

# Klingelnberg

## INTRODUCES DRESSER CONTACT CONTROL

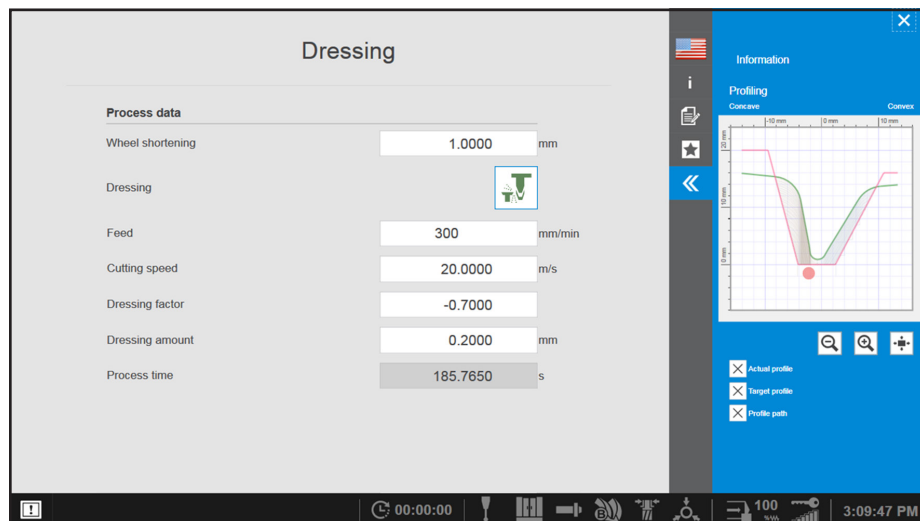
The full capacity of gear grinding machines flexibility can only be used when the dressing process for profiling the grinding wheel is highly precise. Highly economic grinding requires a high removal rate and therefore a significant wear of the grinding wheel with the risk of non-proper profiling. This dilemma can be eliminated with Klingelnberg's Dresser Contact Control. Two conflicting targets are brought together: highest precision of the grinding wheels profile and the most profitable dressing process parameters.

For gear grinding machines profiling of the grinding wheel is an essential function. This so-called dressing operation removes the worn-out surface and applies the correct profile on the grinding wheel. This is done using a diamond coated dressing tool. The machine performs movements of the dressing tool and the grinding wheel to achieve the proper profile.

### The Dressing Process

When grinding bevel gears a cup shaded grinding wheel is used. The dressing tool is diamond coated disc with a radius on the outside diameter. Profiling the grinding wheel is done with the outside of the dressing tool.

Each dressing operation reduces the



Dressing parameters and view of dressing roll and target profile of grinding wheel.

length of the grinding wheel by the so-called dressing amount. The geometry of the profile on the outside and inside will not change along the service life of the grinding wheel. The dressing amount must be big enough to guarantee a proper profile after the dressing cycle.

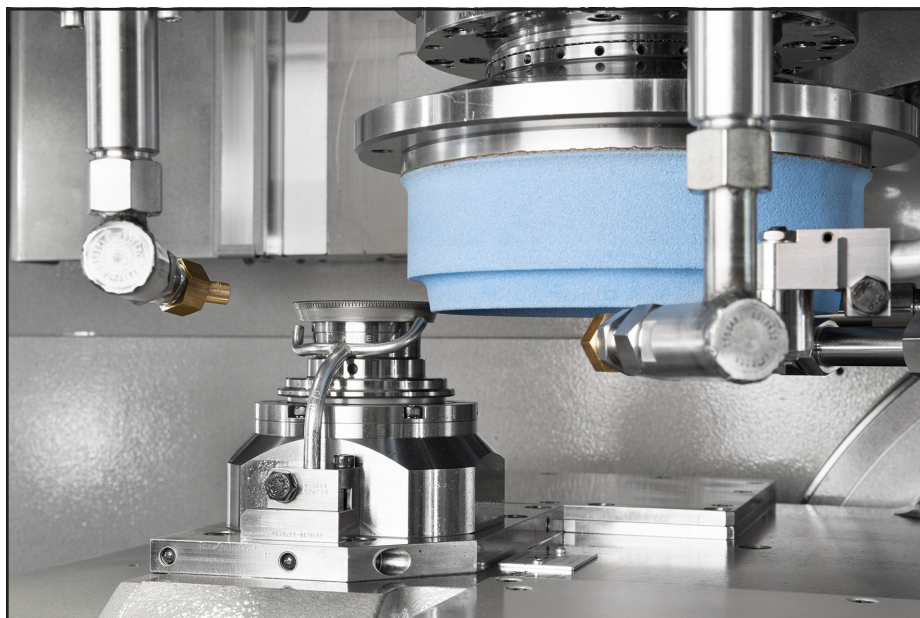
And this is the problem! In case of a dressing amount being too small it will happen that we do not get the proper profile on the grinding wheel. If the dressing amount is too big, the dressing tool will wear out unduly and the service life of the grinding wheel decreases.

