularly provides you with solutions to your machining problems (p. 4/5) and a new Gühring product is currently conquering the field of additive manufacturing (p. 28/29).

In order to create innovations that offer you real added value, we rely on close partnerships. This is evident, for example, in mould and die, one of the major growth markets at the moment: Together with customers such as Hago (p. 8/9), we looked into ways to make our tools for this field even more reliable. The result is not only satisfied customers, but also a completely new range of tools. This is our mission statement: To develop solutions, from practice for practice.

Of course, digitalisation is also one of the most important issues for the future: Our software solutions make your job easier. While one customer is bringing 100% transparency to its production processes through our machine connection solution (p. 18/19), another is able to calculate the cutting data for its application in the online navigator (p. 6/7).

These are all stimuli that should help you to remain competitive over the long term – and save costs in everyday life. Whether it's because you achieve cost savings of 62% with our re-grind service (p. 22/23), reduce your tool costs by 20% thanks to tool management (p. 24/25), or because we have uncovered potential savings in your processes with process data analysis (p. 10/11). We are at your side with our 125 years of experience, but always with our sights on the future. This magazine is full of examples of this and we hope you enjoy reading it!

Yours sincerely, Oliver Gühring




## SUCCESS STORY

**Save three solid carbide milling cutters per job**  
RF 100 Sharp at LB production service  
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**Software in the poster country for digital technology**  
100% control at Metec in Estonia  
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**Cost-efficient management of operating resources**  
Digitalisation at Fill Maschinenbau  
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**Searching for tools eats up time. But not yours.**  
Tool management at Hewi  
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**Wear is a thing of the past; today, you can manufacture with process reliability**  
Hard milling in mould making at Hago  
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**Tool life up, costs down**  
Milling at Hennecke  
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**Diamond nozzle for additive manufacturing**  
Dianoz in CR-3D  
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## ADVICE

**The biggest mistakes made when threading**  
And how to avoid them  
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**Machining a shaft: Grooving operations**  
Five typical problems and how to solve them  
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**Flying blind with your machine?**  
Recording process data and detecting errors  
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## READING & LEARNING

**Check out Chips & Tricks and learn while watching**  
Our new video series  
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**HSS, SC or PCD?**  
Find out more in our quiz!  
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**Drilling by hand**  
Professional quality from the manufacturer  
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**Carbide from Gühring**  
How it is produced, how we re-grind, how you save by recycling  
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Take a look at  YouTube

# CHIPS & TRICKS – OUR NEW VIDEO SERIES

**Why does my thread tap break, how do I avoid vibrations during milling and which strategy can I use to successfully drill deep holes on CNC machines? If you encounter a problem during machining, you need to work quickly to find a solution. As a customer, you already rely on our sales representatives to identify and solve typical problems in no time at all. Or you can simply search for tutorials on the issue at hand on GühringTV: The Chips & Tricks YouTube series solves the most common problems when drilling, milling, clamping, grooving or threading.**

With the new Chips & Tricks YouTube series, Gühring is launching a regular series of short explanatory videos: Topics include typical machining problems and their solutions. One example: The milling cutter breaks during machining for no apparent reason. This is caused by forces acting on the milling cutter: Radial deflection forces and axial tensile forces. If these forces become too high, the tool will be overloaded and break. However, if the tool and workpiece are clamped correctly, tool breakage can be prevented. And you can find out how to do so now in Chips & Tricks. Our host Lara Zell explains why these forces are generated in the first place and what proper clamping looks like in this case – all in under five minutes. “We make sure that we don’t waste time and get to the point quickly. Machining scenarios and explanatory animations present machining problems in an understandable and entertaining way,” explains Lara Zell.

## YouTube:

### The search engine for videos

And which stage is better suited for this format than the world’s largest video platform, which anyone seeking help can access quickly and easily: YouTube. Be it drilling, milling, threading or grooving – with Chips & Tricks, Gühring is not restricting itself to a specific tool category. And each user benefits from 125 years of manufacturing know-how. Simple, fast and fun. With more than two billion users logged in every month, YouTube is the leader of all video platforms. Videos can be watched free of charge and accessed from anywhere with Internet access. Gühring is making the most of this reach and flexibility – and publishing every episode in

**” It is important for us to keep pace with the times and communicate with our users interactively.**

Oliver Gühring, CEO

German and English for the international community. But why has Gühring opted specifically for a problem-solving format? YouTube is not only the front-runner of all video platforms, but also one of the largest search engines in the world. And the platform has long ceased to serve as a pure entertainment medium: “Anyone who is having trouble understanding maths

goes looking for a video to help them learn. If you want to replace your broken mobile phone screen, you can find a suitable tutorial. We would also like to offer explanatory videos to help, for example, if annoying chip nests keep forming during milling or a thread has become too big,” says


**” We make sure that we don’t waste time and get to the point quickly.**

Lara Zell, Queen of Chips

Gühring owner Oliver Gühring, describing the new format. “It is important for us to keep pace with the times and communicate with our users interactively,” continues the Gühring boss.



 **1** [chipsandtricks@guehring.de](mailto:chipsandtricks@guehring.de)  
send in your topics

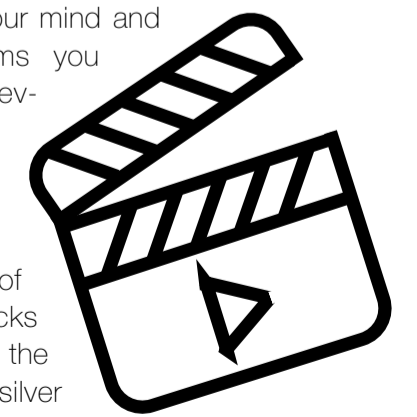
 **<5 Min**  
professional knowledge to-go

 **24/7**  
available free of charge

## Behind the scenes: Get involved!

While some companies employ or sponsor influencers and YouTubers, Gühring has chosen a different route: A manufacturer through and through, Gühring does not outsource its YouTube series, even when it comes to getting behind the camera. Chips & Tricks is a 100% in-house production – from searching for machining-related topics, to recording footage in our in-house studio to producing the finished video. Relevant topics are provided directly by our customers via the sales team, as well as by product management and the research and development department. Over the long term, Gühring would like to address issues suggested directly by its community. The Chips & Tricks mailbox was set up precisely for this purpose. You can submit ideas, queries and suggested topics to the e-mail address [chipsandtricks@guehring.de](mailto:chipsandtricks@guehring.de). So please let us know what is on your mind and what problems you face in your everyday life.

And perhaps one of the next episodes of Chips & Tricks will serve you the solution on a silver plate.



Watch now on GühringTV!

Three tools for higher parameters

# TOOL LIFE UP, COSTS DOWN



**2x**  
tool life with the same cutting values

**9 Min**  
of time saved in stainless steel

RF 100 Speed	RF 100 Diver	RF 100 VA
Art. no.: 6961	Art. no.: 6736	Art. no.: 3803
Material: P250GH (1.0460)	Material: P250GH	Material: X38CrMoV5-1
$v_c = 292$ m/min	$v_c = 450$ m/min	$v_c = 180$ m/min
$f_z = 0.2$ mm/z	$f_z = 0.13$ mm/z	$f_z = 0.1$ mm/z
$a_p = 80$ mm	$a_p = 30$ mm	$a_p = 26$ mm
$a_g = 90$ mm	$a_g = 3.2$ mm	$a_g = 3.2$ mm
$\phi = 25$ mm	$t = 5.19$ min	$t = 12.8$ sec.
	$\phi = 16$ mm	$\phi = 16$ mm

**Enjoy longer tool lives and save money at the same time: Hennecke GmbH is managing to do just that together with Gühring. Three highlight products show why the machine and system manufacturer relies almost exclusively on Gühring for milling.**

Hennecke GmbH is a global leader in the production of machines, systems and technologies for the processing of polyurethane. Whether in cars, clothing or furniture – the synthetic substance is an indispensable part of everyday life. With a broad product portfolio, Hennecke not only caters to the diverse properties of polyurethane, but can also adapt the necessary machine and system technology and process technologies to customer-specific requirements. Flexible and powerful tools are a must for the manufacturer.

But flexibility and performance are not the only criteria that Hennecke looks at when purchasing tools. With a focus on cost-effectiveness, the company based in Sankt Augustin is constantly striving to make processes more efficient while also reducing costs. And this is precisely where Gühring proves itself to be a reliable partner that doesn't just supply tools – it also helps to uncover hidden savings potential: "A standstill in process optimisation results in a backlog. Hennecke therefore runs continuous series of tests, whether in milling, drilling, reaming or grooving," says Marcel Horn, sales representative. "As a result, a number of machining operations were completely changed and improved." This applies particularly to the field of milling. Hennecke now purchases almost all of its milling tools from Gühring.

explains Tobias Hörger, planning engineer at Hennecke. Although the previous milling cutter from the competitor had worked, in retrospect it would not have been competitive from a cost perspective. The RF 100 Speed P is characterised by high metal removal rates and stable process reliability. Even in materials that are difficult to machine. The unequal blade pitch of the RF 100 Speed P also improves running smoothness in HPC milling and leads to excellent surface quality. The stable cutting edge corners with corner chamfer and front correction offer optimum protection against wear. This results in a longer tool life, which benefits Hennecke.



#### Four times the cutting speed

And another application case also shows how a Gühring milling cutter reveals undiscovered potential. When sales representative Marcel Horn presented the RF 100 Diver to Hennecke, the new product quickly impressed with extreme cutting values: When manufacturing a terminal block, the RF 100 Diver outperformed a previous 16 mm end mill from a competitor by a factor of four. The Diver, which was perfectly suited to the terminal block's heat-resistant material, can produce the component at a cutting

speed of 450 m/min, whereby the previous tool could only achieve a maximum of 120 m/min. The time saved per component is over twelve minutes. But this is just one of many examples. "With the Diver, we produce around 1,400 related components every year with a similar level of savings," Hörger says. Switching to the Diver was also straightforward and helped to save time: "We could simply take the cutting values from the Navigator." The Diver impressed Hennecke not only with its excellent cutting values and tool life, but also with its versatility in ramping, drilling, slotting, roughing and finishing – and with optimum chip removal and tool stability. As such, the Diver performs particularly well as a three-flute design, even under difficult machining conditions. "We were struggling with vibrations on a machine that we couldn't control with other tools, even when we corrected the cutting parameters. With the RF 100 Diver, we were able to machine much faster without any vibrations," recalls Tobias Hörger. Due to the unequal distribution of the cutting edges, hardly any vibrations are able to occur.



#### Half the machining time

Hennecke recently started using the high-performance RF 100 VA end mill: Another example of a tool that enables the customer to benefit from higher metal removal rates and tool lives. When manufacturing a mixing head blank, the RF 100 VA doubled the previous cutting speed from 90 m/min to 180 m/min, saving an impressive 9 minutes per component. This tool is particularly suitable for soft, tough and stainless steels. The milling cutter impresses with its running smoothness, optimum chip removal and stable cutting edge corners. "We were able to achieve good results using the RF 100 VA in high-alloyed stainless steel," says Hörger.

#### Uncovering potential with Gühring

Hennecke shows that the search for a better alternative does not always have to be preceded by complications. Gühring always sees itself as a technology partner for its customers. With the common goal of enhancing processes on an ongoing basis. While other manufacturers stick to established processes, Hennecke is exploiting hidden potential through foresight. And, as a result, it is able to reduce costs and machining times across several tool categories and

significantly extend tool lives. In addition to milling cutters, the company now also uses numerous grooving systems as well as micro and deep hole drills, combined with the same advantages: Time and cost savings. Gühring shows that changing tools in this way can be easy. In many places, Hennecke was able to replace the tools directly and has already noticed significant improvements. With the cutting data that Gühring provides free of charge via the Navigator, the customer also saves precious time during setup. And all this without any compromises, because the need for top quality never loses its priority.

