

Leading innovations for the machine tool industry

Networked, integrated manufacturing solutions for machining processes – from raw part to finished workpiece.

At **EMO 2023**, the world's leading trade show for production technology, which takes place in Hanover **from September 18–23**, the DVS TECHNOLOGY GROUP is presenting its latest innovations in the areas of machine and precision tools as well as automation and digitization concepts.

The DVS TECHNOLOGY GROUP is one of the world's leading system providers for machine, tool, and production solutions for soft and hard machining, with a focus on drive train and bearing components. At the same time, the group of companies specializes in machining technologies for manufacturing electric drives for the automotive industry. This includes various transmission components, such as ring gears, planetary gears, and sun gears, drive shafts and components for the commercial vehicle industry as well as for construction and agricultural machinery. With so many innovative solutions, the group never stops setting standards that ensure the ultimate in customer benefits.

The group has developed grinding machines and abrasives especially for processing coated brake disks according to the new European Vehicle Emission Standards (EU7). For several years, as a reliable partner to various OEMs, the DVS TECHNOLOGY GROUP has applied its expertise and solutions in grinding machines and abrasives to developing these complex new workpieces.

Moreover, the DVS TECHNOLOGY GROUP has comprehensive expertise in production technology for many components for the aerospace, robotics, and wind energy sectors. Especially worthy of highlighting are the machine designs for the high-precision machining of bearing and transmission components for the wind energy sector and power unit components for aerospace.

At EMO 2023, the group will be presenting under the motto **Leading Innovation – Creating the Future** at **booth 17C22**. Visiting professionals will see the current portfolio of precision tool machines for lathing, tothing, grinding, and gear honing, along with automation cells. All the company's subsidiaries will be represented: *Präwema Antriebstechnik*, *Buderus Schleiftechnik*, *Pittler T & S*, *Naxos-Diskus*, *rbc robotics*, along with tool and component

suppliers DVS and *DVS Production*. Visitors will be able to experience the broad range of perfectly coordinated machines and service and digitization solutions from the group and its subsidiaries.

Präwema Antriebstechnik: the latest generation of machines for geared drive components

At EMO 2023, Präwema Antriebstechnik will present the latest generation of the *SynchroFormV Advanced*. The system is specially designed for producing geared drive components. At EMO, visitors can experience the manufacturing of typical components for an electric drive train up close and personal. The machine is a further advancement of the *SynchroFormV*. Its automation concept has been completely redesigned. Moreover, the new machine's plug-and-play capability makes it easy to reconfigure it from a jump rail machine to a full-fledged, highly efficient double-spindle machine.

Available in single or multi-spindle versions, the machine from the DVS TECHNOLOGY GROUP subsidiary offers optimized solutions for the soft and hard fine machining of geared components, such as stepped planetary parts, with its range of technologies. Efficient cycle times and high-precision processing results make it easier to manufacture geared drive components with diameters up to 150 mm in small or large series. The gearing range of the machine is between module 0.3 and module 3.5. Additionally, *SynchroFormV Advanced* can be efficiently expanded with core skiving technology for lathing and deburring.

Präwema's second highlight at EMO will be the *SynchroFine* honing machine. Honing of the external gears allows significant optimization of the surface quality. Präwema is the market leader in this processing technology. With material removal of about 50 µm per flank, a reliable process achieves appropriately high gearing quality, allowing stringent requirements for noise prevention to be met.

SynchroFine is especially unbeatable for hard machining of gears on disk- and shaft-shaped workpieces, because the machine and technology can be optimally combined. Its machine bed is made of natural granite for geometric precision and stiffness. Combined with DVS TECHNOLOGY GROUP's tool solutions, this makes for a powerful unit.

Another highlight at EMO 2023 is a new, highly efficient deburring process that allows defined edge breaks of the tooth flank economically and in seconds, thus expanding the technology range.

rbc robotics: Modular automation

The experts from rbc robotics will spotlight the compact, powerful *FX LOAD 600* at EMO 2023. The modular basket stack cell offers plenty of possibilities for feeding workpieces quickly and precisely. Linked directly to a tool machine for hard fine machining, the FX module cell has 6 flexible axes and a 10 kg load capacity for automatically loading and unloading the machine. Moreover, the basket stacking cell offers various additional operations.