### Challenges in Bevel Gear Grinding

At a first glance this problem does not seem to be complicated. When looking more detailed to this task the challenge is the typical shape of a grinding wheel for bevel gears. Since the lengthwise crowning requires tilting of the grinding wheel the flank angle of the outside profile is significantly smaller than that of the inside. Consequently, the removal on the outside is drastically smaller than the removal on the inside.

Experienced operators set the dressing amount such that a reasonably big removal is guaranteed on the outside of the grinding wheel. Typical flank angles of 10° outside and 30° outside and a dressing amount of 0.1 mm create a removal of only 0.017 mm on the outside and 0.058 mm on the inside of the grinding wheel. This dressing amount will only guarantee a safe grinding process as long as the wear on the grinding wheel is significantly less than 0.017 mm. In case this cannot be ensured, the dressing amount must be increase for example up to 0.15 mm. This is on the safe side, but the service life of the grinding wheel will be reduced by more than 30 percent at the same time.

This is the starting point of Klingelnberg Innovation called Dresser Contact Control. All bevel gear grinding machines of the G-Series now have



Dressing tool and grinding wheel.

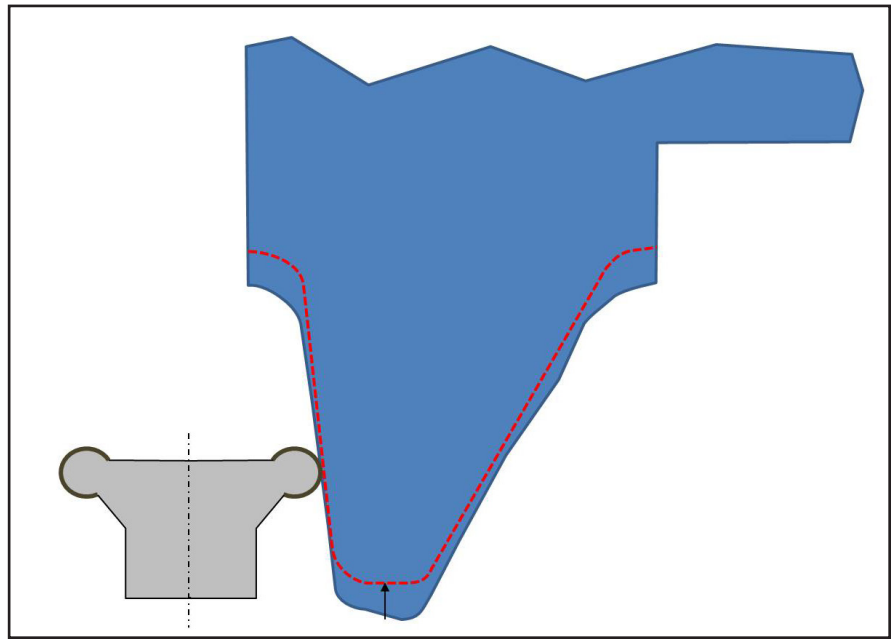
an acoustic emission sensor integrated in the dressing spindle. During the dressing operation this sensor checks if there is really contact in between dressing tool and grinding wheel. This can be seen in real time display on the controller by a blue bar along the dressing path. In case the contact tears off the machine software will repeat the dressing operation.

In collaboration of the acoustic emission sensor and the KOPG software there are many advantages:

The profile of the grinding wheel is always correct independent from the dressing amount.