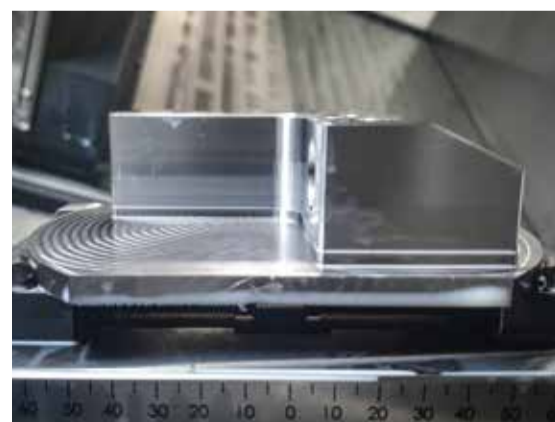


Buy a milling cutter and get started!



#### Double the tool life

Inspired by the savings potential in drilling tools, Hennecke was also eager to optimise milling. And it hit the mark with the RF 100 Speed P solid carbide milling cutter. The cutter easily replaces the previous tool: "We switched to the RF 100 Speed P without adjusting the cutting values. As a result, we were able to double tool life immediately,"



The RF 100 Diver cuts a terminal block made of heat-resistant mild steel in less than six minutes.

In collaboration with:

**Hennecke**  
Polyurethane Technology

**GÜHRING**

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Tools for mould making

# FOUR TIMES MORE THREADS WITH HARD MILLING

Tools for punching sheet metal have to withstand a lot. Hago Feinwerktechnik GmbH therefore uses materials of up to 66 HRC in its own toolmaking facilities. In order to incorporate threads and contours into these materials, the company relies on cutting tools with complete process reliability. Here, two Gühring tools not only impress with low wear, but also with considerable cost savings – a real competitive advantage for Hago.



Moulds for sheet metal processing are produced in the hard milling department at Hago.

Almost no other sector has to deal with as much cost and competitive pressure as mould and die. Paul Preiser, who is in charge of component production at Hago Feinwerktechnik, is well aware of this: "We are always interested in alternative solutions and try to be involved at an early stage in new technologies in order to secure a competitive advantage for the company." Like about 50% of companies in the field of mould and die, Hago deals with sheet metal processing. Based in Küssaberg (Waldshut district), the company produces sheet metal parts for the automotive industry using punching technology. When Paul Preiser took over his department a few years ago, he noticed that there were huge costs in the field of cutting tools. His first step: To get things in order. "I was looking for a way to bring a more systematic approach to the tool management field," he recalls. He then came across some cabinets from Gühring at another local company. Today, three of these tool cabinets ensure that all cutting tools are organised, locked and stored in their drawers with controlled dispensing. But that was just the beginning. He then started to analyse the cutting tools: "Where can we make improvements? What tools can we do without?" For him, it was clear what was needed: He wanted Hago to use tools that were specially made for mould and die.

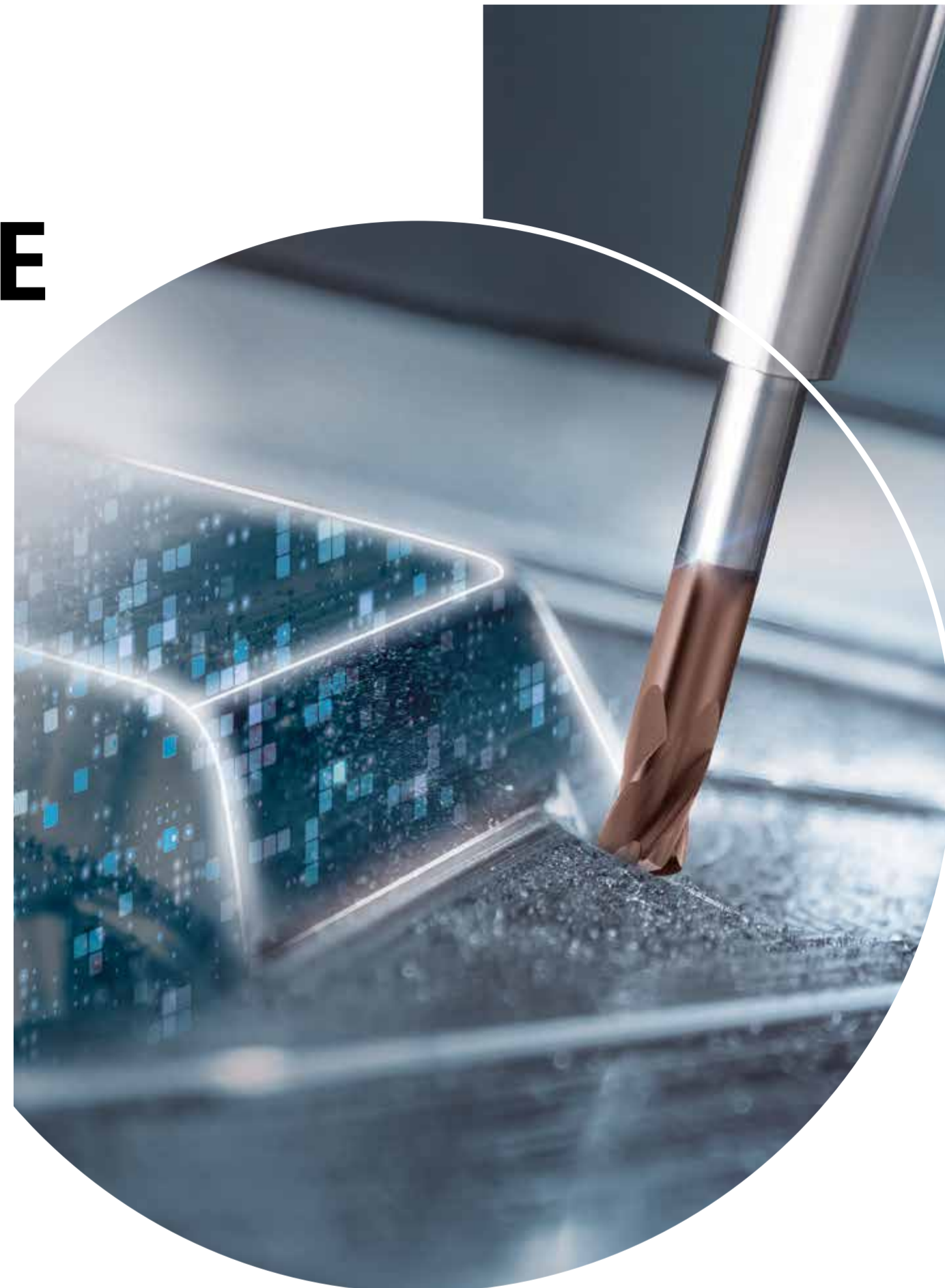
## Hardly any wear, no matter how hard

Punching tools are subject to high requirements as they are used on presses with a pressing force of up to 1200 tonnes and must guarantee reliable, stable and reproducible processes. Hago therefore relies on steels with degrees of hardness between 56 and 66 HRC (e.g. cold work steel 1.2379 and powder steel). However, it was precisely this variety of materials that posed difficulties for the employees in the toolmaking department. For example, a competitor's thread milling cutter performed well in one material, but on an alloy with 66 HRC it eroded the teeth away – literally. After just four threads, the gauge was no longer accurate. This is where Gühring and its micro thread milling cutter came in: Its coating is specially developed for hard machining in mould and die. This was reflected in the tool life in particular: The Gühring thread milling cutter created twelve threads instead of just three. As a result, Hago saves three times as much on tool costs: Firstly, because less wear reduces the need for

**“ We have achieved cost savings of around 20% using the Gühring thread milling cutter for this machining operation. ”**

Paul Preiser, Hago

tools, secondly because all materials can now be machined with just one tool and thirdly, because the thread milling cutter is a combination tool which produces the core hole and thread in one step and without a tool change cycle. "For us, the focus was on the cost aspect," says Paul Preiser. "We have achieved cost savings of around 20% using the Gühring thread milling cutter for this machining operation." Today, the tool is used for all threads in the field of hard metals at Hago.



## High-feed milling in the premier class

But this is not the only machining operation at Hago for which Gühring was able to offer a more economical alternative: "A competitor's product was used for hard milling," recalls Oliver Mattes, who has been advising Hago as a sales representative for over ten years. "But we were convinced that we could do better." Hago agreed to a test and was able to mill pockets with a target depth of 35 mm. The challenge? Despite the very hard material with 62 HRC, it exceeded the tool life of the competitor's tool. Gühring engineers had an ace up their sleeve here, too. A carbide developed especially for mould and die that is significantly finer and 200 HV

harder. This ultra-hard substrate guarantees very good edge stability and, with it, process-reliable tool life in hard machining. The result is a completely new tool solution for mould and die: With its innovative high-feed design, the HPC radius milling cutter G-Mold 65 HF ensures maximum feed rates at low cutting depths. Central internal coolant ducts increase process reliability when roughing hard materials up to 65 HRC and deep cavities. This has also been demonstrated at Hago: With the G-Mold 65 HF, Gühring reached the target depth of 35 mm in 84 minutes. Despite high cutting values, the tool showed little wear after machining. Once the milling cutters have reached the end of their tool life, Hago has them re-ground directly at Gühring to save tool costs.

## Developing alternatives together

Gühring and Hago have far from reached the end of their search for economic alternatives. "Further tests will definitely follow," promises Oliver Mattes. At each of his visits, he and Paul Preiser think about which machining operations can still be optimised with the help of Gühring. Paul Preiser also appreciates this successful collaboration: "It is important for us to have a partner that we know personally and with whom we can draw on shared experience." He found

such a partner in Gühring. "We are very happy with our relationship with Gühring. If we have any problems, the sales team can be reached at any time and help us to look for an approach that can be tested here as a solution."

**20%**  
cost saving in thread milling

**84 Min**  
of hard milling and hardly any wear

## Micro thread milling cutter M8

Art. no.: 4002  
Material: Vanadis 23 (66 HRC)  
 $v_c = 30$  m/min  
 $f_z = 0.02$  mm/z

Our tool range for mould making



## G-Mold 65 HF

Art. no.: 6831  
Material: Steel (62 HRC)  
 $n = 1330$  U/min  
 $f = 1710$  mm  
 $a_g = 6$  mm  
 $a_p = 0.15$  mm  
 $\varnothing = 12$  mm



In collaboration with:

**hago**  
Feinwerktechnik

**GÜHRING**

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## Three examples of process data analysis

# WE FIND THE MISTAKE!

Not every problem can be solved with a quick glance into the machine. This is because there are often correlations and interactions between different parameters, which can only be discovered with a comprehensive analysis of the machining process. Gühring offers precisely this with its detailed process data analysis service. Our experienced machining experts develop solutions using the data obtained. As a result, hidden problems and potential improvements no longer remain a mystery. Here are three examples of successful process data analysis:

### How does process data analysis work?

With the help of our process data recording tool, we collect all factors that affect the tool, clamping and workpiece directly from your machine. This performance data is then evaluated and graphically displayed in the Tool Management Software (GTMS). This approach enables us to gain a reliable database for error analysis and process optimisation by our experts.

