



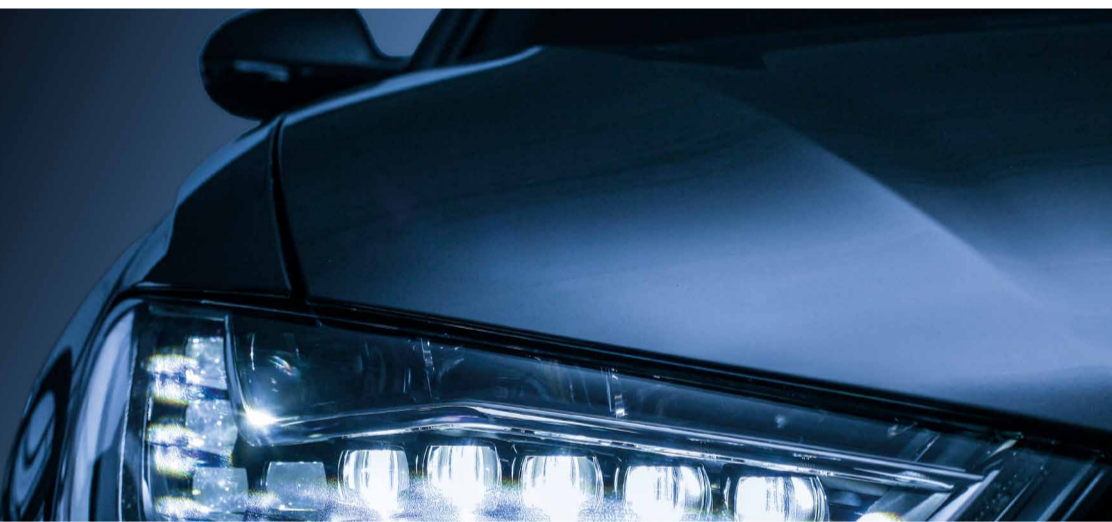
# GROB

INTERNATIONAL

02 | 18

## **FUTURE-ORIENTED THINKING, FAST PRODUCT MARKETABILITY AND A HIGH WILLINGNESS TO INVEST**

ARE THE GROB ELEMENTS FOR  
SUCCESSFUL COMPANY MANAGEMENT



## DEAR EMPLOYEES, DEAR BUSINESS PARTNERS, DEAR FRIENDS OF THE GROB COMPANY,



**Christian Grob, Chairman of the Supervisory Board**

After a good start to the new year, GROB has increasingly felt the impact of worldwide economic developments. We have not experienced the usual cyclical, fairly foreseeable market change, but rather a constantly changing world: political framework conditions, such as the trade conflict between the USA and China, Brexit and its

effects on the EU and the diesel crisis that is increasingly spilling into our sector. The resulting profit warnings from our customers and the weak growth forecasts do not come as a surprise. The crucial challenge will be how to deal with new framework conditions that are difficult to plan.

There are also additional requirements of the market for new technologies and the associated transformation process, which is presenting cross-sector challenges for all companies. For GROB Group, this means change. In the automotive sector, the change is moving away from the combustion engine to the alternative types of drives. This is a process that we recognized early at GROB and have set the course accordingly, but has also cost the company a great deal of money in developing new technology. Because we set out in good time, we are proud to see that we are accompanying our OEM customers through the technological change and are able to service new customers too, especially in the supplier sector. Again and again, in its over 90-year history,

GROB Group has had to face new change processes and decisive points in the company and successfully master them. I would just like to recall, when at the start of this century, under the then changing market conditions, we managed to place the modular G-series machining centers on the market. A phase, during which the GROB family was behind the company one hundred percent, thereby allowing the necessary change process through high investments.

Today, almost fifteen years later, we have a comparable situation. A situation of meeting the far-reaching, new challenges, of positioning oneself on the market, of perceiving the developments in the automotive industry as an opportunity and of taking advantage of them at the same time. This includes the internal optimization of processes and costs and adaptations within the organization.

We can only shape the change together. We need to be open to these changes and must not, under any circumstances, be

afraid of them. For there is only one way, the way forward.

My family and I would like to thank you, dear employees, for the positive cooperation and your commitment. I would like to thank our business partners for the confidence they have shown in us again in the last year. We wish you all a peaceful Christmas season and a happy and healthy new year.

Sincerely,

*C. Grob*  
**Christian Grob**

## DEAR EMPLOYEES,

The paradigm shift in the automotive industry from the combustion engine to the alternative drive types has taken on an enormous dynamic among our global customers – not least due to the diesel issue – and is having a considerable impact on the GROB Group.

Inquiries for new machines and large-scale projects for conventional combustion engines are on the decline and are, among others, being replaced by numerous projects involving machines for producing electric drives and battery storage modules. Moreover, the automotive industry and its suppliers require cutting manufacturing lines for new components in lightweight vehicle construction or parts of the electric drive, for which our universal machining centers with process equipment are especially suitable. Our assembly technology is of great importance here. Especially combined with machines for electromobility, they ensure the baseline for the very fast marketability of GROB in this new technology.

Overall, a development that is not only having a major impact on the current order book throughout the GROB Group, but one that is being reflected across almost all process, operations and organizational structures within our company. The relationships within the product groups and hence within the various GROB technologies are shifting, and this will continue

to happen in the foreseeable future: A declining business for system machines in machining technology is being balanced by an increased demand for highly automated systems for machine technology and electromobility.

Despite this major upheaval in the automotive industry, we have managed to gene-

rate a stable order situation with the latest technologies and machines, and also with a very good combination of machines and systems for combustion engine technology, as well as with new e-drives. This is mainly because our innovative developments allow us to effectively offer new projects and win the corresponding orders.

Dear employees, the company GROB is optimally prepared for the change in the global automotive industry, and will therefore continue to have good opportunities for further orders and hence capacity utilization in the future too.

The entire management team would like to thank you for your commitment and the very good cooperation throughout the year. We wish you and your families a merry and relaxing Christmas season and all the best for the new year.

**Your Management Board**  
**GROB-WERKE GmbH & Co. KG**



**CFO Wolfram Weber, CEO German Wankmiller, CSO Jochen Nahl (left to right)**

# ANNUAL REVIEW IN PHOTOGRAPHS

Our annual review in photographs comprehensively displays the dynamics with which the GROB Group has continued to develop in the last twelve months. Structural measures such as the founding of new service and distribution subsidiaries in Switzerland, Benelux, France, Vietnam and Japan and the appearance at trade fairs in the core markets of America, Europe and Asia continue to contribute to strengthening the position of our company in the established markets worldwide and to start business in new ones. Our renewed growth and the awards and recognition from our customers worldwide confirm that GROB is on the right path to a promising future.



