

GÜHRING

10 SUCCESS STORIES FOR MORE PRODUCTIVITY.
WITH CUSTOMERS. FOR CUSTOMERS.

2025
**BEST
PRACTICE**



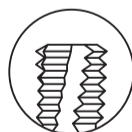
Our customers face unique challenges. That is why our sales representatives are on hand worldwide to work with you to develop the best solutions. Because success is a team effort – through trust, expertise and genuine partnership. In this edition, you can read how close cooperation creates innovation and ensures long-term success.



FB 200 U

With its three cutting edges, our new 180° flat bottom drill fulfils a customer's wish for round, dimensionally accurate fits – and halves the machining time.

p. 20/21



Modular & dimensionally accurate

A customer is struggling with chip problems in the production of deep-set threads. Our modular fluteless tap ensures a reliable process.

p. 12/13



Customised & innovative

GTMS software made for you! Thanks to 7 modules, you decide which areas of the company you want to digitalise.

p. 28/29

FB 200 U



” We combine economic advantages with an active contribution to the conservation of resources – an approach that offers you a twofold benefit.

Oliver Gühring

Dear readers,

In a world that is changing faster than ever before, one thing remains constant: the need to find the best possible solution for every application. This is precisely the standard to which we are committed.

**Manufacturers instead of retailers:
We don't just create tools, we create real added value**

As a benchmark in the field of drilling tools, we develop innovative solutions that not only impress with their performance, but also with their focus on the needs of our customers. Why can we do this? Because as a manufacturer, we have a depth of production that makes us unique. From the raw material to the finished coated tool – everything is produced under our roof. Combined with our own R&D, a wide range of services and close cooperation with you, our customers, we set standards. This distinguishes us fundamentally from competitors who limit themselves to the trade.

Modular systems: More efficiency for every company size

However, a powerful tool is only one part of success. Flexibility plays a decisive role for companies that need to react quickly to different requirements. This is where our modular tool solutions such as the new modular fluteless tap or the BT 800 bayonet drilling system come into play. This allows you to optimise your processes, reduce production costs and at the same time rely on the highest quality.

The next step in your production: Our tool management software

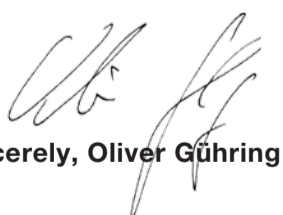
In addition to high-performance tools, the digitalisation of your processes is also one of our key topics. Imagine everything you need is always available at the right time and in the right quantity – without additional working steps. Whether tool management, warehouse optimisation or the use of data-based findings: The GTMS rounds off our portfolio – for customers who not only expect powerful tools, but also intelligent solutions. Our GTMS takes over numerous tasks that would otherwise take up valuable time in your company – from automatic tool ordering to precise data analysis.

Sustainable and economical: The Gühring Tool Circle

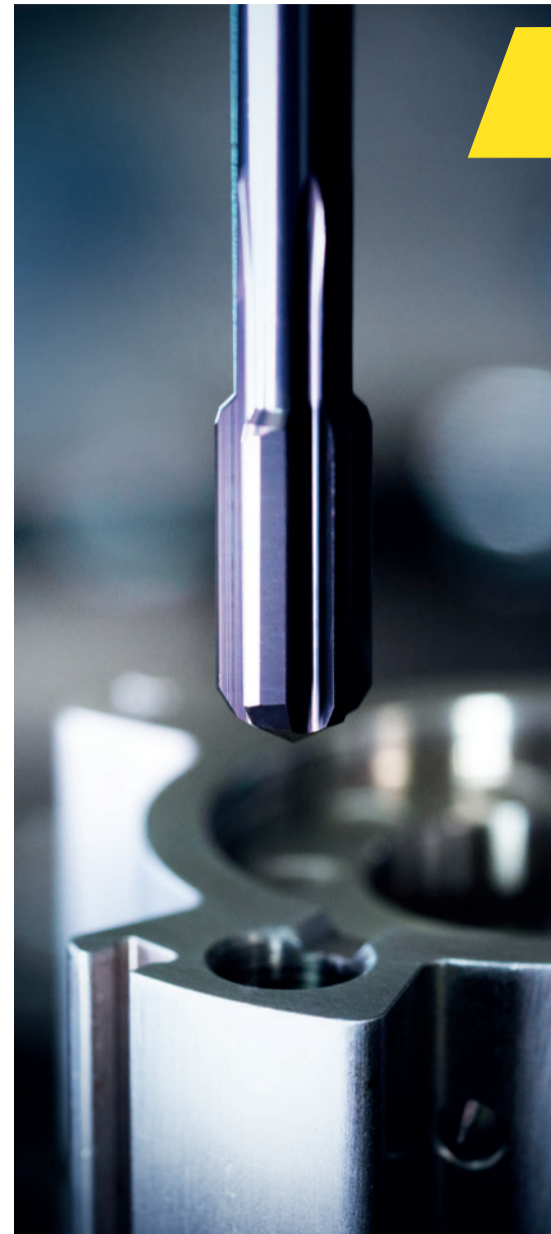
Of course, we know that efficiency is not only crucial in production, but also in the utilisation of resources. This is where our new bonus model, the Gühring Tool Circle, comes in. For us, your used tools are not waste, but valuable resources. If you sell your carbide scrap to us, you benefit from a direct price advantage when you buy a new tool. And that's just the beginning: the more Tool Circle stations you use, the higher your bonus will be. In this way, we combine economic benefits with an active contribution to resource conservation – an approach that benefits both you and the environment.

Innovation and partnership – our promise for your future

What unites all of our solutions – from innovative drilling tools, modular systems and digital tools to our sustainable bonus model – is our commitment to your partnership. Our philosophy is clear: We create products and services that ensure your long-term success and make your processes as efficient as possible.


Yours sincerely, Oliver Gühring

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4000 instead of
40 components

HIGHEST TOOL LIFE DURING REAMING

Working together to find
a solution: Alexander Wolber
(KIPP, left) and Jürgen Knorr
(Gühring, right).



4.8x
higher feed



100x
more components with just one reamer



82x
higher feed rate



*For maximum process reliability
and economy: Our tolerance
calculator guides you to the
perfect tool selection for your fit.

KIPP achieves perfect dimensional accuracy, reduced machining times and 100-fold tool life with the HR 500 high-performance reamer from Gühring. The family-owned company from Sulz am Neckar faces a challenge in the production of precise fits: because machining with μ -precision in difficult materials from the casting process places high demands on the tools used to produce the exact blind holes. With the HR 500, KIPP no longer has to worry about a lack of dimensional stability or short tool lives.



KIPP manufactures mechanical locking elements

Clamping technology, standard elements and operating components – these are the specialties of HEINRICH KIPP Werk GmbH & Co. KG. The family-run company, which made its name with the classic KIPP clamping lever, employs 500 people and manufactures standard parts and assemblies for the areas of industry, mechanical engineering and plant construction. Its exceptionally high standards of ergonomics, stability and precision always come first. This also applies to the production of precision fits in components manufactured using the precision casting process. This pushes conventional reamers to their limits – and KIPP faces a challenge.

Small component – Major challenges

The grip is a small cast alloy product that, after production, is assembled to create a complete device, known as the cam-action indexing plunger. This can be used to lock and unlock machine doors manually, for example. After the

grip has been inserted into a threaded sleeve with a spring assembly, a bolt is pressed into the grip's fit. There is no room for large tolerances: as this is a press fit, the hole must be perfectly matched to the bolt. For the H7 fit with a tolerance range of $+12\mu$, it first has to be pre-drilled and then machined with a reamer.

However, this is easier said than done: Two different materials are used to manufacture the products, which does not make things easy for the reamers: Cast stainless steel (1.4308) and cast steel C 45. "Cast materials are always somewhat problematic, especially when it comes to dimensional accuracy, because the exact composition of the alloy can vary," explains Alexander Wolber, who is responsible for tool coordination at KIPP. "The materials have hard and tough properties, which makes them difficult to machine."

Rapid wear, high costs

And KIPP is all too familiar with these difficulties: "At first, we used HSS reamers for the grip's

fit, which didn't work out at all," recalls Alexander Wolber. But even a competitor's solid carbide reamers delivered results that were far from satisfactory. The tools reached the end of their tool life after a maximum of 20-40 components. "In parts made from cast materials, removing chips is a real issue. Sometimes we had built-up edges, sometimes the tools even broke off", recalls Wolber. "Due to the rapid wear, we were also barely able to maintain the required dimensional accuracy." These difficulties were topped off by high tool costs, as KIPP not only produces grips in four different sizes, but also in high quantities. It is obvious that a different tool solution must be found.

The solution is called HR 500

When Alexander Wolber presented the problem to Gühring sales representative Jürgen Knorr, he quickly came up with a solution: the HR 500. Gühring offers this so called fixed-dimension reamer in 5μ increments and not, as is customary on the market, in 10μ increments*. The smaller scaling in the standard programme allows fits to be adjusted twice as precisely as with competitor tools. So if hole tolerances of just 12μ are required, as is the case at KIPP, up to 100% wear buffer is achieved thanks to the precise diameter selection. "We therefore have a significantly longer tool life and can also machine many times faster", explains Jürgen Knorr. The universal blind hole variant (Art. no. 1675) is used here, which is available in various intermediate dimensions from $\varnothing 1.95$ – 12.050 mm. This allows steels, stainless steels, special alloys and hardened

steels up to 63 HRC to be machined easily and precisely. As a result, this version is suitable for both materials that KIPP uses for the bolts. The extremely uneven cutting edge pitch ensures a smooth cut and high surface quality, while the central coolant supply with frontal exit ensures good chip evacuation in the blind hole. The TiAlN-nanoA coating protects the tool against wear. Thanks to these properties, the HR 500 scores highly in terms of performance compared to conventional solid carbide reamers. And just a short time later, KIPP starts its first trials with the high-performance reamer from Gühring.