### The following parameters can be evaluated:

- drops in performance (recognisable based on feed curves)
- machine-side problems (calibration with override is possible)
- power consumption of all axes and spindles in watts
- position data for all axes
- error messages from the NC program
- secondary and main times
- program code for corresponding visualisation

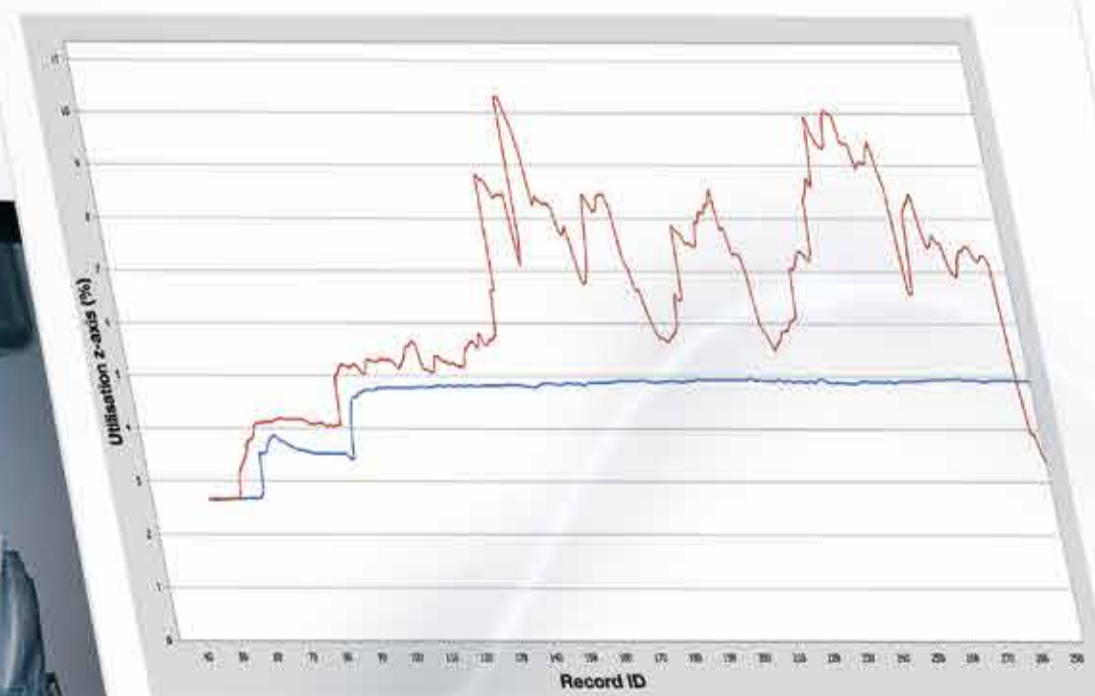


### PROBLEM 1: HIGH DEGREE OF WEAR IN DEEP HOLE DRILLING

**Problem:** When drilling deep holes in crankshafts, a customer complains of poor tool life and occasionally even tool breakage. The surfaces of the components also do not meet the quality requirements.

**Analysis:** In order to find out what factors affect the tool and process, the Gühring experts tested two tools with different geometries and looked at the spindle utilisation. While this progresses evenly with the optimised tool (blue line), extreme fluctuations are noticeable with the previously deep hole drill used (red line). When taking a closer look at the tool, it also becomes clear why this happened: Its rough surfaces impair chip removal. This increases friction during drilling and therefore increases wear.

**Solution:** Since reliable chip removal is of fundamental importance for deep hole drilling, the customer is recommended a special tool with optimised surface quality and modified coating. This tool performs significantly better – and, most importantly, for longer.



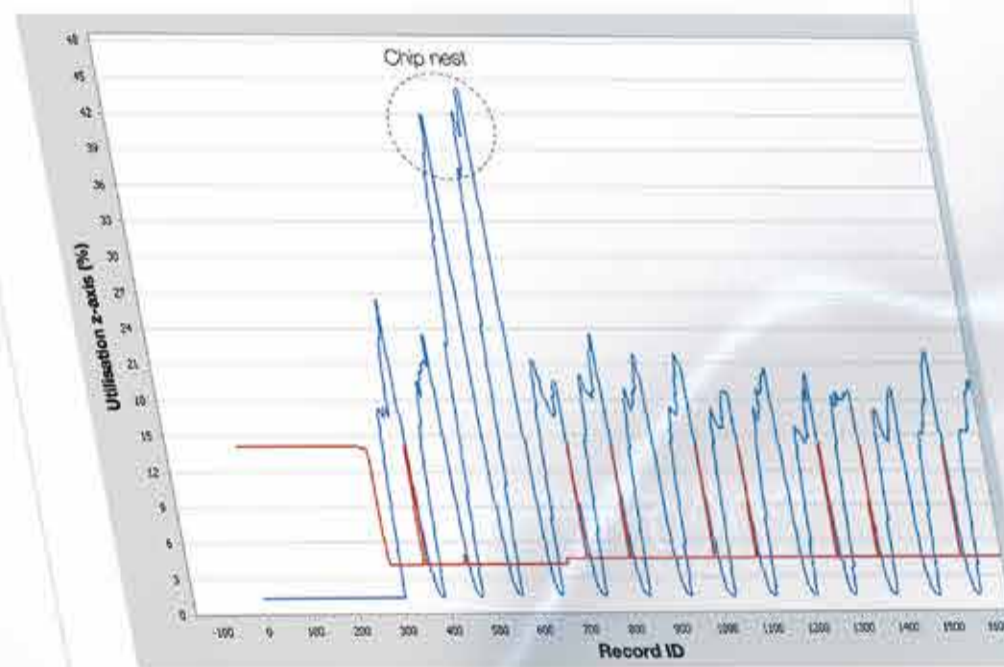
Deep hole drill 1 (blue line Ø 8 mm) achieves a vc of 90 m/min, with a max. load on the axis of 4.95%. For the same vc, the axial load for deep hole drill 2 (red line, Ø 8 mm) is max. 10.30%. All feed charts were filtered to ± 250 mm/min.

### PROBLEM 2: BREAKAGE OF MICRO TOOLS

**Problem:** A customer is carrying out drilling tests in stainless steel (V4A). The micro tool with a diameter of 1.25 mm keeps breaking off. Because the reasons for this could not be discovered in the traditional way, Gühring planned to use process data analysis to find out why the tools are breaking.

**Analysis:** Analysis of the spindle utilisation gives a clear picture: After just two holes, the spindle power suddenly doubles and then normalises again. Thanks to their many years of experience, Gühring experts immediately knew what caused these blips. Due to poor chip evacuation, chip nests had formed during the drilling process. In many cases, these chip nests loosened again after a few holes, but not always. They then caused the delicate micro drills to break.

**Solution:** In order to optimise chip removal, Gühring recommends using a design with a coated tool surface instead of the bare tool. The coating minimises friction during drilling and prevents built up edge.



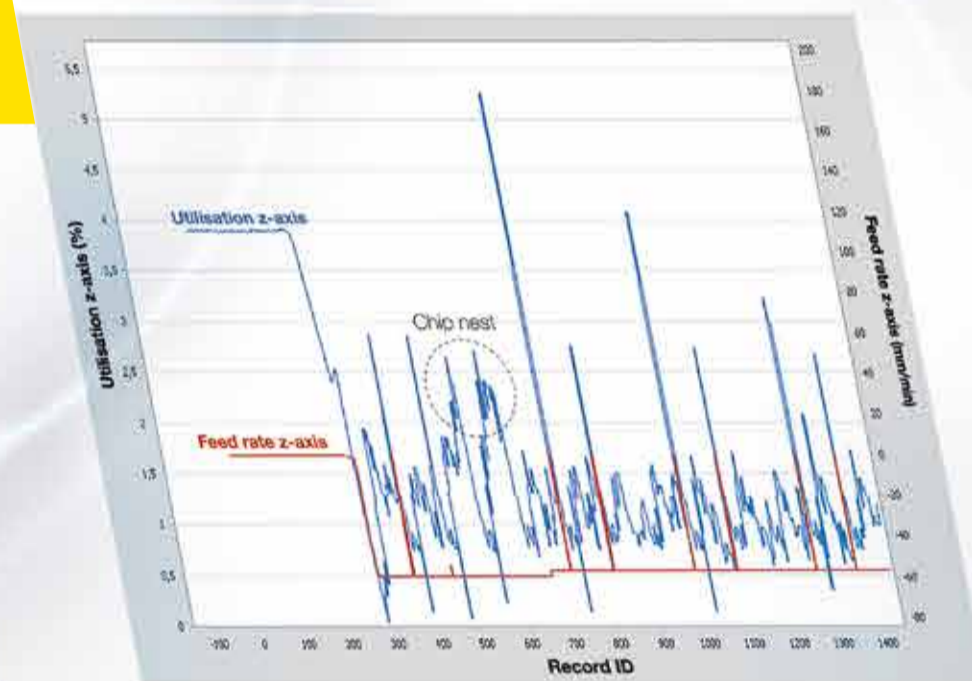
With a drill (Ø 1,25 mm, vc = 15 m/min), it can be seen that the spindle utilisation (blue line) doubles abruptly with the same feed rate (red line, 57 mm/min). This indicates that chip jams generate more radial than axial forces.

### PROBLEM 3: CONCENTRICITY PROBLEMS WHEN REAMING

**Problem:** When pre-machining a motor component with a reamer, concentricity problems keep occurring – without the reason being apparent from the outside. The diameter of the hole is enlarged in these components.

**Analysis:** The entire process including pre-machining is observed over a long period of time. The result: While most drilling operations are completed normally, experts identify jumps in the axial load with hole no. 4. Here, the load rises sharply when compared with the other holes. The reason was easy to find: Chips must have entered the hole during pre-machining. In most cases, these were pushed through the hole during machining. However, in the case of the fourth hole, a chip jams in the reamer and pushes it out, which led to the expansion.

**Solution:** The problem was easily solved with an additional swivel of the A-axis.



When machining with Ø 10H7, the tool generates a max. spindle load of 2.8%. At Ø28.1, the spindle load increases to 10.1% and normalises again for the following holes.

Your contact partner:

**GÜHRING**

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Application Engineer  
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RF 100 Sharp exceeds all expectations

# LONG TOOL LIFE, HARDLY ANY WEAR

**3**  
milling cutters saved per job

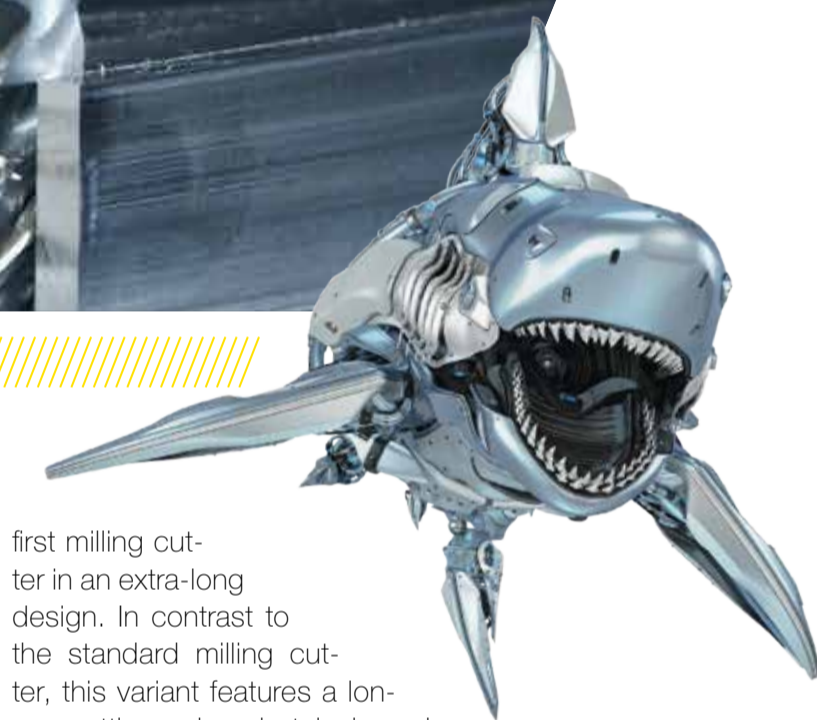
**650 Min**  
without tool wear

**2560 cm<sup>3</sup>**  
of steel machined with just one milling cutter

**RF 100 Sharp**  
Art. no.: 6481  
Material: 16MnCr5  
 $v_c = 140$  m/min  
 $f_z = 0.055$  mm/z  
 $v_f = 613$  mm/min  
 $a_p = 25$  mm  
 $a_e = 2.5$  mm  
 $Q = 2560$  cm<sup>3</sup>  
650 minutes of tool life



Order your Sharp now!