**February** – One year after the acquisition, DMG meccanica is renamed to GROB Italy S.r.l.



**March** – GROB honored with awards from SAIC-GM and GEELY



**May** – 7th Augsburg company run with 350 GROB runners and 12,000 participants. Success for a GROB employee: Florian Mauler finishes third



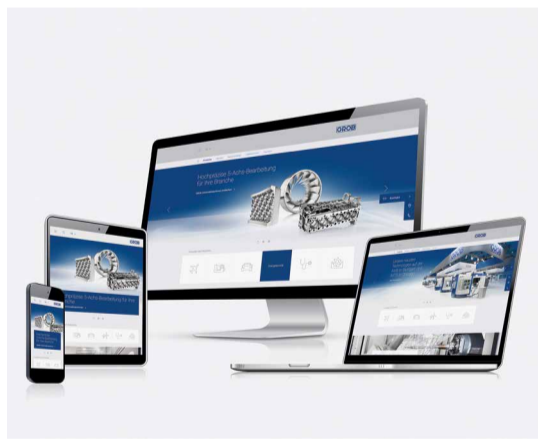
**June** – The GROB Group presents itself for the first time under its own name at CWIEME Berlin



**June** – GROB Brazil honored with the "International Innovation Award"



**July** – Works meeting in Hall 13 with around 4,500 employees



**September** – The GROB website presents its new look and is also optimized for mobile devices



**September** – Welcome: GROB in Mindelheim welcomes its 100 new trainees



**September** – AMB 2018 was the most successful AMB for the GROB Group since its first participation ten years ago



**September** – GROB USA presents seven exhibition machines on around 1,000 m<sup>2</sup> at IMTS Chicago



**September** – The entire workforce is pleased about the visit by Florian Grob in Bluffton, USA



**October** – GROB China and Brazil are proud of two successful Open House events



New systems for small part production in Hall 7

## GROB PRODUCTION – NEW PRODUCTION LINES CALL FOR EXTENSIVE REALIGNMENT

Developing production to accommodate new lines such as e-mobility and assembly technology required extensive measures to ensure production and process optimization. The quantitative, qualitative and technological requirements for small part manufacturing, which is now housed in adapted Hall 7, also increased. Implementing these relocation and optimization measures during ongoing production presented a real logistical challenge.

In our last issue of GROB International, we reported on the extensive realignment of the production department to make it work for the future. We described how a value analysis, conducted across all departments, was able to optimize processes and, hence, reduce costs. The second stage of the production optimization measures involves the realignment of the production department, which became necessary in order to meet the requirements of the ever-evolving e-mobility and assembly technology product sectors. This realignment is affecting primarily small part manufacturing in Hall 7, spindle assembly in Hall 9 and sheet metal production in Hall 3, with far-reaching consequences also for the production of universal machining centers in Hall 9.

### Small part manufacturing – higher volumes and adapted structures

The demands of the new product lines, electromobility in particular, are having a serious impact on small part manufacturing

at GROB. The revenue shift has created the need for substantially more small parts, especially for the assembly technology and electromobility sectors.

To achieve this increase in demand, capacities had to be expanded and small part manufacturing needed to be relocated from Hall 3 to Hall 7. In addition, small part manufacturing has evolved, for technical reasons, to become more of an in-house activity. This is due to the growing importance of short-term production. The additional machinery, including three CTX1250 machines, one S141 grinding machine, several G350 and one G550T, required by this development almost doubled the space requirement. To keep pace with the fast-changing products, the rework capacities also had to be increased accordingly. Because the product and the process, or manufacturing, run in parallel, the conventional Simultaneous Engineering concept was implemented. Production has also been expanded by an express cell. This allows unexpected require-

ments to be covered without the impacting day-to-day business.

The higher volumes and increased quality demands in small part manufacturing brought on a complete change in the flow

of materials and flow of production value. This includes measuring and finishing activities, such as grinding and jig finishing, for high-accuracy components. Processes were separated according to their "turning", "grinding" and "milling" technologies.



Sheet metal laser machine in Hall 3

Key hotspots, such as tool preparation and an I-point for material delivery and collection, have been centralized. To optimize communication, programmers and master craftsmen have been accommodated in one office wing in Hall 7.

### New processes and technologies

It was not only the organizational structure, but also the operational structure of small part manufacturing, that was analyzed in detail and modified accordingly. As a result, the processes for machine operation were expanded. To increase low-manpower production, pallet magazines and tool magazines for various G350 machines have been provided. The goal of controlling production capacity is to optimize delivery reliability. In addition, employees are being trained to become so-called hybrid staff. The idea is to make deployment even more flexible and shorten response times.

Overall, the objectives in small part manufacturing are very ambitious: shorter throughput times alongside a continuous value flow, less material stock (minimized WIP/circulating stock), modern production facility for high-tech commodities and, last but not least, the automation of various processes to increase efficiency, including automated loading of turning machines and G-modules with pallet storage systems.

### Paradigm shift in GROB sheet metal manufacturing

Now that small part manufacturing has been relocated from Hall 3 to Hall 7, which had to be converted into a production hall, product-oriented value creation with

individual (sheet metal) components can finally be transformed to the production of entire assemblies in sheet metal manufacturing. The material flows between the individual steps, from the raw sheet to the finished assembly, optimizing production and reducing outside raw sheet storage. The additional production space was also absolutely essential to being able to satisfy the expansion requirement for sheet pre-assembly to create entire assemblies. In the future, the pre-assembly structure will be product-oriented and the welding workstations will be equipped with new welding technology and welding robots. The overall responsibility will gradually lie with assembly production.

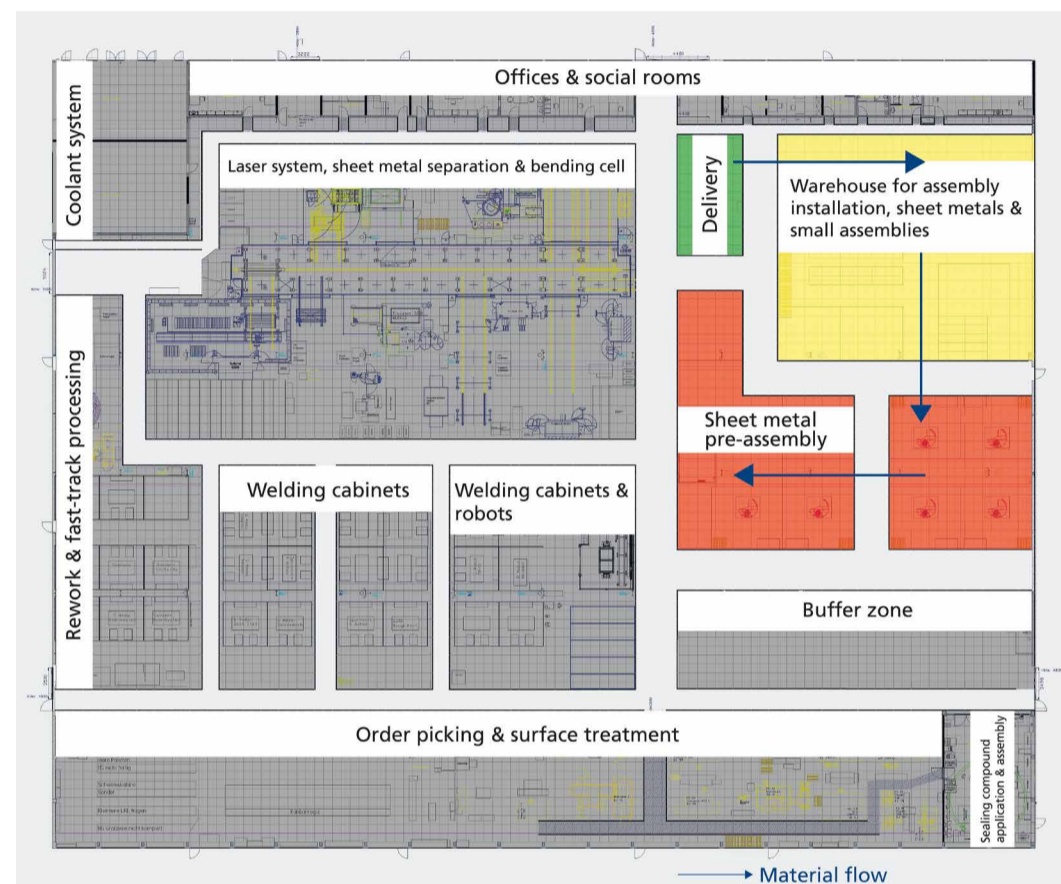
The realignment in sheet metal production will allow quality and reliable delivery to be optimized while keeping throughput times short. Likewise, the ancillary processes in logistics through to the assembly can be reduced and the conditions at the welding stations improved.