The courage to push ahead pays off

"The first attempts were relatively unsuccessful because we approached the new tool with low feed rates", smiles Wolber. "We weren't used to it at all, that a reamer works with these high feed rates." Jürgen Knorr knows that this is not an isolated case: "The HR 500 enables significantly higher feed rates. This puts many customers off at first, because they tend to work with slow feed rates when reaming." Thanks to the HR 500, KIPP doesn't have to worry about this. But the courage to feed is rewarded: "We can not only achieve outstanding dimensional accuracy, but also machine much faster", reports Alexander Wolber enthusiastically. Compared to the competitor's reamers, KIPP can produce the fit with a feed rate of 0.6 mm/rev instead of 0.125 mm/rev. The HR 500 is also an absolute game changer in terms of tool life: "We used to be able to produce 20-40 bolts per reamer.

The HR 500 can produce up to 4,000 bars without any loss of dimensional accuracy," says Wolber happily. By switching to the high-performance reamer from Gühring, KIPP not only saves machining time, but also tool costs – and does not have to worry about adhering to the tight tolerances.

Overcoming obstacles together

KIPP now uses a large number of reamers from Gühring. In addition to the HR 500 programme, this also includes special tools that are specially tailored to the requirements of the customer. What KIPP particularly appreciates about the collaboration with Gühring is having a permanent contact person who is not afraid of a challenge: "Jürgen Knorr always has an open ear for us. If there is a problem, he is quickly on site and provides us with expert advice," praises Wolber.

TOOL PERFORMANCE REPORT

Tool	HR 500	Competitor
Art. no.	1675	Solid carbide reamer
Diameter (\varnothing)	6 mm	6 mm
Feed (F)	0.6 mm/rev	0.125 mm/rev
Cutting speed (v_c)	103 m/min	6 m/min
Speed (n)	5,500 rpm	320 rpm
Feed rate (v_f)	3,280 mm/min	40 mm/min

82 x higher feed rate

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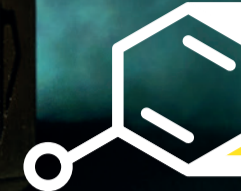
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Customer care hotline: 00800 2607 2607

Nozzle for frequent printers

PERFECT SURFACES THANKS TO DIAMOND



7,506 g
filament printed



4x

better thermal conductivity than brass

LIFETIME
GUARANTEE*

ONE NOZZLE FOR ETERNITY

Moritz Schmitz relies on the high print quality of DIANOZ at Schubert Additive Solutions.

* More information on the guarantee at dianoz.com/lifetime_guarantee

The packaging for the products we consume is as diverse as the products themselves: while a delicate croissant is protected from squashing by a plastic shell, a glass bottle is used to contain lemonade and matches are delivered in a small cardboard box. Each of these packages is produced on a machine that has been specially designed and built for the purpose – and in many cases, by Gerhard Schubert GmbH.

The family-owned company, based in Crailsheim (Baden-Württemberg), is a globally recognised market leader for toploading packaging machines and offers simple solutions for every packaging task. In order to be able to respond even more flexibly to the individual requirements of each customer, the company has been using 3D printing in its production for over ten years and has even founded a subsidiary for this purpose: Schubert Additive Solutions. There, 26 additive manufacturing systems print parts for packaging machines non-stop – for hundreds of hours a month. This is how around 20,000 products are created each year.

Wear often comes gradually

The filaments that Schubert Additive Solutions prints are not particularly demanding: polyamide plastics (PA6) are used as standard. However, in large quantities, even non-abrasive

elements can cause a printer nozzle to wear out – if more than 750 kilograms of them are printed. "Anyone who prints a lot, always has a certain amount of wear," says Moritz Schmitz, Head of Mechanical Development and Engineering at Schubert Additive Solutions. He repeatedly observes the following situation in additive manufacturing: if the print bed is not calibrated correctly, the printer nozzle may accidentally pass through the print bed. With conventional brass nozzles, this is enough to damage the tip of the nozzle, but the wear is not yet visible to the inexperienced machine operator. He simply continues printing with the nozzle and then wonders why the component quality is getting worse and worse as the wear gradually sets in. Sometimes, a small scratch on the nozzle exit is enough to disrupt the material flow, which in turn affects the surface quality.

Surfaces at a high level

"Surface finish is an important quality aspect for us," explains Moritz Schmitz. But even hardened nozzles had never convinced him in terms of surface finish. "We then got to know DIANOZ and simply tested it", he remembers. The printing nozzle from Gühring has a tip made of artificial diamond, which offers maximum wear protection. And with this, Gühring is pursuing a clear goal, explains DIANOZ Sales Manager Udo Lerach: "Our goal is to meet the demands of our customers and to offer added value in terms of usability, performance and quality."

The heart of the design: Black diamond optimally conducts heat and provides the best possible protection from wear.



Moritz Schmitz was also immediately impressed by the result: "The Diamond nozzles are much more reliable and last longer. And then I have to ask myself: Would I rather constantly buy a cheap nozzle or a good one once?" DIANOZ has made a huge difference as far as the surfaces of the products are concerned:

"The quality improved immediately and since wear is no longer an issue with DIANOZ, the level is consistently high – even without constant nozzle checks and changes." DIANOZ expert Moritz Stehle can confirm this experience: "When it comes to surface quality, we often get feedback from our customers that DIANOZ stands out from other hardened nozzles." The reason: The nozzle not only surpasses the wear resistance of other hardened nozzles, but also conducts heat much better than steel nozzles, for example. "The PCD insert conducts the heat extremely well at the most important point, resulting in very even material extrusion," explains Moritz Stehle. DIANOZ also has a special ironing surface that presses the filament flat and thus ensures that the layers adhere more firmly to each other. All of this leads to outstanding component surfaces in FFF printing.

Maintenance made easy

DIANOZ also offers advantages when it comes to maintenance and cleaning. Slight soiling of the nozzles cannot be avoided during printing. However, if, for example, a burr forms at the nozzle exit, this can prevent the material flow and lead to a poor component appearance. Built-up material must therefore be removed regularly with a brass brush, but this

can cause scratches in brass or steel nozzles. These scratches are barely visible to the naked eye, but affect the quality of the component surface. That is why a major advantage of the diamond nozzles is that they are very easy to clean: "I simply go over them with a stainless steel brush," explains Moritz Schmitz. "I don't have to worry about damaging the tip, which makes the maintenance process much easier." The DIANOZ can remain in the printer for cleaning, is briefly heated up and built-up material is removed with a brass brush – and it is as good as new again.

Profile of the Schubert Additive Solutions GmbH

- Products: 3D printers for the packaging industry
- Production size: 26 additive manufacturing systems
- Materials: polyamide plastics (PA6)
- Printed filament per year: 750 kilogrammes
- Printed products per year: 20,000 pieces

In collaboration with:



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Keeping track with software

MEDICAL TECHNOLOGY IN THE DIGITAL CHANGE



Together they have digitalised tool management (from left to right): Martin Nolle (Gühring) with Rimon Abd-Elseid and Wolfgang Eppe (Getsch+Hiller).



7 modules for full flexibility



90% of the operating resources are managed digitally

TM 326 + Logistik-Modul GTMS

- 8 drawers
- electronically interlocked dispensing system
- manually operated drawers with LED display and full-extension runners
- overall height: 1700 mm (incl. attachment)
- usable height: 900 mm
- 21.5" HD touchscreen monitor
- PC with WIN 10, 64 bit
- Scanner for barcode and QR code

Find out more about the Gühring Tool Management Software modules on p. 28 / 29

The story of Getsch+Hiller Medizintechnik GmbH shows how the requirements for tool management change when a company expands. With Gühring Tool Management Software (GTMS), the company has found an attractive solution for entering the world of digital tool management that can grow flexibly. This saves valuable time, costs and manual effort.

In 2003, Arnold Getsch and Werner Hiller laid the foundation for an impressive company history: they founded the company Getsch+Hiller Medizintechnik GmbH. What started with one machine and a few employees has evolved into a specialist for the manufacture of a wide range of medical instruments. The product portfolio comprises around 6,000 articles that are used in various fields of endoscopy. All instruments are developed and manufactured in-house at its site in Nendingen. To meet the high requirements in the field of medical technology, Getsch+Hiller relies on reliable, precise tools from Gühring from the outset, such as micro-precision drills and reamers. "A tool management system was impossible to imagine back then," recalls sales representative Martin Nolle, who has been the contact person for Getsch+Hiller for around 20 years now.

Challenges in tool management grow with the company

However, the industry – and therefore also the business – is developing splendidly and the

young company is growing rapidly: Getsch+Hiller not only expanded its product portfolio, but also its machinery workforce too, which led to the company moving to new headquarters in Nendingen in 2016 – complete with modern production facilities. To begin with, there was one thing that went unnoticed as the company grew: After all, instruments made of titanium, plastic or steel, for example, place a wide range of demands on cutting tools. "Almost everyone had their own tool drawer," recalls Rimon Abd-Elseid, Head of the CNC Turning Department at Getsch+Hiller. "In some cases, we ordered tools that we actually had in stock – just because we couldn't find them." However, in order to be able to deliver flexibly, quickly and on time, the tools must be available in the right place at the right time. Otherwise, the company will not only incur unnecessary tool costs – it will also experience delays in the production process or even production downtime. It quickly became clear that something had to change in order to maintain an overview. In light of this, Getsch+Hiller began a manual trial: One employee kept Excel tables to track consumption and take care of orders for new tools. But it's not just the company that had become too big for manual monitoring – it was also the effort involved.

We maintain tools once - the cupboard takes care of the rest. GTMS makes this much easier.

Rimon Abd-Elseid,
Getsch+Hiller Medizintechnik GmbH

"If you want to work in a way that doesn't involve constant searching, you need Gühring Tool Management Software," says sales representative Martin Nolle. When he learnt about the problem that was troubling his long-standing customer, he presented them with the Gühring solution and to great success: Managing Director Arnold Getsch was won over straight away. He wanted to order the dispensing system on the spot," recalls Nolle.

