

Power Skiving - High Quality, Productivity and Cost Efficiency in Gear Cutting

DR. MANFRED BERGER, MAG – STEPHAN DOERR, HESSAPP – MARIO GRUEBERG, MODUL

Like electric mobility, the technology of power skiving has been known for more than 100 years (Ref. 1) and, with the availability of 5-axis machining centers, has found its way into individual and series production due to its convincing process flexibility. With e-mobility, a market is now growing which demands high precision (low running noise), high power transmission (torque and speed) from the product and equally high product flexibility in volume production. The use of planetary gears for reduction or as a differential in the drive system also increases the demand for internal gears. As with all manufacturing technologies, quality, cost optimization, flexibility and productivity are the top issues. "Power Skiving" makes a significant contribution to each of these aspects.

In addition to traditional gear machining processes such as hobbing, gear shaping and broaching, skiving is a continuous machining process for soft and hard machining of internal and external gears (Ref. 2). The skiving process is characterized by the tool and workpiece axes arranged in a certain relationship to each other: the axis cross angle (Fig. 1). With the coupled

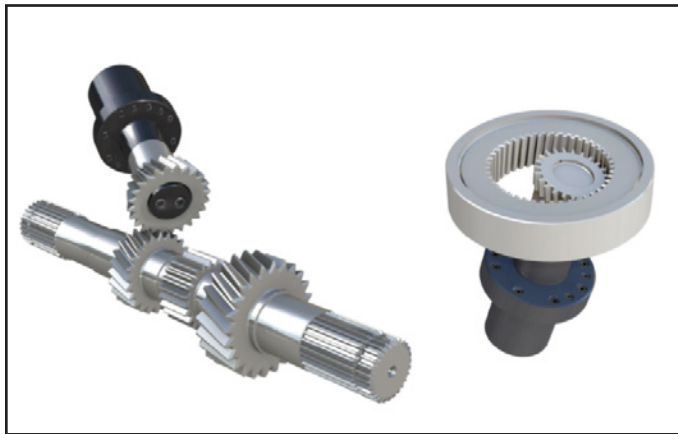


Figure 1: Gear skiving of internal and external gears with a relation of tool and workpiece axis arranged at an angle to each other.

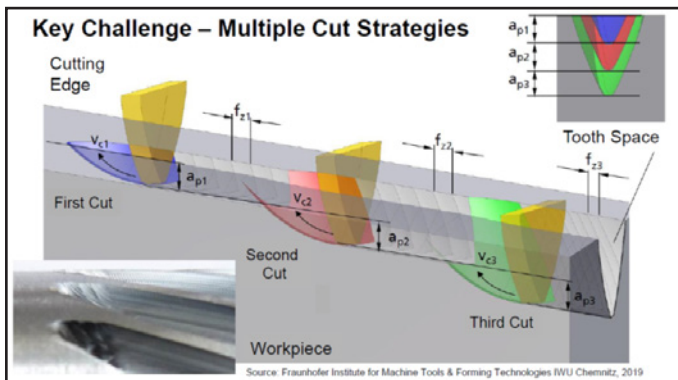


Figure 2: Production of the tooth space on the workpiece using the multi-cut strategy [3] and illustration of the kinematics with sickle-shaped chip formation when rotating the workpiece and tool with crossed axis arrangement (axis cross angle).

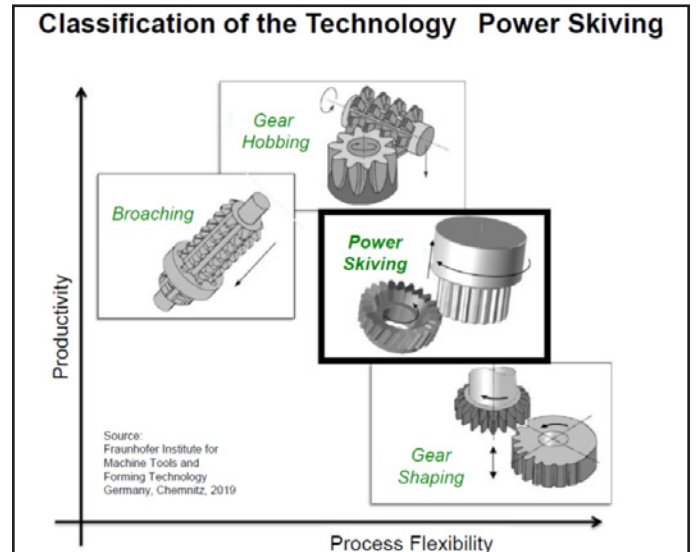


Figure 3: Power Skiving in comparison to other gear manufacturing processes.

rotation of workpiece and tool, a relative movement of the cutting edge in the tooth space is thus created. By superimposing a feed motion, both add to the movements to the feed speed and guide the cutting edge along the workpiece axis. In this way the tooth space is "peeled out" of the workpiece in several cuts (Fig. 2). The cutting speed results from the rotational speeds of tool and workpiece in relation to the axis cross angle. Significant for the skiving process is the short machining time (approx. 30 to 50%) in comparison to the likewise flexible gear shaping and the ability to apply the gearing close to an interfering contour (workpiece shoulder). The smaller the axis cross angle, the closer towards the interference contour can be machined.

While the traditional alternative processes for gear machining such as broaching, gear shaping and gear hobbing are mainly used in technology-specific special machines, gear skiving can be applied on special machines and on modern 5-axis machining centers. In recent years, skiving has made a quantum leap in industrial manufacturing with the availability of modern control technology for spindle synchronization, tool technology for high-performance cutting and a machine structure that meets the high demands for rigidity and dynamics.