### Change in spindle assembly

The positive revenue development in universal machining centers required a capacity increase in the assembly areas in Hall 9. Consequently, spindle assembly will be relocated to Hall 1 early next year. At the end of this year, spindle production will move to Hall 7 as part of the small part manufacturing relocation. The overall capacity and all processes for motorized spindle components, including the urgent need for "clean space" for spindle assembly, can now be replicated in Hall 7. The decision to relocate spindle assembly to Hall 1 was based on a detailed dirt analysis and additional definitions of the thresholds for the

components. The size and quantity of the particles were analyzed, the type of particle defined and the dirt sources determined through dirt traps in the production and assembly facilities. Once these results had been evaluated, the existing cleaning processes were able to be optimized. Consequently, spindle assembly in the "clean space" with the special measures required and complying with the residual dirt thresholds can be guaranteed. Other complex measures include redefining spindle packaging, redesigning the cleaning process and the final inspection, integrating dirt barriers for maintaining cleanliness and mounting

dirt traps on the floor in the entrance area. By joining spindle assembly and production, a continuous assembly line for all spindle types can be implemented to replicate the flexibility of the market. And now, for the first time, workflows for dirt-critical processes can be logically separated, relocated and redesigned. Overall, the relocation of spindle assembly and production to Hall 7 will further optimize spindle quality. In addition, improved ergonomics, more flexible production with respect to versions and quantities and a more stable material supply in conjunction with Hall 7 and its overall processes can be ensured. ■



The new layout in Hall 3 optimizes the material flow in sheet metal production



Spindle assembly is set to move to Hall 1 at the start of next year

# GROB DIGITALIZATION – GROB<sup>4</sup>INTERFACE EXPANDS FOR AMERICAN MT-CONNECT STANDARD

To be able to connect machines with the MT-Connect standard to GROB-NET<sup>4</sup>Industry, the GROB<sup>4</sup>Interface has been expanded by a new module. The goal is to make GROB-NET<sup>4</sup>Industry accessible for this American-wide standard, networking as many third-party products as possible in the process. In addition, another Datacenter for the "GROB Cloud" has been placed in operation in the USA.

Digitalization was one of the key themes at AMB in Stuttgart and IMTS in Chicago in September of this year. For some time now, digitalization has been a buzz word and GROB is showcasing the concepts for optimizing business and production processes time and again. "Industry 4.0 is playing a key role in the latest GROB-NET<sup>4</sup>Industry applications," explains Emil Nigl, responsible for GROB-NET<sup>4</sup>Industry at GROB. "GROB-NET<sup>4</sup>Industry software uses web technology to create cross-plant transparency throughout the production process. This software now networks machines at all worldwide locations of the GROB Group. Both machine tools and other types of machines such as grinding or bending machines from GROB and also from manufacturers such as HELLER, TRUMPF and DMG have been connected."

Now there is the option of connecting machines from the manufacturer MAZAK. These machines have their own control system and can be connected only via MT-Connect, a standard common throughout the USA. The GROB<sup>4</sup>Interface has been expanded by a new module for this purpose.

## Worldwide networking of GROB machines

The worldwide networking of around sixty GROB machines in the five GROB plants

is almost complete, and is constantly evolving with every production expansion. In addition, twelve machines in Mindelheim have been connected to GROB<sup>4</sup>Track. The state of the ball screws can now be checked at a glance in the new dashboard. The GROB-NET<sup>4</sup>Industry solutions are in use at all locations and GROB<sup>4</sup>Analyze and GROB<sup>4</sup>Line are being used intensively and productively, particularly in Mindelheim and Brazil. Consequently, unmanned weekend shifts with standby service are now possible on all GROB machines with automation.

GROB<sup>4</sup>Connect, which connects the machines to the ERP, MES, PLM and TDM system, currently has 1,666 users worldwide and registers over 233,000 read and 22,000 write accesses per week. The Manufacturing Execution System (MES) employed for this purpose was developed by GROB. Via web technology, the production-related data are transmitted straight to SAP. The machine operator can enter job feedback, such as tool requirement, into the ERP system directly via the GROB<sup>4</sup>Pilot HMI or a shop floor station.

## Digitalization at the focus of international attention

The digitalization activities, which began at GROB seven years ago, are still the focus of attention and are constantly being expanded both internally and externally.

This includes, for example, the attendance of GROB employees at so-called "Hackathons", where software developers, programmers and other IT specialists meet for brainstorming sessions. And GROB Systems was also involved when a computer center, which acts as a Cloud for North and South America and via which the first customers have just been connected, was successfully commissioned for the IMTS in the USA. The white label "<https://www.cloud4machine.com/>" now allows competitors and other machine manufacturers to sell GROB-NET<sup>4</sup>Industry solutions to their customers. One example is the grinding machine manufacturer VOLLMER from Biberach, Germany, which is now one of our customers.

## GROB supports VDW Initiative Industry 4.0

At EMO 2017, the Association of German Machine Tool Manufacturers (VDW) started the industry initiative "Connectivity for Industry 4.0 on Machine tools", and GROB is an active member of the core team. The aim of this initiative is to develop an interface standard that will make it much easier and cheaper for companies to push forward connectivity for their machines. Because connectivity is the key to all added value and to the business models, the mechanical engineering sector is expecting Industry 4.0 to deliver.

Since the start of this year, all participants have attended workshops and meetings on an almost weekly basis. From a technical and scientific perspective, the project is supported by the Institute for Control Technology of Machine Tools and Manufacturing Units (ISW) at the University of Stuttgart. The scientists at ISW are among the leading experts in industrial control technology – especially for machine tools – and have made a name for themselves internationally by developing standards and solutions, especially in the Open Platform Communications Unified Architecture (OPC-UA) environment. OPC-UA means a collection of standards for communication and data exchange in the industrial automation environment.