Perfect for the start: The TM 326 with GTMS logistics module

"As Getsch+Hiller has been purchasing tools from us for several years, it made sense to work with Gühring to find a tool management solution. The quick decision to purchase GTMS was a real sign of confidence." Getsch+Hiller opted for the TM 326 dispensing system, which is perfect for getting started with digital tool management. The heights and divider variants of the drawers can be customised – depending on which articles the customer wants to store in it," explains Martin Nolle. The dispensing system is accompanied by the Gühring software, which is ideal for the digital management of tools, measuring instruments and other articles in production. These are sto-

red in the electronically locked drawers. The integrated card reader as well as a QR code and barcode scanner allow the respective employee to identify themselves via a chip card and select, remove and scan the desired article on the monitor. This means that it is always possible to trace which tool has been removed by which employee. Access rights can be defined individually.

Martin Nolle sees a decisive advantage in this modularly expandable variant: "High acquisition costs are often a hurdle for customers when they are considering a tool management system. It is difficult for them to estimate how much space they actually need and which software modules they really need. The TM 326 together with the GTMS is a cost-effective entry-level model that can be expanded at any time – and exactly at the pace that suits the customer," says Nolle. This means that the customer can purchase additional dispensing systems or software modules at any time – such as the tool data module or the order module. As Gühring offers both software and hardware from a single source, these additions can be flexibly combined with each other. In 2019, Getsch+Hiller began implementing GTMS and welcomed the first dispensing system into production. The relief quickly became clear: "The implementation took some time, but it didn't take long before we realised it was worth the effort," recalls Rimon Abd-Elseid. While the dispensing systems ensure controlled removal,

GTMS monitors the minimum stock levels specified by the customer in the background. As soon as a minimum stock level is reached, the production employees receive an e-mail. The purchasing department is also informed so that their colleagues can take care of follow-up orders directly. "New tools only need to be input once – the system takes care of the rest," says Rimon Abd-Elseid. "The GTMS is a great relief."

Modular design for maximum flexibility

Just a few months later, it became clear that one dispensing system is not enough. Getsch+Hiller therefore decides to expand with two dispensing systems. No problem at all for the flexible GTMS: "In 2023, we decided to manage our measuring instruments via the GTMS as well. At the moment, we have implemented around 90% of all our stock," says Abd-Elseid. The investment has paid off: thanks to GTMS, Getsch+Hiller can manage its tools efficiently and save unnecessary tool costs. In addition to the time saved searching for tools, checking stock levels and placing follow-up orders, the medical technology company no longer has to worry about production downtimes due to missing tools. "Getsch+Hiller achieved considerable growth within a short period of time," says Martin Nolle. "This is not only a prime example of how the requirements for a company's tool management can change within a short period of time – but also how Gühring, as a long-standing partner, can support them with this."



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A job for the stainless steel specialist

BREAKTHROUGH IN HIGHLY HEAT- RESISTANT STEEL



2-fold

tool life with the same precision



50%

time saving per component

RT 100
INOXPRO

As an experienced contract supplier in metalworking, Recker Technik GmbH was faced with a particular challenge: a highly heat-resistant steel was pushing its universal drills to their limits. But with the RT 100 InoxPro stainless steel specialist from Gühring, the company found the solution – and is now achieving twice the tool lives.

Recker Technik GmbH from Eschweiler (Aachen) is a contract supplier of metal parts for a wide range of customers in the food industry, laser technology and mechanical engineering. The various individual and series parts are produced in a modern, automated machine fleet, consisting of eleven CNC lathes and eight CNC milling machines, some of which are equipped with robots.



The dream team (from left to right) Karsten Raßbach (Gühring), Kevin Schippers & Daniel Schultes (Recker Technik)

The material for the components depends on the customer's requirements, but stainless steel materials play a major role, as Production Manager Daniel Schultes explains: "We specialise in highly heat-resistant steels and stainless steels. This is our core business and we have a lot of expertise in this area." But one material is proving to be difficult, even for the experienced metalworkers: For a check valve in a gas pipeline, a customer wanted a particularly stable material and opted for an extremely heat-resistant steel (1.4825). A material that was pushing the previous drills to their limits.

Universal drills are blunt after drilling

In the field of drilling, Recker relied on universal drills made by one of Gühring's competitors for 25 years. But in the highly heat-resistant material, they quickly reached their limit: "We simply couldn't break through with the universal drills," recalls Schultes. "After every single hole, the drill tip was blunt." Even with different cutting values and cooling techniques, machining experts could not get a grip on this material – after a very short time, the drills began to show typical signs of wear and became unusable. Schultes realises that a material specialist is needed. The production manager contacted his Gühring sales representative, Karsten Raßbach, who had already been successfully advising the company in the field of thread

milling. After looking at the component, material and machining conditions, Raßbach identified the tool that was needed here: "With this highly heat-resistant material, I immediately opted for the RT 100 InoxPro, as I had already achieved very good results with this tool with other customers. Long tests were not necessary here, only the cutting values were discussed and then the tool was used directly".

RT 100 InoxPro delivers double the tool lives

The plan works: The RT 100 InoxPro shows much less chipping on the cutting edges and the coating lasts much longer. 64 holes with a depth of 30 millimeters can be drilled with just one tool. After that, the first signs of wear on the coating become noticeable, but the limit has not yet been reached. Daniel Schultes is enthusiastic: "The success of the Gühring drill is significant: we have never used material specialists before. Recker Technik now also uses the RT 100 InoxPro for other components. For example, the drill has machined a series of 110 bronze parts without becoming blunt. "In general, we achieve at least twice the tool life with the InoxPro

compared to competitor products and at a better price-performance ratio," summarises Daniel Schultes. Thanks to this success, the production manager now wants to switch to Gühring tools in other areas such as milling and reaming. What convinced him about Gühring? "I have been in metalworking for 16 years and like every manufacturer in this field, I know that when it comes to drilling and thread cutting, Gühring is number one. Gühring has made a name for itself through drilling and is therefore an absolute specialist in this field.

RT 100 InoxPro

Art. no. 8513
Material: 1,4825
Ø = 10.8 mm
F = 0.20 mm/rev
v_c = 85 m/min

In collaboration with:

**RECKER
TECHNIK**

GÜHRING

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Product Manager Drilling
markus.kraus@guehring.de
Customer care hotline: 00800 2607 2607

Modular moulding master

THREADS FOR GIANTS

3x

longer tool life

1

less working step

Marcel Horn (Gühring, left) and Philipp Hüscher (Karl Georg) are enthusiastic about the new modular fluteless tap.

In the port, where containers weighing tonnes are moved by gigantic cranes, everything depends on precision: gears mesh, shafts drive and every single component has to withstand the highest loads. But as impressive as these machines are, the precision of the small parts is just as crucial. This is precisely where the collaboration between the family-owned company Karl Georg and the tool manufacturer Gühring comes in. An innovation – Gühring's new modular fluteless tap – has made it possible to solve difficult threading challenges at Karl Georg and raise process reliability to a new level.

Karl Georg, a family-owned company based in the heart of Germany, is a specialist in crane components that is in demand worldwide. With 146 employees, the company manufactures products including wheels that are used in harbour cranes or heavy-duty logistics systems. "However, we have faced considerable challenges in the past, especially when it comes to threads."

The challenge: Threads beyond the standard

A particularly demanding task is the production of blind hole threads in drive and idler shafts, which are later shrunk into the crane trolleys. Here, thread depths of up to 70 millimeters have

to be produced with thread cutters – unusually deep for an M16 thread. This depth regularly caused problems with chip removal. "In the past, we often had a reduction in tool life because chips got stuck in the blind hole. Often, the tool would even break off and could no longer be removed from the hole," recalls Hüscher. "The entire component had to be scrapped." Such incidents are particularly annoying when they occur in an automated machining process: The entire process comes to a standstill, machines have to be stopped and valuable time is lost. "I have to be able to rely on the process," emphasises Hüscher.



The solution: The modular fluteless tap from Gühring

Until now, Karl Georg had to rely on special tools for such deep threads, but Gühring field service consultant Marcel Horn had a different idea: the new modular fluteless tap. "The length here is perfect and we don't have to work with any extensions or special concepts," explains Marcel Horn. Another advantage of the Gühring system is the combination of HSS tool shank and carbide thread head. The AlCrN coating of the thread head ensures high wear resistance, while the repeated use of the shank drastically reduces the costs per component. In addition to the practical advantages, the process changeover also offers improved quality: fluteless tapping produces particularly strong threads that can easily withstand the high stresses that occur during the operation of crane systems. For a company like Karl Georg, which relies on reliability and precision, this is a decisive competitive advantage.

Economic efficiency and process reliability redefined

"That was a real game changer," reports Philipp Hüscher. In contrast to taps and milling cutters, where the chips have to be removed from the blind hole, fluteless tapping does not produce any chips. "This not only makes the entire process safer, but also faster,"

says Hüscher. The modularity of the tool is particularly impressive. "The shank is retained and only the tool head is replaced when worn. This saves costs and makes changing the tool much easier," explains Hüscher. For Karl Georg, this means no more special solutions, no complex customisations, but an efficient and trouble-free process. "With this tool, we have not only tripled the tool life from 20 to 60 minutes, but we have also significantly reduced the machining times, since re-drilling to remove chips is no longer necessary." The synchro tapping chuck specially developed by Gühring also contributes to process stability. It balances out axial and radial loads, thereby extending the tool life. "For us, that was a real added value, because the tools last even longer and the quality of the threads remains at a consistently high level," emphasises Hüscher.

