

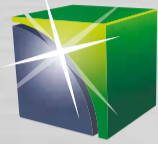
TECHNICAL HIGHLIGHTS OF TRADE FAIRS

GROB

INTERNATIONAL
Trade Fair Edition



September 18 to 22, 2018
Messe Stuttgart, Germany



IMTS2018

September 10 to 15, 2018
McCormick Place, Chicago, IL



G-SERIES – ALWAYS ONE STEP AHEAD

DEAR BUSINESS PARTNERS AND FRIENDS OF GROB,

The IMTS and the AMB are among the most important leading trade shows for GROB in the machine tools sector. Every two years, the Exhibition for Metal Working (AMB) is held in Stuttgart and the International Manufacturing Technology Show (IMTS) is staged in Chicago, two important locations for the German and American manufacturing industries.

The IMTS will be opening its doors at Chicago's McCormick Place on September 10th this year, eight days before the AMB. Positioned in the heart of the South Building, Booth 339033, GROB Bluffton is set to unveil a total of six machining centers on a 930 m² exhibition booth, which is twice as large as two years ago: a G350 – Generation 2 with GROB⁴Pilot (SIEMENS control) "Made in USA", a G350 – Generation 2 with HEIDENHAIN TNC 640 and a G550 – Generation 2 with a GROB PSS-R13 rotary pallet storage system and a TM200 auxiliary tool magazine. A first-generation G550 with FANUC control will also be shown. All four machines are equipped with an HSK-A63 motor spindle, which operates at a speed of 16,000 rpm. The exhibition highlights are rounded off by a G750 – Generation 1 with high torques and an HSK-A100 motor spindle, 9,000 rpm, as well as the new G600F for the machining of automotive frame structure components. There will be a range of live demos, from machining a basketball basket and a frame structure component, through mold and milling demos to heavy machining.

Market launch of GROB-NET⁴Industry

The specially developed GROB-NET⁴Industry production software, which is now also being unveiled for the North American region, is regarded as a special innovation. This software solution can use web technology to create connectivity and transparency throughout the entire production process between plants. GROB Bluffton has installed a local cloud provider for the IMTS, to "hook up" North American customers to the network. To give visitors an insight into GROB-NET⁴Industry, there is a separate exhibition area on the GROB booth, which includes the new GROB⁴Pilot control panel. Further highlights are the areas given over to electric mobility and service. Just beside that, customers can follow the demo of a longitudinal frame on the G600F. As IMTS is an important trade fair not only for the American market, but also for Mexico, Canada and even for Brazil, GROB Mexico and GROB Brazil will also be represented.

IMTS – The mother of all American trade fairs

"The IMTS is the most important trade fair for the GROB Group in North America," explains Christian Müller, Head of Sales for the Americas at GROB. "Although we take part in five regional trade fairs, the IMTS has the most to offer by far. The doubling of our booth space and the improved positioning of the booth in the South Building chime with our corporate strategy of focusing on diversification in different markets in an "age of change".

We can also demonstrate how we maximize the efficiency of our plants with new technologies such as GROB-NET⁴Industry."

Sixth appearance at the AMB trade fair in Stuttgart in 2018

For the sixth time in a row, GROB will be unveiling its products at the AMB in Stuttgart. GROB celebrated its first appearance at this important international exhibition for metal working in 2008.

This year, GROB-WERKE will be exhibiting the following highlights at the AMB in Stuttgart, based at booth B11 in hall 10:

- G350 – Generation 2 universal machine with an HSK-A63, 16,000 rpm motor spindle and high-dynamic rotary table for enhanced stability, precision and greater efficiency in workpiece machining
Demo: Machining of steel blisk segments
- G350 – Generation 2 production cell with a rotary pallet storage system and TM200 auxiliary tool magazine, for maximum flexibility, even with small machining centers. The machine is equipped with an HSK-A63 motor spindle, which operates at a speed of 16,000 rpm
Demo: Machining of an aluminum Eiffel Tower and a steel demo part
- 5-axis G550T – Generation 2 mill/turn universal machine, with a HSK-T100, 14,500 rpm motor spindle for almost unlimited possibilities in the machining industry

Demo: Mill/turn-machining with a high-performance steel cutter

- G520 double-spindle machine with a pallet changer for parallel set-up with an HSK-A63, 18,000 rpm motor spindle

Demo: Two pallets, each with one blank and one finished part of a suspension arm and a turbocharger

- GROB-NET⁴Industry: For global connectivity and digitization throughout the production area
- GROB⁴Pilot: Available for SIEMENS and HEIDENHAIN control systems
- GROB Service: For maximum machine availability and exclusive services

All machines are equipped with a SIEMENS control unit.