The dressing amount can be reduced to a reasonable minimum. In case a gear was ground having a large material allowance of having large heat distortions both causing a excessive wear of the grinding wheel the next dressing cycle will be repeated as long until the proper profile on the grinding wheel is guaranteed.

When profiling a new grinding wheel, the sequence of dressing operations will be stopped as soon as the proper profile is shaped on the grinding wheel.



Typical dressing wheel profile before and after dressing.

With the new Dresser Contact Control feature not just the process reliability of bevel gear grinding is improved but also cost reduction is guaranteed: instead of applying a dressing amount of 0.1 mm this can be reduced down to 0.8 mm.

The effect is a reduction of up to 20 percent in the pro rata tool costs.

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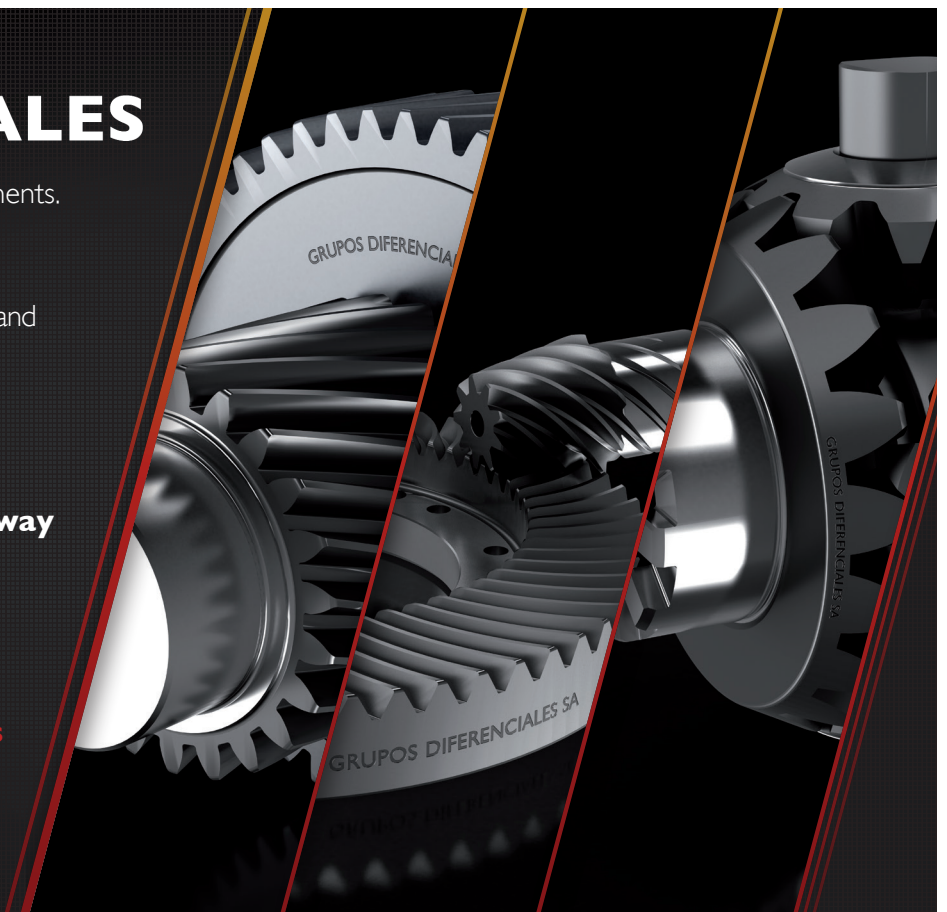
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# WFL

## OFFERS VARIETY OF MEASURING TASKS FOR COMPLETE MACHINING

In order to reliably manufacture complex workpieces with high quality requirements, it is necessary to control the processes by means of a closed-loop process. The production of small batch sizes — sometimes only of individual parts — usually involves expensive blanks which are difficult to procure and can quickly be “wasted.” Therefore, since the beginning of complete machining, WFL has paid great attention to measuring workpieces in the machine and has developed cycle packages for a wide range of measuring tasks.

These measuring methods ensure highest manufacturing accuracy with tightest tolerances on complex workpieces. There is a wide variety of measuring devices such as switching measuring probes, scanning measuring probes or ultrasonic measuring devices.