Although initially started as a purely German working group, the VDW industry



umati – the new name of connectivity

initiative is now considered an international project, since only internationally harmonized standards can be accepted. Talks are currently underway with American, Chinese and Japanese partners with a view to agreeing an internationally valid interface standard.

## AMB sets a milestone

A first milestone for creating an international interface standard was set at AMB 2018 with a demo application. All partners who were represented at ABM integrated an appropriately configured OPC-UA server into their control and were able to quickly connect and exchange data with their communication partners.

Our universal machining centers with Siemens control systems are connected to the Siemens MindSphere, IGH and to our GROB-NET<sup>4</sup>Industry platform (<https://www.cloud4machine.com/>). The connectivity initiative of the VDW was also christened at AMB with the name "universal machine tool interface (umati)".



For production in the Industry 4.0 era: GROB-NET<sup>4</sup>Industry networks machines all over the world

# GROB DEVELOPMENT TEAMS – FAST-PACED DEVELOPMENT

"Development and Engineering" has recently experienced a stronger dynamic than most other departments at GROB. "Mechanical concept design" has made the transformation to become "Development" as the central department for new machines. The goal, at all times, is to satisfy the requirements of the market and the needs of our customers.

Some years ago, when GROB-WERKE was still best known on the market as a system supplier of cutting machine tools, most new developments involved mechanical concept design and were engineered specifically for a department organized for machining centers. Some 40 employees in this department formed the core capability of GROB machining, and this team was supported by another 30 members for trialing and optimization (Test & Mechatronic). At the time, the demands for specific customer projects for known part types and part-related machining processes were driving numerous innovations. Even back then, highly innovative ideas that secured the lasting market success of GROB-WERKE were created time and time again. It was recognized at an early stage that the ever-increasing market demands for the transition to flexible manufacturing lines would call for additional concepts, such as two-spindle machining centers, various loading methods and control functions.

## Unbroken claim to technology market leadership

It was not only the system business that had the need for new technologies. The transition to flexible manufacturing lines developed at an even faster rate. If we compare GROB's very first standard machines with the company's latest, highly advanced 5-axis universal machining centers, we see just how far mechanical engineering technology has developed. The trend for increasingly shorter development cycles can be seen in the traditional areas of the system and universal machining center business or in assembly technology and automation. It is also highly evident in the shift in powertrain engineering towards electromobility. This is an area where GROB wondered, at an early stage, which business fields it could develop from this future technology using its existing expertise.

## Emergence of interdisciplinary development teams

If we look at the conventional machine tool, the innovations are being shaped by the need for new part types, such as frame structure or chassis components. GROB-WERKE is able to gear its existing expertise to handling tool technology, automation



The representatives of the interdisciplinary development department of GROB-WERKE

solutions and process knowledge projects in the machining sector by implementing new machine concepts in coordination with the Sales department and management team. These concepts are based on customer and technical specifications and have been successful, despite the stagnating willingness in the automotive industry to invest in new projects.

The Development department is using existing machine types to improve present series, create different versions and develop completely new machines from the basic module. When it comes to the control system, it has the support of both the Fluid and Electrical engineering departments. The Test & Mechatronic team is staying informed on the now-established cross-functional development concepts. What was once a conventional attempt at trialing new machines has now become an indispensable part of optimizing machines in terms of their drive concept and compensation methods to increase the accuracy of the machine geometry.

In the project business, machining centers are used in combination with automation solutions and the requisite elements, such as automation system and linear gantries. They are developed in the conventional

manner in the Mechanical concept design department, often ensuing from the requirements placed on specific customer projects, but also with a view to continuously expand the generally used modules.

## Development milestones with electromobility

The first steps required to expand this business sector were initiated some years ago, and GROB-WERKE can now reflect on a successful development of its assembly technology. This success expanded existing expertise for combustion engines assembly systems by integrating new methods of assembling electromobility components, such as the stator. The technologies required to produce the stator winding were either developed by the newly established Assembly department for hairpin technology or, for the feed mechanism, were brought in through the prudent acquisition of DMG meccanica in Italy.

For the development of completely new methods for production and assembly in the electromobility sector, the engineering areas are being supported by a team of application engineers in the Innovation management and Electromobility department. These departments do not develop marke-

table machines, instead, they devise robust assembly methods or examine alternative manufacturing methods, such as laser welding or impregnation, as part of market research, internal reviews and test setups.

## And the focus is always on people

Time and time again, the most basic ideas, often for optimizing internal processes, culminate in products that can benefit the customer too. The development of Industry 4.0 solutions, for example, began as an improvement project for in-house production and has now become, with GROB-NET<sup>4</sup>Industry, a leading market solution for linking machine tools to Cloud-based services for monitoring machine statuses.

In conclusion, innovation at GROB is not the responsibility of each individual employee, but rather is a collaborative effort. It is required by all engineering departments and is often an interdisciplinary interaction between multiple teams, where explicit organizations for new machine tools and assembly machines are of course defined. This success comes from innovative basic ideas of individuals, which can be implemented only through the collaboration of all employees. ■

# GROB'S LONG-SERVING EMPLOYEES – MINDELHEIM & WORLDWIDE

40  
years



Siegfried	Böhner	Preassembly technology
Helmut	Deinhardt	Express technicians
Werner	Ende	Complete production
Manfred	Fey	Assembly Technology Engineering – Hardware
Mathias	Filser	NC programming
Franz	Knauer	Electrical installation
Bernhard	Laure	Manufacturing system
Harald	Mann	Tool technology
Wilfried	Satzger	Tool technology
Ernst	Schwed	Manufacturing system
Franz-Josef	Siebert	Mechanical Engineering
Norbert	Thoma	Spindle and gearbox preassembly
Erhard	Weinalt	Production maintenance
Hartmut	Wengler	Universal machining centers preassembly
Josef	Wissmiller	Production
Mehmet	Adan	32 years
Josef	Frank	33 years
Helma	Schmid	39 years
Helmut	Strodel	37 years
Ernst	Stromer	38 years
Ernst	Stübler	31 years
Alexander	Welitschkowskij	38 years

People celebrating anniversaries and pensions with between 30 and 40 years seniority

25  
years



Bernhard	Baur	Assembly Technology Engineering – Hardware
Peter	Buxbaum	Assembly Technology Engineering
Wolfgang	Frey	Machine commissioning administration
Thomas	Hampp	Assembly technology electrical preparation
Rainer	Harnisch	Tool manufacturing
Christian	Hofmann	Mechanical commissioning
Manfred	Huber	Manufacturing system
Reinhard	Koch	Information technology
Thomas	Kohler	Mechanical Engineering
Sonja	Kraus	Drawing documentation
Thomas	Krauß	Development

People celebrating anniversaries with 25 years seniority

Konstantin	Kufer	Mechanical Engineering
Rainer	Lutz	Manufacturing system
Michael	Lutzenberger	Proposal Engineering
Joachim	Miller	Electrical commissioning, special areas
Ralf	Pietryga	Operative Purchasing
Christian	Saulich	Electrical installation

Christian	Scheib	Complete production
Andreas	Schmid	Electrical Engineering – Hardware
Hubert	Schmid	Electrical commissioning, administration
Thomas	Schmitz	Quality assurance
Claudia	Schneider	Human Resources Management