DIAGON Tools GmbH & Co. KG is our partner at the AMB and shows the honing of a cylinder block with in-process measurement on a G350 – Generation 2 at its booth in Hall 5, Stand C76. The material is aluminum with coated cylinder bores.

Trend towards automation

GROB's vision of the trend towards automation is demonstrated impressively by the PSS-R rotary pallet storage system which expands the G-module into a flexible machining cell, offering an ideal point of entry into automated and high-efficiency production. GROB is not only offering a second generation of universal machine here with auxiliary tool magazines that are easy to operate, but is also consistently moving towards complete automation solutions.

GROB PRODUCT PORTFOLIO

A single-source supplier with a full range

GROB PRODUCT PORTFOLIO



Over ninety years of experience in the systems business, over ten of them in the universal machine business and now the first systems provider for electric mobility, after three years of intensive research and development work. They are the hallmarks that characterize GROB's high degree of proven process, technology and tool know-how. Consequently, GROB is, and remains, the go-to contact and full-range supplier to the automotive industry. This expertise also benefits GROB customers in tool and die making, medical technology, mechanical engineering and the aerospace sector.

The change in drive technology in the automotive industry has gained significant traction in recent years, most notably in the Asian region. Very few experts anticipated this development. Despite that, GROB-WERKE has readied itself for this and evolved into an electric mobility systems provider within the space of three years by virtue of extensive research and development work, coupled with GROB's specific technological expertise. In addition to this new competence in production systems in electric drive and battery storage technology, it also advanced other very important innovations in the business of production systems for the automotive industry. GROB is also making waves in digitization and automation, both in the worldwide networking of systems and in the automation of machines, with innovative storage systems and robot loading technology.

Systems business – innovative technology creates a paradigm shift

The new sixth generation G-modules for G300 and G500 models in single- and dual-spindle models are even more dynamic and feature additional components, such as the pallet changer. Thanks to them and the new machines for frame structure and chassis parts, such as the G500F, the G520F and the G600F, turn-key supplier GROB can guarantee OEMs high production volumes with reliable delivery to keep pace with their ever increasing demand for lightweight components in the body and chassis of cars. All these innovations are another chapter in the unique success story of the G-modules, over 10,000 of which have been sold around the world. They are also available in a modular design and can be constructed to reflect the customer's individual specifications. This applies to automatic loading with linear gantries and also manual loading, while factoring in all relevant safety guidelines.

Universal machine business – pioneering technology in mechanical engineering

The G-module concept with its dynamics and innovative capacity has established itself successfully in the market, as has 5-axis technology in tool and die making, aerospace, medical technology, mechanical engineering or power engineering. This is a development that was only possible because GROB universal machines have been developed continuously since their market launch in 2007. This is particularly true of the

current second generation, which was unveiled at the EMO in Milan in 2015. Whether it be a standardized 5-axis universal machine, designed with a milling and turning technology, or with a rotary pallet storage system or with a pallet changer, the latest generation of the 5-axis universal machine is the perfect fit for all areas of application.

Assembly technology – GROB expertise is also an important element of electric mobility

GROB boasts many years of experience in the conceptual design of assembly systems. The GROB assembly concept supports all customization requirements, from the fully automated line to partially automated solutions with integrated assembly stations. All assembly units and lines are special fabrications and are individually planned and built according to customers' specific requirements. Assembly technology systems from GROB are largely modular in their design. GROB will continue to be more competitive, especially with the new modular structure for the assembly of vehicle transmissions and combustion engines.

However, assembly technology is not only used in the area of engine and transmission assembly or during assembly in the machining process. GROB assembly technology plays a particularly important role in the field of electric mobility, such as in the assembly of batteries, battery systems and fuel cells or in the very complex and high-precision production and assembly of stator/rotor production systems.

