

GÜHRING

PRESSRELEASE



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RT 100 **XF**

NEW.
EXTREME.
POWERFUL.

120 years of manufacturing expertise, innovation and synergy: These are the pillars of our success that have allowed Gühring, once a pioneer of drilling solutions, to develop into an industry-leading full-service provider. This was made possible by our own R&D departments in geometry, production and coating, the production of proprietary carbide, as well as grinding and coating systems. These elements find their way into the performance of our products, enabling us to continually set new standards for the industry.

This leading expertise serves as the basis for the new RT 100 XF Ratio drill. Exceptional performance and a qualitative advantage. With unrivalled power and guaranteed outstanding machining results for your processes.

New carbide and nanoFire coating

Extremely hard, absolutely unbreakable: the carbide, which has been specially developed for the RT 100 XF, performs a balancing act between hardness and toughness through the unique combination of tungsten carbide and cobalt. The special structure of this composite cutting material has a re-sharpening effect. Major breakages that normally accelerate tool wear no longer occur.

In addition to titanium and nitrogen, the tried-and-tested nanoFire coating system also contains aluminium and is characterised by a high level of hardness and good thermochemical resistance. Finishing in particular has been optimised through the holistic approach, meaning that there is an optimum connection between the newly developed carbide and the tried-and-tested nanoFire coating. This specially designed pre-treatment and post-treatment smooths the coating and therefore makes it significantly more robust.

THE BENEFITS TO YOU:

- ▶ ***COMBINED OPTIMISATION OF ALL TOOL PARAMETERS ENABLES **OUTSTANDING FEED RATES AND EXCEPTIONAL METAL REMOVAL RATES*****
- ▶ ***IN-HOUSE HIGH-END FINISHING FOR **MAXIMUM PERFORMANCE UTILISATION*****
- ▶ *****REDUCED CYCLE TIMES** FOR DIFFICULT-TO-MACHINE MATERIALS AND SPECIAL APPLICATIONS IN SERIES PRODUCTION***

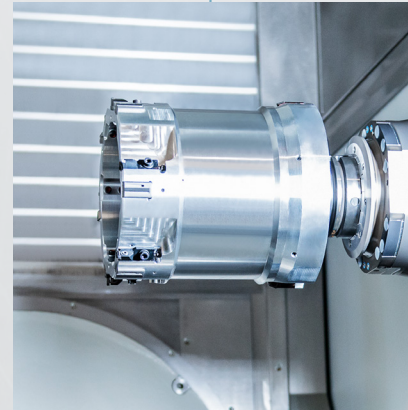
Outstanding quality as standard: geometry and micro-geometry

The robust relieved cone and the concave main cutting edge make the RT 100 XF an extraordinarily sturdy tool for use in steel machining and for stainless steels, cast iron, special alloys and hardened steels (≤ 45 HRC). Four guiding chamfers grip extremely early, thus perfecting the concentricity, ensuring perfect drilling quality, improving straightness and surface finish – and are therefore standard on the RT 100 XF from 5xD upwards. The third and fourth support chamfers ensure excellent running smoothness. The chip flows off faster through the polished flutes – this therefore protects the drilling surface and also significantly reduces the machining temperature. The micro-geometry in the form of a cutting edge rounding ensures homogeneous and stable cutting edges. The accurate reproducibility (to the nearest micrometre) is made possible by our manufacturing expertise. Original quality is restored in the in-house regrinding and re-coating centres.

THERE IS NO FUTURE WITHOUT A PAST

HOW GÜHRING POSITIONS ITSELF IN E-MOBILITY

The automotive industry is changing: alternative drive concepts such as the electric motor are putting brand new machining tasks on every supplier's agenda. Tool manufacturers have a duty to reliably manufacture e-components. Gühring is already able to process all of the aluminium alloy components of an e-vehicle that require machining. In addition to electric motor housings and associated gearbox covers, auxiliary units such as battery trays or electric refrigerant compressors are also machined.



CHALLENGES IN SERIES PRODUCTION

The electric motor housing including gearbox cover is made from aluminium alloys and produced using Gühring PCD tools. The challenges here are enormous: reliable manufacture of small diameter tolerances of up to IT6 and small geometric tolerances, such as concentricity of up to 40 µm with a reference length of more than 400 mm and with machining on both sides.

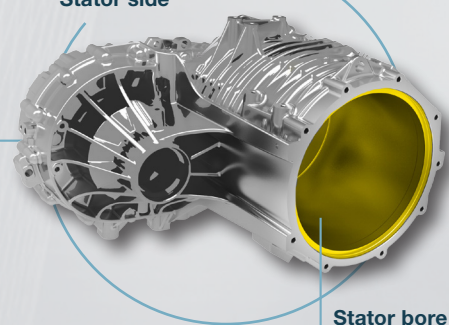
IDEAL PARTNER FOR THE PRODUCTION OF ELECTRIC MOTOR COMPONENTS

The stator bore requires a high level of dimensional accuracy. With a diameter of 235 mm, the appropriate 6-fluted Gühring PCD tool has a tilting moment of 22 Nm and weighs less than 20 kilogrammes. This lightweight tool is made from aluminium which, as well as reducing the spindle load, guarantees maximum productivity. In addition to the lightweight design, which enables maximum precision, component cleanliness is an additional challenge. With the assistance of innovative tool geometries, the chips are evacuated in a defined manner during milling, roughening and reaming the surface/hole to be machined. The risk of Al chips getting stuck in the cooling fins is therefore significantly reduced.