To meet customer demand for ever higher-performance cells with greater operating comfort, the basket stacking unit has been completely redesigned and optimized. The basket stacker's load capacities have been increased, which enormously adds to the system's robustness. Moreover, the drive system works with just two servo axes. The complete floor roller feeder has been newly developed and is simpler and easier for the operator when loading the cell in series production.

Also offering great customer benefits are the new process modules for additional operations such as brushing, laser marking and component cleaning, which round out the *FX LOAD 600* line.

The graphical interface allows a variety of diagnostic options, along with interfaces in the common BDE systems in industry, for intuitive operation of the cell with shop floor based assistance systems.

The portfolio of FX module cells is constantly being expanded. Currently available, for example, are bin picking cells for almost all common container sizes, special ring pickers for rotationally symmetrical components, or high-performance feeder modules for fast, flexible, camera-based component feeding. With smart robot automation, the DVS Group adds value for its partners.

Pittler T & S: New skiving machine for internal and external gears

The *pSkive* is a new gear skiving machine developed by Pittler T & S. At EMO 2023, it will be presented to the professional public for the first time. It sets new standards in gear processing and is ideal for producing premium geared parts in medium and large quantities.

Based on Pittler's advanced, proven skiving technology, *pSkive* efficiently and precisely produces premium internal and external gears. The gearing range of the machine is between module 0.3 and module 5, and it processes workpieces with a diameter of up to 315 mm.

Available in two versions with MONO or DUO head, *pSkive* offers space for up to four more tool holders, such as turning tools, an in-process measuring probe, or a sensor for finding tooth gaps. These are mounted on the skiving spindle and can be swiveled using revolver technology. The in-process measuring probe allows continuous monitoring of the workpiece during processing, thus ensuring consistent component quality. It is an integral part of the configuration options. Moreover, the integration of hard peeling is possible using the indentation sensor to control the precise, fully automatic processing of hardened workpieces.

The MONO head version of the machine has a propelled tool spindle and allows processing of spur and annular gears in one clamping. This means that finished peeling and deburring take place in one operation. Possible overturning of the reference surfaces and diameters is also ensured by the revolver technology.

The version of *pSkive* with a DUO head has two propelled tool spindles that can accommodate two skiving wheels at the same time. This enables a quick switchover to the second skiving wheel. This considerably increases productivity, because one tool each can be used for roughing and finishing the gearing, for example. Of course, this also provides the option of machining two different types of gears on one component, using sister tools or doing single-flank machining with a left-hand and right-hand skiving wheel for maximum precision. To integrate further processing steps, a separate drilling or grinding spindle can also be implemented.

The *PV315 pSkive* is a multifaceted, first-class solution for the modern production industry to efficiently and precisely manufacture premium geared components. Its flexibility and the ability to perform complex processing steps in a single clamping make it a high-performance skiving machine for demanding production requirements in the gearing sector.

Efficient soft and hard machining of shaft parts with the V300

At EMO 2023, Pittler T & S will additionally present a new, refined machine line for the soft and hard machining of shafts with diameters up to 350 mm with the *V300* and the more compact

V300 Mini. With the *V300*, the company is presenting an innovative multi-technology solution for hollow shafts for electromobility with a shaft length up to 1200 mm. The smartly designed modular system allows the *V300* to be configured as a traditional horizontal lathe or a counter-spindle lathe. Depending on the processing task, the machine can be equipped with up to four revolvers, a multi-function head with B and Y axes, along with steady rests and tail stock. This means the *V300* covers everything from simple lathing to complete 5-axis processing (lathing, drilling, grinding, hobbing, and skiving).

Its high variability makes the *V300* ideal for processing large unit quantities. The standard version of the turnkey machining solution is designed for an annual output of about 50,000–100,000 units.