GROB: the first system provider in electric mobility

GROB is one of the few manufacturers to have become actively involved in research and development in electric mobility in large-series production a number of years ago, purposefully seeking solutions in the areas of electric motor production, battery cells (assembly), battery modules and battery packs, as well as fuel cell assembly. Nowadays, we are the first systems provider for electronic mobility in the world to work with leading automobile manufacturers in the development of concepts, prototypes and solutions for mass production in the electric mobility sector that deliver maximum levels of automation and always utilize the latest cutting-edge technology.

Digitization – a globally renowned partner

The sheer volume of different tasks in digitization is seen as one of the greatest challenges, although this can be mastered by skilling up and by developing a close network of reliable partners. GROB has successfully implemented the networking of systems across the entire globe. New, international cloud concepts are providing our customers with an entry point to digitalization. Individual machines can now be connected as standard and their data securely transmitted. New chapters will continue to be written in GROB-NET⁴Industry's success story. Positive feedback from our customers and our own production teams shows that we are providing practical solutions developed specifically to meet the needs of each application scenario.



GROB stand (South Building/339033) at the IMTS, Chicago



GROB stand (H10/B11) at the AMB, Stuttgart

GROB TRADE FAIR HIGHLIGHTS

From the universal machine to a highly automated production system

GROB-WERKE will be using its trade fair appearances at AMB and IMTS to demonstrate its innovations from the machine portfolio in the universal machine and system sector. We plan to unveil our automation solutions and to explore the topic of Industry 4.0 within the framework of the latest GROB-NET⁴Industry applications.

Highlight I: Universal machining center with highly dynamic rotary table

Since their market launch eleven years ago, the 5-axis universal machining centers have undergone continuous technical advancement. With the second generation, the possibilities for using the successful machine concept have been significantly expanded. This is due in particular to their improved dynamics, their even greater stability, the significantly reduced external dimensions and the reduced chip-to-chip times. Thanks to the innovative double disk magazine, the tool length of the G350 – Generation 2 has been increased from 365 to 550 mm.

The unique machine concept of the 5-axis G350, G550 and G750 universal machining centers offers all metal-cutting industry customers almost unlimited possibilities for machining work pieces made of various materials. Whether for the aerospace industry, machine manufacturing, the tool and die industry, the automotive sector, or medical technology, GROB universal machining



centers are optimally designed for the wide range of requirements of individual manufacturing sectors and are based on the same standard component program. All the machines are also available as mill and turn variants. The mill and turn option enables complete machining by milling and turning in a single clamping operation. The combination of both technologies reduces the time required by eliminating set-up times, while at the same time reducing investment costs and taking up less space in production.

GROB is set to unveil a specially developed highly dynamic rotary table on a G350 – Generation 2 at the AMB in Stuttgart. An optimum swivel angle can be achieved due to the compact design, which is matched to the motor spindle contour. This makes it possible to use significantly shorter tools with short Z-travel ranges for greater stability, pre-

Highlight II: Automation application of a G350 – Generation 2 with rotary pallet storage system PSS-R13

Our customers have relied upon automation solutions from GROB in large-scale production for decades. This experience is directly reflected in our automation concepts, making GROB a reliable partner for solutions ranging from workpiece storage to high-flexibility production systems. New developments such as rotary pallet storage systems, workpiece handling systems and robot loading systems enable machines to be automatically run in shifts without manual intervention.

In addition to the highly dynamic rotary table, other VARIO rotary table versions are available for the G350 model for machining long, narrow components, such as turbine blades or tools – the basic module, steady rest with tailstock center or steady rest with tandem drive.

GROB is set to unveil a G350 – Generation 2 production cell with a PSS-R13 rotary pallet storage system and TM200 auxiliary tool magazine at AMB. Three designs of rotary pallet storage systems are avail-



VARIO rotary table with steady rest and tandem drive

able for the G350 and G550. With five and ten storage slots both for the G350 and G550 and in the third variant with 13 storage slots for the G350 and 15 for the G550. A rotatable and lockable set-up station is located next to the machine console for optimum access. The innovative rack feeder enables rapid 180° pallet changes when two pallets are being used. The flexible control software for the GROB rotary pallet storage system (PSS-R) also visualizes and organizes production orders. With these individual solutions which are specially tailored to the needs of the customer, GROB is boosting economic production by increasing machine

capacity utilization, thereby enabling longer periods of production without manual intervention.