Reinhold	Schuster	Sales & Services
Stefan	Senner	Engineering Management
Edgar	Strobl	Machine commissioning, process commissioning
Christian	Waltenberger	Electrical commissioning, special areas
Peter	Zindath	Customer service





10 years



People celebrating anniversaries with 10 years seniority



Helene	Alf	Andreas	Biehler	Karl	Ehlotzky
Kathrin	Anderlik	Johann	Binzer	Matthias	Endras
Jürgen	Arnold	Franz	Bissinger	Markus	Engstle
Horst	Barufke	Eugen	Bosserdt	Franz	Epple
Andreas	Bauer	Edmund	Brecheisen	Thomas	Ewert
Alexander	Baum	Thorsten	Breuer	Matthias	Feichtmeier
Achim	Baumann	Ricardo	Cantagalli	Oliver	Feig
Bettina	Baur	Viktor	Dautfest	Eugen	Felsing
Viktor	Beller	Andreas	Deichfischer	Walter	Fiener
Meik	Bergdorf	Frederik	Dittrich	Waldemar	Frei
Nicolas	Bertele	Tobias	Domesle	Stefan	Frey
Tobias	Biberacher	Marcus	Dorer	Christoph	Grabherr
Michael	Bickel	Thomas	Eck	Christian	Graile

People celebrating anniversaries with 10 years seniority

Daniel	Gugenberger	Hermann	Honold	Stefan	Klughammer
Matthias	Haban	Thomas	Hovanjek	Alexander	Knoll
Martin	Hagen	Lisa-Marie	Hoyer	Sebastian	Kraus
Jens	Hanesch	Benjamin	Huber	Florian	Krauß
Barbara	Härter	Christoph	Huber	Andreas	Kucharz
Marianne	Harzenetter	Johann	Huber	Manuel	Kutter
Michael	Hefele	Michael	Huber	Markus	Lampert
Johannes	Heimpel	Thomas	Immerz	Magdalena	Ledermann
Markus	Heinrich	Ginldirai	Impraim	Stefan	Lehle
Anton	Helzenlichter	Dirk	Jekle	Daniel	Lehner
Karl	Hempfer	Marcus	Jendryka	Patrick	Leppin
Jakob	Hergenreider	Alexander	Jung	Michaela	Lidl
Jürgen	Hildebrand	Thomas	Jung	Michael	Liebl
Nicolas	Hipp	Sebastian	Kapusta	Manuel	Löhle
Dominik	Hirschmüller	Engelbert	Keidler	Jurij	Martin
Nikolaus	Höbel	Patrick	Keppeler	Lothar	Matzka
Jaroslav	Hoffmann	Edwin	Kieble	Alexander	Mayer
Tobias	Hohenegger	Steffen	Kirchner	Raphael	Meitinger

Fabian	Meixner	Thomas	Roos	Ralf	Sieber
Christoph	Merz	Ralf	Rosenbaum	Roland	Späht
Wolfgang	Micheler	Gerhard	Rueß	Benjamin	Stark
Matthias	Mögele	Andreas	Salger	Christoph	Stempfle
Christian	Moser	Mehmet	Sariay	Necip	Tiras
Waldemar	Müller	Norman	Schäfer	Markus	Urbanek
Erkan	Mutlu	Carsten	Scheunchen	Mladen	Vujica
Stefan	Nattenmiller	Alexander	Schlosser	Philipp	Wahl
Fabian	Neß	Stefan	Schmalholz	Matthias	Waigel
Thomas	Neubert	Florian	Schmid	Florian	Weixler
Manuel	Paulus	Wolfgang	Schmid	Thomas	Werner
David	Pfeffer	Thomas	Schorer	Holger	Wessig
Matthias	Pursch	Manuela	Schregle	Markus	Wexel
Sven	Rampp	Christoph	Schröder	Stefan	Wöck
Christian	Rauscher	Benjamin	Schuch	Jens	Woll
Stephan	Reisländer	Nadine	Schuster	Sebastian	Wurm
Paul	Resch	Timo	Schuster	Georg	Zimmermann
Maximilian	Ribits	Thomas	Siebeneicher	Florian	Zingerle



USA

Renan Franzoi	Baptista	Detailer
Philip	Basinger	Controls Safety Engineer
Tom	Benson	Saw
Cody	Doster	Machinist
Alex	Hermiller	Assembler
Daniel	Kaufman	Controls Software Engineer
Dennis	Recker	Fabricator
Ron	Schimmoller	Machinist
Nathan	Seidner	Designer
Brandon	Vorst	Machinist

People celebrating anniversaries at GROB Systems, USA



People celebrating anniversaries in GROB Brazil



People celebrating anniversaries in GROB Brazil

Celebrating anniversaries at GROB has a long tradition. Especially at B. GROB do Brasil with its many employee families, affiliation with the company has a special meaning and decades of tradition. In Brazil, once someone has been with the company for ten years, an anniversary is celebrated every five years afterwards. This year, a total of 73 employees have been recognized. 21 employees can reflect on ten years, 23 employees on 15 years, 20 employees on 20 years, four employees on 25 years and one employee on 30 years. Four employees are especially proud: two can look back on 35 years and two on 40 years with the company. Congratulations to you all on your anniversaries.

## GROB TRAINING – A JOURNEY THROUGH TIME: OUR 70-PLUS RETIREES RECALL ...

From training year 1961, the editorial team of GROB International obtained a report about its active time at the then Ernst Grob Werkzeug- und Maschinenfabrik in Hofmannstrasse in Munich and also about their regular meetings as 70-plus retirees, which are held to this day. To recount the history as authentically as possible, the editorial team has decided to reproduce the report largely unchanged.

### Solid basic training – Door opener for occupational health and safety and a successful start to the future

From August 1961 to 1965, when the trainee was still an apprentice or novice and the good old Deutschmark ruled, we at ERNST GROB were taught the basics of metal processing. This was still in the venerable factory halls and premises in Hofmannstrasse in the Sendling district of Munich. The training also covered the daily sweeping of the factory hall floors,

not only how to leave our own workplace clean and tidy. And the day didn't end until the department managers had completed their inspection. It didn't do any of us any harm. We still remember today, with thanks, our trainer Mr. Heilander.

In 1961, we were twelve of around 50 aspiring machinery fitters, a strong group among a total headcount of some 280. Passing the craftsmen examination as a machinery fitter was the first culmination of our long career path. A sense of

belonging, the purposefulness typical of the post-war generation, a tight management organization in the company under Mr. Gegenhuber, the plant manager at the time, and also the companionable working atmosphere brought us together as one unit. And this was 57 years ago. Several times a year, we former employees meet to celebrate anniversaries, such as when our training started and ended or examination dates, or even for no particular reason.

Good memories stay forever. Including memories of thoughtful and cheerful company outings or visits to the Oktoberfest, which were generously subsidized by GROB. Also worthy of special mention are the joint sporting activities out of hours, such as the company football team or boxing training. In our days, there were no cellphones or smartphones, yet we were never bored. We all know, the way to a man's heart is not only through his stomach, it's also how he performs at work. Everyday, we had a free snack from the snack van. And the staff canteen financed by GROB was no fast food establishment, nor could you get warmed-through ready meals. It was a place of culinary pleasure that we could look forward to every day.