**650 minutes of tool life, 2560 cm<sup>3</sup> chip volume, hardly any wear. Impossible? Of course not! With this result, the RF 100 Sharp solid carbide milling cutter from Gühring is exceeding the expectations of metal processor LB-Fertigungsservice GmbH from Schöneck. Even under unstable machining conditions, a single milling cutter can handle the entire job.**

Founded in 2005, LB-Fertigungsservice GmbH's core skill lies in manufacturing sophisticated mechanical components. In addition to qualified series production, the family-owned company specialises primarily in the production of individual parts. Be it samples, prototypes or niche products – LB Fertigungsservice also has to meet project requirements in economic terms at all times. "Individual parts are our business. Our hallmark is our speed in manufacturing. Then the order has to work," explains production manager Stefan Petermann. "If we have any questions, we need an answer quickly. And we can count on that with Gühring."

**The task:  
Lots of milling with a lot of vibration**

One order presented some major challenges to the company LB Fertigungsservice: A total of four components needed to be manufactured, which would later be used in textile production. The blank was to be machined from two sides. And two deep steps

needed to be milled on each side. But in addition to the depth of the steps, the machine intended for this purpose posed a particular challenge for the contract manufacturer from Altenstadt: The machine with SK40 has been in use at LB-Fertigungsservice for 18 years – and placed high demands on the tool due to the unstable machining conditions.



Stefan Petermann (LB-Fertigungsservice, left) and Walter Wolf (Gühring) are impressed by the performance of the RF 100 Sharp.

**A clear case for the shark**

The blank made of 16MnCr5 case hardened steel weighs 82 kilograms. After milling, only 16.8 kilograms of case hardened steel will remain: a machining volume of almost 80%. With the exception of stock removal of one millimetre, just one single milling cutter is required for the entire machining process. It quickly became clear: A good metal removal rate and high process reliability are essential to meet the eco-

nomonic efficiency requirements. For Gühring employee Walter Wolf, it is clear: "The long design of the RF 100 Sharp – the sharpest of all milling cutters – is our only chance here." The length of the milling cutter is decisive for the deep step to be milled into the component. In addition to the star milling cutter, the RF 100 Diver, the customer already uses the RF 100 Speed. "The Speed is also available in a long design, but has a lower rake angle compared to the Sharp. This tool would have built up too much pressure on this machine – that would not have worked," says Wolf. With his recommendation, Wolf hit the mark. Thanks to its high rake angle and very sharp cutting edges, the RF 100 Sharp exceeds all expectations. After 3.5 components and a tool life of 574 minutes, Petermann and Wolf checked the milling cutter. And found almost no signs of wear. And not even the completion of the fourth and final component was affected by this – there was no sign of any micro chipping or corner chipping. The result: The milling cutter achieved a tool life of 650 minutes with an impressive metal removal rate of 2560 cm<sup>3</sup> – in spite of the tool's enormous overhang and the poor machine conditions. The RF 100 Sharp thus exceeded all the cus-

**After 3.5 components and 574 minutes of tool life: Nothing!**

Walter Wolf, Gühring

tomers' expectations: "We ordered a total of four milling cutters for the order – one tool per component. In the end, we were able to complete the entire order with just one tool," Petermann says happily.

**Gühring's sharpest milling cutter**

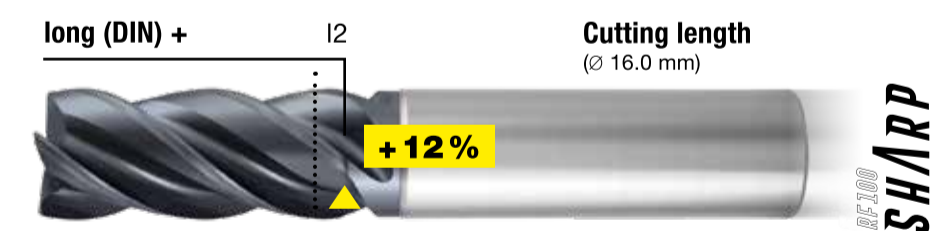
How did the RF 100 Sharp achieve this? Thanks to its product properties, the new Gühring product is particularly well-suited for machining soft, tough and high-alloyed materials. With a rake angle of 12 degrees, the solid carbide tool cuts powerfully and smoothly through challenging materials – and ensures exceptionally easy cutting. Another major advantage that benefits LB-Fertigungsservice GmbH in particular: The RF 100 Sharp stands out with its strong performance in all operating conditions. Even on unstable machines. Thanks to the tough carbide, tool breakage is prevented even under very unstable machining conditions. The optimised facet cut dampens vibrations and increases running smoothness and tool life, while the corner protection chamfer ensures maximum stability and edge strength. Wear is also reduced by the AlCrN coating developed by Gühring. The solid carbide milling cutter RF 100 Sharp extends the Gühring portfolio as the

first milling cutter in an extra-long design. In contrast to the standard milling cutter, this variant features a longer cutting edge, but is based on "long (DIN)". For even greater depths, the RF 100 Sharp is available as a mid-length design, which has been designed so that the cutting edge accounts for

milling experience, but there's always so many new developments. If you stay in the same place, nothing will get any better," he explains. With Gühring, he has found a partner who not only sells tools, but also shares valuable expertise. These are the best conditions for continuing to master common challenges quickly and efficiently.

**We ordered four milling cutters for the job. We completed it with just one.**

Stefan Petermann, LB-Fertigungsservice



more than 50% of the reach. This means that the sharpest milling cutter from Gühring to date offers the right length for every application. An advantage that LB-Fertigungsservice GmbH was able to benefit from in this case.

**Gühring: More than just a tool manufacturer**

For Petermann, one thing is certain: The three remaining milling cutters are still coming in useful. After all, new challenges require new tools for the company to remain competitive. "We have 30 years of

In collaboration with:



**GÜHRING**

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Grooving tools in practice

# ONE WORKPIECE, FIVE SOLUTIONS

One component that requires different turning and grooving tools to be used is the drive shaft. These shafts have to withstand the highest strength and toughness requirements and are therefore manufactured from high-strength and

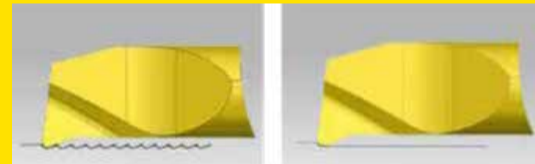
alloyed steels. Here, as an example, 42CrMo4 with a strength of 900 to 1200 N/mm<sup>2</sup>. Secure internal cooling is advisable; oil or emulsion is usually used in these materials. Using this drive shaft as an example, we will show you five typi-

cal machining tasks and how you can master them perfectly and economically using our turning and grooving tools.

## SOLUTION 1: BORING OUT THE INNER CONTOUR

### Cutting parameters

$v_c = 100$  m/min  
 $f = 0.10$  mm/rev.  
 $a_p = 0.20$  mm



without wiper      with wiper geometry

### Benefits for the customer

- reduction in machining time thanks to 60+% higher feed rate
- resulting in better chip breakage
- consistent surface finish and surface roughness from 2 to 4 µm

In the first step, a pre-drilled centre hole is machined to the finished dimension. The turning tool must protrude a long way for this purpose, which leads to instability. The result: fluctuating surface qualities, surface roughnesses between 5 and 10 µm and low feed rates of no more than 0.06 mm, resulting in a long machining time. Our System 110, a particularly stable tool system for challenging applications with a shaft diameter of 10 mm, provides a solution here. Whether long projections, large groove widths or large machining depths: The System 110 offers a wide array of options. A special wiper design ensures effective smoothing of the surfaces and significantly higher feed rates. Our layer of TiAlN nanoA is used to increase tool life.

## SOLUTION 2: MOULD GROOVE ON THE OUTSIDE DIAMETER

### Cutting parameters

$v_c = 70$  m/min  
 $f = 0.05$  mm/rev.

### Benefits for the customer

- time saving of approx. 20 seconds per component
- strong increase in productivity
- burr-free contour
- high dimensional accuracy



Machining engineers often use two or more tools to groove different flutes on the outside diameter: Separate tools are often used for pre-grooving and finishing. The problem? Each tool change cycle leads to dimensional fluctuations and increases the machining time. The 128 Grooving System offers a more economical solution. Blanks are available in widths of 10 to 28 mm. The entire contour, including chamfers and transition radii, is ground onto these blanks. This allows the user to machine the entire contour with just one tool. A Gühring coating tailored to the application enhances the performance further. The tool holders are particularly sturdy thanks to their clamping screw with M6 thread and a V-shaped contact surface.

## SOLUTION 3: MILLING A SERRATED SHAFT (ACCORDING TO DIN 5482)

### Cutting parameters

$v_c = 100$  m/min  
 $f_z = 0.01$  mm  
 $a_p = 2.20$  mm  
 Number of cuts = 1

### Benefits for the customer

- more teeth result in a 50% higher feed rate
- 40% higher cutting speed
- significantly shorter cycle time
- improved surface finish by 2 µm

The outside diameter of the drive shaft needs to be serrated. Milling this profile requires precision and a high surface finish. In addition, the machining time should be reduced, for example by increasing the number of teeth, which is difficult in confined spaces. System 305 is perfect for this. Due to its compact design, this special tool is particularly stable. Despite limited space, four indexable inserts whose special geometry is adapted to the component requirements can be mounted on a milling body with an internal coolant supply. Thanks to three usable cutting edges, they offer good cost-effectiveness and their FIRE machining has proven successful in steel machining.

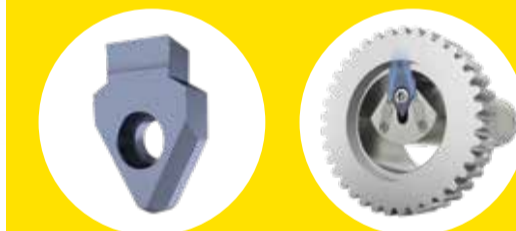
## SOLUTION 4: BROACHING THE KEYWAY

### Cutting parameters

$f = 6000$  mm/min  
 $a_p$  per stroke = 0.06 mm

### Benefits for the customer

- improved chip removal and surface through effective internal cooling
- maximum stability thanks to special holder
- significantly reduced rework



When creating a keyway, the grooving tool does not rotate, but is pushed into the hole. A long protruding tool is required here, too, but this is often unstable and leads to vibrations. In addition, a burr forms when the tool emerges, which then has to be removed manually. System 128 is also the solution here. The contour of the flute has already been ground into the cutting insert. The sturdy special basic body features innovative cooling channel technology to optimally supply the cutting edge with coolant. The result: Burr development is minimised and tool life is increased.