Highlight III: System machines for machining frame structure and chassis components

With its new development from the G-series, the sixth generation of double-spindle G520, equipped with an optional double pallet changing system, GROB can demonstrate how productivity can be boosted significantly by means of parallel set-up during machining. Pallets are switched between the set-up station and machine work area via a rotatable pallet

changing mechanism. The clamping system designed specifically for the machine holds the pallets on the machine's rotary table and set-up station. The G520 with pallet changer is specially designed for machining workpieces such as oil pumps, wheel carriers, valve and steering housings as well as brake calipers, steering knuckles and turbine housings. Therefore, it is particularly interesting for the automotive industry. The integrated pallet changing system offers great advantages when machining chassis parts. For example, while the left-sided workpiece types are being machined in the work area, the right-sided workpiece blanks can be clamped on the set-up station. The advantages are evident with a clear time saving and maximum output with a minimum footprint.

Frame structure of the G600F machining center

GROB is demonstrating a G600F at IMTS. The type terminology is already indicative of the fact that the G600F model with the "F" is primarily designed for machining "frame" structure components. It is designed in standard AC kinematics and has a swing circle diameter of up to 1550 mm. With its complete 5-side machining and high dynamics, it guarantees full flexibility for future workpieces. Its swivel head has a swivel range of 180° and automatic chip removal at the rear of the machine. It is also ideal for MQL

machining. Despite its compact outer dimensions, it offers a very good view into the work area. The G600F is available with both manual/automatic front loading and automatic top loading. The machining of a frame structure component from the automotive industry will be demonstrated on the machine shown at the IMTS exhibition. In addition to the G600F, GROB also markets smaller variants, the G500F and the two-spindle G520F.

Highlight IV: New technologies – GROB-NET⁴Industry

In a "New Technologies" area, which is being specially installed at the AMB and IMTS trade fair booths, visitors can find out how GROB-NET⁴Industry software technology can be used to create cross-plant connectivity and transparency throughout the entire production process using web technology. A particular highlight, without precedent to date, is the way the machine can be controlled by the GROB⁴Line mobile application, which can execute authorized actions and commands regardless of location. The modular applications developed within GROB-NET⁴Industry are used to network and digitize production processes and not only enable paperless communication, but also boost productivity and system uptime. An increase in productivity of up to 30 percent can be achieved by using GROB-NET⁴Industry and associated machine networking.

HIGHLY DYNAMIC ROTARY TABLE

VARIO ROTARY TABLE VERSIONS



Rotary table with pallet clamping system



Basic module



Steady rest with tailstock center



Steady rest with tandem drive



G600F – a machine concept for machining frame structure and chassis parts



Machining of suspension arms on a double-spindle G-module

GROB CASE STUDIES

OMR – Making successful use of 5-axis technology to increase productivity



(f.l.t.r.): Fabio Candian (CEO OMR Brasil), Rodrigo Manzano and our representative Moisés Gomes

OMR is an Italian mechanical engineering company which operates worldwide. It was founded in 1919 under the name of F.Ili Tirini and was renamed OMR in 1955 and today employs over 3,300 people. As an automotive supplier, the company manufactures vehicle parts such as engine blocks, cylinder heads, transmission housings, drive axles and brake discs. In Brazil, OMR has two production plants in Sete Lagoas, OMR Componentes Automotivos and

OMR Strepavara Componentes Automotivos, employing a total workforce of over 700. We talked to Mr. Fabio Candian, Managing Director at OMR Brazil, about his experiences with GROB.

What was the key factor that prompted OMR Brazil to choose GROB 5-axis technology?

In order to ensure that we maintained our planned increase in production and enhanced productivity, OMR purchased

several universal machines in recent years, testing the possibility of achieving further improvements in production quality with GROB 5-axis technology. In the case of the FIAT GSE "bedplate project" in 2016, OMR realized that the G520 two-spindle machines with pallet changer (which was a GROB innovation at the time) provided the opportunity to combine all the advantages of the 5-axis machining centers, as they ensure high productivity in confined spaces. This is particularly the case since the pallet changer, as with the universal machine, enables fast, flexible and cost-efficient retooling to accommodate new products.