The main advantage of the above-mentioned process integration is that the components can be finished without or at least with fewer downstream machines. This eliminates a large part of the loading and unloading of the components, the intermediate transportation and the quality losses due to clamping faults in the subsequent machining processes. The FFG Group therefore offers users the technology of Power Skiving on different machine concepts (Modul gear cutting machine skiving with alternative machining processes, Hessapp vertical turning

	Broaching		Gear Shaping		Power Skiving
Source: Dauter AG Dr. Achim Raab April 2019					
Cycle Time [min]	0,65	↑	1,95	↓	1,0
Set-up Time [h]	1,5	↓	1,0	↓	0,5
Layout Flexibility	height/below floor level	↓	crane hook MC	↑	crane hook MC
Dry Machining/MQL	no	↓	partially possible	↑	yes
Cutting Tool Cost	300 %	↓	100 %	↑	130 %
Process Compensations	not possible	↓	related lot Df/MBK	↓	with compensations
Investment	120 - 150 %	↓	100 %	↑	100 %
Summary	↓		↑		↑

Figure 4: Evaluation matrix of gear machining in series production [5].

machine for disc-type components with swiveling workpiece axis or the Boehringer shaft turning centers with optional tool spindle). In an isolated comparison of the machining scope for gear cutting, Power Skiving can keep up with broaching and gear shaping and only has to admit defeat to classical gear hobbing in terms of economy. However, for series production on a greenfield site, costs, quality and productivity must be assessed as a whole, and the evaluation matrix for Power Skiving can be even more advantageous (Fig. 4).

Advantages of Power Skiving:

- Elimination of the loss of accuracy with multiple clamping in subsequent operations (quality improvement) - turning (as well as other operations) and gear cutting in one clamping
- Floor space-saving process due to less logistics space for subsequent machining
- Lower total investment (no special foundations (broaching), periphery, operating and maintenance costs in the system)
- Economical machining due to short machining times (compared to gear shaping)
- Process flexibility (process optimization, retooling, path compensation, tools, cutting materials)
- Dry machining possible, no need for cooling lubricant or oil

(environment, costs)

- Product flexibility (quick changeover to other workpiece types, gear profiles, straight and helical gearing)
- Production of gears close to interfering contours (shaft shoulder)
- Internal and external gearing
- Soft and hard machining - Roughing and finishing
- Hardening distortions can be compensated by tool path corrections
- Broad competence of machine and tool suppliers

The obvious advantage of “Power Skiving” can be found in process integration. This background also explains the FFG Group’s multiple path approach to machine development. Both machines for “Power Skiving” offer additional machining technologies such as turning, drilling and milling in addition to the gear skiving process. In the process combination, a workpiece can be almost completely machined on the machines. With the “Power Skiving” option on the Hessapp DVH 500, which is very well established in the market, we approach those customers that have to apply a gear to the turned part. With the Modul VS 250, the focus is on the classic manufacturer of gears and transmissions.

A special software package for technology and process development, for simulations and for process visualization is available for both machines. FFG’s skiving software is compatible with the *SkiveAll* design and simulation software from IWU Chemnitz, an institute of the Fraunhofer Gesellschaft (Refs. 6, 7).

SkiveAll contains algorithms for the optimization of component quality. A kinematic process model is created from the workpiece analysis and the required tool geometry is calculated. In order to fully exploit the potential of skiving, this digital process twin also takes into account the machining forces, tool wear and stress on the processing machine (Fig. 5). The process (cutting sequence, cutting values, machine settings and other data) is exported to the machine where it serves as the basis for the automatic generation of the NC machining programs.

When coupled with a measuring machine, the data is

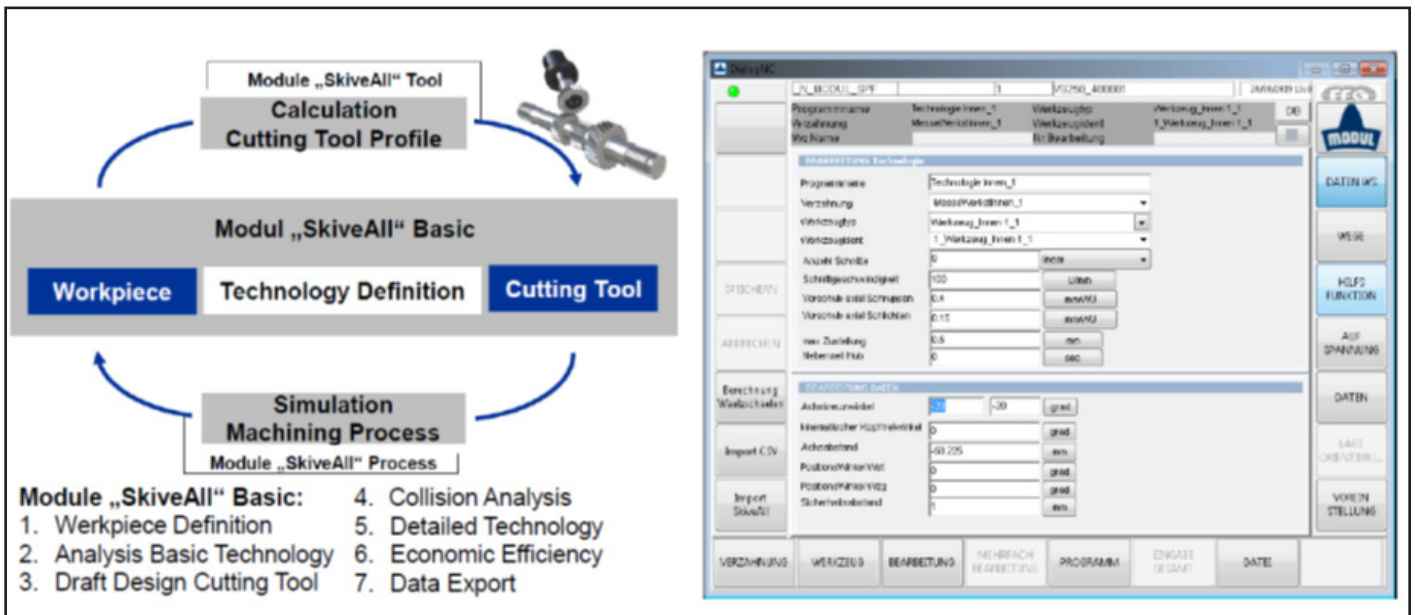


Figure 5: Application software for designing gear skiving processes SkiveAll (left) and input mask of the machine control DialogNC (right; operation, workshop programming, NC program generation, import/export to peripheral units) with direct coupling of both systems.

transferred in GDE format (Gear Data Exchange, Ref.8) or in customer-specific formats. This allows a closed process chain to be established from the workpiece drawing to the finished product. "Closed Loop Manufacturing" (Ref.9) is becoming a key issue for gear machining in order to further strengthen its position compared to the gear cutting processes of gear shaping, broaching and hobbing, which have been continuously developed for decades.