### Manual measuring versus automated measuring

In order to meet today’s requirements, measuring is an integral part of future-oriented manufacturing processes. The closed-loop approach tries to create a simple and efficient cycle between the production system, machine, human and measurement technology. One of the most important aspects in this cycle is measuring during manufacturing processes.

Measurements can be carried out manually and automatically during a manufacturing process. With manual measuring, the operator is responsible for measuring and measurement data management, whereas the machine takes on both tasks in the case of automated measuring.

Manual measuring is still very important in today’s production, but it is increasingly replaced by rapidly developing innovative measuring techniques. At first glance, measuring equipment for manual measuring seems to be more affordable than modern measuring equipment, such as measuring probes. However, over a long-term production period, innovative measuring equipment and techniques are more efficient and cost-effective.



When using manual measuring equipment, random measuring errors must be expected. These occur with every measurement and are very difficult to find. Process interruptions, which are necessary to carry out measurements, result in longer production times. For this reason, only a low level of automation can be achieved. Since the tool correction is calculated by the operator, there is a higher error rate compared to an automated process.

All in all, the advantages of modern measuring technology, e.g. measuring with a measuring probe, outweigh any possible disadvantages in an innovative, automated production process.

Automated measuring is playing an increasingly important role in the manufacturing process. Thanks to the use of smart measuring equipment and techniques, a high degree of automation can be reached. This in turn leads to shorter production times. The process is no longer interrupted, there are fewer measurement uncertainties, and, in addition, one single measuring probe can be used for a wide variety of measurements. Innovative measuring equipment and strategies make MILLTURN complete machining centers even more efficient and versatile than before.

### The measurement process

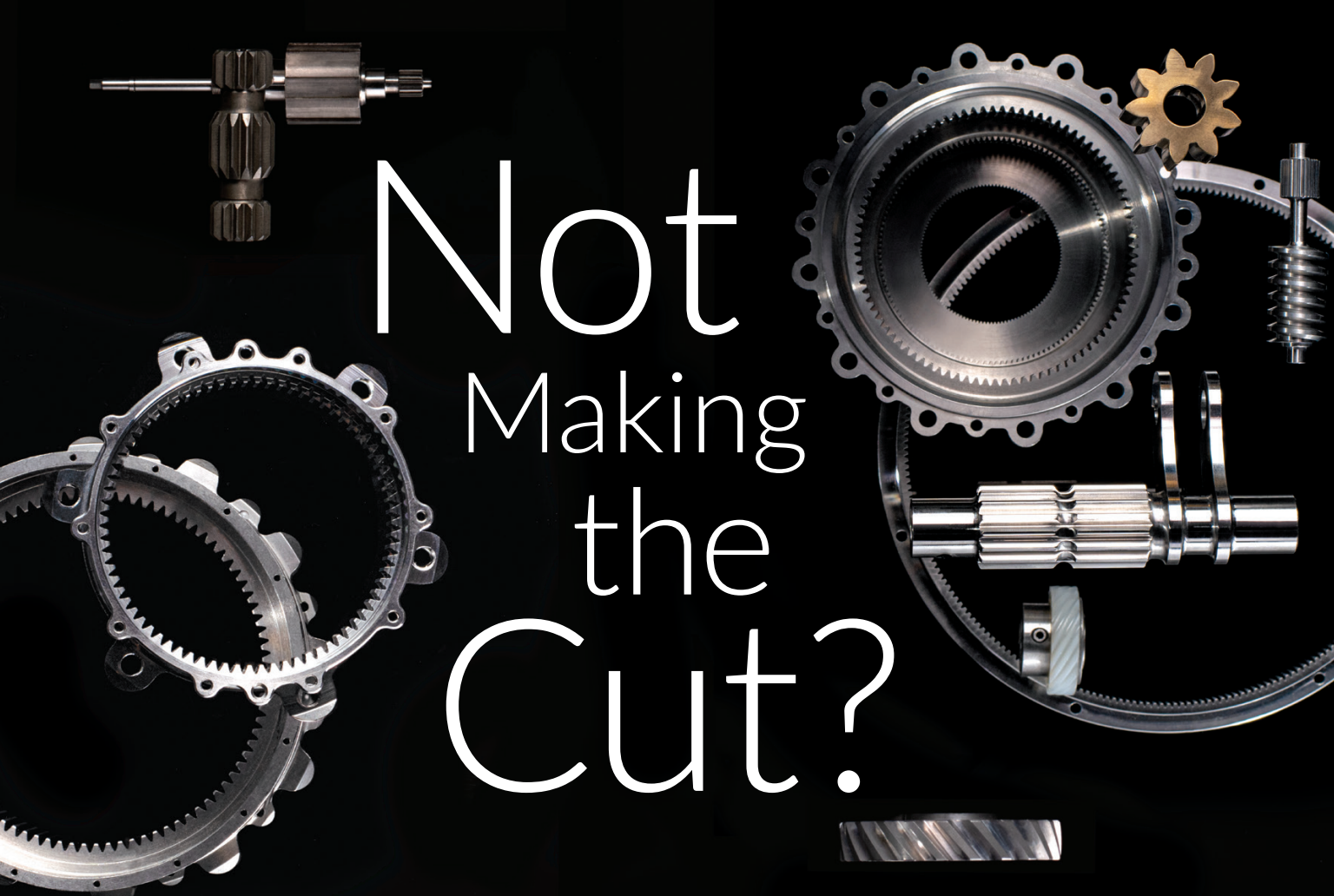
Measuring probes have to be calibrated before they can be used for measurement. The calibration always takes place before the machining process and is carried out by the operator. The individual