Buderus Schleiftechnik: New center drive machine for complex machining in minimal cycle times

At EMO 2023, Buderus Schleiftechnik, a subsidiary of the DVS TECHNOLOGY GROUP, will be presenting a new hard-fine machining center from the 235V series: the 235VM, which is primarily designed for electric drive manufacturers. Applications include shaft-shaped components with high shape and position requirements and low tolerance specifications, such as rotor, input, intermediate, and drive shafts for electric drives.

The mixed design with a horizontally arranged workpiece spindle and vertically operating grinding spindles enables technological processes such as internal, external, plane, and bevel grinding, hard lathing, drilling, grating, honing, and milling. The solid structure with several compound slides allows components to be machined simultaneously inside and outside with up to four channels. In this way, the main time is significantly reduced and machining yields the highest quality standards in one clamping.

At the heart of the machine is the new Buderus center drive. With the narrow width of 100 mm, even the smallest shafts with a short clamping length can be processed simultaneously. The center drive reaches a maximum of 3,500 rpm, which enables hard turning processes. This enables combined processing of components with the highest quality. For milling operations, the center drive comes standard with an integrated sensor system, which makes it a fully fledged C-axis and allows positioning tasks in a range of ± 3 angular seconds.

The 235VM is equipped with a natural granite bed, which has a low expansion coefficient for thermal stability and dampens vibration. The upper two of the four compound slides lie flat on the bed and can be fitted with multifunction heads. These can be fitted with various internal and external spindles, turning tools, and measuring probes.

In the lower part of the machine there is also a guide level with room for up to two compound slides. These can be equipped with grinding spindles and optional driven revolvers for simultaneous machining.

This means that besides high precision and short cycle times, the machine also offers a great deal of flexibility.

Altogether, the 235V line primarily allows complete finish machining of rotationally symmetrical shaft-shaped workpieces. After testing, however, other types of workpieces are also possible. Through consistent use of the modular principle, the machine can be custom tailored to the application or range of components.

DVS Universal Grinding: The latest UGrind hard fine machining center with optional automation cell

With the *UGrind* machine model presented at EMO 2023, DVS Universal Grinding offers a highly flexible grinding machine for a wide range of applications. The machine is optimally prepared for machining shaft and chuck parts.

For optimal part processing, all required processes for internal and external grinding, hard turning, honing, and of course measuring, are mapped in *UGrind*, and production takes place in one clamping with maximum precision. This flexibility is made possible by the multifunction head specially manufactured by the DVS Group with up to six integrated processes.

This machine process is enhanced by the *ULoad* automation unit, which can also be retrofitted to existing machines. For the customer, the combination offers an optimally tuned solution for efficient, profitable production.

With the refined *UGrind*, the coated brake disks currently required by the automotive industry can also be machined. Multiple successful machining tests have already been completed in recent months. They involved a wide range of coatings, such as tungsten carbide and titanium carbide.

DVS Tooling: Original tools and dressing solutions for gear honing

Specially for Präwema gear honing, at EMO 2023, DVS Tooling is presenting the latest generation of diamond-coated dressers and *VarioSpeed* dressers. Honing rings and dressing tools from our subsidiary set the highest quality standards and can provide tool solutions that are precisely tailored to the honing process and offer high accuracy and quality profile shape.

DVS Tooling will also be presenting the new *ToolRing Pro* series. With the newly developed bonding system and optimization of the total number of grains, the *ToolRing Pro* honing product line provides a significant performance boost. Coordinated with the VSD (Vario

Speed Dresser) dressing system, a performance increase of up to 70% output is possible. With the new *ToolRing Pro* series, the number of workpieces per dressing cycle can be increased significantly while maintaining maximum process reliability.