A strong team for big tasks

The collaboration between Karl Georg and Gühring has existed for five years and has steadily deepened since then. "Our tool management used to be a bit of a mess," recalls Philipp Hüscher. "But after we rigorously switched all our threading tools to Gühring, we have only had positive experiences." With the modular fluteless tap, Gühring has developed a solution that meets the special requirements of Karl Georg and guarantees the highest process reliability.

For Hüscher and his team, this means less downtime, fewer rejects and greater efficiency – a success story that shows how small changes can lead to big changes.

Modular fluteless tap

Art. no. 4871 head
Art. no. 4873 shank
Material: 42CrMo4 (1,7225)
Ø = M16x2
F = 1,200 mm/rev
v_c = 30 m/min
n = 600 rpm

“That makes the entire process not only safer, but also faster.”

Philipp Hüscher, Karl Georg

In collaboration with:

KARL GEORG

GÜHRING

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Product Manager Threading
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Keeping pace with the times

POCKET MILLING IN GRADE 5 TITANIUM



73x
longer tool life



100%
more feed

Information on the processing situation:

- MAKINO a61nx horizontal machining centre
- Tool clamping: HSK A63
- Cooling: internal cooling, oil-based coolant

It may just be a small battery case, but it's crucial for many people's lives. That's because it's installed in a pace-maker and keeps our internal motor running. However, only perfectly machined parts can guarantee the durability and efficiency required. It's a good thing that our Gühring heart beats for precision machining.

Like many companies in the medical field, the Japanese company Microcut Co., LTD also relies on the material grade 5 titanium (Ti6Al4V). A battery case made of this material does not feel heavy when it is installed in the body and yet is extremely durable. The titanium alloy is also biocompatible, does not cause any reactions or allergies, does not corrode and is not magnetic. But grade 5 titanium also has its pitfalls – especially when it comes to machining.

Goal: Faster milling with less wear

Microcut could not ignore this when milling pockets into the components. After just 32 workpieces, a competitor's tools were worn out despite the coating. The company therefore approached Gühring with the challenge of supplying a tool solution for improved tool lives and machining times. Gühring provides the solution with the G-Mold 65 HF solid carbide end mill.



Sales representative Shinji Fukai (left) presents the G-Mold milling cutter to Microcut managers Hiroshi Saito (centre) and Atsuya Tsuji (right).

Equipped with internal cooling and a Signum coating, which is known for its extremely high wear resistance, this milling cutter promises a considerable improvement in tool life and machining efficiency. "We recommend the G-Mold 65 HF, which can be used at high feed rates, making it extremely efficient," explains sales representative Shinji Fukai.

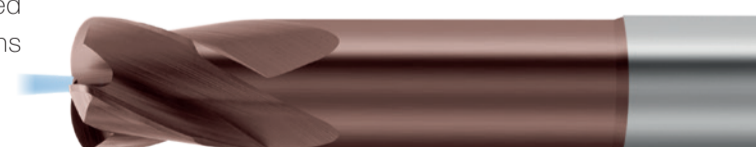
73 times longer tool life

The results of the first tests using the previous cutting parameters were already impressive: The tool life of the G-Mold 65 HF was 15 times longer than that of the competitor's tool. But that was just the beginning. After the customer had adapted their cutting parameters to

the new high-performance tool, he achieved a 73 times longer tool life with the G-Mold 65 HF compared to the competitor's tool. This is where the G-Mold 65 HF showed its strength, as it could be used at a high feed rate and with maximum efficiency. Gühring was also able to achieve an advantage for the customer with regard to machining time:

The G-Mold 65 HF can be used with a high feed rate, making it extremely efficient.

Shinji Fukai, Gühring



With the G-Mold 65 HF, it was possible to achieve twice the feed rates and 25% higher cutting speeds, which significantly reduced the machining time.

FAQ about milling grade 5 titanium

What is grade 5 titanium?

Grade 5 titanium refers to a special alloy of titanium known as Ti-6Al-4V. This alloy consists of around 90 per cent titanium, 6 per cent aluminium and 4 per cent vanadium. It is one of the most commonly used titanium alloys. Grade 5 titanium is characterised by its high strength, low weight, corrosion resistance and good weldability. Due to these properties, it is used for various components in the aerospace, medical technology, sports equipment and many industrial applications. The material is particularly popular in situations where high strength and low weight are required.

What are the challenges of milling titanium?

Milling titanium poses several challenges due to the unique properties of this material. Titanium alloys have extremely high strength and toughness, resulting in increased tool wear. High temperatures are generated during machining, which further impairs the tool life of the milling cutters. The thermal conductivity of titanium is low, which can lead to heat build-up, and the chips produced are often long and sticky, which makes chip removal more difficult. Overall, milling titanium requires careful process control, advanced tool materials and effective cooling systems to achieve optimum results.

TOOL PERFORMANCE REPORT

Tool	G-Mold 65 HF	Competitor
Number of cutting edges	4	4
Diameter (Ø)	4 mm	4 mm
Material	grade 5 titanium	grade 5 titanium
Cutting speed (v_c)	100 m/min	80 m/min
Speed (n)	7,961 rpm	6,368 rpm
Feed (f_z)	0.1 mm	0.05 mm
Feed rate (v_f)	3,184 mm/min	1,273 mm/min
Lateral infeed (a_e)	4.0 mm	4.0 mm
Cutting depth (a_p)	0.3 mm	0.3 mm
Tool life	2,336 parts	32 parts

73 times more components possible with one tool at 100 % higher feed rate

In collaboration with:

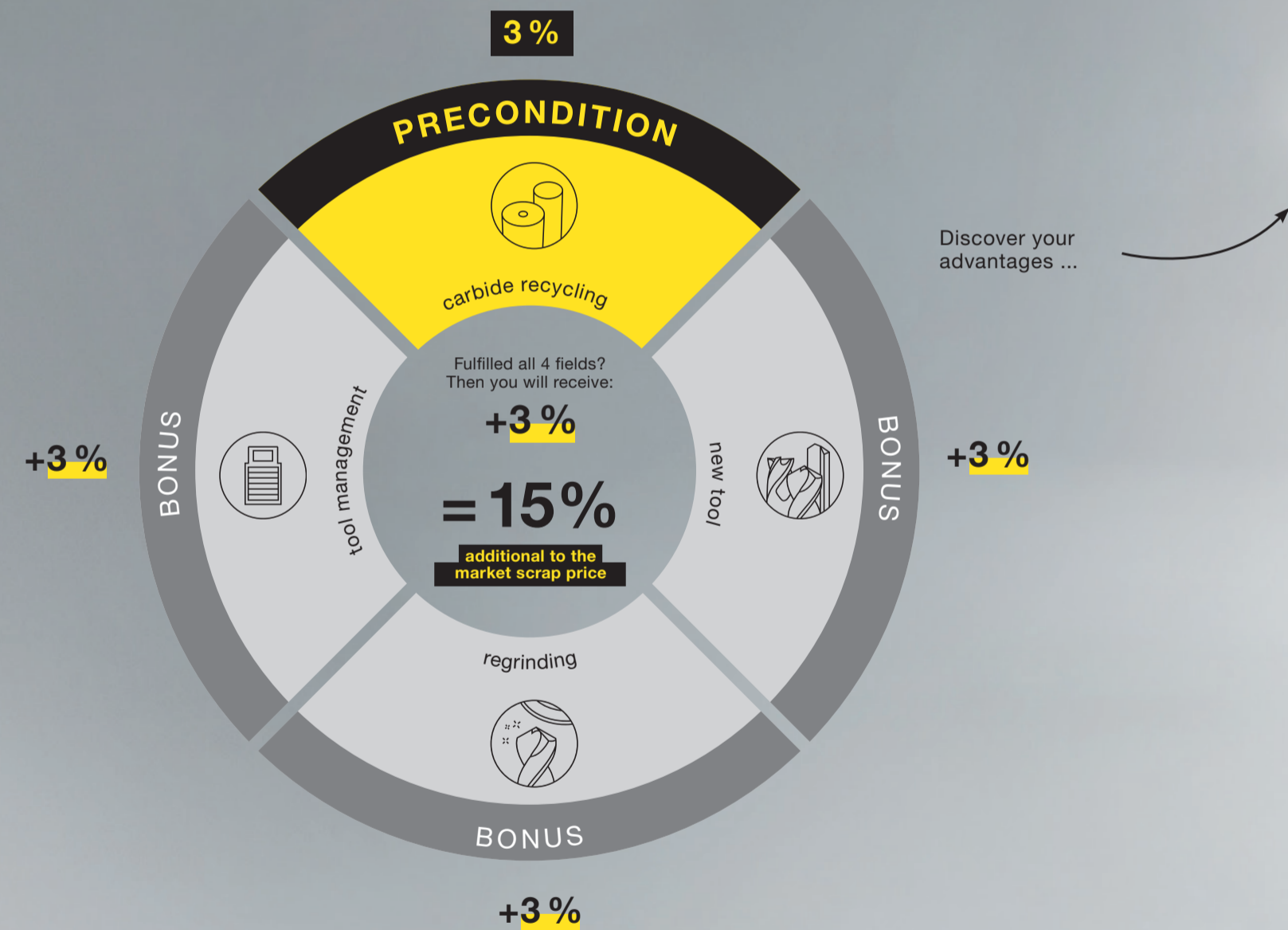


GÜHRING

Rolf Ehrler
Product Manager Milling Tools
rolf.ehrler@guehring.de
Customer care hotline: 00800 2607 2607

YOUR SCRAP IS ADDED VALUE!

Carbide tools often contain valuable and rare raw materials. Extracting them is resource-intensive, time-consuming and expensive. By recycling carbide and refurbishing the tools, natural raw materials can be conserved and the environment protected – and you even save money!