Through personal development, we became master craftsmen and engineers, company representatives, shipping com-

pany owners or even imparters of knowledge in the vocational education system. And one of us exchanged Munich for Mindelheim and remained loyal to GROB through to retirement.

Despite the various directions our career paths have taken us, we have stayed friends. It's best to report on ill health only once. Even good jokes are boring after them being told twice. Yet our memories, which we recount at our apprenticeship meetings time and time again, are just as vibrant after more than half a century as they were then, and for us almost immortal. So planning for the next apprenticeship gathering with memories to share gives us, the 70-plus retirees, a very welcome "maidenly" anticipation.

### Machinery fitter trainees 1961-08-01 – 1965-01-31

Viktor	Bernadi	Germering
Wolfgang	Beste	Munich
Günter	Huber	Munich
Franz	Krappmann	Grünwald
Gerhard	Ritter	Mindelheim
Helmut	Schmidbauer	Munich
Emil	Staats	Unterföhring
Horst	Weidner	Putzbrunn



Company football team around 1961

# GROB SERVICE – A YEAR OF CUSTOMER RELATION IMPROVEMENTS

The "Customer relations" division at GROB has been strengthened and, to some extent, placed on a new footing by a number of activities. The focus was very much on digitalization applications, establishing the new sales and advisory team for the European market, new service products, the global rollout of the GROB<sup>4</sup>Care web shop, as well as a strategic reorganization of various areas within the central GROB Service Division in Mindelheim.

One of the greatest service challenges facing GROB is the growing supply of universal machining centers and the extensive market launch of these systems in their sixth generation. This development is having a major impact on the ability to guarantee an express Service (24/7 service support), in Europe, the USA, China, India and Mexico. Consequently, the GROB Service Team has been strengthened by additional hotline personnel and express technicians in order to satisfy the criteria for meeting high customer requirements and continuing to offer service activities in the GROB quality they have come to expect.

## New sales and advisory group established

With a newly established sales and service team for the entire aftersales market in Europe, GROB is making yet another clear commitment to its European service network.

The service network, which consists of GROB branches and service agents that work in partnership to offer the best performance, can be supported much more effectively by this newly established sales and advisory group. This cooperation creates the closest possible customer proximity and allows service products and processes

to be perfectly matched to customer needs. The expectations being placed on this young sales team are extremely high and the successes to date are extremely admirable. This year, some 137 machines have been overhauled and the number of maintenance contracts has been increased to a record high of 170 machines.

## Industry 4.0 applied in GROB Service

With the new service products such as GROB<sup>4</sup>Track and the GROB<sup>4</sup>Care global web shop, the Service Division is continuing its digitalization strategy with a view to further improving its services offered. Supported by numerous testers, the extremely user-friendly Condition Monitoring function, GROB<sup>4</sup>Track, is now available for ball screws. No more unscheduled machine shutdowns caused by a worn ball screw.

The software, recently developed and market-ready, is able to determine the actual wear on the ball screws and alert the user through an automated signal. Both quality-relevant wear and an incorrectly installed ball screw can also be detected.

Following the successful launch of the first GROB<sup>4</sup>Care web shop in Mexico, all GROB branches worldwide and all Euro-

pean service agents will have their own web shops for their direct customers by the end of the year. This will enable branches and agents to access the available service stocks and prices in real-time and place orders 24/7. These can already be processed through to dispatch automatically, allowing the parts to be provisioned within a very short time.

Customers also benefit from an expanded stock view; locally available stocks and stocks in the global spare part warehouse in Mindelheim are shown. Newly created shipping options with binding delivery dates are also available. All this creates the greatest possible transparency, speed, and reliability for our customers. The goal is to have provided all partners with adequate training, set up their web shops and link the first customers to the system by the end of the year. Currently, there is a rising number of connected customers in the direct market for GROB<sup>4</sup>Care.

## Service presence at AMB in Stuttgart

For the first time, the Service Division was present at AMB in Stuttgart with its own stand. This year, the focus was on digitalization topics, such as GROB<sup>4</sup>Track, a premium service offering with augmented reality platform, GROB<sup>4</sup>Care and

digital applications. Once again it was clear how Service has become an increasingly important part of success in sales. GROB Service is well positioned in the competitive environment with its products and is emphasizing its strong commitment to active customer support through its presence at the trade fair. This new offering will make Service increasingly recognized and valued as a partner to sales.

## Thomas Glüder retires

Thomas Glüder retired in June 2018 after over 32 years at GROB. After joining the company, he passed through various departments until transferring to Service in 2010. Under his leadership, GROB Service developed from a conventional customer relations division to become a modern, digitalized service partner to GROB customers all over the world.

The new Service Manager is Werner Müller, who returned to the Headquarters in Mindelheim after two years as Head of Production in the company's Dalian plant in China. ■



The new sales and advisory group in the service department



Service stand at AMB Stuttgart

## GROB BENELUX

The GROB branch, set up on January 6, 2018, in SH Hengelo in the Netherlands close to the German-Dutch border, got off to a successful start by establishing its own service team.

Alongside our managing director and man of the hour Eric Huiskes, a long-standing GROB distribution partner in the Benelux countries, and his assistant Lisette Hampsink, the GROB team was expanded by one service and one electronics specialist. The goal is to provide Dutch, German and Belgian customers in the region with even better support. With our own service technicians on site, the journeys can be significantly reduced and the

service quality considerably improved as a result.

SH Hengelo is an important location in the emerging Benelux countries. The Dutch market, in particular, has developed well, especially in the Aerospace sector and the die and mold industries. With our own service staff on site, we can now respond to customer inquiries even more efficiently. "In addition to existing customers from the automotive and mechanical engineering sectors, the idea is to convince also small and medium-sized companies of the technological potentials of the GROB 5-axis machining centers", says Eric Huiskes explaining his goals. ■



Eric Huiskes and Lisette Hampsink from the GROB Benelux branch

## GROB ITALY

To complete the integration of DMG meccanica and to optimize structures, DMG meccanica was renamed GROB Italy S.r.l. at the start of this year, with no changes to the management. Our sales and service branch GROB Italia (Turin) has been integrated into GROB Italy S.r.l. during the course of 2018. As a result, GROB Italy S.r.l. now has two divisions: the electromobility division and the universal machining center and system business division.

In the universal machining center and system business division, GROB Italy S.r.l. has a Key Account Manager for Italy's

most important automotive manufacturer, the Fiat-Chrysler Automotive Group (FCA), thanks to the long-term GROB agent, S.I.M.U., GROB Italy S.r.l. also has a product manager for universal machining center sales activities who looks after an Italian sales network consisting of direct sellers and sub-agents.