measuring points that were determined with the probe are evaluated after measuring. Various algorithms are available for analysis. The results are then evaluated, and a correction is calculated. Most of the time, a tool correction is determined based on the measurement results and automatically assigned to a tool via a WFL cycle. In addition, the individual results can be recorded, and a detailed analysis can be carried out at a later point in time.

### Measurement strategies and possibilities

The right measurement strategy is crucial for a successful measurement process. The new generation of measuring probes offers extensive possibilities and should be part of every future-oriented, automated production process. Not only workpieces, but also complete contours and profiles can be scanned with the new measuring probes. This new and unique method unleashes an unimaginable efficiency and versatility of WFL’s MILLTURN machines. WFL has developed its own cycles and measuring strategies for a wide range of applications in order to make the best possible use of the new generation of measuring probes and a MILLTURN.

Measuring strategies for the measurement of gears replace manual measurements by machine operators. The correction for the tool is determined automatically. This measurement process is essential for reliable gear machining



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and can be simulated with WFL's programming and simulation software CrashGuard Studio.

**Scanning measurement of roundness and axial run-out**

Since the exact deflection angle can be determined with new switching heads, the exact roundness and axial run-out can be measured on the workpiece, for example. For this reason, it can be checked before machining whether the blank meets the requirements. If this is

not the case, either the program must be changed or the blank must be exchanged in order to avoid any machining problems. Since programs have flexible structures, they can usually be adapted automatically using a parameter program. In automated production, blanks should always be inspected in order to avoid problems and downtimes.

The new measuring probes can measure roundness as well as entire profile contours. WFL has developed measuring cycles and strategies for implementing

highly complex measuring applications in one machining process. These cycles allow scanning any kind of profiles and calculating corresponding tool corrections. Therefore, different form milling cutters, which together create a contour profile, can be automatically coordinated via the WFL measuring cycles.

Surface quality can be measured with a new generation of special measuring probes. This means that any problems occurring during a machining process can be reacted to at an early stage, which avoids costly downtimes and scrap parts.

Thanks to the possibility of scanning profiles and evaluating the results, WFL has developed cycles especially for gearing technology, which, for example, allow measuring the flank profile or the tooth trace. Afterwards, the measurements are evaluated. The evaluations and protocols correspond to the general industry standard for gearing technology. Gearings can thus be checked and recorded after the machining process in accordance with industry standards.

**Ultrasonic measuring**

The ultrasonic measuring unit allows the measurement of the wall thickness of components. This method is used for long pipes or deep inner contours which can usually no longer be measured with a measuring probe. The wall thickness can be easily measured and evaluated by using WFL's measuring cycles. For example, the center error of an inner contour can be determined using the various evaluation algorithms.