## SOLUTION 5: PARTING OFF ON THE HOLE

### Cutting parameters

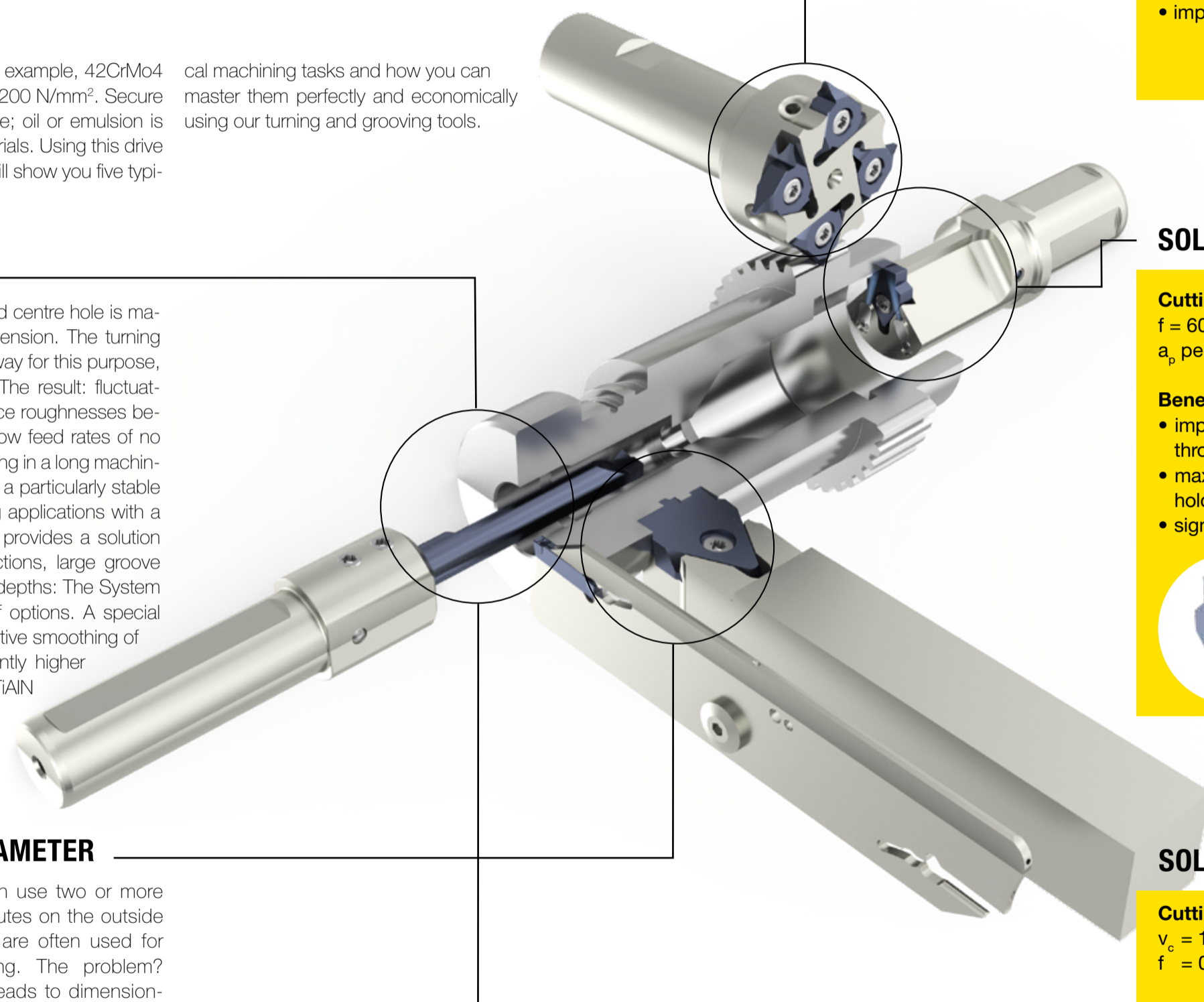
$v_c = 170$  m/min  
 $f = 0.05$  mm/rev.

### Benefits for the customer

- constant tool life: 900 to 950 parting cuts
- very good chip constriction
- good surface finish:  $R_z = 3$  to 6 µm



At the end of a turning operation, the parting off of the component usually occurs. Process-reliable chip removal is one of the key points here. If chips jam in the flute, this can lead to tool breakage. System 222 is the solution here. The new parting off plate for steel materials impresses with its combination of effective chip breaker, coordinated carbide and a FIRE coating. The chip breaker ensures safe chip constriction, meaning the chips run off without jamming. The tool holders with optimally arranged coolant holes support chip removal.



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More grooving tools in action can be found in our application catalogue!



Creating threads? Not a problem!

# THE MOST COMMON MISTAKES AND HOW TO AVOID THEM

**Threading occurs at the end of the production chain when you have already invested a lot of time, energy and money in the component. If something were to go wrong now, this would result in expensive reworking and, in the worst case, even the loss of the component. We show you typical problems that occur when thread tapping, thread milling and fluteless tapping and how you can prevent them in advance.**

## THREAD TAPPING

### Swirling chips

Swirling chips that wind around the tool shaft are often caused by insufficient cutting speed. By increasing the cutting speed, the chips are pushed away from the tool. If the spiral shape of the thread tap is too shallow, this can also be problematic for chip flow. Here tools with 45° to 50° spirality are recommended. In the case of steel materials, it is also possible to use tools with a bright flute or bright correction. This creates shorter chips.

### Thread is too small or too big

The thread is smaller than intended? This may be due, for example, to the fact that the thread tap has decreased in circumference due to heavy wear. In this case, the only option is to use a new tool. Lag errors on the machine can also be the cause of threads that are too small, for example if the machine

does not run exactly on the helix angle due to rigid clamping setups. This problem can be solved by using a synchro tapping chuck. A thread can also be enlarged unintentionally due to excessive cutting speed or jammed chips. You should also check whether there is an axis offset between the pre-drilled hole and the threading tool. In this case, the hole position may not be correct and the alignment of the hole may not match the threading tool. In this case, adjusting the clamping of the workpiece can help.

### Tool breakage

The main reason for tool breakage when thread tapping is jammed chips. Here, you should ensure good chip removal by using high spirality or adjusting the cutting speed. In the case of through-holes in particular, it must be ensured that the tool runs completely through the thread and that the final turn is completely cut out so that the chips can be safely discharged downwards. Only then should you switch to counter-clockwise rotation. In the case of blind hole threads, on the other hand, it is important that the thread tap does not run down

to the bottom of the hole, as this can also lead to tool breakage. Therefore, check the core hole depth or drill deeper if permitted. Alternatively, you can use a thread tap with a shorter chamfer lead to create more space between the hole base and the thread depth.

## CHIPS & TRICKS

Does your thread tap break when the direction of rotation changes? In this video, we explain why tool breakage occurs and how to avoid it.



Thread tap breakage

## FLUTELESS TAPPING

### Thread is not fully formed

If the thread profile is not fully formed after fluteless tapping, this may be because the pre-drilled hole is too large. In this case, you should select a suitable pre-drill diameter for the next core hole.

### Thread is overformed

Conversely, the thread may be overformed if the pre-drill diameter selected was too small, meaning the fluteless tap had to displace too much material. In addition to

choosing the correct pre-drill diameter, sufficient cooling lubrication is crucial here, too: If the oil concentration in the emulsion is too low, this leads to a build-up of material in the hole and, as a result, the thread in the core diameter becomes too small.

### Thread surface is unclean

Here, too, the cause is often insufficient cooling lubrication and material adhesion on the tool. Make sure that the oil concentration in the emulsion is sufficient.

## THREAD MILLING

### Thread tapers downwards

It is often the case that the thread gets narrower at the bottom or is too narrow as a whole. Tapered threads are mainly created climb thread milling. It is therefore worth adjusting the programming to conventional thread milling. Our free programming aid "CNC Gühring ThreadMill" helps you with reprogramming. Excessive radial load can also be the cause of a tapered thread. You can spread this radial pressure using a radial cut index (2/3 to 1/3) and thus relieve the load on the tool. For very deep threads (2.5xD), an axial cut index (50:50) helps. An HPC chuck, which is perfectly suited for thread milling, is also a quick solution. You can also reduce the radial pressure by reducing the feed rate.



### Cutting edge chipping

Again, too high a feed rate can cause the cutting edges to chip. The problem can be solved by reducing the feed rate per tooth. Collisions often occur during machining, for example when the tool hits an interfering edge on the workpiece or fixture. Poor chip removal during thread milling can also result in tool breakage. An internal coolant supply is therefore advisable.

### Poor thread surfaces

Poor thread surfaces are particularly common when thread milling takes place under unstable conditions. Once again, the tool holder makes the difference here: The HPC chuck ensures a clean thread without chatter marks. You can also check whether the tools' projection length can be reduced further or whether contamination in the holder or on the shank is interfering with the concentricity. Even with unstable workpiece clamping, the component tends to vibrate, which is reflected on the thread surface.

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# Tool Management Software

## GÜHRING IN THE POSTER COUNTRY FOR DIGITAL TECHNOLOGY



**100%**  
transparency thanks  
to machine connectivity



**When it comes to digitalisation, Estonia is a poster country: Submitting your tax return, requesting government services and even electing a government – the Estonians do all of this online with ease. Andis Bulavs, plant manager at Metec CNC, also wants to achieve digital advancement in his business: “This is our chance to be globally competitive.” Gühring is making this possible.**

### Insight instead of flying blind

Metec CNC is part of the Metec Group, which is headquartered in Estonia's second largest city, Tartu. Since 1993, the company has been producing components and complex systems for various sectors such as gear systems and medical technology, electrical drive technology and the optics industry. Almost half of the products, most of which are produced by machining, are exported to Germany. Bulavs was interested in optimising efficiency because he is considering: What percentage of the planned production time was the machine actually producing for? Was the intended result from the preliminary costing achieved? Which area of the production line could be improved? Bulavs was certain: “Connecting the individual machines was the key to digitised production and would improve efficiency and quality.”

Metec has state-of-the-art CNC machines in its halls – but its tool management system was slightly less cutting-edge. Gühring expert Thomas Gassert, who advises Metec on software solutions, remembers: “Tools were dispensed via simple drawers. Accessible to everyone.” If an employee took a tool, the stock level in ERP no longer matched the actual stock. In addition, the team was flying completely blind during production: As is the case at many companies, production and machine data was not collected digitally or analysed. Andis Bulavs wanted to change that.

**“The tool dispensing solution was very traditional, with simple drawers [...]”**

Thomas Gassert, Gühring



Metec CNC uses digital dashboards to view all machine data from utilisation rates to the remaining term of the order.

### Greater transparency thanks to machine connectivity

Bulavs was already familiar with Gühring as a tool supplier after purchasing tools from us. But now the bright yellow automated tool dispensing systems had piqued his interest. Or more precisely, the software behind them. Gühring Tool Management Software (GTMS) coordinates tool stock levels in companies by documenting all removals and even automatically dealing with follow-up orders. But it was a new module in the software that convinced Bulavs: Each of his machines would connect to this intelligent software via the Gühring Machine Control Centre (GMCC), thereby enabling their data to be accessed for fully connected and digitalised production. The GMCC module records all key figures in a production facility, such as operating data (BDE), machine data (MDE) and process data. Continuous runtime analysis uncovers potential for improvement and eliminates machine downtimes. The aim is to turn downtimes into productive service times. Bulav was convinced: “It was clear to me that I had found the right partner for my vision. I have never seen such a flexible and customer-oriented software solution.”

### 100 percent control

Metec CNC chose the complete package with 100 percent control: 22 machines are connected to the Gühring Machine

Control Center. These include new and modern machines, as well as older models, which are connected to the software via an adapter. Both work equally well, as does the inclusion of machines from various manufacturers in the system. For all machines connected to the software, the system records the machine statuses including the required error management and all corresponding evaluation options such as OEE determination, control station, etc. At Metec, the software is linked to the higher-level ERP system. As a result, it can automatically transfer all MDA messages to the ERP system. At the same time, the software automatically adopts all production orders from the ERP system and ensures feedback in real time.

**“I have never seen such a flexible and customer-oriented software-solution.”**

Andis Bulavs, Metec CNC

### Customised software

GMCC is not an off-the-rack product, but is individually adapted to the needs of the customer. In the case of Metec CNC, three different dashboards have been developed, i.e. digital overview pages, which employees can access on a monitor and which give them a live overview of all relevant data. This includes, for example, a “production dashboard” on which employees can gain an overview of all 22 machines. As such, they can immediately see which machines are working at full capacity and where there is still capacity. A “workshop monitor” shows the machine status in detail: When did the machine run and how long for? How long did maintenance take? When were there interruptions due to technical problems? If the machine is not currently in operation, it is immediately apparent whether, for example, a technical fault, a tool change cycle or another

reason caused the fault. “This digital monitoring offers us the opportunity to participate in the production process live and on a permanent basis and to intervene immediately if necessary,” explains Ahti Savi, head of technology development at Metec CNC. However, the heart of all this is the individual “machine cockpit”: the progress (OEE) and expected end of the order are displayed here. On the dashboard, the employee can see which order is currently being processed on the machine, how many parts of the order are finished and how many are still outstanding. Real post-calculation is possible by recording and evaluating these actual processing times. Even recurring components can be calculated more effectively thanks to these real measured values from previous production.