Example: 50 kg x € 20 + 15% = € 1,150			
Carbide scrap Quantity	Market price per kilo	Bonus realised Total	Credit note on new tool

Legal notice: Carbide recycling and the associated bonus model are only available in Germany

inas confirms 65 % CO₂ savings through recycling

In our product carbon footprint study, we analysed the production of carbide rods at Gühring KG in Kulmbach. Our results showed that Gühring's recycling of cemented carbide saves 64.8% CO₂ compared to the use of commercially available carbide powder made from primary materials. For us, it is therefore clear that the conversion costs for carbide production can be minimised. The use of secondary raw materials and thus the topic of material cycles represent the greatest lever for reducing CO₂ emissions.



> 15%
discount on the purchase of new tools



100%
of your tool logistics is taken over by us



65%
less CO₂ than market competitors

Achieve better prices for your carbide scrap and buy your new tool at a lower price!



New tool from the manufacturer, because this gives you first-hand manufacturer know-how and machining expertise. Everything else is second choice.



Regrinding at the manufacturer, because only here will you receive original quality and even save up to 62% on tool costs by refurbishing worn tools. Rework instead of buying new!



Tool Management from the manufacturer, as this gives you an overview of the entire life cycle of your tools and saves process costs. This is because we take care of comprehensive scheduling and management – including third-party tools.



Carbide recycling with the manufacturer, because we close the circle. So you not only conserve resources. You receive a credit note and transparent documentation.

Your contact partner:

GÜHRING

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Product Manager Carbide
wilfried.hartmann@guehring.de
Customer care hotline: 00800 2607 2607



From the Rhineland region into space

MACHINIST COLLECTS BONUS POINTS

Turning scrap into money: That went down well with the entire PJK team.



€ 3,000

annual savings through recycling



≤ 15 %

credit note on the purchase of new tools

Just outside Cologne, in the heart of the Rhineland region, PJK Peter Josef Klein Feinmechanik GmbH from St. Augustin has made a name for itself. Using state-of-the-art CNC machining, the company manufactures high-precision components for industries where inaccuracy is not an option – medical technology, the food industry and even space technology.

“Our portfolio is constantly developing and we increasingly have series productions with evolving materials such as Inconel or titanium,” explains Peter Klein, who is the second generation to run the company together with his brother. These materials, known for their extreme strength properties, present even experienced companies with challenges. “In such cases, we ask Gühring for special tools that are precisely tailored to our requirements.” These Gühring tools are used at PJK in almost all areas of machining – from turning, drilling, reaming and milling to thread production. “We appreciate the quick availability of the tools and the expert advice from the application engineers at Gühring,” explains Peter Klein. “They help us to further optimise processes and increase

efficiency in our production.” This is why the collaboration between the two companies has grown considerably over the past two years.

Sustainability as a success factor

However, PJK can not only rely on Gühring when it comes to new tools, but also when it comes to tool refurbishment. “A major advantage of the Gühring regrinding service is that we can rely on getting back exactly the same tool we originally purchased: With identical geometries and coatings,” emphasises Peter Klein. Other service providers have not always been able to guarantee this in the past. For PJK, however, regrinding is not just a question of quality, but

“The tools in our production have a very high value in some cases. Having them reground pays off for us in many aspects.”

Peter Klein, PJK

Also, some of the tools in production have a very high value. Having them reground pays off for us in many aspects.” At PJK, worn tools are collected in a box and, if required, Gühring sales representative Marcel Horn is informed. He explains the procedure as follows: “We organise the collection very easily. As soon as the collection box is full, I receive a message on WhatsApp and collect the tools.” Thanks to the dense

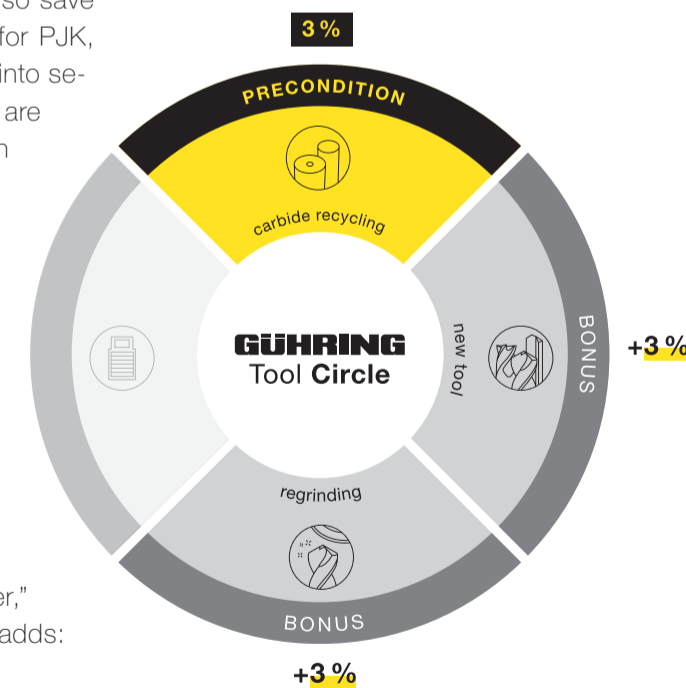
network of Gühring regrinding centres, PJK receives the tools back in a short period of time and they correspond exactly to the original specifications.

Efficiency meets environmental awareness

The collaboration between PJK and Gühring is similarly uncomplicated when it comes to carbide recycling – and here too, PJK has undergone a transformation. “In the past, every employee had their own small collection point for carbide scrap, which was often uncoordinated,” recalls Peter Klein. Broken tools often disappeared into the rubbish. “Today, we have the Gühring recycling barrel as a centralised collection container in production and everyone can simply put their carbide scrap into it.” All carbide scrap is collected here – from worn milling and drilling tools to indexable inserts. The introduction of carbide recycling has also led to a change in awareness within the workforce, explains Peter Klein: “We now strongly encourage our employees to collect their scrap metal, because these are raw materials that are becoming increasingly rare and expensive.” And it's working: significantly more scrap metal is now ending up at the collection centre. PJK sends up to 30 kilograms of carbide scrap to Gühring for recycling every quarter.

Closing the tool circle with Gühring

From new tools to regrinding and recycling – with Gühring, PJK covers the entire life cycle of its tools. This makes sense for Peter Klein: “Thanks to the bonus programme, we can generate an absolute throughput. We no longer have to worry about anything, we only have one central point of contact and we also save money.” In fact, it pays off financially for PJK, because those who integrate Gühring into several stages of the circular economy are rewarded with the bonus model. When recycling with Gühring, PJK not only receives the current market scrap price, but an additional nine per cent on top of that, because the company also relies on Gühring for new tools and regrinding. To complete the tool circle, tool management via a Gühring TM cabinet would now be the only thing missing. The company currently uses a tool cabinet from another manufacturer. “But I never say never,” reveals Peter Klein and Marcel Horn adds:



Sample calculation: 30 kg x € 20 + 9% = € 654

Carbide scrap Quantity Market price per kilo Bonus realised Total

Credit note on new tool per quarter

Order a free barrel now & collect scrap

Order form

Which barrel size would you like?

(Minimum quantity for collection: 25 kg)

- ☐ Size S (20 L | 25 kg – 100 kg)
☐ Size M (60 L | 100 kg – 350 kg)
☐ Size L (210 L | 350 kg – 1,000 kg)

Calculate your bonus:

The more services you use from Gühring, the higher your bonus. Receive up to 15 %

- ☒ I recycle carbide scrap at Gühring: + 3 %
☒ I buy new tools from Gühring: + 3 %
☒ I have my tools refurbished by Gühring: + 3 %
☒ I use tool management from Gühring: + 3 %
Fulfilled all 4 fields? + 3 % extra
Total bonus

Delivery address

Company	Customer no.	Department/plant
First name & surname		
Street & house number		Postcode & city
Telephone	Mail	

In collaboration with:



GÜHRING

Wilfried Hartmann
Product Manager Carbide
wilfried.hartmann@guehring.de
Customer care hotline: 00800 2607 2607

With three cutting edges to flat bottom drilling

INDIVIDUAL TOOL FOR CUSTOMERS



50 %

less drilling time per component



2x

higher feed rate when drilling

Their joint work was successful:
Andreas Buch (HWG, left)
and Benjamin Gluth (Gühring, right)

FB 200 U

Art. no. 6065
Material: tempered steel
42CrMo4, hardened
 $\varnothing = 4.2 \text{ mm}$
 $v_f = 227 \text{ mm/min.}$
 $t = 11.1 \text{ sek.}$

A perfectly manufactured cog meshes seamlessly with the gear of a larger system. The interaction of these two components transmits power and rotary motion, which ultimately drive a machine or a bicycle, for example. Ideally, this is exactly how collaboration between two companies works: When the expertise of users and developers comes together, an innovation can be created that really makes a difference.

A perfect example of this is the joint success story of Gühring and HWG Horst Weidner GmbH in Renningen (Böblingen district). The company manufactures a wide variety of drive units such as cogs, ball and axial bearings. Due to the high quality of its products, the company is growing continuously and is constantly working on new developments for the industry. The company endeavours to cover as many production steps as possible in its own machining department in order to make itself independent of others and to meet its own high quality requirements.

High hardness and tightest tolerances

Among other things, 10,000 cogs are machined in this machining department every year. The components made from heat-treated steel (42CrMo4) are rough-turned, toothed, hardened and glass bead blasted before they end up in the machining department for hard machining.

Several flat holes are drilled into each component, into which threads for seals are later turned in the lathing company. Machining takes place on a 5-axis machine that was purchased especially for the production of this component. Very tight tolerances are specified by the customer, the hole must have a very high roundness and the maximum deviation is 8μ . The hardness of the material of around 58 HRC also poses a challenge and means that high cutting values are not possible. It takes a whole 15 minutes to machine a single component. Andreas Buch therefore tries to modify the process so that a few more minutes of machining time can be saved – by using the right tools, among other things.