"By implementing measurement methods, we are able to ensure and improve the quality of components. The automation of all measurement processes is an essential step to implement nearly or completely unmanned production processes," said Reinhard Koll, head of application and project engineering at WFL Millturn

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# Junker

## DEVELOPS ALL-IN-ONE GRINDING MACHINE

Sullair LLC, located in Michigan City Indiana, a Junker customer since 2011 has changed their finishing process to eliminate the demand to pair shafts and achieve highest compressor efficiency. In the past, the process required multiple grinding machine setups to finish a shaft. Diameters and faces of the shaft were ground on the Junker QUICKPOINT prior to grinding the compressor flutes on form grinding machines.

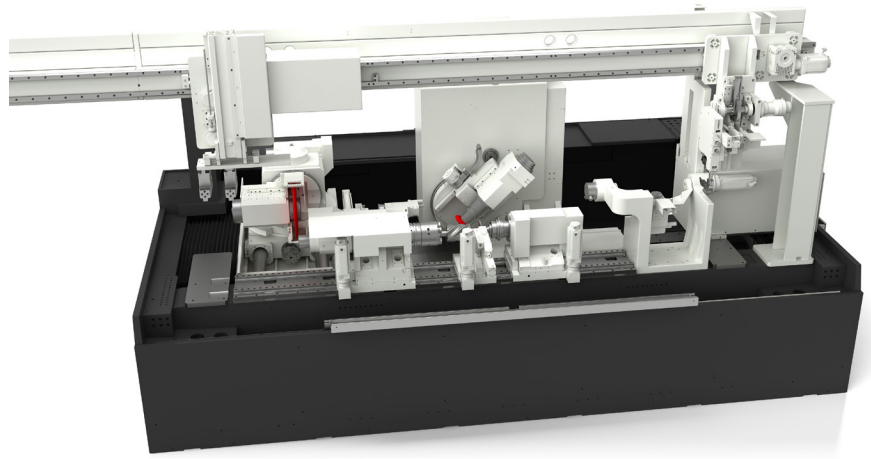
Today with the JUMAT 6L all of this is done in one setup and one machine. In addition, for faster changeovers and to control process quality the machine in process measuring systems measures key features and automatically adjust the process to produce highest quality without operator intervention. Junker developed the capability to measure the complex compressor flute profile and correct the dressing path to dress the CBN wheels complete automatically.

### Cost-effective complete grinding with optimum accuracy

The correction is essential as tool pressure varies depending on the contact zone of the shape. It is necessary to apply a wheel with an incorrect shape to make a perfect part. The Junker grinding machine masters this with ease and for an optimum accuracy, the machine produces parts with a total lead variation of  $\pm 3$  microns and a profile accuracy of less than 6 microns.

### Junker ensures productivity with intelligent processes

For the different flute shapes and for rough and finish grinding - the machine is equipped with a wheel changer. The machine programs call up the correct wheels and manage their life span. If a wheel has reached the end of its life, the controller requests a new wheel and alerts the production manager to purchase a new one. The parts are presented to the machine on a conveyor with an autonomy of a full shift. Parts are loaded into the machine by an internal gantry system. With that, the safety of the entire system is safeguard and grinding with



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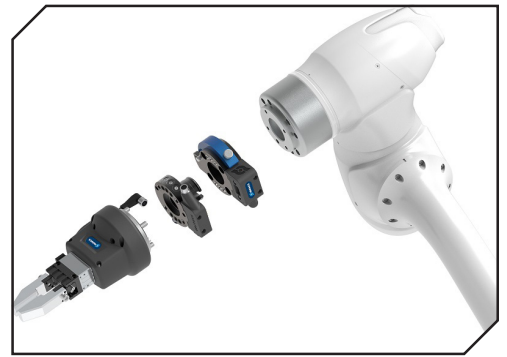
Economical, intelligent and highest dimensional precision Junker rotor shaft technology provides the capability to grind highest efficiency compressor shafts in one setup with controlled part quality by the grinding machine.

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## Schunk

### OFFERS MODULAR PLUG AND WORK GRIPPER SYSTEM FOR COBOTS

As more and more manufacturers discover cobots, including major players in industrial robotics as well as specialized cobot pioneers, Schunk has established its ready-to-use Plug & Work portfolios that radically simplify the equipment of the Cobot front-end.