### Progress thanks to 20 years of experience

“Our cooperation with Gühring is very honest and sustainable. Over time, we have grown together to form a good team,” says Bulavs. “This route has one hundred percent paid off and I am glad that I kept hold of my vision.” The software has become part of the company and our employees work with it on a daily basis. “We are now able to assess and implement new customer requirements more quickly,” says Ahti Savi. “The field of digitalisation is far from exhausted. The next development stage of connecting the new measurement and calibration system has already been defined and is set to be installed in the near future.” Gühring employee Thomas Gassert is pleased that he was able to implement a machine application in Estonia, a country of digitalisation: “This is only possible because we have been developing machine tools and our own software for over 20 years. We have developed a high-end product that is setting new standards, even in a highly digitised country like Estonia.”

**“This is our chance to stay competitive.”**

Andis Bulavs, Metec CNC



In collaboration with:



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The new StepPower

# PROBLEM SOLVER IN THE WORKSHOP



**20%**  
time saving for through-holes



**160%**  
longer tool life in stainless steel



Buy professional  
tools now!

## StepPower

## CIRCULAR HOLES BY HAND

**Drilling holes by hand: Easier said than done. Conventional drills in cordless screwdrivers require a lot of force, which can result in non-circular holes and imperfect hole exits. Drills can hook into the material and spin in the chuck. In the worst case, the tool or workpiece will break. But not with the new StepPower twist drill from Gühring – it promises professional quality for efficient, universal and safe drilling by hand.**

The StepPower's unique design ensures precise, circular holes and burr-free hole exits, while at the same time being easy to handle. This is all down to its stepped drill point, a small pilot hole diameter and the 2-stage diameter increase. With the StepPower, you can save on centre punching and pre-drilling in the future. The stages drill the required diameter on a step-by-step basis, with not one but multiple main cutting edges ensuring that the chip is broken into small individual chips. Thanks to the step geometry, optimum chip removal is guaranteed.

### Look after yourself!

At the same time, the StepPower impresses with high tool stability and ideal tool handling. This not only protects your own strength levels, but also the battery, too. The 3-flats on shank guarantee comfortable and problem-free handling without the drill spinning in the clamping chuck. Optimal torque transmission prevents the tool from getting caught at the hole exit. Thanks to the fast drilling progress, the StepPower is also very economical. In benchmark tests, the Gühring twist drill was tested with a handheld drill against comparable tools from two market competitors. The task: Drill a through-hole with a depth of 5 mm in flat material (mild steel St52-3). The StepPower was up to 20% faster than the competitors.

### A drill for every application

The StepPower proves its flexibility in various drilling applications. In addition to precise, round through-holes with handheld



drills, it can also be used on upright pillar drilling machines. In addition to drilling blind holes,

the drill is also suitable for spot drilling on rounded or sloping surfaces, such as pipes. The StepPower can also effortlessly drill an existing hole and drill out bolts or rivets. And it can do all this in different materials. These include cast materials, aluminium, plastics and hardwood and softwood. The StepPower also unleashes up to 1200 N/mm<sup>2</sup> in steel, too. Even plexiglass or composite materials are no problem for this drill.

### HSCO variant for stainless steels

Gühring also offers the StepPower in an HSCO variant to meet the requirements of higher-strength materials such as alloyed and high-strength steels as well as stainless steels. However, instead of adapting just the cutting material, our developers have also optimised the geometry of the tool for machining these materials: Significantly sharper cutting edges ensure that the drill cuts the material easily and generates little heat. The result: A significantly longer tool life. For example, the StepPower achieved a 160% longer tool life than a competitor's tool when producing a through-hole in 3 mm sheet metal made of stainless steel (1.4301) using a pillar drilling machine.

### Wide diameter range

The StepPower is available in a diameter range from 1.0 mm – 13.0 mm and can be purchased as a single tool or as a set. Based on DIN 338 dimensions, the tool is available in HSS and HSCO versions. The StepPower is an all-rounder for any workshop. Order the new twist drill now from our online shop and see for yourself!

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If it has to be carbide, then ours

# JUST SAVING THE WORLD FOR A MOMENT



Sure, saving the world is great! However, it usually takes a lot of effort and money. With carbide from Gühring, you not only get premium quality from Germany at a preferential price, but you can also rest easy when it comes to ecological concerns. The use of carbide tools, re-grinding and carbide recycling means reduced tool costs for you and less degradation of finite raw materials for our planet. But enough of the super-heroes: The main thing to know is that it triples the tool life and halves your costs.

2000

tonnes of carbide per year

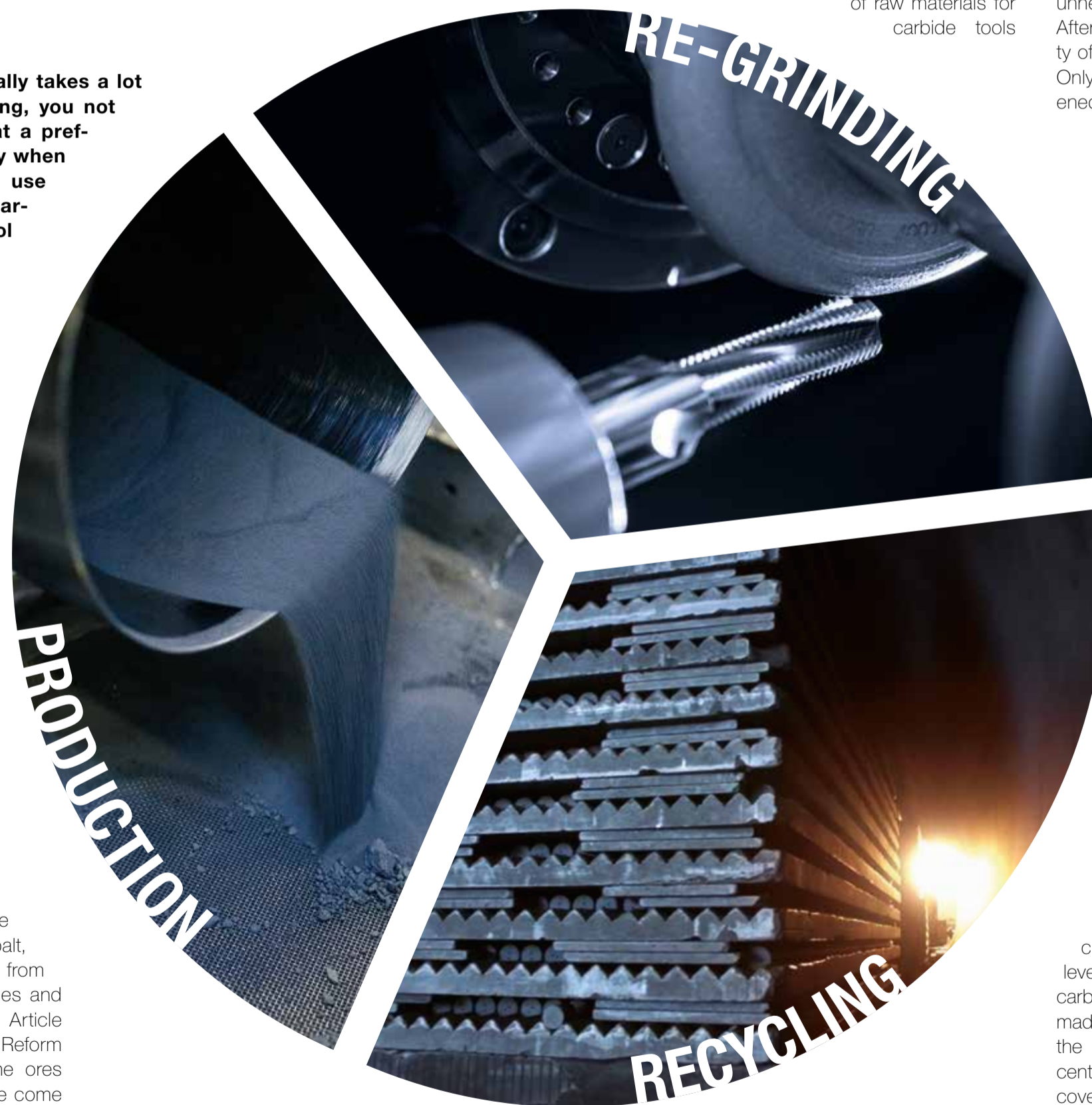


## CARBIDE PRODUCTION

Top quality made in Germany

As one of the largest carbide manufacturers in the world, Gühring produces carbide of the highest quality – made in Germany. Our warehouse contains more than three million carbide articles, including both blanks for rotating tools and moulds according to individual customer requirements. With our carbide grades, we have set ourselves the same mission as our tools: Durability decreases demand while improving performance. High-quality carbide is the most sustainable solution because it helps to reduce wear and, as a result, lowers material and energy consumption. We are convinced that sustainability starts with the raw material.

That's why we have a supply chain policy with a high level of environmental and social responsibility. Because carbide contains the conflict materials tungsten and cobalt, we only source our raw materials from suppliers that meet OECD guidelines and comply with the requirements of Article 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act. The ores from which we produce our carbide come from certified and officially tested mines.



62%

cost savings per tool due to re-grinding

## RE-GRINDING

Exploit the maximum service

Why should you have your tool re-ground when it has reached the end of its tool life? On the one hand, we owe it to the environment to use resources sparingly as the global stock of raw materials for carbide tools

(cobalt and tungsten) is limited. On the other hand, however, refurbishment also makes sense in terms of cost-effectiveness. Investing in a new tool every time you discover wear is expensive – and also unnecessary for many solid carbide tools. After all, nothing has changed in the quality of the tool core and the cutting material. Only the cutting edges need to be sharpened. The costs for re-grinding are just a

fraction of the purchase price for a new tool. Take the solid carbide deep hole drill RT 100 T from Gühring, for example, which can be re-ground up to three times: If the costs for re-grinding three times are added to the new costs of the drill, the individual tool price is many times lower than the price of buying a replacement tool. In this way, you can reduce the costs per tool by more than half when re-grinding several times.

40%

less CO<sub>2</sub> emissions

## CARBIDE RECYCLING

Turning scrap into money

Simply throwing away worn carbide tools? That's a real shame! After all, this tool scrap still contains up to 90 percent tungsten and 10 percent cobalt. Cobalt in particular is currently one of the most strategically important raw materials in the world as it is used to manufacture articles including lithium-ion batteries. Tungsten carbide, on the other hand, falls into the category of very polluting materials. Thanks to its own carbide technology, Gühring is able to recycle the precious raw materials from the carbide. Gühring uses recycled carbide with the same performance level as commercially available submicron carbide substrates. As such, the carbide made from recycled raw materials achieves the same performance level as 10 percent submicron carbide – with 70 percent coverage, the most important grade group for drilling and milling tools in the world.

BMW

One example of how sustainable carbide recycling can be achieved comes from the BMW Group: It already uses drilling and milling tools that contain recycled tungsten. This material cycle has been extended to all BMW plants in Germany and Austria. Nearly nine tonnes of scrap from carbide tools are produced in these plants every year, which contain an average of over seven tonnes of recyclable tungsten. Nadine Philipp, head of supply chain sustainability at BMW Group, says it counts "every gram for which we can ensure that we are conserving natural resources and not contributing to violations of environmental and social standards."



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Time for the essentials

# HAND OVER YOUR TOOL MANAGEMENT TO US!

 **20%**  
reduction in tool costs

 **32 days**  
more productive machine runtime p.a.

## GÜHRING CASE STUDY FOR TOOL MANAGEMENT:

Searching for tools eats up time and leads to workflow interruptions



**Still got room for improvement in your tool management solution, but lack the time to make changes alongside your day-to-day business? The tool managers from Gühring specialise in topics such as logistics, procurement and scheduling. This allows you to concentrate completely on the tasks that generate value for you – for added efficiency in your business.**

A wide variety of tools are stored loose on shelves that are so high that employees have to climb ladders to look for the right tool: This was the situation at Hewi G. Winker in the summer of 2019. The tool situation at the automotive supplier based in Spaichingen in Baden-Wuerttemberg was too confusing as the range of variants from ten different tool suppliers was far too wide and the sensible, ergonomic removal of tools was almost impossible.