Did OMR already have some experience with dual-spindle machines?

Yes we had, although GROB Brazil managed to persuade us of the benefits of GROB 5-axis technology, especially meeting our requirements in terms of the structure of the clamping device, process design and the turnkey handover of the project.

What was the reason why OMR choose GROB machining centers?

GROB struck us as a reliable supplier of 5-axis machines, as both single-spindle

and double-spindle machines. We were also impressed by the well-structured cooperation and the fact that GROB Brazil acted as a turnkey supplier.

What are the main advantages of GROB machines for workpiece machining in your view?

The reduced number of clamping operations, the optimum chip fall, which also made clamping easier, and the excellent accessibility to the rotary table brought us both higher efficiency and better quality in the machining process. Another important factor is the fact that the 5-axis concept helps to dispense with expensive tool concepts such as angle drilling heads. What's more, we have also been able to reduce the footprint significantly due to the smaller dimensions of the machines. Besides that, costs for machining personnel on the double-spindle G520 have been cut in half.

Which workpieces are produced on GROB machines at OMR?

We produce aluminum bedplates on four G520 machining centers, an aluminum transmission housing on eight universal machines, and cylinder heads, also aluminum, are produced on a single universal machine.

also needed to be clarified, and whether this type of GROB machine with its specific axis concept could be integrated in the HETEC environment successfully.

HETEC team impressed by GROB technology

The more Friedhelm Herhaus and his technicians learned about the technology of the GROB machining centers, the more they could see the strength of these machines. First the benefit that – thanks to the special axis concept – the entire length of the tool can be used in each axis setting – even at maximum workpiece size. The special tunnel concept means that the whole work area can be used, even as the motor spindle plus tool withdraws into the spindle shaft. This means the machine table can rotate and swivel with the

workpiece and clamping mechanism without colliding – a definite bonus. This was something completely new to the HETEC technicians. While in Mindelheim for training during the initial and test periods, the machine operators soon appreciated another benefit provided by GROB machines: the spindle position is virtually at eye level, ensuring that the operator has a good view of the cutting tool.

From the first G550 to the G550 with rotary pallet storage system (PSS-R)

After successful testing at GROB in Mindelheim, the HETEC management team finally made the decision to buy a G550. They made this decision because the axis concept allows for machining deeper cavities with good chip removal

and drilling operations with deep hole drilling tools (Ø 8 x 650mm) went without a hitch. The first G550 was then installed as planned for machining modeling components with complex contours, high surface requirements and parallel introduction of cooling bores in a single clamp. Later on, HETEC saw the machine's actual potential for machining in the tool and die construction. The G550 was ideal for machining the high-strength, hardened steels typically used in this area. HETEC technicians were amazed by the option of full introduction of cooling and ejector bore with tool lengths of up to 650 mm in the same clamp.

Continuing close collaboration between HETEC and GROB, allied with a desire to introduce automation for die- and tool-making processes with typically long

running times, led to the purchase in 2014 of a G350 with a zero point clamp system and a pallet system that made it possible to set up workpieces outside of the machine.

And then came the GROB in-house trade show in 2015. The HETEC management team were impressed by the benefits of a G550 with a rotary pallet storage system (PSS-R), purchasing one soon afterwards with a master computer. A major plus point in their eyes was the fact that, even with the GROB automation application, the machine operator still had a good view and access to the work area.

The purchase of a G550 seven years ago marked the beginning of a solid partnership based on trust – something that HETEC had never before experienced in over twenty years of existence.

HETEC – Efficient and ultra-dynamic: milling and drilling without the need to reclamp

An extremely impressive machine concept providing the option of milling and drilling without re-clamping and – above all – a high level of process safety with maximum accuracy for workpiece machining. Impressed by these benefits and located in Breidenbach, Hessen, the milling services provider, HETEC, is now a loyal GROB customer.

construction and for many mechanical engineers when they have to drill deep holes. The highly experienced Friedhelm Herhaus had never seen milling and drilling on a single machine of this kind before. This peaked his interest. He found the travel and kinematics – the whole machine concept in fact – very appealing.