The customized Plug & Work portfolios include pneumatic and electric grippers, co-act gripping modules for collaborative applications, and quick-change systems. Whereas the pneumatic grippers are easy to use, have a high-performance density and are attractive in price, they are especially predestined for conventional automated applications, where primarily its robustness is sought-after. Electric grippers are flexibly adjustable to force or stroke, are versatile in use, and offer many variants. Plugins simplify programming, particularly for those users who are new to automation, because they enable a fast and simple start into process automation.

#### Broad selection of components

The segment of pneumatically controlled actuators includes modular systems of the industry-proven, multi-tooth guided parallel gripper PGN-plus-P, the centric gripper PZN-plus, the universal gripper JGP with the best value for money, as well as the long-stroke grippers KGG, and PSH. Micro valves for control of the pneumatic modules are already integrated in the Plug & Work adapters. Moreover, the selection of components includes electric grippers for small components EGP, electric grippers type Co-act EGP-C, as well as the versatile Schunk EGH with a freely programable overall stroke of 80 mm, which is virtually the ideal gripper for starting cobot-supported automation. But the Plug & Work portfolio also includes the manual change system SHS with integrated air feed-through, electric feed-through and an optionally integrated lock monitoring. It allows flexible use of cobots and Schunk grippers. Other actuators can be exchanged in just a few working steps.

#### Diverse applications

Cobot applications can be easily adapted to different application cases because

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every component is flexibly combinable and the whole offering of accessory products and options listed in the Schunk catalog are available. Solutions can be intuitively configured with the Schunk online configurator, based on the eCATALOG solutions technology of CADENAS. It takes just one click and all common CAD formats (optionally two- or three-dimensional ones) can be downloaded. Thereby a combinational logic ensures that only configurations can be implemented, which are feasible from a technical and mechanical point of view. The ready-to connect Plug & Work portfolios cover diverse fields of application: the ones of common automation but also of collaborative applications. They are equally suitable for people without any experience in automation and experts of the metal-cutting industry, automotive and electronics industry, logistics and of many other industries, who want to discover the potentials of robot-based automation by using cobots.

**Schunk.com**

# Chiron Group

## INTRODUCES MULTIFUNCTIONAL MACHINING CENTER

Chiron Group recently demonstrated for the first time its new 715 Series machining center. Designed for complete machining of all six sides of complex parts, the machine fits between the vertical Chiron FZ 08 S mill turn precision+ machining center and the STAMA MT 733 machining center. It includes part handling automation and storage.

Matthias Efinger, Chiron Systems Engineer R&D, says “the goal during development was to create a machining center designed for autonomous processing on all six sides, rounding off the Chiron Group bar machining portfolio and fully bridging the gap between the FZ 08 S mill turn precision+ and MT 733.”

The 715 Series is designed for fully automated, complete machining tasks in the medical technology, aviation and aerospace, energy, and automotive

industries. Part size range is bars up to Ø 65 mm or chuck parts up to Ø 200 mm, with maximum workpiece weight of 20 kg.

### Continuous machining process

Two versions of the machining center are available: Chiron MT 715 and Chiron MP 715 – MT is Mill Turn and MP is Multi Profile. The machines include a direct-drive 20,000 rpm milling head, a horizontal main spindle and a matched, opposing counter spindle to permit continuous multifunctional machining on all six sides of a part in a single setup. This capability is used to machine hip stems, turbine blades, and extrusions for chassis or battery storage.

Both machines accommodate 128 tools and include integrated workpiece handling and workpiece storage. This supports fully automated,

## SMT

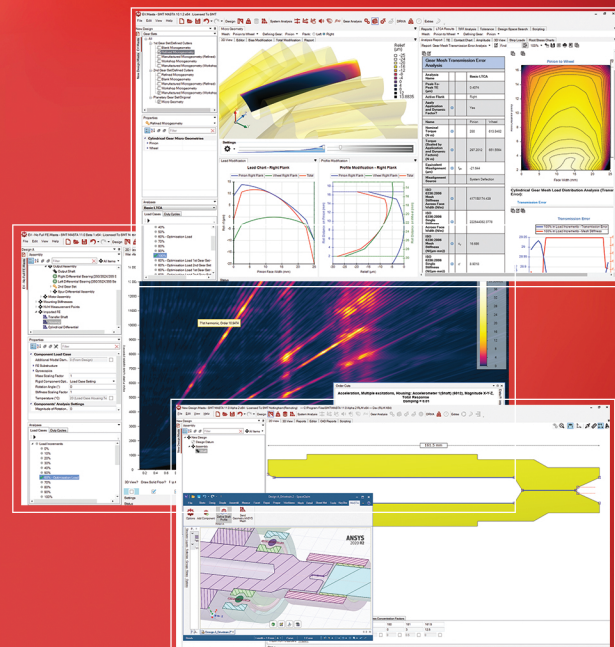
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cost-reducing manufacturing of workpieces in small and medium batch sizes. Convenient loading and unloading of the tool magazine can occur during machining.