And the situation at Hewi is the same for a huge number of other companies, as some of our case studies show: Foremen spend up to 60% and machine operators spend up to 20% of their time searching for tools, resulting in overall machine availability falling by around 9%. A total of 16% of all workflow interruptions are

due to a lack of tools. Most companies are aware of these shortcomings, but there is no time for improvement alongside day-to-day business. This is where Gühring comes in, says Marcello Mintrone, sales manager in the tool management team: "When talking to customers, I often feel that tool management is seen as a necessary evil. Time and expertise flow mainly into production and technology. It is precisely this necessary evil that is our core business. As a tool manager, we have specialised purely in topics such as logistics, procurement and materials planning." This means that the customer is spared the non-value-adding tasks, which increases efficiency in the company.

### Tailor-made tool management

Tool management from Gühring is a very flexible service that is individually adapted for each customer. For this purpose, the Gühring tool managers first analyse the company's entire tool management system, including the tool cycle, work preparation, tool storage and production areas. Based on these analyses, organisational weaknesses and optimisation solutions are identified and corresponding concepts are determined. This also includes suggestions for outsourcing

**“In conversations with customers, I often feel that tool management is seen as a necessary evil.”**

Marcello Mintrone,  
Gühring

processes and functions as well as for the use of tool management software and hardware. The customer can then compile an individual service package from five modules with different services. "This is our menu from which you can put together your meal," explains Marcello Mintrone. "We are completely flexible and do not force the customer into a rigid system."

### The "Power menu"

When the customer has chosen the "ingredients" required in their production facilities and combined them into a customised tool management package, there are two different processes: The customer can either specify which tool from which supplier is used in their company. Gühring acts as the central coordinator for procurement and refurbishment." We offer the customer a uniquely high level of transparency with regard to the procurement of Gühring and third-party tools and in all removal and billing processes," explains Marcello Mintrone. Another option is to hand over responsibility for all tooling to Gühring. In this case, our project team

**“We are completely flexible and do not force the customer into a rigid system.”**

Marcello Mintrone,  
Gühring

on-site takes over the scheduling and ordering of all tools, the monitoring of delivery dates, incoming goods inspections and the management of the tool warehouse, but also the

assembly and pre-calibration of new tools. The service also includes the continuous technological optimisation of tools and processes and comprehensive reporting.

### Exploiting full potential

The end result is a tool management solution that optimally meets the wishes and requirements of the customer and brings in corresponding optimisations. Experienced tool managers on-site ensure that these improvement concepts are also implemented promptly and that the optimisation goals are achieved. Because only measures that have actually been implemented are effective. In this way, you can achieve your optimisation goals much faster. Hewi also decided to hand over logistics completely to the Gühring tool managers, who also looked for optimisation potential in tool management. This enabled tool variety to be reduced by 33%. Optimising the tools themselves will lead to a 20% reduction in tool costs and thanks to better tools, the company will save almost 32 days of machine runtime per year.

In collaboration with:



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Provision of operating resources with GTMS

# ONE CLICK TO HAPPINESS

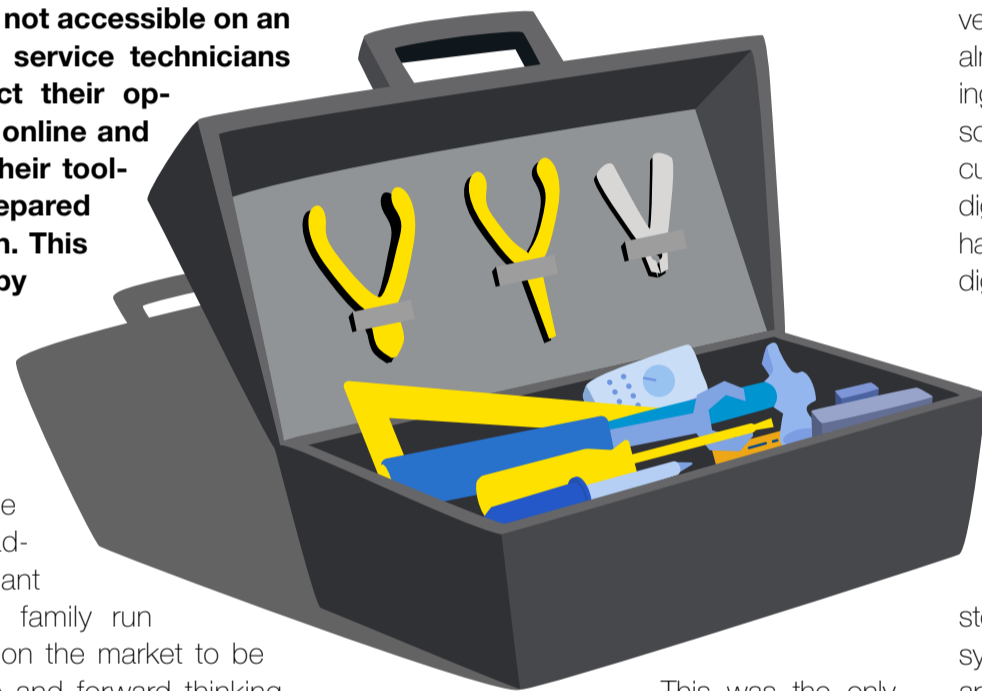
**“Have I thought of everything?” Almost everyone asks themselves this question as soon as they get in the car. It is especially important for service technicians who travel to customers on a daily basis and need to take tools or spare parts with them. However, they are often located centrally at the headquarters – and are not accessible on an ad hoc basis. Fill service technicians conveniently select their operating resources online and can simply have their toolbox sent out or prepared at their destination. This is made possible by software from Gühring.**

Since 1966, Fill in Gurten, Austria, has evolved into one of the world's leading machine and plant manufacturers. The family run company is known on the market to be extremely innovative and forward thinking. Experienced Fill technicians and service technicians are therefore employed around the world to guarantee consistently high productivity of Fill machines over their entire life cycle. On-site visits to the customer are part of the day-to-day business of service technicians, who also support the maintenance, optimisation and spare parts management of the production plant after acceptance.



A major name in specialist machine construction that has perfected this skill: Fill from Gurten, Austria.

The right operating resources are essential at such customer appointments: Tools, spare parts, but also personal protective equipment such as helmets and gloves. Until recently, Fill had a central storage location for all these articles: A lift system at the Gurten site that was supervised by one store keeper.



This was the only place where operating resources could be borrowed from and returned. These withdrawals and returns were not recorded. The service technician simply placed a personalised tool token on the location of the removed operating equipment.

### Reducing expensive waits and journeys

Peter Brandstötter, production team leader at Fill, remembers a system with weaknesses: “The strong growth of our company in recent years has made it harder and harder to keep track of the tools and operating resources available.” This meant that Fill technicians had no prior insight into whether the required operating resources were actually available or were even sent away after a long waiting period after discovering the required article was not available at all. Such unproductive waits and journeys are hugely expensive, so the company decided to redesign the process for dispensing tools and operating resources. A digital solution had to be created that would enable every employee to reserve tools and operating resources via a tablet,

smartphone or PC. Fill brought in a long-standing partner for the implementation, because “Gühring had the best concept ready for our requirements,” Brandstötter says.

### Product management with GTMS

This concept is based on the Gühring Tool Management Software (GTMS). Originally developed for controlling Gühring tool cabinets, almost all products can now be managed using this software. This is not an off-the-shelf solution, it is flexibly adapted to the needs of customers. Uwe Reich, sales manager for digitalisation at Gühring, adds: “The GTMS has already given us many opportunities to digitise this process, we only had to tailor it to Fill.” For this purpose, Gühring initially installed a tool dispensing system at Fill, in which all tools and fast-moving consumables for service technicians are now managed digitally. Operating resources and spare parts are still

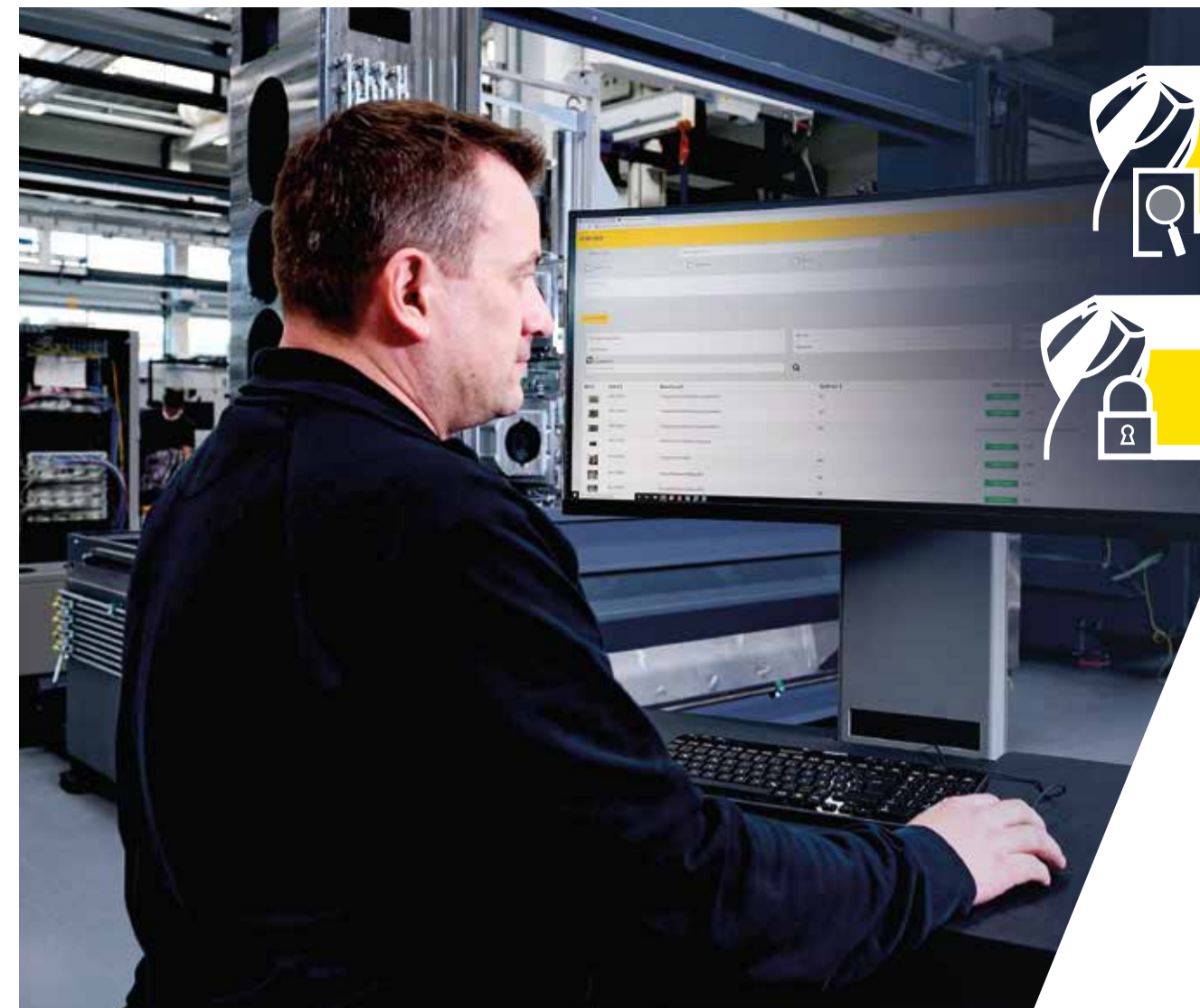
stored in the lift system, but each article has been added to the database. The result: The lift system with all travel commands is now managed and controlled automatically via the GTMS. All booking processes are linked to Fill's ERP system. Data is still maintained in the customer's ERP system.