NAXOS-DISKUS Schleifmittelwerke: Grinding wheels from 350 mm to 1,600 mm

Another innovation in grinding wheels will be introduced at EMO 2023 by NAXOS-DISKUS Schleifmittelwerke. With more than 150 years of experience in grinding and manufacturing of abrasives, the company is presenting innovative grinding wheels in a wide range of designs. The line ranges from standard to special grinding wheels with an outer diameter of 350 mm to 1,600 mm, which are used when machining large crankshafts for ship engines or camshafts, for example. The company focuses on optimized binding strength, temperature resistance, and better damping behavior during grinding. The goal is a longer tool service life, improved conditionability and feed and input rates for better metal removal rates.

NAXOS-DISKUS specializes in diamond and CBN grinding wheels. In addition to diamonds, CBN (cubic boron nitride) is another super-hard abrasive. In terms of hardness, both are vastly superior to conventional abrasives, such as corundum or silicon carbide.

The vitrified bonded diamond and CBN grinding wheels are precisely tailored to the DVS machines and the required grinding process, significantly shortening the dressing and profiling intervals, which improves the precision and repeatability of the machine tool at the same time. Moreover, this allows processing of very hard materials well in excess of 60 HRC.

NAXOS-DISKUS grinding wheels can be produced straight or with a coarse profile. This reduces wheel change times and increases productivity of the machine processes even further.

In close collaboration with DVS's sister companies DVS Tooling and Buderus Schleiftechnik, NAXOS-DISKUS is striving to reduce the variety of models. This is to make warehousing feasible and allow cost-efficient tool production. The companies of the DVS TECHNOLOGY GROUP thus also contribute to optimizing their customers' the grinding processes economically.

DVS TECHNOLOGY GROUP: Digital solutions for tomorrow

With their digitization solutions, the DVS TECHNOLOGY GROUP helps machine and system builders increase energy and raw materials efficiency. This allows manufacturers to improve production costs and profit from predictive maintenance. It also makes it easier to operate machine tools.

The cornerstones of the DVS TECHNOLOGY GROUP's digital ecosystem are the new *DVS Connect Portal* and *DVS Edge*. At EMO 2023, the group will be presenting the latest version of *DVS Edge*. Functions such as energy monitoring, acquisition of workpiece datagrams, solutions for profile angle correction and integration of the machines into the existing IT landscape have been implemented.

Also for the first time at EMO 2023: *HRI*[®] (Hybrid Reactive Index), a tool for monitoring production process and workpiece quality. Digital monitoring detects potential damage and faults before they occur. Additionally, the system delivers ongoing data to provide valuable insight into processing and pre-processes.

The latest version of the *DVS Connect Portal* puts the spotlight on tool management. This offers access to the tools' digital files and allows digital recording of tool life. This optimizes tool delivery processes.

The DVS Digital Unit at the DVS TECHNOLOGY GROUP is continuously developing its cloud-based, digital ecosystem and is working with AI and big data to add crucial value for customers. The digital experts will be happy to personally show EMO 2023 visitors the possibilities of digital solutions.

DVS PRODUCTION: From prototype to large-scale series

At DVS PRODUCTION in Eisenach, four production halls for machined production of high-precision workpieces are available.

Above all, components for conventional and electrically driven vehicles are produced. The company offers both contract and complete machining.

Specially focused on customers who want to outsource their in-house production, DVS Production can produce workpieces with time savings up to 50%. This means the customer

has no investment commitment. Considering fluctuating demand from OEMs and Tier 1 companies, this is a considerable economic advantage.

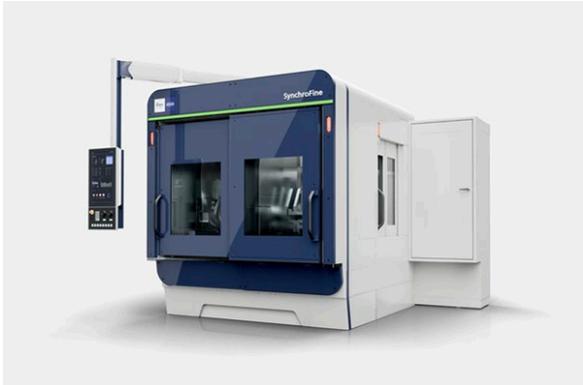
As a producer for Tier 1 and 2 companies, the end customers' demand for precision is correspondingly high. DVS PRODUCTION's highly productive lines were created with the machine and tool engineering technologies of DVS's sister companies. Machining technologies from Präwema Antriebstechnik and Pittler T & S, machines from Buderus Schleiftechnik, tools from DVS Tooling, and clamping devices from SWS Spannwerkzeuge were used. They form the foundation for the production of complex, high-precision components, such as stepped planetary gears, rotor shafts, and ring gears for automotive manufacturers. This is where the expertise of the DVS TECHNOLOGY GROUP shows.