Two-fluted cutters are not convincing

Andreas Buch looked at the flat bottom drills from various suppliers, but none of the tools convinced him. He quickly realised that although many manufacturers have a flat bottom drill in their range, these are usually two-fluted tools. Not the ideal solution, as Andreas Buch explains: "As we don't pre-drill, we hit a flat surface with a flat bottom drill. If the conditions are not right, it is inevitable that the hole won't be round." In the beginning, it often worked reasonably well. But with increasing wear of the tool the fit became increasingly loose which later led to a strength problem with the threads. In addition,

The speed at which this tool works is extreme. It has nothing to do with drilling, it's almost like punching.

Andreas Buch, HWG

the blunt drills began to press against the base of the hole, which was only a few millimeters thick, and created a bulge there. Components became scrap. With the two-fluted cutters, it also frequently happened that the long chips wrapped around the drill and scratched the surface. "We constantly had to observe and measure whether the tolerance was still being adhered to, how much wear the tool was experiencing and whether

there were any problems with chip removal," recalls Andreas Buch. "But I have to be able to rely on my drill still working precisely even after the 200th component."

Three cutting edges for process reliability

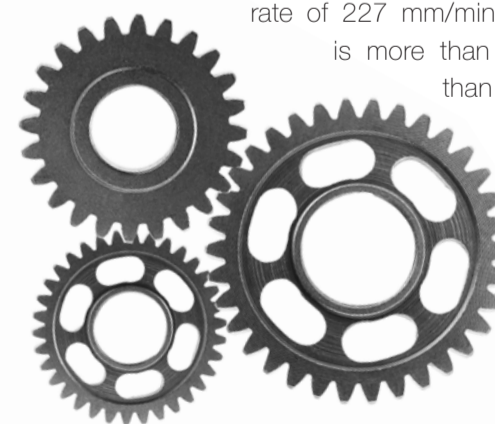
In his search for the optimum tool solution, Andreas Buch approached Gühring. The two companies had already developed solutions together for earlier machining problems and Buch agreed to do the same for the cog. At that time, Gühring did not have a three-fluted flat bottom drill in its programme – but was ready to change that. The Gühring experts took a close look at the component in the R&D department and finally developed a new drill that made Andreas Buch realise: "This is the right way, it works." This way is now called "FB 200 U" and is a 180° flat bottom drill with

three cutting edges, which lead to a significantly higher drilling speed and a more equal distribution of the cutting forces. In combination with the reinforced shank transition, the increased number of cutting edges also ensures high stability during drilling, which means that the FB 200 U can produce significantly more dimensionally accurate and rounder holes than conventional flat bottom drills. Another advantage of the FB 200 U is the improved chip removal: the three-fluted cutter produces short chips that can be reliably removed in three directions.

Machine operator is enthusiastic

"My machine operator is completely thrilled with the tool," explains Andreas Buch. "The speed of this tool is extreme. It has almost nothing to do with drilling anymore; it's almost punching." HWG uses the flat bottom drill with a feed rate of 227 mm/min, which is more than double than that of

the flat bottom drill from other manufacturers tested previously. Thanks to these cutting parameters, it is possible to produce the four 10.5 mm deep holes in each component in just 11 seconds. This has halved HWG's drilling time per component. The tool also impresses in terms of hole quality, as Andreas Buch notes: "What is most important to us is that the drill produces a dimensionally accurate, round fit. And the FB 200 U does that very, very well." For Andreas Buch, the project was a complete success: "I'm glad that I was able to make the entire complicated machining process for the cogs reliable and reduce the scrap rate." And with the FB 200 U, Gühring has created a new innovation that many other customers will benefit from. Gühring sales representative Benjamin Gluth summarises: "The requirements for the FB 200 U were clearly defined by the market – and not just by HWG. This is how Gühring works: when there is a demand, we start field trials and, if a new tool is suitable, we add it to our standard programme."



*Perfectly interlocking like a gear and a cog:
HWG and Gühring*



Experience the FB 200 U in the video on Gühring TV!

Information on the machining setup:

- Machine: Fanuc Robodrive alpha D21MiB5 vertical machining centre
- Tool clamping: BT30 shrink fit / BT30 Weldon
- Cooling: emulsion internal cooling

In collaboration with:

HWG
WÄLZLAGER

GÜHRING

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Customer care hotline: 00800 2607 2607

From raw material to finished component

PERFECT SURFACES WITH G-MOLD

Precision is crucial in mould and die, so the tools from the new G-Mold range promise component surfaces of the highest quality. But can they also live up to this promise in practice? We use a demo component to demonstrate our expertise in mould and die and show you how you can achieve perfect surfaces with the right choice of tools and optimum parameters.



Scan the QR code now
for all information ab-
out the component!



Would you like to see the demo component live?
Talk to your Gühring sales representative!

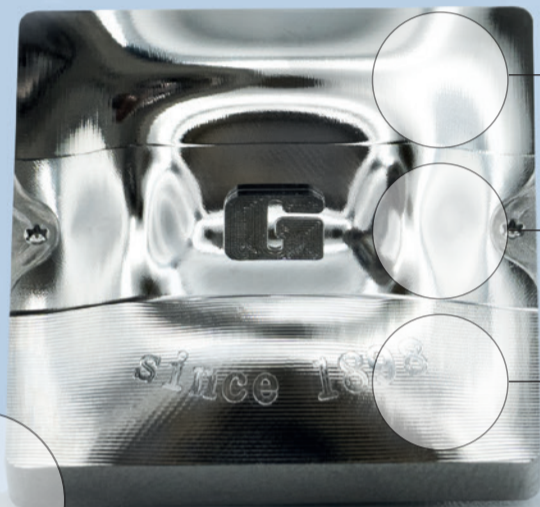
GÜHRING

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Product Manager Micro Tools
christian.sieker@guehring.de
Customer care hotline: 00800 2607 2607

5 STEPS TO THE FINISHED COMPONENT

The component is made from Stavax, a high-quality, stainless tool steel. It is characterised by its high corrosion resistance and excellent polishability, which makes it particularly suitable for applications in mould making, optical components or in food and medical technology.

Thanks to its high hardness and dimensional accuracy during hardening, it is also a popular material for precise mould inserts. However, in order to get the maximum out of this material, perfectly coordinated high-performance tools and machining strategies are required.



STEP 1: EDGING

In the first step, the outer contour of the component is milled. The G-Mould 65 U with a diameter of 6mm is used for this. The four-fluted ratio end mill has a special flute geometry with a thicker core, which increases the stability of the tool. An ultra-hard Signum coating makes the milling cutter temperature-resistant for maximum tool life in materials with a hardness of up to 65 HRC.



Cutting parameters

Art no. 6943	$v_f = 254 \text{ mm/min}$
$\varnothing = 6.0 \text{ mm}$	$f_z = 0.01 \text{ mm}$
$n = 6,366 \text{ rpm}$	$a_e = 1 \text{ mm}$
$v_c = 120 \text{ m/min}$	$a_p = 10 \text{ mm}$

STEP 2: ROUGHING

Now the component mould is roughed out of the full Stavax cube. The tool of choice here is the G-Mold 65 T in the version with four teeth and a diameter of 4 mm. This Torus end mill is perfect for profile milling in hardened steel up to 65 HRC.



Cutting parameters

Art no. 6837	$v_f = 1,003 \text{ mm/min}$
$\varnothing = 4.0 \text{ mm}$	$f_z = 0.03 \text{ mm}$
$n = 8,355 \text{ rpm}$	$a_e = 2 \text{ mm}$
$v_c = 105 \text{ m/min}$	$a_p = 0.1 \text{ mm}$

STEP 3: FIRST-FINISHING

The first step involves pre-finishing the 3D contour. The G-Mold μ 65 B ball nose cutter with GühroJet cooling is used for this. The contour is machined to an allowance of 0.055 mm using parallel-axis moulding.



Cutting parameters

Art no. 6815	$v_f = 2,100 \text{ mm/min}$
$\varnothing = 3.0 \text{ mm}$	$f_z = 0.050 \text{ mm}$
$n = 21,000 \text{ rpm}$	$a_e = 0.25 \text{ mm}$
$v_c = 198 \text{ m/min}$	$a_p = 0,045 \text{ mm}$

STEP 4: FINISHING

The centre surface is also finished with the G-Mold μ 65 B ball nose end mill. The infeeds are 0.05mm. Here too, machining is carried out parallel to the axis, with the ball at an angle of 30° to the component. The surface achieved: $R_z 0.60 \mu\text{m}$ and $R_a 0.118 \mu\text{m}$ and thus forms an optimum basis for the subsequent fine finishing process.



Cutting parameters

Art no. 6815	$v_f = 2,100 \text{ mm/min}$
$\varnothing = 3.0 \text{ mm}$	$f_z = 0.050 \text{ mm}$
$n = 21,000 \text{ rpm}$	$a_e = 0.05 \text{ mm}$
$v_c = 198 \text{ m/min}$	$a_p = 0.05 \text{ mm}$

STEP 5: FINE FINISHING

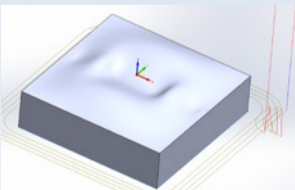
In the final working step, fine finishing, the tool achieves surface finishes that are close to mirror finish: The surface values are $R_z 0.39 \mu\text{m}$ and $R_a 0.068 \mu\text{m}$. The machining was again carried out parallel to the axis with the ball at an angle of 30° to the component. Here too, the G-Mold μ 65 B enables machining down to the smallest detail and is μ -precise in terms of diameter, radius precision and concentricity.