Another component is the Modul Tool Manager, a sophisticated tool management system that has already been supplied with gear hobbing machines.

For services, FFG offers an outstanding support through the digital maintenance manual installed on the machine, which provides maintenance and repair instructions in words and pictures directly at the machine. The display of maintenance intervals or the preventive announcement of due maintenance is just as possible as the logging of completed tasks. All service data can be uploaded and evaluated externally.

The gear skiving machine Modul VS 250 complements the successful product range of gear hobbing machines with the "Power Skiving" technology (Fig.6). The process and production advantages described above are primarily aimed at suppliers and production plants in the automotive industry, regardless of the drive concept with combustion engine or e-drive. However, the machine with its tool magazine is also suitable for more complex workpiece assortments in small and medium volume production.

The 30 kW main spindle of the VS 250 allows a tool speed of 8,000 rpm, the workpiece spindle offers a maximum speed of 4,000 rpm. The tool magazine, already included in the basic equipment, has 6 pockets for tools with an HSK 100 interface.



Figure 6: Gear skiving machine MODUL VS 250 with automation and view into the work area.



Figure 7: Vertical turning center HESSAPP DVH 500 L WS for „Power Skiving“ with integrated automation and part supply via conveyor belt.

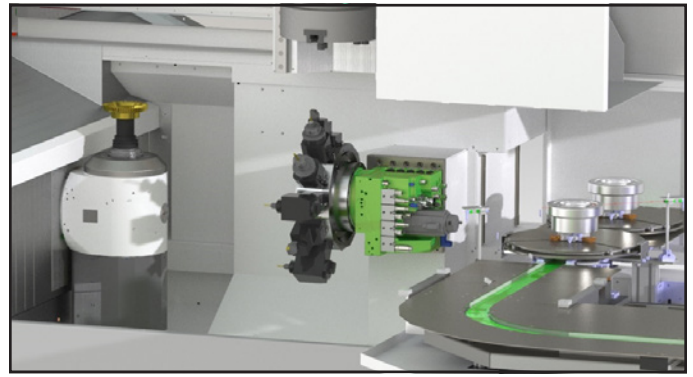


Figure 8: Work area of the CNC turning machining center HESSAPP DVH 500 L WS - view into the work area (suspended workpiece spindle, swiveling tool spindle, tool turret with a.o. driven tools - direct loading/unloading with the workpiece spindle (pick-up)).

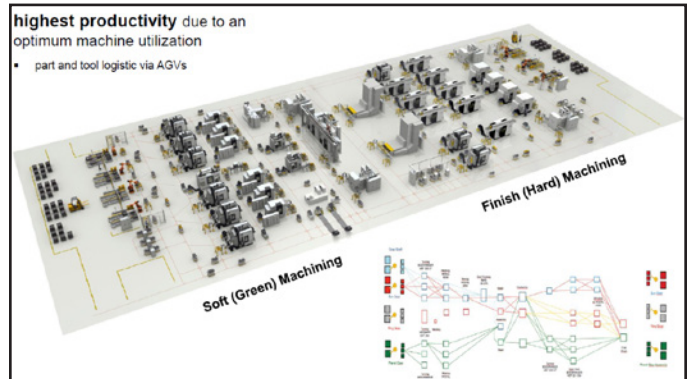


Figure 9: Algorithmic production system [10] for components of a planetary gear with flexible configurable material transportation by floor vehicles (example of a turn-key system for the complete machining of wheels and shafts).

- Maximum producible module $m=6$
- Maximum workpiece diameter=250 mm
- Automation through integrated loading gantry or external robot
- Possibility of mirrored design for integration into existing production lines or when replacing existing machines

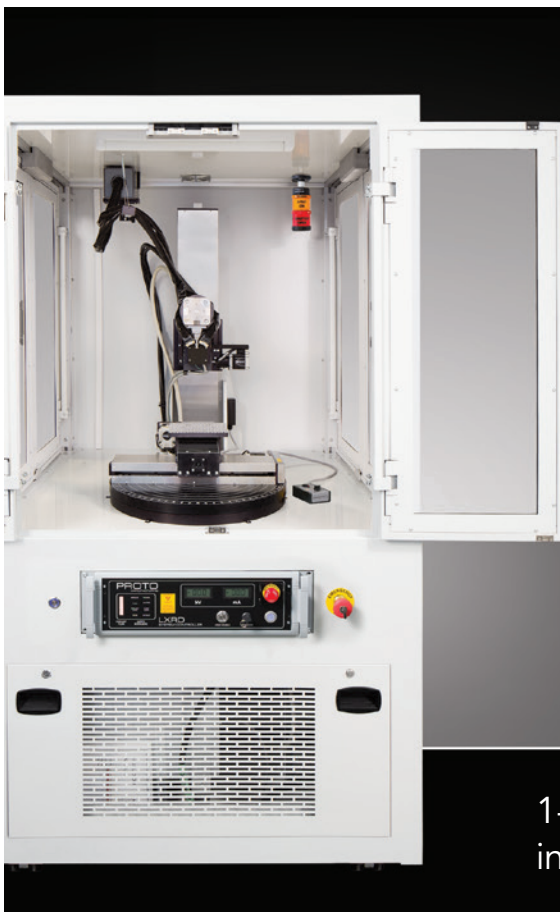
The vertical Pick-up Turning Machining Center DVH 500 L WS (Fig.7) can pick up and completely machine workpieces up to a swing diameter including clamping elements of 500 mm. For this purpose, driven tools can also be accommodated in the tool turret, which is equipped with state-of-the-art process monitoring (MONTRONIX). To increase the machine dynamics, the X-axis can be equipped with linear drives on request. In addition to the classic machining operations of turning, drilling, milling and grinding, the "Power Skiving" option package now also provides an additional swiveling tool spindle (Fig.8) with a torque of 270 nm, a maximum speed of 7,800 rpm and an HSK 100 tool interface:

- Maximum producible module $m=6$
- Integrated workpiece handling from the conveyor belt with the pick-up spindle
- Optimum set-up operation
- Modern special software for workshop programming and process visualization SkiveAll with dialogue programming
- Main spindle with max. 4,000 rpm and 795 nm @ 40 %
- Y- axis stroke $\pm 300\text{mm}$
- Advantage of manufacturing an internal gear for workpieces with an internal shoulder

Both machine types can be integrated into existing production lines for wheels and shafts as a replacement or supplementary investment or can be used in FFG's turnkey plants with full effectiveness of the potential of multi-process technology. The Algorithmic Production System (Fig. 9) is particularly suitable for gear production, where not the individual component but components in containers (lots) are transported to the subsequent processing section, offering the best productivity and resulting lowest unit costs. These production systems are characterized by the fact that process-specific machine groups are planned in the system, which are approached with different components depending on capacity utilization and availability. It is therefore essential that the individual machines are designed for the acceptance of different components in volume production and this process flexibility requires the coverage of the largest possible machining scope (e.g.: turning, milling, drilling and gear cutting) in one clamping. The logistics target for an order (container/batch) is determined based on the respective current capacity utilization of the production cells and thus the available production and peripheral machines are optimally utilized. Both machine types for skiving can also be optimally integrated into conventional multi-stage production plants and agile manufacturing systems (Ref. 11).

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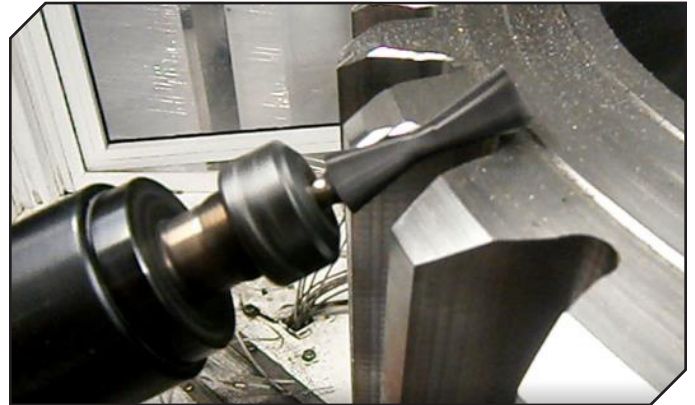
Helios

ANNOUNCES STRATEGIC APPROACH TO LARGE-GEAR DEBURRING

Chamfer-deburring of large gears — considered here to be those over 1-meter diameter — demand significant labor that comes with the risk of inconsistency and low quality. In partnership with Tecnomacchine, Helios announces an improvement to such applications. “For very large spur and helical gears, this deburring approach cost-effectively reduces labor and increases consistency and quality,” said Adam Gimpert, president of Helios Gear Products.

For such large gears, several challenges demand improved solutions. Because these gears take significant time to move and fixture, a dedicated machine for deburring such workpieces becomes impractical. This is due to complex setups and relatively expensive machine components, such as precision motors, electronics, and structural elements. To solve these challenges, Tecnomacchine has developed a solution that adds chamfer-deburring capability to a manufacturer’s existing finishing equipment, either hobbing or grinding. The key benefit to this “deburring unit” is that the workpiece remains fixtured from the prior finishing operation, and the same platform rotates the workpiece for the chamfer-deburring operation.

This added capability comes in a simple package for less than half of the cost of a dedicated machine. The deburring unit either mounts permanently to the existing hobbing/grinding machine structure or it uses a clamping system to temporarily mount for operation. Once the unit is positioned, the hobbing/grinding machine rotates the workpiece, and the deburring unit



engages a disk-type cutter to shear away large burrs particularly at the root of the tooth. This allows consistent, high quality chamfer-deburring in subsequent steps. Next, the unit simultaneously engages two tools to deburr bottom and top of the gear.

Manufacturers with large-gear finishing machinery, such as hobbing or grinding equipment, will welcome this strategic approach. Effectively, this solution simply adds to existing machinery new chamfer-deburring capability as a subsequent cycle without the need for re-fixturing. Consequently, manufacturers can have a simple, productive means for reliable, high-quality gear chamfer-deburring.

Heliosgearproducts.com

Chiron

INTRODUCES 5-AXIS, TWIN SPINDLE MACHINING CENTER

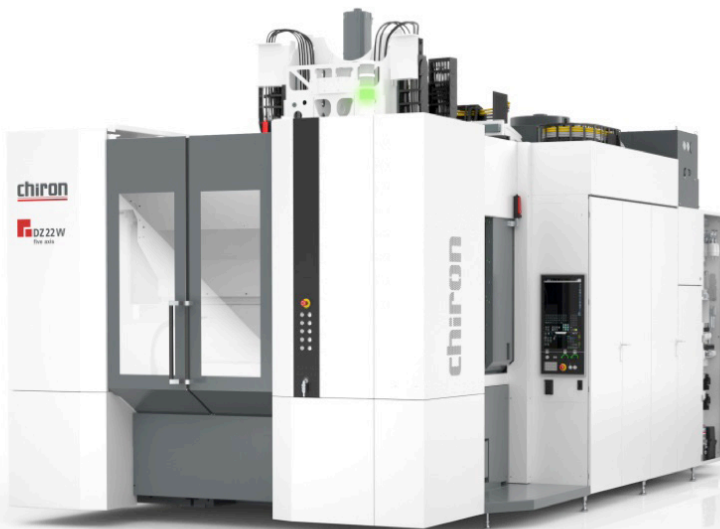
The new twin-spindle series DZ 22, with spindle clearance of 600 mm, is designed to completely and rapidly machine complex, large workpieces, including housings for electric motors and transmissions, oil pumps, chassis components, and more. Chiron introduced the DZ 22 W five axis at its virtual open house in May. The company also offers a 4-axis variant of the Series 22.