Italy has become an important sales market for GROB in recent years. Especially since an increasing number of aluminum foundries are developing into full-service providers with machining applications and a high demand for system and universal



The future GROB Italy plant

machines in the Italian market. As a result, numerous additional potential GROB Italy S.r.l. customers have developed from a small number of Italian companies. The potential for success of GROB Italy S.r.l. continuously increases. Moreover, the

decision for GROB to build a new plant in Italy has significantly strengthened the commitment to the Italian market, the sustainability and the ability to provide fast responses to service events. ■

## GROB SWITZERLAND

To further expand national sales and service in Switzerland, GROB Schweiz AG was established in Steinhausen (ZG) in December 2017. The company currently has two employees and is actively seeking strong support in the service department.

With its conventional small and medium-sized enterprises, the Swiss mechanical engineering market is predestined for GROB universal machining centers. Because Swiss mechanical engineering companies are often very well networked, intense support before and after the sale is crucial. The first universal machining center, for

example, was delivered to the showcase company Wild & K pfer from the die and mold industry and successfully commissioned. "Moreover, we are expecting the completion of a highly flexible manufacturing line consisting of five G550 universal machining centers with pallet change systems and automation components at PILATUS Flugzeugwerke AG", explains Harald Folk, Managing Director of GROB Schweiz AG. With a complete control system, extensive GROB-NET<sup>4</sup>Industry functions and a central vacuum clamping system, the project meets the customer's requirements for a highly efficient system and permits the

production of up to 3,000 different components in the aerospace sector in unmanned shifts.

"The GROB universal machining centers already have a very good reputation with us in Switzerland in the die and mold industry, as well as in aircraft construction, and we hope that we can soon follow suit in other sectors. In Sales, the long-term cooperation with Reimann AG as general agent for the national market is being efficiently supported by GROB Schweiz AG, especially in the service sector, such as with machine inspections and material supply. ■



The new faces of GROB Schweiz AG: Harald Folk and Rheinhard Wallaberger



GROB Brazil organized an Open House event on 25 October 2018



This time, the event was held under the banner of "Connectivity"

## GROB BRAZIL – B. GROB DO BRASIL HOLDS ONTO A STRONG MARKET POSITION, DESPITE THE WEAK ECONOMY

After the worst economic recession in its history, Brazil bottomed in 2017 and is expecting a 1.5 percent growth in the GDP this year. Now that the elections are over and the economy has experienced slow growth, there is a renewed hope that the capital goods industry will gradually improve again. Strong economic growth averaging 2.4 percent per year is expected for the next three years.

The Brazilian market has been in crisis for years. A slow consolidation is expected, although the projects currently being discussed in the market would appear to be at a very manageable level. "Nonetheless, we can proudly say that all Brazilian automotive projects – both new projects and capacity expansions – have been won by B. GROB do Brasil this year," says Christian Müller, GROB President of Sales America, explaining current developments in Brazil. In the universal machining business as well, B. GROB do Brasil is successfully powering through and has surpassed last year's results many times over.

Due to the start of production of the second G-module generation and its technological advantages, our Brazilian colleagues are hoping that its order book will continue to expand over the next few months.

Assembly technology has also evolved in recent years to become an increasingly im-

portant product for B. GROB do Brasil. In 2018, B. GROB do Brasil has been able to realize several assembly projects. Unfortunately, activities in the electromobility sector in Brazil are currently at a low level and it will certainly take several more years before alternative vehicle awareness has been raised sufficiently in the Brazilian market.

Nonetheless, B. GROB do Brasil will be focusing, along with the other GROB sites, on this new technology in the long term in order to be an adequate partner for our customers when the time comes.

### Motorized spindles produced by B. GROB do Brasil

For several years now, B. GROB do Brasil has supplied complex parts for motorized spindle construction in Mindelheim. Our Brazilian colleagues have comprehensive know-how of the precision required to

produce motorized spindle components. Backed by this expertise and with the notion of localization, the GROB Group experienced a shift in strategy.

In the future, motorized spindles will be produced in GROB in Brazil, as well as in Mindelheim. This has begun by producing the type 1 spindle (motorized spindle 47 Nm, 18,000 rpm) in a quantity of 200 units per year, around four spindles per week. To be able to achieve these quantities, the production area for motorized spindles has been doubled and an assembly line according to Mindelheim standards has been set up. The company has also invested in further machines in the mill-turn sector. The first spindles are scheduled to be delivered at the end of the year. Other spindle models will expand the range in Brazil next year.

In addition, a new Technology and Application Center with offices and a meeting room for customers has been established close to the motorized spindle production facility. The Technology and Application Center has an area with space for two machining centers and their operating facilities, which include a balancing machine and a shrink-fitting station.

### Further optimization measures in production

In light of the planned productivity expansion at B. GROB do Brasil, the manufacturing lines are becoming increasingly

automated. For unmanned production, two GP2050 with a pallet storage system, one G550 with GROB's proprietary rotary pallet storage system PSS-630 R13, and one G350 with EROWA pallet storage system are running in the 24 hour/6 day shift system. There are also plans to invest in a further G350 and a G550, each with GROB's proprietary rotary pallet storage system, having 15 (PSS-400 R15) and 13 pallet locations (PSS-630 R13).

### Open House at GROB Brazil

B. GROB do Brasil holds an Open House that is considered to be the most important event in the industry with 5-axis machining as its main focus, every two years. On October 25 this year, almost 500 participants attended various technical presentations and a "state-of state-of-the-art technology" exhibition in the 5-axis machining sector.

This time, the event was held under the banner of "Connectivity". Together with its partner Open Mind, B. GROB do Brasil presented the entire digitalization chain in the Technology and Application Center in São Paulo.

In addition, another 28 technology partners joined the event. Companies that attended with their own exhibition stand and gave technical presentations were awarded the status of "Diamond Partner". These include Sandvik Coromant, Schunk, YG-1 and Sequor.



Around 500 participants visited the Open House event of GROB Brazil



Annual awards for the top sales agents

GROB USA was pleased with the most successful IMTS in its history

## GROB USA – PRODUCTION OF UNIVERSAL MACHINING CENTERS BEGINS AT GROB SYSTEMS

With the start of production of the G350 universal machining center, GROB Systems is setting another milestone in its 35-year history. Producing G350 universal machining centers in the USA also allows to meet shorter delivery times in the fast-growing market for universal machining centers. The goal is to cover 80 percent of the national market with in-house production.

The universal machining center first made its debut at IMTS in September 2008 and the first delivery to a customer, in the medical technology sector, was two years later. 5-axis machining didn't make its breakthrough until the 29th IMTS in 2012.

Several years of marketing campaigns, numerous trade fair appearances, the setting up of Technical Application Centers (TAZ), the further expansion of a well-trained sales team, and the establishing of a sales branch in the metropolitan region of Detroit allowed the universal machining center, and hence 5-axis machining, to finally make its breakthrough into the US market.

During the course of the current year, GROB Systems will install over 70 machi-

nes at its customers, primarily in the aerospace sector. To be able to keep pace with the flow of incoming orders and the market demands for shorter delivery times, machines must be held in stock at GROB Systems and produced in the US. To date, the 5-axis universal machining centers have been produced and delivered from Mindelheim. The production of G350 universal machining centers in Bluffton, which started this year, and its larger sister machines, G550 and G750, will help the GROB sales team respond even more flexibly.