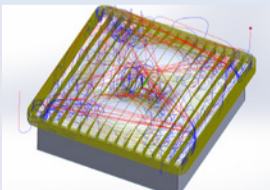
Cutting parameters

Art no. 6815	$v_f = 320 \text{ mm/min}$
$\varnothing = 3.0 \text{ mm}$	$f_z = 0.005 \text{ mm}$
$n = 32,000 \text{ rpm}$	$a_e = 0.005 \text{ mm}$
$v_c = 302 \text{ m/min}$	$a_p = 0.005 \text{ mm}$

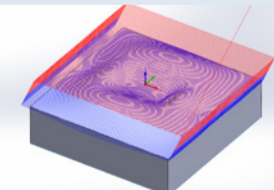
1: Edging



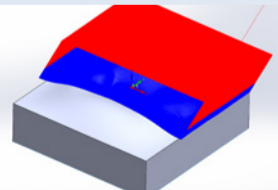
2: Roughing



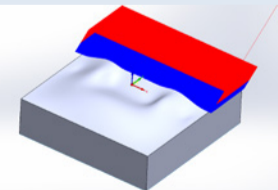
3: First-finishing



4: Finishing



5: Fine finishing



Burr-free surfaces & extreme cutting values

HIGH-PERFORMANCE IN ALUMINIUM



45 sec.

time saving per component



9x

longer tool life

PCD Diver

Art. no. 4190

Material: lead-free aluminium (6026 LF)

Ø = 16 mm

$v_f = 5,370$ mm/min.

$f = 0.3$ mm/rev

Tool life = 9,000 min

Proud of the successful
collaboration: Marc Schneider
(Schmalz, left), Jürgen Knorr
(Gühring, centre), Bernd Huss
(Schmalz, right)

Chip problems in aluminium machining? Not with the PCD Diver. The innovative milling tool promises short chips, burr-free surfaces and extreme cutting values. Schmalz also relies on the material specialist from Gühring – and can thus not only optimise some process steps, but also reduce the machining time per component by 45 seconds.

Whether in the automotive industry, electronics sector, logistics or furniture production – Schmalz has made a name for itself worldwide as one of the market leaders for ergonomic handling systems and automation with vacuum. The company, headquartered in Glatten, focuses on pioneering products that are developed, produced and distributed worldwide by 1,800 employees with a great spirit of innovation. A reliable partner on this journey is Gühring – for decades, the Swabian tool manufacturer has not only provided Schmalz with tool solutions, but also with first-class advice on how to successfully master demanding manufacturing processes.

Chip problems in aluminium machining

Schmalz can also rely on Gühring when they are faced with a challenge in aluminium machining: For the production of a basic body, the company from Glatten has to contend with chip problems. This component is used as a connecting element in the electrical

industry. Marc Schneider, Head of Production at Schmalz, explains why Schmalz uses lead-free aluminium (6026 LF) for the production of the base body: "The European RoHS Directive 2011/65/EU (Restriction of Hazardous Substances) specifies the limit of certain hazardous substances – such as lead, mercury, cadmium, chromium VI, brominated flame retardants and phthalates – in electrical and electronic



devices. This directive ensures that products are environmentally friendly and meet safety standards. In addition, the RoHS directive is CE-relevant. "The material changeover caused us problems with chip formation," recalls Marc Schneider. The reason: the lead-free material is more difficult to machine. This is because the lead additive in aluminium alloys, which

Schmalz does not use, makes the material softer, ensures short chips and good chip breakage. For Schmalz, this has consequences for process reliability: "We now produce the basic body fully automatically on a Hermle C32 with automation RS 2 – for this reason, maximum process reliability is an absolute prerequisite. This process was disrupted by the chip formation, as these chips caused problems when reclamping or gripping," explains Schneider. Gühring sales representative Jürgen Knorr quickly realises: "We need a materials specialist here."

A case for the all-rounder in aluminium: the PCD Diver

Made for this application: the PCD Diver from Gühring. The material specialist shows its strengths in longchipping aluminium alloys – i.e. in materials that often cause chip problems during machining. The milling tool produces short chips that can be easily removed. The PCD Diver owes this to its optimised chip space geometry: The chip spaces are designed in such a way that no protrusions, corners or sharp edges obstruct the chip flow. In addition, the tapered tool neck ensures reliable chip removal even when milling deep pockets, without scratching the component walls during machining. Schmalz states: The PCD Diver delivers what it promises. With this milling cutter, we have achieved perfect and burr-free surfaces. This is a big advantage for us, as

there is no need for reworking," explains Schneider. "Ultimately, the component has to come off the machine reliably – and we've achieved that with this milling cutter."

Reliable milling with maximum cutting values

However, the PCD Diver is not only impressive in terms of process reliability. The application also shows how a single tool can optimise necessary process steps and save costs. This is because the PCD Diver now does one job for two: previously, an indexable insert milling cutter and an end mill were used for machining. "Thanks to the significantly higher cutting values, we were not only able to save on tools, but also machine faster," praises Schneider. Jürgen Knorr explains how the PCD Diver achieves this: "Thanks to its highly positive cutting edge geometry, the tool ensures a very gentle and low-vibration cutting behaviour and running smoothness during milling." The result: The cutting force is reduced, the machine spindle is protected and the machining forces acting on the component are reduced. This allows for higher cutting speeds and feed rates per tooth. The PCD Diver is also equipped with a special front end that enables plunging with a ramp angle of up to 60°. As a result the PCD Diver can ramp to the maximum cutting depth in the tightest of spaces or plunge helically with full infeed. "Helical plunging is a great added

value for us, as it is much faster," summarises Marc Schneider. Schmalz also benefits from its length of use of 55mm and a high level of freedom during 5-axis machining. The PCD Diver also outshines the previously used solid carbide milling cutter in terms of wear resistance: Thanks to its ultrahard PCD cutting material, Schmalz is able to optimise the tool life from 1,000 minutes to 9,000 minutes. In summary, Schneider states "With the PCD Diver, we were able to reduce the processing time per component by 45 seconds. With a quantity of 2,500 pieces, this results in a cost saving of € 2,900."

Aluminium tools for every challenge

But Gühring's aluminium specialists are not only convincing in the milling sector. "Schmalz is now successfully using various tools from our aluminium range," reports Jürgen Knorr. "These are, for example, taps and fluteless taps as well as high-performance reamers, which ensure maximum process reliability and tool life in aluminium thanks to their extremely smooth Carbo+ coating." Gühring also has a material specialist in the micro-precision range: with a slim diameter of 1.2 mm, the RF 100 AL micro-precision milling cutter performs smoothly and with extreme machining volumes.

In collaboration with:



GÜHRING

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Customer care hotline: 00800 2607 2607



GTMS

One software, seven modules

YOUR PATH TO DIGITALISATION

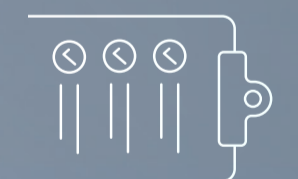
You only need one software to digitise your entire production: The Gühring Tool Management Software (GTMS). Because from automatic tool ordering to analysing tool data, GTMS takes care of the most frequent requirements in a company.

It always pursues one goal: to minimise your administrative workload and that everything you need is available in the right quantity and in the right place at all times. The Basic module of the GTMS is the basic prerequisite for digital, paperless production. It enables controlled withdrawal and automatic reordering of tools. In this way, you can avoid unused stock and clearly allocate tool costs. Building on this basic module, you have the option of expanding the software with six modules and customising it to your individual requirements and purposes.



GÜHRING

Sales Tool Management
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+49 74 31 17-25573



Quality module

Expiry date at a glance: So you never miss an inspection date

Regular maintenance and calibration is mandatory for operating and testing equipment. But which test equipment is past its expiry date? If you lose track of this, you run the risk of test equipment not being available and orders not being completed or delivery times not being met. The quality module secures production by ensuring that test and operating equipment is always ready for use.

- **Manage & issue test & operating equipment**
- ✓ **Maintain test & calibration plans in line with audit**
- 🔔 **Monitor requirements & remind due dates**
- 📋 **Audit compliance with current industry standards**

Logistics Pro Modul

Digitalisation for experts: everything for warehouse management & scheduling

If production is not analysed, potential remains unused. Stock levels tend to be calculated "by gut feeling", which leads to unnecessarily high tool costs. We have the solution for companies that want to achieve more: with the Logistics Pro module, you get the maximum out of evaluations and analyses. The software calculates minimum stock levels based on consumption and authorisation and ensures guaranteed availability.

- 📋 **Article management with dimensions, cutting data, serial numbers, etc.**
- 🏠 **Digital warehouse management incl. stock development**
- 📌 **Reserve & pick operating resources online**
- 📁 **Securely manage blanket orders, complaints and scale prices**

Maschine module

For transparency instead of flying blind: a look inside the machine

For many machinists, their production is a "black hole": No information is collected on the utilisation of machines and their OEE. Important production data is transmitted in a hanging manner and, due to a lack of wear information, tools are only changed when machine downtime occurs. The machine module provides a live overview of production progress and all relevant machine data. This means that problems are detected earlier and downtime is avoided.

- 📖 **Machine log book regulates handover at shift changes**
- 📱 **PDA terminal for reporting orders, set-up times & breaks**
- 📊 **Overview of live status overview, progress & OEE**
- 📝 **Manage NC programme with change history**

Tool data module

Your tool in detail: reliable information on every tool

Which tools and components are currently being used? Anyone who does not manage their tool data quickly loses track of this. In addition, all setting data must be entered manually during tool pre-setting – a typical source of errors. With the tool data module, you can optimise your set-up times using stored parameters. You gain transparency about your tool requirements and avoid error-prone media interruptions.

- 🔧 **Manage tools & their components incl. parameters for assembly and adjustment**
- 📊 **Record, evaluate & analyse costs per component**
- 🔍 **Check tool in relation to use**
- 📋 **Record & analyse wear data**

Order module

No time for paperwork? Good planning makes your orders more efficient

Those who do not document recurring work processes lose time and money. Product quality often fluctuates and because run times are not recorded, it is impossible to recalculate. Inadequate scheduling means that delivery deadlines are not met. Complete processes can be mapped in the order module, allowing potential savings to be identified. Standardised processes also ensure higher quality.