Big diameter – light tools

- small tilting moment
- maximum rigidity with few materials
- minimised machine spindle load

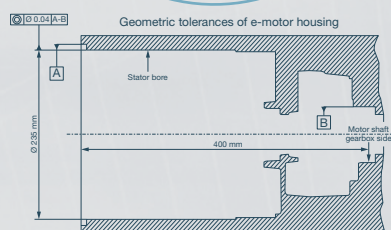
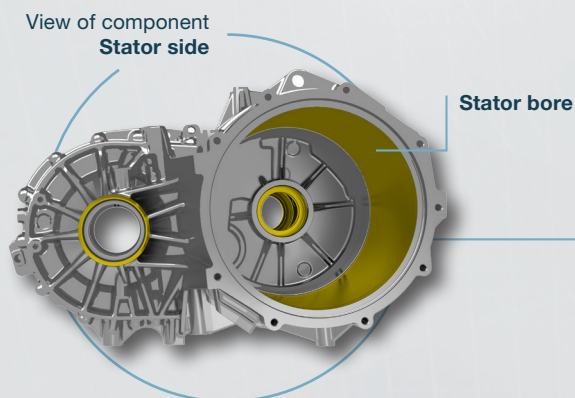
View of component
Stator side



Stator bore

ALL THE COMPONENTS AT A GLANCE

In addition to electric motor housings and the related gearbox covers, auxiliary units such as battery trays to accommodate the energy storage system and refrigerant compressor, which are used for thermal management in vehicles, are also machined. Due to their size of up to 2x1 m and their thin walls, battery trays are particularly susceptible to vibration. This problem is overcome, chiefly during milling, with the aid of geometric features such as very uneven spacing of the cutting edges and a rigid tool interface created by holders with optimised interference contours. Having already successfully completed more than 20 battery case projects, Gühring is considered a leader in this application. Machining with minimum lubrication also guarantees the long-term sustainability of production.



Small diameter tolerances and geometric tolerances

- cost-efficient and precise machining of small diameter tolerances up to IT6
- reliable tool solutions for particularly small geometric tolerances, e.g. concentricity of up to 40 µm with a reference length of over 400 mm
- FEM calculation during tool construction to reduce weight

CLEAN THERMAL MANAGEMENT THROUGH OPTIMISED MILLING TOOLS

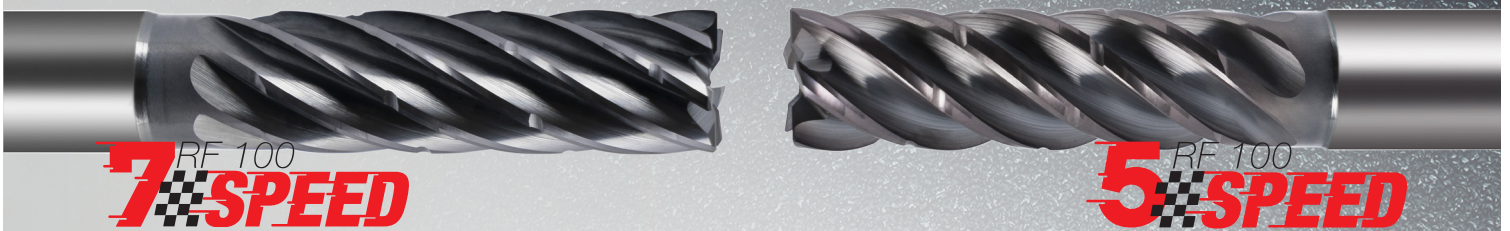
Thermal management presents another challenge in electric vehicles. In the past, conventional air conditioning systems have been powered by combustion engines. For electric vehicles, in future electric refrigerant compressors will be used as heat and cold pumps. The refrigerant compressor comprises two coils, the opposing motion of which compresses gas. Small tolerances for the coils ensure that the most efficient compression possible is achieved. For example, the requirements for geometric tolerance are an angularity of 20 µm and a line profile of 8 µm. The smallest surface finish qualities below R_z 4 µm combined with thin-walled surfaces of less than 3 mm and cutting heights of up to 25 mm are typical of this machining task. The solutions are milling tools with minimum cutting pressures. Highly positive rake angles and increased rigidity mean that tolerances are reliably met.