### Most successful IMTS in the history of GROB Systems

Just like AMB in Stuttgart, IMTS in Chicago was also a huge success for GROB-

WERKE. In the GROB exhibition booth, which covered 10,000 ft<sup>2</sup>, our colleagues from GROB Systems were able to welcome over 1,300 visitors – more than in previous years. They were overjoyed not only with the high number of visitors to the GROB booth, but also at having sold nine machines during the course of the show.

The series of 5-axis universal machining centers and a G600F for machining frame structure and chassis components were presented at IMTS. In addition to experiencing these machine exhibits, visitors to the GROB booth were also able to learn about service, e-mobility and other related areas.

For GROB, IMTS is "still the best platform in America, not only for showcasing its technologies and products, but also for entering into promising dialog with potential customers with a view to explaining the benefits of GROB machines and 5-axis machining," said Christian Müller, President of Sales in America, summing up what proved to be a very successful IMTS 2018 for GROB.

### Promising activities in the e-mobility sector and in the system business

E-mobility is becoming increasingly popular in America. To keep pace with this development, GROB Systems has appointed a Key Account Director for e-mobility in order to be at the forefront in this growing market. The first e-mobility project with an American OEM is currently underway

in the USA. At the same time, GROB Systems is also delivering a machining line for a V8 engine block and the corresponding engine assembly line to another American customer.

Other projects are being realized to a worldwide supplier to the automotive industry with a US production facility in Ohio. This order is for a manufacturing line that will machine integrated brake control housings; a highly complex component with intersecting boreholes and deep brake cylinder boreholes. "Our work has become a benchmark for the company," explains Christian Müller with pride. "In this project, we are supplying two-spindle machining centers for machining the component."

For the frame structure part business, GROB Systems is collaborating closely with the most important suppliers in the industry. The GROB series for machining frame structure parts and chassis components is being well-received, as GROB is able to offer the growing market suitable solutions.

### Construction projects progressing well

The construction of the new sales and engineering building at the Bluffton plant is progressing as planned. The steel structure for the building is up and the shell will be complete by the end of December. Work on the interior will follow. Final completion is scheduled for August of next year.

GROB Systems presented itself at IMTS on a stand of around 1,000 m<sup>2</sup>



The celebratory renaming of GROB China in September



Around 170 participants visited this year's Open House event of GROB China

## GROB CHINA – FURTHER EXPANSION WITH NEW COMPANY STRUCTURE

GROB China has emerged as a powerful organization within the GROB Group, and is comprised of the plant in Dalian and the Shanghai and Peking branches. It has successfully pooled production and development expertise and sales capabilities centrally in Dalian. The third construction phase in Dalian is also progressing rapidly and will be completed on schedule in April 2019.

Special celebrations to mark the change of name were held on September 21 in the presence of high-ranking representatives from the political and economic sectors. GROB Dalian became GROB Machine Tools (China) Co., Ltd. and the two distributors in Beijing and Shanghai became GROB Machine Tools (China) Co., Ltd. Beijing Branch and GROB Machine Tools (China) Co., Ltd. Shanghai Branch. This is the most recent milestone in the long history of GROB-WERKE in China. "We are convinced that with GROB China as a cohesive strong group, we can now have a greater presence in the Chinese market", explains Christian Grob, Chairman of the Supervisory Board.

In 1989, GROB delivered the first manufacturing line for passenger car cylinder heads and special-purpose machines for camshaft bearing caps to Shanghai Volkswagen (SVW). In April 2003, the first Asian GROB branch was established in Beijing. The ceremonial opening to mark the founding of GROB Machine Tools (Dalian) Co. Ltd. in October 2010 was held in June 2012.

And today, almost 30 years after the very first activities in China, GROB China has emerged as one of the most profitable subsidiaries of the GROB Group. "And we will be expanding GROB China in the future too, not only to ensure that GROB activities in China and Asia continue to develop successfully, but also to develop the entire Dalian Jinpu New District", says Hongzhi Ren, General Manager of GROB China, describing the goals ahead in his ceremonial address.

### Second expansion stage still on schedule

After GROB Dalian was established in 2012 on around 12,000 m<sup>2</sup> of production space, the ground-breaking ceremony for the first expansion stage with a further 13,700 m<sup>2</sup> was held two years later. "The second expansion stage, which was started in May 2018, is well on-schedule" explains Marcus Ostler, Plant Manager at GROB China. "This means that by the middle of January 2019, we will be able to benefit from the additional 6,700 m<sup>2</sup> or so of space."

Construction phase III will be successfully completed on time by the end of April 2019. The Dalian plant will then have 32,400 m<sup>2</sup> of production and logistics space. The newly acquired space will accommodate the existing assembly line and the new facility to be introduced. This new assembly line will effectively shorten the cycle times in the Chinese plant even further, enabling customer requirements for delivery dates to be better met.

### Electromobility in China

Electromobility in China has a completely different status to electromobility in Europe. As early as 2017, four Chinese carmakers were among the world's top ten largest manufacturers of electric vehicles, including BYD Auto Company Limited in Shenzhen with 113,700 vehicles and the Beijing Automotive Industry Corporation (BAIC) with 103,200 vehicles. In the first six months of 2018 alone, the

number of electric vehicle registrations has almost doubled compared to the same period in the previous year. Against this background alone, GROB's decision to establish another branch with electromobility is continuing to gain importance.

### New customers from the automotive supplier industry

It's not only the electromobility market that's developing well in China. GROB China has won three important orders from the automotive supplier industry. One of these new customers is Hanlong Industrial Co. Ltd., to which two turn-key projects for cylinder heads and blocks, completely built at GROB China, will be delivered at the end of this year. This order involves 28 sixth generation machines.

A further turn-key project is being delivered to Chang'an Ford. For this project, all eight machines were produced in Dalian. A highlight of this project is the first-time delivery of a logistics cell with two robots, which operates automatically like an assembly station.

Another large order from Volkswagen, Dalian ATD involves eleven fully-automated and 24 manual assembly stations for the wheel set assembly. They will be produced by GROB China, including the engineering work, in cooperation with GROB Mindelheim. This order crosses into new territory for GROB China in many respects. This assembly line project differs significantly from other machining lines, not only in terms of production

and technology, but also in engineering, commissioning and project management aspects. This experience will prove invaluable for assembly machine and electromobility projects.

### Successful "Open House" at GROB China

On October 24, the GROB Group organized a technology day together with MAPAL, CASTROL and HEIDENHAIN called "GROB productivity day for 5-axis machining".

The event was held at the Dalian plant and attracted 170 visitors. Experts from the GROB Group and its partner companies presented solutions for making production facilities much more efficient, economical and eco-friendly using MQL technology.

In technical presentations, those attending the technology day became acquainted with manufacturing solutions and strategies that can boost their productivity.

Visitors were able to see for themselves how the solutions operate in practice during the impressive live milling demonstrations. An aerospace frame structure part was milled on an ultra-modern GROB 5-axis universal machining center GA350.

The GA350 is part of the Asia series with two sizes, the GA350 and the GA550, which are produced completely in the GROB plant in Dalian. ■



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