According to the company, the Series 22 combines both

high-speed and high-precision processing for complete production of even large high-precision components. Featuring two workpiece-changing table variants, part capacities are generous - the 4-axis trunnion plate version handles 680 mm × 1,330 mm dia., up to 600 kg; and the twin-spindle 5-axis version handles 2 × 599 mm × 340 mm dia., up to 150 kg.

Key to success of the small-footprint innovative machine concept is a machine platform using a moving gantry design. The rigid machine bed and active component cooling enable the required degree of precision on the workpiece. High acceleration — X-Y-Z max. 10–10–17 m/s² — in all axes and rapid response to programming inputs ensure dynamic machining as never before seen with workpiece dimensions of this size range. Axis travel distances are X-Y-Z max. 620–650–600 mm and rapid traverse speeds X-Y-Z max. up to 120–120–90 m/min.

In addition to precision and dynamics, Series 22 also offers impressive flexibility. From very complex workpieces or product series with many different tools: The magazines offer space for up to 77 tools and, thanks to the integrated workpiece changer, the workpieces are loaded and unloaded during machining, saving cycle time. Tool change time from 3.1 sec., chip-to-chip.





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Spindle options — one fast, one strong

Depending on the processing task, two different main spindles are used in Series 22: a fast spindle with a speed of up to 20,000 rpm and a torque of up to 137 nm for workpieces made of aluminum or aluminum alloys. Or a strong spindle with a speed of up to 12,500 rpm and a maximum torque of 200 nm for hard materials and large tools. The 22 series is also available as an HSK-A100 machine for further stability and performance.

Simple, clear access

The working area is easily accessible, and the process easy to see through large glazed doors. The control panel is located directly next to the working area, making set-up easier. The new machines are operated easily and according to context via the Chiron TouchLine operating system.

On the back, the tools are inserted in the chain magazine, and the tool data can be entered here directly via the operating console. Tool replacement is carried out during machine operation; the new tool is clicked into the magazine

with a single movement of the hand.

Modular design, application-oriented

Series 22 is available with a ball screw drive or a linear direct drive. You can also choose from two plate variants: A suspension plate for four-axis machining or two face plates for five-axis simultaneous machining. All models can also be equipped according to the application with a cooling system, suction unit, chip conveyor, individual tool packages and more.

To maximize uptime, Chiron develops individual automation solutions with the customer. The solutions range from robot loaders to pallet handling systems.

Even better with Chiron SmartLine

To tap the full potential of digitalized production, Series 22 is prepared for the integration of various SmartLine modules to optimize productivity, product quality, and machine availability.

ConditionLine: Early detection of non-typical operating behavior and targeted planning of maintenance and repair

ProcessLine and ProtectLine: Reliable protection against machine crashes with a digital twin, both in preparation and during running operation. The machine operator is only shown those functions that are useful in the particular operating situation. TouchLine also offers enormous expansion possibilities, and Chiron is working on many features that will help customers exploit the potential of highly productive machining centers.

Optimized machine assembly and logistics processes for shorter delivery times

The machining centers are built in the new Chiron Precision Factory in Neuhausen, Germany, and are characterized by maximum precision and faster availability. The machines are produced in a cluster assembly process — one team, one machine — in shorter cycles. For each order, the optimized processing saves about two to three weeks of time, so that customers can get started with production sooner. And better too, thanks to advance simulation of processes: All machining which is later carried out on the machine can be programmed, simulated and optimized right in the Chiron Precision Factory.

“To assemble a machining center that combines maximum productivity with the highest precision, you need a factory that is ideally suited to it. The design and construction of the Chiron Precision Factory therefore went hand in hand with the development of our new 16 and 22 series machines. The primary goal was to create an optimal assembly environment for the state-of-the-art machining centers right from the beginning. We were able to optimally plan and implement material flow, temperature control, cranes and much more,” said Bernd Honold, project manager operational excellence at Chiron.

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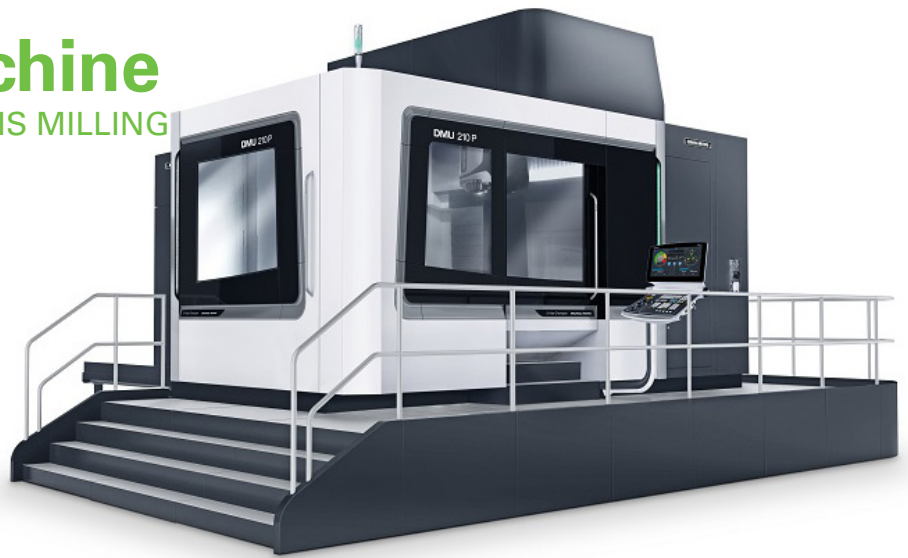
C-B Gear & Machine

EXPANDS CAPABILITY WITH 5-AXIS MILLING

C-B Gear & Machine has expanded its precision milling capability with the addition of a new DMG MORI DMU 210P2 5-axis milling center.