A CLEAR GRASP OF THE COMPLEXITY IN THE FUTURE

Gühring has 40 years of experience in PCD (polycrystalline diamond), which it incorporates in the machining of electric motor housings. It also integrates the latest product innovations into e-machining. Preventive measures aimed at maximising process reliability, such as the FEM calculation during tool construction to reduce weight or rigidity and vibration tests taking account of real operating speeds, are an established part of the routine. Gühring is dedicated to ensuring that its customers can have all their e-mobility needs met holistically, from a single source and anywhere in the world. It also acts as a professional partner to the global automotive industry in the series production of electric drives. Through the strategy of having a wide product range, Gühring is well prepared for dynamic technological change in automotive drivetrains.

RF 100

SPEED



THE ALL-NEW POWERFUL GTC

THE RF 100 SPEED 5 AND 7-FLUTED CUTTERS

Especially when performing milling operations with very tough materials, it is only possible to increase the cutting speed to a limited extent while taking process reliability into account. Due to the increased number of teeth of the RF 100 Speed 5-fluted and 7-fluted Ratio milling cutter, high metal removal rates can be achieved with stable process reliability, even with these difficult-to-machine materials.

RF 100 Speed 5 and 7-fluted cutters

The RF 100 Speed 5-fluted and 7-fluted Ratio milling cutter is now an addition to the Speed family and allows for highly dynamic GTC processes with an a_e of up to 10%. In the event of a restricted machine speed or cutting speeds limited by the material, the increased number of teeth ensure high feed rates and long services lives. They are particularly suitable for difficult-to-machine materials in stable conditions.

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- // high-performance roughing even at high cutting depths
 - // maximum feed rates for large metal removal rates
 - // highly dynamic GTC milling in tough stainless steels, special alloys and a wide variety of steel and cast iron grades



RF 100 Speed P and M

The **5 and 7 Speed** add to the established RF 100 Speed range with the P and M material specialists. They are suitable for GTC machining at an ae of up to 15%. Thanks to the high spiral angle of 48° with unequal cutting edge distribution for soft, quiet cutting and large flutes, the RF 100 Speed P and the RF 100 Speed M ensure a low load on the machine and power consumption. The lower number of teeth provide maximum chip space for good chip evacuation. Different versions of the milling tools are available. The long version has chip breakers in order to break chips into short pieces and therefore ensures smooth chip evacuation. Large face chip spaces and the improved web thinning enables reliable plunging. The optimised corner protection chamfer and face correction protect the cutting edge corner, as the most delicate part of the tool, from two sides, meaning that the cutting edge is also able to withstand heavy shear loads. Through this combination, the tool life is significantly longer.

New milling strategy: roughing with GTC (Gühring Trochoidal Cutting)

GTC roughing is ideal for machining large cutting depths, as the roughing cutter machines the entire depth of the workpiece with the whole length of the cutting edge. Controlling the cutter path with low radial feed allows for comparatively gentle edging of the workpiece, as the cutting forces are distributed evenly over the entire length of the cutting edge. This allows for high processing speeds and long service lives. Gühring Trochoidal Cutting is the first choice for applications with enormous material removal rates. The components to be machined are usually made of high-strength steels, which place increased demands on the machining process. In order to achieve appropriate results, higher cutting speeds, higher feed rates per tooth and greater cutting depths are used. The high cutting speeds are achieved with the help of high revolution frequencies, as long as the milling machine allows for this. By using the entire length, the load placed on the cutting edges of the milling cutter at the perimeter is significantly less and wear is reduced. The milling process is not new, but it is only on the basis of the performance of today's machining centres and geometry adjustments and the wear resistance of milling tools that GTC shows itself to be an advancement in machining when it comes to enormous metal removal rates. The RF 100 Speed has a corresponding geometry in order to meet the demands of tough, low and high-alloy steels and difficult-to-machine materials – particularly in state-of-the-art application technologies such as the GTC milling strategy.



The benefits to you:

- ▶ ***Machine connection, networking and data evaluation***
- ▶ ***Reduce costs***
- ▶ ***Identify areas with improvement potential***
- ▶ ***Perfect your tools and processes***
- ▶ ***Transparency in real time***

▶ ***The GTMS sees more***

With process data monitoring, parameters such as machining times, the active NC program, parts counters, performance data and much more can be monitored, documented and evaluated. Processes are therefore more stable, as causes analysis in the event of malfunctions can be carried out more quickly. This gain in transparency allows you to react quickly and efficiently to changes. Furthermore, cost drivers in the production process can be identified quickly and easily. There is therefore transparency when it comes to run times, costs and quantities. For example, through the display of the remaining job time, idle times are reduced.

▶ ***More than 2,500 projects around the world***

More than 15 years of experience with interface development ensures peace of mind and a large degree of professionalism when it comes to integration into existing IT infrastructures. Gühring therefore provides solutions and expertise from a single source. Through our practical experience from over 2,500 software projects around the world and continuous further development, we are able to react to the requirements of our customers at any time. This means that Gühring is always a reliable partner. Now and in the future. In the midst of the era of Industry 4.0, Gühring views itself as a reliable partner, trailblazer and supporter and, with GTMS, provides a strong instrument for digitalising your production.



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