Thorough preliminary research and intensive technical analysis

Basic issues needed to be clarified first as to whether HETEC actually wanted to implement the axis system (with rotated y axis). An axis system that was totally new territory to HETEC at the time. But as he traveled back from the trade fair, Friedhelm Herhaus called Hans Rink to discuss the machine's axis symmetry and the machining technology for workpieces with long tools. He was increasingly persuaded, recognizing that workpieces can be machined



(f.l.t.r.): Friedhelm Herhaus (Managing Director), Hans-Hermann Rink (GROB-Representation Hessen) and Tom Herhaus (HETEC machine operator of the GROB G550)

with long tools with the GROB machine and that the horizontal spindle position enables optimum chip removal for both

drilling and deep cavities. The question of the extent to which the GROB machine would suit existing HETEC machine tools

VINFAST – The company relies on GROB's technology

The newly established Vietnamese automotive manufacturer VINFAST is a company with big ambitions. Located in Haiphong, which is one hundred kilometers southeast of Hanoi, VINFAST's goal is to compete with strong market competitors like Korea's HYUNDAI, China's GEELY or Japan's TOYOTA. To be able to guarantee optimum quality in machining operations, VINFAST is counting on the expertise of GROB-WERKE for its new vehicles.

Since the 1990s, Haiphong, a city of 900,000 inhabitants, has been developing into a major location for international industrial and production plants. Thanks to the port on the Red River delta, goods and raw materials can be shipped directly from Haiphong to Europe and America. This is an advantage the newly established automotive manufacturer VINFAST is benefiting from. On Cat Hai island just off the coast, the new brand of the multi-billion VinGroup is currently building a 335 hectare production plant, where affordable high-quality cars will be produced from next year.

The fact that the company already sees itself as a global player is made clear by

its slogan. The new vehicle manufacturer defines the envisaged character of its cars with "Vietnamese Identity – Italian Design – German Engineering – International Standard" and is therefore looking to be international as well as provide top-of-the-line support. While the Italian design studio PININFARINA looks after the appearance of the planned SUV and limousine model, the Canadian-Austrian supplier MAGNA takes on the development. Support from the Allgäu also plays a key role for the newcomer from Vietnam.

Around 9,000 kilometers eastward: From Mindelheim to Haiphong

In an individually-conceptualized turnkey project, GROB supplies a complete cylinder head and cylinder block line, including the very latest automation technology, tools and clamping fixtures to Vietnam. Despite the large project scope of three modular special-purpose machines and 45 machining centers from the renowned G-series in total, GROB is working to ensure that the production lines can be commissioned as early as December 2018.

In detail, the cylinder head line conceptualized by GROB comprises 15 G520

and four G500 modules with innovative machine technology: The swiveling changers integrated in every machining center guarantee fast and fully-automated loading and ensure optimized part machining with their customized equipment, including work area flushing, seating check and adapter pallet clamping. The same goes for the cylinder block line which, with 22 G520, four G500 machining centers, and three modular special-purpose machines, promises the best quality and high productivity at the same time. The two production lines have a capacity of 250,000 parts per year.

Focus on customer requirements

The Mindelheim team was able to show VINFAST, before the order was placed, that GROB not only promises the qualities mentioned, but also keeps those promises. To fulfill the require-

ments from Vietnam for a motor without automatic valve lift adjustment, the GROB engineers collaborated with the Austrian motor developer AVL List to change the design of the complete cylinder head. "We consider it our duty to do everything in our power to fulfill our customers' specific project requirements. So for VINFAST, we have designed tailored production lines for the cylinder head and the cylinder block. Especially for the cylinder block, this required the use of new technologies such as the mechanical activation for the thermal spraying process of the cylinder bores. The fact that high-quality vehicles can very soon be produced in Vietnam at an affordable price is in part down to our support from Mindelheim, and of that we are very proud," explains Jörg Retza, responsible Key Account Manager at GROB-WERKE.





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Note regarding gender: We place great value on diversity and equal treatment. For the purpose of readability, reference to both genders has been omitted.