The DMU 210P2 is one of a handful of five-axis milling machines in North America that can perform complex milling operations as well as mill gear teeth, making it state of the art machine technology. Reduction in set up and run times give C-B Gear a new capability for the high-speed production of any gear type on the market up to AGMA quality class 12 and higher. Cylindrical and right angle gearing up to 82" in diameter, soft or hard finished are possible.

Additionally, C-B Gear can now produce hard finished spiral bevel gears to either Gleason or Klingelnberg tooth forms. The DMU 210P2 adds to the company's wide range of large precision gear manufacturing, which complements C-B Gear's tooth grinding capability up to 4 meters in diameter. C-B Gear is one of the few gear manufacturing facilities in the country with this type of capability in this size range.



"We're excited about the prospect of expanding into new markets with this type of capability" said C-B Gear General Manager, Frank Irey. "We've added all of the bells and whistles that help C-B Gear become even more competitive in the industry with on-board tooth inspection, tool offset compensation and automatic workpiece eccentric adjustments. Customers can expect higher quality and faster turn-around times than in the past".

Since 1952, third-generation family-owned C-B Gear has been providing a wide variety of industries with quality products at a competitive price. "Expertise in precision mechanical component production, gear manufacturing and aftermarket gearbox repair has established C-B Gear as a highly valued supplier to our customers," said Irey.

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Marposs

OFFERS MINIMICROMAR3 GAUGE FOR SMALL GROUND COMPONENTS

Marposs has announced Minimicromar3, an in- and post-process grinding gauge designed for small diameter measurement. This ultra-compact gauge is well-suited for the manufacturing of very small ground components such as fuel injectors, electronics and other parts.

The Minimicromar3 is designed for measuring external diameters, positioning and length for both smooth and interrupted surfaces. It can measure workpieces from 25 mm to 42.5 mm with a measuring range of $\pm 100 \mu\text{m}$ and a repeatability of $\leq 0.1 \mu\text{m}$. It is designed

with a high degree of protection against coolant and abrasive substances. Its low thermal drift value ($< 0.1 \mu\text{m}/^\circ\text{C}$) helps maintain high measurement precision.

The Minimicromar3 can be used with a range of Marposs electronic units including the P7ME, P7UP, P7SYS, Blù and Blù LT for higher end applications and the P1dME and P3dME for entry to mid-level applications. The gauge, together with the associated electronic control unit, exchanges information and signals with the machine in order to maximize performance and achieve the desired results. It is designed for quick and easy installation and operation.

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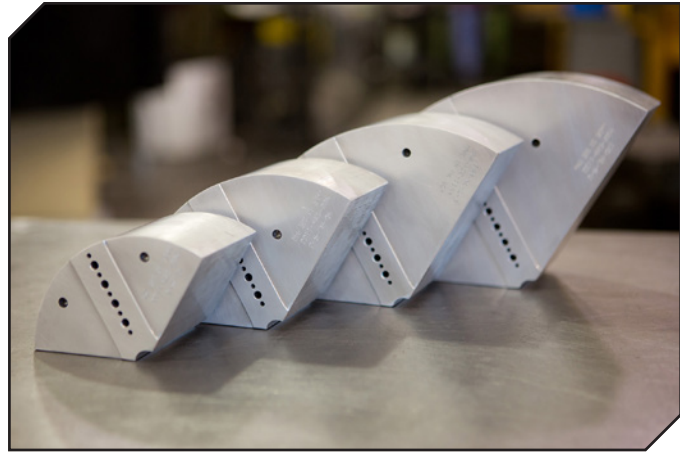


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Dillon Manufacturing, Inc. full grip (pie) blank jaws manufactured for Northfield, Microcentric and others, are CNC milled to provide maximum accuracy for workpiece location, enabling air chucks to hold thin wall and deformation sensitive workpieces firmly. The full grip jaws are manufactured for chuck sizes ranges between 4" and 10" diameters.

Full grip jaws are available in 1018 steel and 6061 aluminum. Jaw heights are available between 1" and 4". Jaws can be customized per customer request — a quotation of these engineering services are performed at no charge by experienced Dillon application engineers.



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With its lean automation program and the Plug & Work portfolio for cobots, Schunk already offers cost effective solutions for component handling. Now the competence leader for gripping systems and clamping technology expands its offering for stationary workpiece clamping by launching a low maintenance vise that makes it easy to transition into the world of automation.

The pneumatically actuated clamping force block Schunk Tandem PGS3-LH 100 can be directly mounted via the integrated flange on the machine tables, dividing heads or Schunk Vero-S NSL3 150 clamping stations of machining centers. Its compact and square design ensures optimum accessibility and



enables a considerable stroke of 6 mm per jaw.

With a clamping force of 4,500 N and a repeat accuracy of 0.02 mm, the low-maintenance Schunk Tandem PGS3 is suitable for basic applications in the field of aluminum and plastics machining. Special quality features include a chip-repelling design, the surface-treated components in the power flux, and the fact that the long base jaw guidances avoid a lifting up of the chuck jaws. The vise can be equipped with all standard top jaws with tongue and groove (KTR, KTR-H) from Schunk's extensive chuck jaw program. The vise can be immediately incorporated into any machine tool: it has lateral air connections and built-in keyways.

Schunk.com

Forest City Gear

EXPANDS THREADED WHEEL GRINDING CAPABILITIES

Forest City Gear now can perform hard fine finishing of larger diameter cylindrical gears faster and more efficiently in higher volumes with the addition of a new Reishauer RZ 410 Threaded Wheel Grinding Machine.