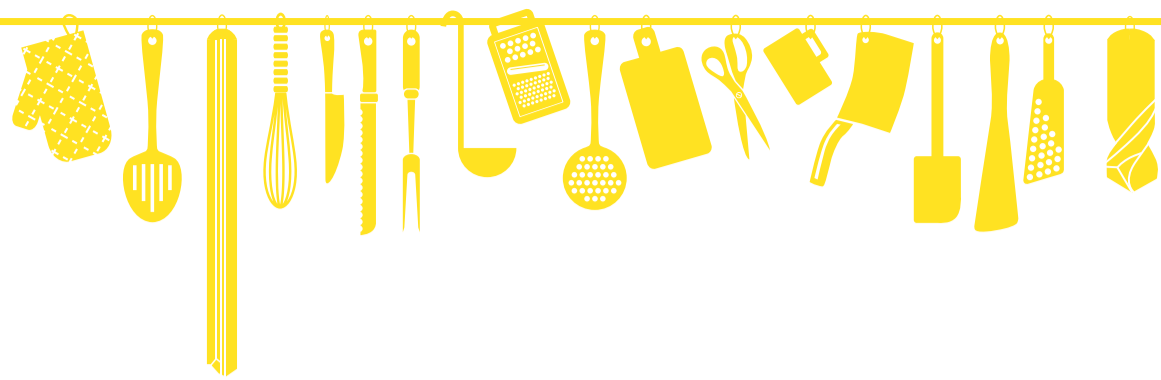
- 🔔 **Plan, monitor & report processes**
- 📊 **Order status & production progress live at a glance**
- 📋 **Withdrawal booking direct & order-related**
- 📊 **Analyse working time & costs & compare with figures**

Machine maintenance module

On-schedule maintenance: avoid downtime through targeted maintenance

Machines must be serviced regularly to ensure a long tool life. If this is neglected or delayed for too long, downtime and loss of warranty are the consequences. However, too frequent maintenance is uneconomical as it means interrupting production. The machine maintenance module provides transparency about the machine history and helps to document and schedule maintenance.

- 👤 **Manage machine park & assign users**
- 📋 **Plan, document & report machine documents**
- 📝 **Document & report maintenance**
- ⚡ **Evaluation & documentation of faults with solution data**



3 recipes for secure processes

GÜHRING COOKS THE BEST SOUPS

Sometimes things get as hot in production as in a commercial kitchen: milling cutters break for seemingly inexplicable reasons, chips clog blind hole threads and drilling

depths become a challenge for tools and machinists. But if you combine the right ingredients, stick to the recipe and follow a few small tips, you can shine with a perfect

result in the end. Here, we provide you with the solutions to three typical problems in everyday machining.

THE PERFECT BLIND HOLE THREAD WITHOUT MACHINING PROBLEMS

INGREDIENTS

- CNC lathe
- Clamping device, e.g. hydraulic chuck (art. no. 4299) for core hole drilling
- Gührosync threaded chuck (art. no. 4601) for tapping
- Tap (art. no. 393)

We recommend the use of cooling lubricants

In contrast to a through-hole, the thread is not cut all the way through in a blind hole. In addition, the chips are transported upwards out of the hole against the feed direction due to the positive helix angle of the tap. With these instructions, perfect blind holes are no problem:

1. Select the correct pre-drill diameter:

If the pre-drill diameter is too small, the threading tool has to cut more material. This can lead to a poor tool life or tool breakage. If the pre-drill diameter is too large, the flanks are not formed correctly, the thread loses its load capacity and does not meet the standard. Rule of thumb for the correct pre-drill diameter:

Thread Ø minus pitch

2. Set the correct thread depth

If the tap is inserted too deeply into the hole, the tool and workpiece will collide. The result: The tool breaks. You can avoid this error by the length of the tap in advance, setting the correct thread depth or drilling the core hole slightly deeper.

3. Check the size of the clearance angle

A large clearance angle has the advantage that the tap cuts well. The greater the clearance angle, the greater the risk of the chip jamming and the tool breaking when turning back. In addition, the tool can lose the guide – which has a negative effect on the gauge accuracy. Minimise this risk by choosing the right tap. A large clearance angle on the tap ensures that the chips are sheared off better when changing the direction of rotation.

4. Adapting the tap to the material

For long-chipping materials, we recommend spirals taps – the positive helix angle ensures that the chips are optimally removed upwards out of the workpiece. For short-chipping materials, such as cast iron, it is better to use a straight-fluted tap. Here, the short chips are flushed out by the cooling.



Difficulty:
medium



Time required:
medium



Advantage:
high quality



Machine requirement:
conventional or CNC

SAFE DEEP HOLE DRILLING: 80XD ON THE CNC MACHINE

INGREDIENTS

- CNC machining centre
- Pilot drill: RT 100 U, Ø12.0 (art. no. 2479)
- Deep hole drill 1: EB 80, 40xD Ø12.0 (art. no. 5640)
- Deep hole drill 2 (follow-up tool): EB 80, 80xD, Ø11.95 (art. no. 5642)
- Oil or emulsion for cooling
Important: Ensure high cooling lubricant pressure!
- Clamping device, e.g. hydraulic chuck (art. no. 4299)

Preparation and cooking

No deep hole drilling machine in sight? Not so bad because with the right approach, you can also produce deep holes on a conventional CNC machining centre. The key point here is the drilling strategy. As a CNC machine has no steady rests or drill bushes, the deep hole drill must be guided through a pilot hole.

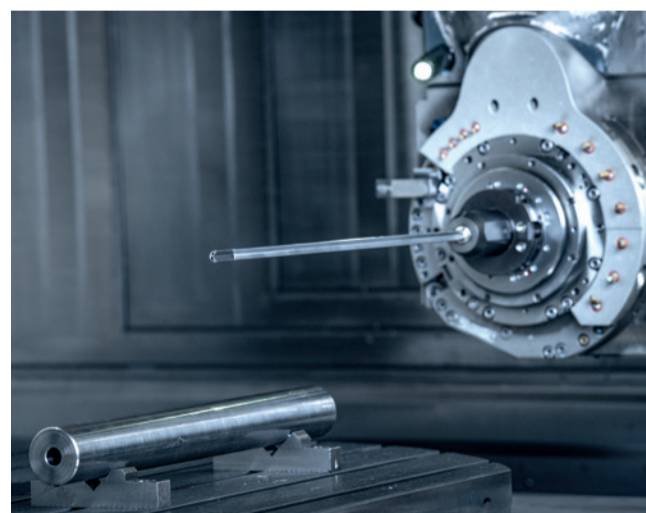
1. Pilot drilling: Drill a pilot hole that is between 1.5xD and 4xD deep, depending on the material.

2. Entering: The deep hole drill 1 with Ø 12.0 then enters into the pilot hole in a counterclockwise direction at a speed of approx. 200 rpm and a feed rate of approx. 100 - 200 mm/min.

3. Hole: Switch on the machining pressure of the cooling lubricant and the speed and wait briefly until both are 100 % available. This is followed by a brief reduction of the feed rate. Drill continuously at maximum feed rate without breaking the chips until you have reached the desired drilling depth.

4. Pulling out: Now, after a short holding time at the bottom of the hole, switch off the cooling lubricant and the speed. Then pull the deep hole drill out of the hole with the spindle stationary and at an increased feed rate.

5. Follow-up tool: Repeat the process with deep hole drill 2. Deep hole drill 1 serves as a pilot drill for deep hole drilling. Accordingly, deep hole drill 2 should be slightly smaller in diameter so that the tool does not jam in the hole. Re-enter the hole as described in step 2 and drill at a higher feed rate until just before the bottom of the hole of deep hole drill 1.



FORCES DURING MILLING: HOW TO AVOID TOOL BREAKAGE

INGREDIENTS

- GühroJet Weldon holder (art. no. 4232)
- Safe clamping device

Preparation

Milling generates various forces that act on the tool and favour tool breakage. Two forces in particular play a role here: the radial deflection forces and the axial tensile force.

1. Keeping an eye on forces during milling

When milling, we have a rotating tool and lateral cutting movement. This results in radial, i.e. lateral, deflection by the material. As soon as the milling cutter enters the material and touches the workpiece, it is pushed to the side. This results in a lateral offset until the

milling cutter leaves the workpiece again.

2. Axial tensile force

Radial deflection becomes critical in combination with a second force, the axial tensile force. During milling, this is mainly caused by the helix angle. A large helix angle can be advantageous: It ensures a smooth cut. However, the larger the helix angle, the greater the axial tensile force. The rotation of the tool in combination with the cutting force pulls the tool out of the tool holder. If these two forces become too great, an overload occurs and the milling cutter breaks.

3. Clamping tools correctly

By clamping the tool securely – for example with a Weldon holder or a pull-out safety device in the power chuck – you can avoid tool breakage. A high clamping force

and concentricity are crucial here. You should also clamp the milling cutter as short as possible so that it cannot bend. You should also regularly check the clamping screw for wear. The same applies to the concentricity of the milling tool after clamping.

4. Ensure secure component clamping

The workpiece must also be securely clamped. Otherwise, there is a risk that the workpiece will be pulled up by the tensile force. This also leads to tool breakage. Ensure that the workpiece is clamped as rigidly as possible and is not deformed in the process. If you do not have a stable clamping option, you should direct the tool path and the feed direction to the most stable point of the clamping fixture.



Difficulty:
demanding



Time required:
high



Advantage:
depth up to 80xD



Machine requirement:
CNC



Difficulty:
simple



Time required:
low



Advantage:
minimum wear



Machine requirement:
conventional or CNC

2025 BEST PRACTICE

BT 800

Bayonet drilling system for quick head changes
and precise results

- Up to 50 % longer tool life compared to conventional modular drills
- Can be reground up to 2x

- Drill head for steel machining Ø range 10.0 – 26.0 mm
- Holder for 3xD and 5xD drilling and piloting head
- Flexibility & wear resistance: The BT 800 combines the properties of carbide with the advantages of modular tools

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