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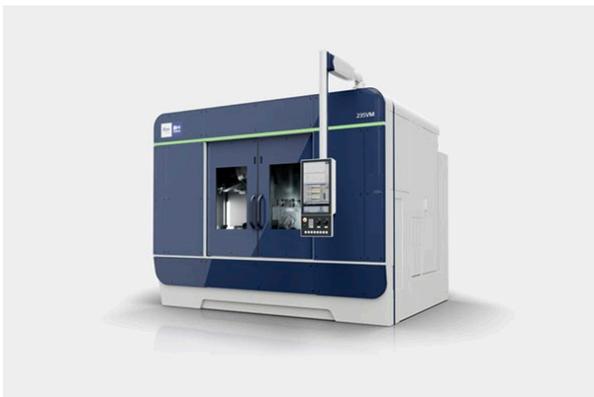
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The SynchroFormV is an efficient machine for the complete machining of toothed drive components.



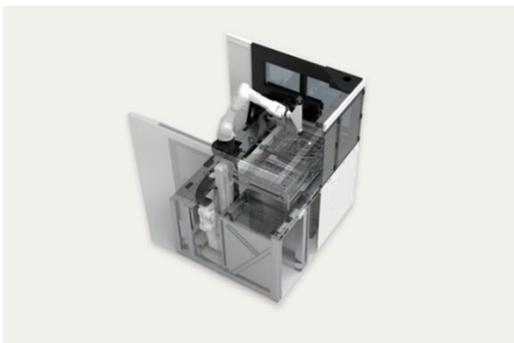
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The SynchroFine is the world's leading honing machine for geared components.

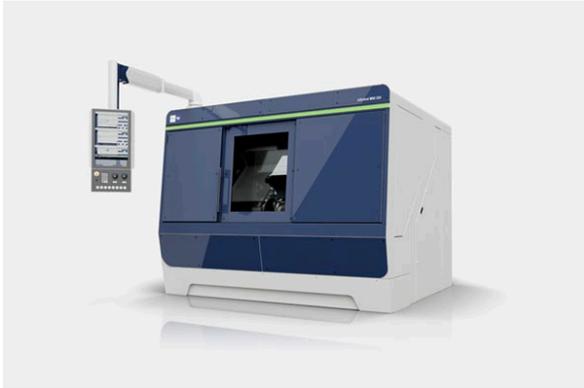


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The latest center drive machine for rotationally symmetrical components.



File name: RBC_FX-LOAD-LR



File name: DUG_UGrind_800_DD_LR

The universal solution for hard turning and circular grinding of transmission and drive shafts.

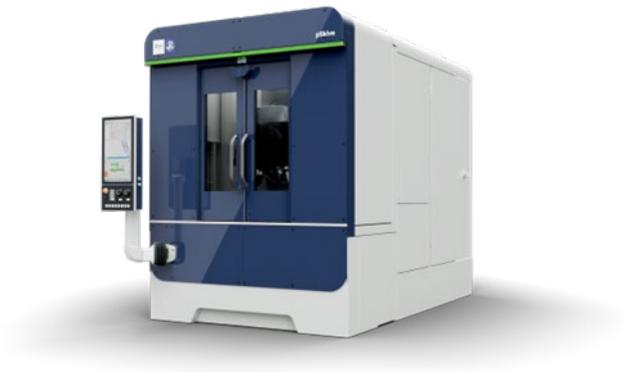


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The new skiving machine with Pittler Skiving technology for internal and external gears