The new Reishauer uses the threaded wheel (continuous generating) grinding process to combine very high metal

removal rates and short idle times to produce gears as large as 500 mm in diameter and module 10 and shafts up to 700 mm in length much faster and more efficiently than profile grinding.

For smaller lot sizes, specialized, and prototype work the Reishauer also gives Forest City Gear the ability to perform profile grinding using either CBN plated or dressable grinding wheels that can be modified on the machine with an on-board CNC dressing unit, working in conjunction with integrated inspection.

The unique architecture of the Reishauer also provides optimum speed and accessibility during wheel or work-piece changeover. The turret-mounted grinding spindle can be rotated between grinding position, dressing position and an easily accessible wheel-changing position that allows the operator to change the clamping fixture at the same time the grinding wheel is being dressed on the opposite side of the column.

The capability of this machine to perform threaded wheel grinding, profile grinding, and polish grinding to create gears with 'mirror' finishes, along with the ability to control bias, allows it to fit perfectly within Forest City Gear's very diverse product requirements, according to Forest City Gear Technology Manager Gene Fann.

"The Reishauer adds speed and capacity for production of larger gears at lower cost per piece to our grinding operation, with the versatility to accommodate a very wide variety of customer

requirements, whether the high precision of a one-off master gear or ultra-quiet gears with mirror finishes produced in higher volumes," said Fann. "With quality and delivery standards never higher in all the industries we serve, this machine is a great addition."

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Pittler SkiveLine

INCREASES QUALITY WHILE REDUCING COSTS

The future of automation lies above all in the intelligent combination of the respective strengths of man and machine. In order to achieve better results, conventional procedures and processes are being rethought from the ground up. In industrial production, this is primarily a matter of improved ergonomics with a simultaneous reduction in manual processes. As a result of this development, robotics has grown by an average of more than 10% in recent years. An end to this growth is not in sight for the time being - robots are a key component in the automation of production processes.

Robots place extreme demands on positioning accuracy with high dynamics. For this reason, low backlash gears with high torsional stiffness are used in the development of drives for jointed-arm robots. However, this requires a correspondingly high-quality production technology for these gears. Robot gearboxes have a high transmission ratio and a compact design. Planetary, shaft and cycloidal gearboxes are used as robot gearboxes, as well as new gearbox solutions such as the Galaxie from Wittenstein. Cycloidal gearboxes currently account for the largest market share in Asia. The high transmission accuracy requires a limitation of tolerances, so that the gear profiles, the pitch accuracy and the position accuracy must meet increased requirements. Even small deviations in the tooth width or minor positional deviations lead to variations in the rigidity of the drive. Due to the unfavorable size ratios, the robot's compliance at the tool tip is many times greater than the play in the gear.



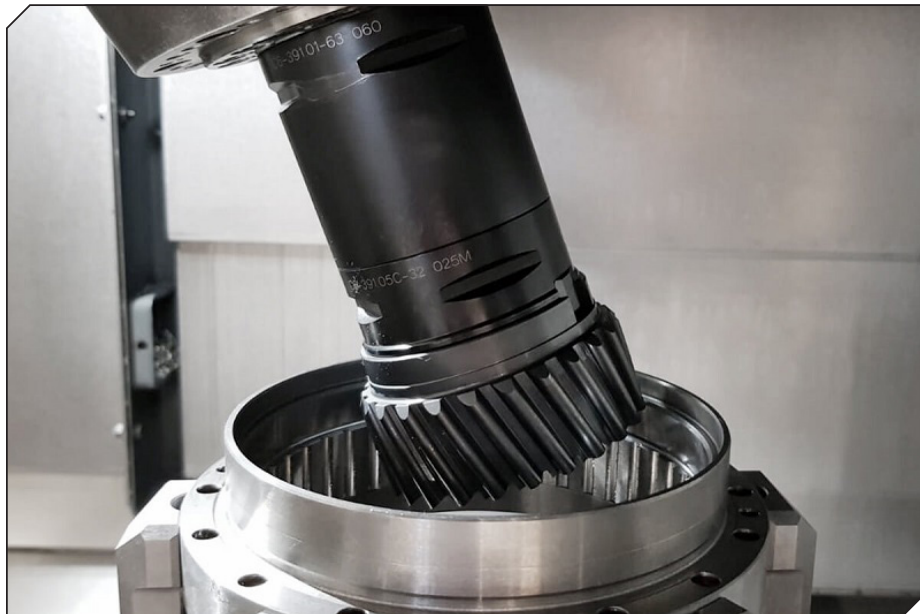
In cycloidal gears, the challenge is to machine the gear teeth in relation to the cam bores. Here, tight tolerances must be maintained in order to achieve a minimum backlash. On conventional gear cutting machines, the gears are machined independently of the cam

bores. Here the position orientation must be ensured by the clamping device.

The machining strategy, which is realized on a Pittler SkiveLine, follows a different approach. By machining the toothing and the cam bore in one clamping, the clamping device for machining a

cycloid disc can be designed more simply without negatively influencing the form and position quality. The advantage of complete machining in one clamping is that the reference of the cam bore and gear teeth can be generated and corrected via the machine. This machining strategy even leads to a further improvement of the position quality. In this way, the Pittler SkiveLine contributes to solving an apparent conflict of objectives - to reduce manufacturing costs with improved quality.

In addition to external gearings, internally toothed housings can also be completely machined on a Pittler SkiveLine. This is possible by creating the special profiles with Pittler Skiving and machining all other functional surfaces by turning, drilling, and milling. The machining of components for robot gears on a Pittler SkiveLine is not limited to the green machining itself. To achieve the highest quality, the already toothed and hardened components can be finely machined. Here Pittler can fall back on the modular technology of the DVS Group.



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The Pittler SkiveLine thus proves once again that no special machines are required for the manufacture of high-precision gearings, but that the key to success lies in the flexible and scalable basis of the DVS modular technology system. For this purpose, machining center, clamping and tool technology must be coordinated.

www.dvs-now.com

Drivetrain Hub

LAUNCHES GEARS APP

Drivetrain Hub has launched its fully web-based gear software, Gears App.