### High levels of automation

The new machine platform is also set up to integrate digital systems from the Chiron SmartLine Portfolio, including automatic condition monitoring, integrated machine and process diagnostics, machining simulation, preventive

machine protection in every mode of operation, remote diagnostics and remote maintenance, and intuitive operation.

Within the Chiron Group portfolio there are a range of options for machining workpieces with up to a 200 mm diameter and a length of up to 500 mm, for milling and turning off the bar, or milling off the bar or from profile.

CNC machining centers and “Made by Chiron” turnkey solutions guarantee high-speed manufacturing and CNC machining with maximum productivity and maximum precision. Whether with one, two or four spindle, machining centers from Chiron produce components of the highest quality at minimum unit costs. Economical turnkey solutions for CNC machining, high-speed cutting and high-speed manufacturing permit “seconds ahead” production.

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# KISSsoft

## OFFERS CROSSED HELICAL GEAR CALCULATIONS

The gear calculation in *KISSsoft* covers all common gear types such as cylindrical, bevel, hypoid, worm, beveloid, crown and crossed helical gears.

In the *KISSsoft Release 2021*, new graphics for the crossed helical gear calculation are available: The evaluation graphic for specific sliding is calculated and displayed based on the geometry of a spur replacement cylindrical gear. A visual evaluation of the tooth meshing in 2D is now also possible for axis crossing angles not equal to 90°. For this purpose, parallel sections to the center axis plane of the worm are calculated and shown. This 2D geometry is visualized using the “Tooth meshing in slices” function. The option “Determine form diameter  $d_{FF}$  and  $d_{Fa}$  from tooth form” is also selectable.

With the help of the fine sizing method in *KISSsoft*, you can also find the best variants for crossed helical gear stages with preset, definable boundary conditions. If you input the nominal ratio, normal module, pressure angle, helix angle, center distance and profile shift coefficient, the system calculates and displays all the possible suggestions.

All the variants the system finds are then output in a list, classified by the most varied criteria (accuracy of ratio, contact ratio, safety factors, weight, axial forces etc.). You can either expand or reduce the scope of the list, if you want to display more or fewer individual results for a specific solution.

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# Liebherr

## PROVIDES CLAMPING SOLUTION FOR DIVERSE REQUIREMENTS

SECLA offers easy operation combined with maximum flexibility and short setup times. These are the clamping arbor features that Liebherr has been successfully using in its own gear cutting machines for many years. Anyone who buys a SECLA from Liebherr benefits from manufacturing to after-sales service, as the company offers everything from a single source.



Customer feedback was so positive that, in 2019, Liebherr decided to offer the clamping fixture as a separately available component. The clamping arbor manufactured by Liebherr offers modular construction, enabling a clamping fixture exchange in next to no time.

### Short delivery times

As well as its diverse variety and its robustness, which make it suitable for different workpieces, the SECLA also impresses with its fast availability. A complete clamping device can be delivered within 10 weeks, while individual components such as the clamping arbor, clamping base and the mounting for the counter column are in stock and thus immediately available.

Liebherr even goes one step further and provides customers with the interface geometry of individual, workpiece-touching components – for example, the workpiece support, the centering tip or the clamping top – for their own production.

### Work area and collision monitoring in advance

Liebherr offers a special peripheral service for the clamping fixture: in case of possible interfering contours, Liebherr conducts advance collision monitoring in the work area as an engineering service. This ensures that production can start immediately after installing the clamping device.

### SECLA service help desk

Liebherr has set up a help desk for any questions concerning SECLA. The employees can be reached by telephone or email and will answer any questions about technology, delivery times or commercial handling, or will connect you with the right person.

[www.liebherr.com](http://www.liebherr.com)