**“In recent years, it has become harder and harder to keep track of the tools and operating resources available.”**

Peter Brandstötter, Fill

### The “digital service technician”

This year, the process has been extremely straightforward for the service technicians: They log in to the Fill intranet with their personal login details. No matter where in the world they are. They then fill a digital shopping cart with all the required operating resources. As soon as they save this shopping cart, a corresponding reservation is generated in GTMS. Tools that are subject to an inspection interval are blocked by the system on the inspection date and the responsible internal inspection body is automatically informed. GTMS then converts the booking of the service technician into a picking order. The store keeper



**100%**  
data overview of available articles



**4691**  
digitally managed operating resources

### AT A GLANCE

- simple, audit-proof management
- complete documentation of maintenance appointments
- internal maintenance according to stored test plan
- management and documentation of repairs

receives a packing slip, from which he simply enters the individual articles into the lift system – and all the required operating resources are then dispensed to it. “From now on, service technicians can concentrate entirely on service,” explains Uwe Reich. “And the store keeper always knows who needs what and when it will come back.”



At Fill, a store keeper collects all operating equipment from the lift system.

As Brandstötter reports, GTMS makes daily work much easier for Fill employees: “Our fitters and service technicians love this innovative software solution and could no longer imagine organising tools without it.” There are also many advantages from a business perspective. Processes are optimised and

efficiency is increased. Thanks to greater transparency regarding articles in circulation, it is possible to track where the operating resources are currently located at any time. “Thanks to the digital solution, waiting and travel times were greatly reduced,” Brandstötter notes. He is also enthusiastic about the co-operation between the two companies: “The implementation process with the Gühring software developers was very professional and straightforward.”

**“The implementation process with the Gühring software developers was very professional and straightforward.”**

Peter Brandstötter, Fill

For Uwe Reich, the order is an example of how software solutions simplify everyday life: “This is a perfect example of classic digitalisation: Manual paperwork becomes a perfectly thought-out, digital process. And the customer is grateful.”

In collaboration with:



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Diamond nozzle for additive manufacturing

# 50 KG CARBON – LIMITLESS PRINTING



**5 times**  
the tool life compared to steel nozzles



**150 Min**  
annual time saving when changing nozzles



Learn more about Dianoz now!



CR-3D is a leading complete supplier in the field of additive manufacturing and develops and produces all necessary components for 3D printing in industrial environments. What began as a garage start-up recently started filling a hall with over 700 square metres of production facilities – equipped exclusively with state-of-the-art 3D printers. Gühring supplies the heart of this new type of machine: the diamond printer nozzle.

manufacturer on the market that produces exclusively in Germany." The engineer founded the CR-3D brand in 2016: "I was already obsessed with 3D printing during my studies and this technology has been with me ever since. That's why I want to continue to promote and establish it on the market." The process is extremely versatile and flexible. Be it metal, clay or chocolate – 3D printing knows no bounds. But this calls for 3D printers that anyone can use – the 14-year-old amateur crafter or the dental assistant, who uses them to print parts for oral surgery directly in the practice. And there's something else that's important: The printer, software and filament, i.e. the material that is printed, must

which is why the printer nozzle must also be as wear-resistant as possible for this type of printing job. And that's exactly the one thing Reil was missing.

### The nozzle with the black diamond

The cooperation between Gühring and CR-3D began with a Facebook post: "Looking for reliable partners who can produce nozzles for our 3D printers from different materials (brass, steel, tool steel, etc.)," wrote Christian Reil. "When I read the ad, I immediately knew that the Dianoz nozzle would fit in perfectly here," recalls Peter Hartmann, who had recently developed the Gühring diamond nozzle with his team.

**With this material, a brass nozzle would have been finished after just 30 grams.**

Christian Reil, CR-3D



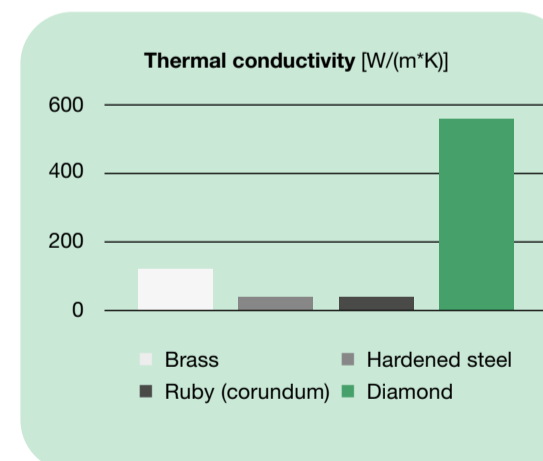
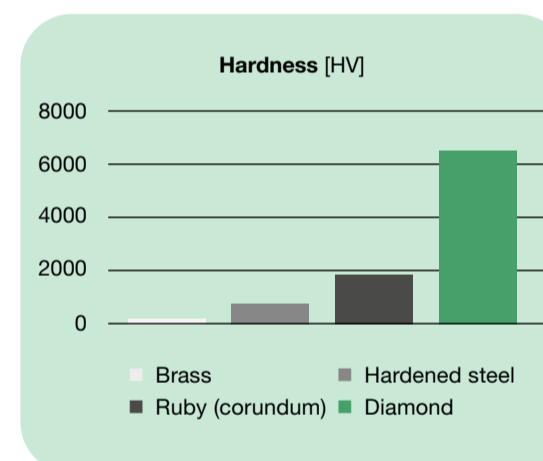
The heart of the design: a black diamond conducts heat optimally and provides optimum protection against wear



work together perfectly. That's why Reil offers everything from a single source. "We offer many standard plastics for 3D printing, but also metal filaments and technical materials that contain carbon or glass fibres and can be used to print extremely stable components." However, these components are extremely abrasive,



The components that Reil is able to print at its production facilities in Cham are 5 millimetres to one metre long.



two properties so well. This makes the Dianoz nozzle perfect for printing abrasive filaments in fused deposition modelling (FDM). Hartmann sent a diamond nozzle to Christian Reil. That was over a year ago – and it's still running. Since then, 50 kilograms of carbon fibre filament have passed through this nozzle without it showing any signs of wear, let alone having to be replaced. This is despite the fact that the printed material is an extremely abrasive material, 20% of which is filled with very long and hard glass fibres. "With this material, a standard steel nozzle would have come to an end after around ten kilograms, and a brass nozzle after just 30 gram," explains Reil.

### Less wear saves time

As soon as the nozzle becomes shorter due to wear, the distance to the printing bed is no longer correct and the surface suffers. The printing process then often has to be aborted or unstable components are created. Particularly when high-quality filaments such as carbon fibres are printed, this wear-related waste is expensive and must be avoided at all costs. In addition, changing nozzles is time-consuming as the printer platform needs to be completely recalibrated, time that can be saved with Dianoz. "Since we have got to know the

**The nozzle fits perfectly with my approach to providing the customer with the best possible solution.**

Christian Reil, CR-3D

Gühring nozzle, there are no more 10-euro nozzles on the printers in our production facilities, which means no more constant replacement. Whether I'm printing a standard material or a highly abrasive filament: The nozzle can do both very well, so I don't just save myself a few nozzle changes a year, but also the time and frustration involved," says Reil enthusiastically. He also recommends the Dianoz nozzle as an upgrade for his customers' printers. "The nozzle is a good fit with my approach to giving the customer the best possible solution."

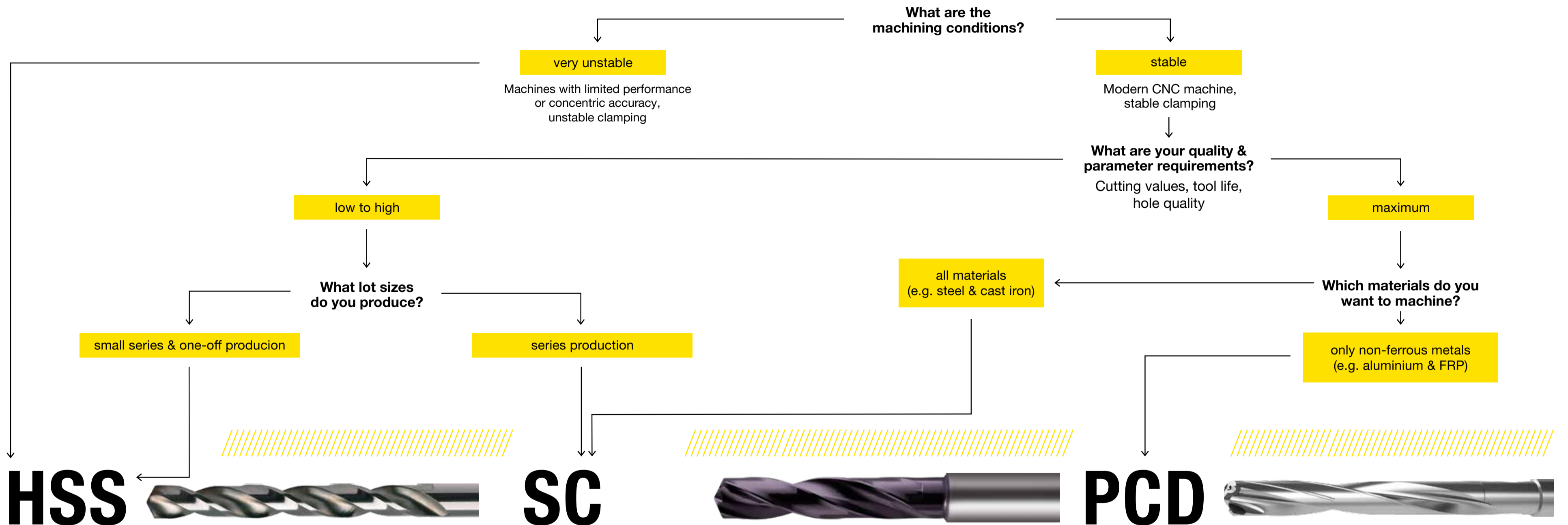
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# FIND THE RIGHT CUTTING MATERIAL!

**START**



## HSS



**HSS tools: good quality at a reasonable price-performance ratio**

Users still rely on high-speed steel (HSS/HSCO) drilling tools, especially in unstable machining conditions and whenever toughness is required. HSS tools are better able to compensate for loads such as transverse forces, especially when components are at risk of vibrations or bending, and thus offer high process reliability without tool breakage. HSS tools are also in demand in the production of small or medium lot sizes, as they offer good quality at a reasonable price-performance ratio. They can be used universally in almost all materials. Thanks to a medium hardness, tempering resistance

and a high-temperature hardness of up to 600°C, HSS is perfectly suited for machining thin-walled workpieces. The sharp cutting edges of HSS tools are ideal for machining aluminium and plastic. This is why they are still indispensable for rivet hole drilling in the aviation industry, for example.

## SC



**Solid carbide tools: universally usable at high cutting speeds**

Compared to high speed steel, carbide exhibits approximately twice the hardness and a high-temperature hardness of up to 1000°C. Solid carbide tools can therefore be used at significantly higher cutting speeds and at higher temperatures. Solid carbide tools are also extremely wear-resistant, pressure-resistant and vibration-damping. They also achieve high hole quality due to their high rigidity. These properties make solid carbide tools ideal for series and large-scale production on high-performance CNC machines with low-backlash spindles. However, fracture toughness and thermal shock resistance is lower in carbide,

which makes the tools less suitable in unstable machine conditions. Carbide can be used for machining almost all materials. Gühring benefits from its own carbide production facilities for manufacturing its solid carbide tools. This gives us a great deal of freedom in terms of geometry, as we can already equip the carbide blanks with internal coolant ducts and provide for complex geometries.

## PCD



**Tools from PCD/PCBN: for perfect results in high-volume production**

When it comes to tool life, polycrystalline diamond (PCD) tools are unbeatable as this cutting material has a long-lasting and high level of sharpness. In addition, PCD tools enable even greater process parameters than solid carbide tools, which can reduce costs per part. All this makes PCD tools the first choice for mass production, where significantly higher quantities with longer tool lives and shorter tool change cycle times are achieved with excellent machining quality. However, stable clamping conditions are important for the use of PCD. In addition, PCD reacts chemically with steels and iron,

which is why PCD tools can only be used for machining non-ferrous metals such as aluminium, FRP or plastic.

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# BEST PRACTICE

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