Gears App is the only Software-as-a-Service (SaaS) gear development platform that integrates gear system modeling, design-for-manufacturing, industry standards, powerflow analyses, CAD, FE, 3D printing, manufacturing, data management, and collaboration tools. Model, analyze, and build gear systems for parallel-axis and planetary architectures.

Gears App is accessible online from anywhere on any operating system, no special hardware, software, or complicated license required. It is the only professional gear engineering software made available as an affordable monthly subscription service, entirely online. Just open your web browser and start using it.

Drivetrainhub.com/gears

SMW Autoblok

OFFERS ZEROACT SYSTEM FOR MANUAL AND ELECTRIC ACTUATION

SMW Autoblok introduces the connectable ZeroAct workpiece positioning system ideal for manual and electric zero-point clamping used in a variety of machining applications including milling, inspection, and finishing operations.

With an ultra-low profile of 40 mm, ZeroAct is ideal for any zero-point application especially those where the z-axis travel of the spindle is critical. The ZeroAct features rapid open and closing of the modules and simultaneous actuation with one simple twist of the wrist generating 15kN clamp force. Easily actuate workpieces onto a table or adapter with a low stack-up of 38.1 mm, greatly increasing the z-axis travel.

The modular ZeroAct system, with a compact size of 150 x 150 mm, offers the ability to easily attach up to three

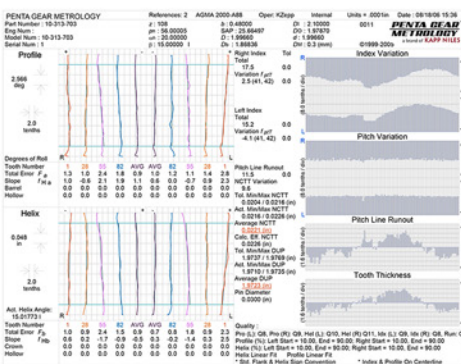


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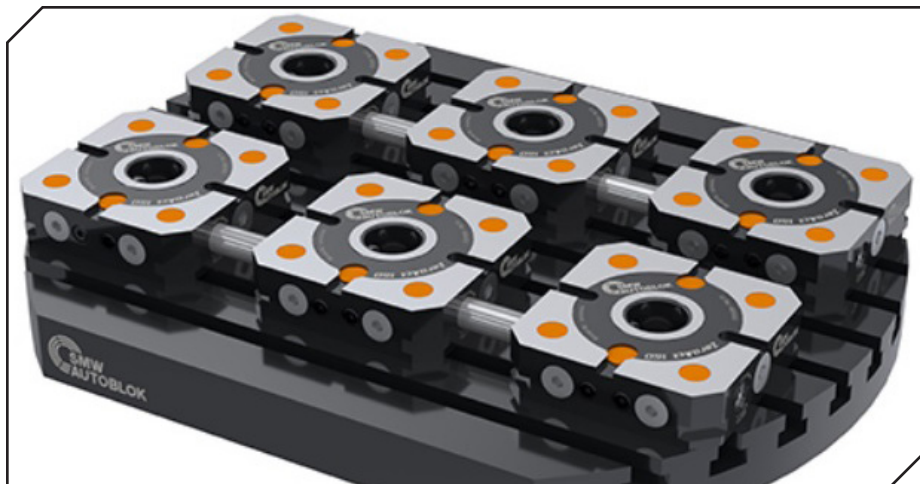
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clamping modules in a row with a connecting pin that is available in sizes from 5 mm to 105 mm. By actuating the first unit, all three units clamp simultaneously therefore it is not required to lock each unit individually into position like others on the market. This benefit adds tremendous flexibility to machine operations, saves time and increases operator safety.

The ZeroAct is also available in an electric e-motion version, unique to the industry, to fully automate the manufacturing processes. Using 24V power supply that operates with a built-in electro-motor, this system offers great flexibility to machining processes. Switch between a manual and electric ZeroAct version for fully automating load and unload processes. Pull down pins are fully interchangeable with the manually operated ZeroAct and other APS/WPS clamped systems.

All modules are proofline sealed protected against corrosion and feature a built-in air cleaning function to ensure



that the clamping system's support surface remains clean and free of chips during changeover or automation, greatly reducing maintenance and production time, and providing a repeat accuracy of <math><0.005\text{ mm}</math>.

ZeroAct is part of the comprehensive lineup of stationary workholding systems that include the manual and pneumatic WPS/APS clamping modules, fully

customized and self-centering vises that fully integrate with automation and pallet systems, and SinterGrip clamping inserts for ultra-low clamping depth and no pre-marking of parts. Systems provide high repeatability, maximum holding forces, and up to a 90 percent reduction in setup time.

www.smwautoblok.com

Siemens Digital Industries Software

INTRODUCES QUALITY MANAGEMENT SOLUTIONS

Siemens Digital Industries Software announces *Teamcenter Quality* software, a new suite of solutions that provide a closed-loop approach for quality management, from design to manufacturing on the shop floor and back again. *Teamcenter Quality* helps keep product development, quality planning and continuous improvement

processes in synchronization to help maximize the value of change management and configuration management capabilities on the Teamcenter collaboration platform.

“Given today’s product complexities and time to market agility needs, leading manufacturers include quality management into their collaboration, change

management and data backbone, such as Teamcenter represents today,” said Matthew Littlefield, president and principal analyst at industrial transformation analyst firm, LNS Research.

In today’s market, companies are continuously challenged to reduce product and operating costs, while still improving quality, to distinguish products and gain a competitive advantage. Every effort must be made to improve efficiencies among teams that may be distributed across the globe. On the other hand, consumers are requesting more innovation, faster delivery and cheaper products to the market, while still ensuring their quality and safety. This new extension to the Teamcenter portfolio allows engineers to set quality requirements early in the design process and establish the parameters required to help ensure the product realized during the production phase will meet the necessary quality standards.

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