WITTENSTEIN

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The magazine for customers and partners of WITTENSTEIN AG

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Innovation driver for mechatronic drive technology

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Contents

Masthead

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Cover photo: Low-backlash planetary gearheads mady by WITTENSTEIN alpha – then and now

Dear readers,

when they first set out, successful entrepreneurs tend to rely on their intuition, ingenuity and absolute determination to assist them in realizing their visions. They seize the opportunities presented to them in times of technological upheaval to create new products for new markets based on original ideas. Werner von Siemens, Gottlieb Daimler, Henry Ford, Carl Zeiss, Adam Opel – founding fathers from the past – Bill Gates and Dietmar Hopp – two modern-day examples – all began their careers as intuitive pioneers.
More than three decades ago, the potential for planetary gearheads appeared to be completely exhausted – when a small, bright orange gearhead attracted the attention of numerous machine designers at the 1983 Hanover Fair. It had been developed by a trio of engineers: Bernhard Orlowski, Manfred Bastian and Manfred Wittenstein. The success of the world's first low-backlash planetary gearhead was not long coming. Looking back, it was this product that laid the foundation for the entire WITTENSTEIN Group's evolution to a sought-after specialist for mechatronic drive technology.

Low-backlash planetary gearheads made by WITTENSTEIN alpha continue to set benchmarks to this day: the world's first low-backlash planetary gearhead in hygienic design, which is due to be unveiled at the Hanover Fair a few weeks from now, is the newest demonstration of our biggest subsidiary's innovative vitality. "Backlash-free quality" – our thirty year-old exhibition slogan from 1983 is still as relevant as ever for the latest gearhead series.

Acknowledged technological expertise and a tradition of innovativeness remain the mainstays of our success. Driven by a visionary pioneering spirit, WITTENSTEIN has for some time now been committed to implementing Industry 4.0 – the high-tech IT strategy. We firmly believe that Industry 4.0 will become the universal language of production. Our Hanover exhibit will show how flexibility, resource efficiency and interconnected business and value creation processes could revolutionize industrial production in the next few years with the help of cyber-physical systems and the Internet of Things. Using the mechatronic system construction kit developed by WITTENSTEIN tool drives as a novel approach to woodworking that integrates 'elements' of Industry 4.0, we will pinpoint ways in which the manufacture of highly customized industrial products can in future be reconciled with maximum flexibility regardless of the batch size.

Come along and visit us at the Hanover Fair at our main stand No. F08 in Hall 15 or at the joint E-MOTIVE Stand No. K12 (02) in Hall 25!

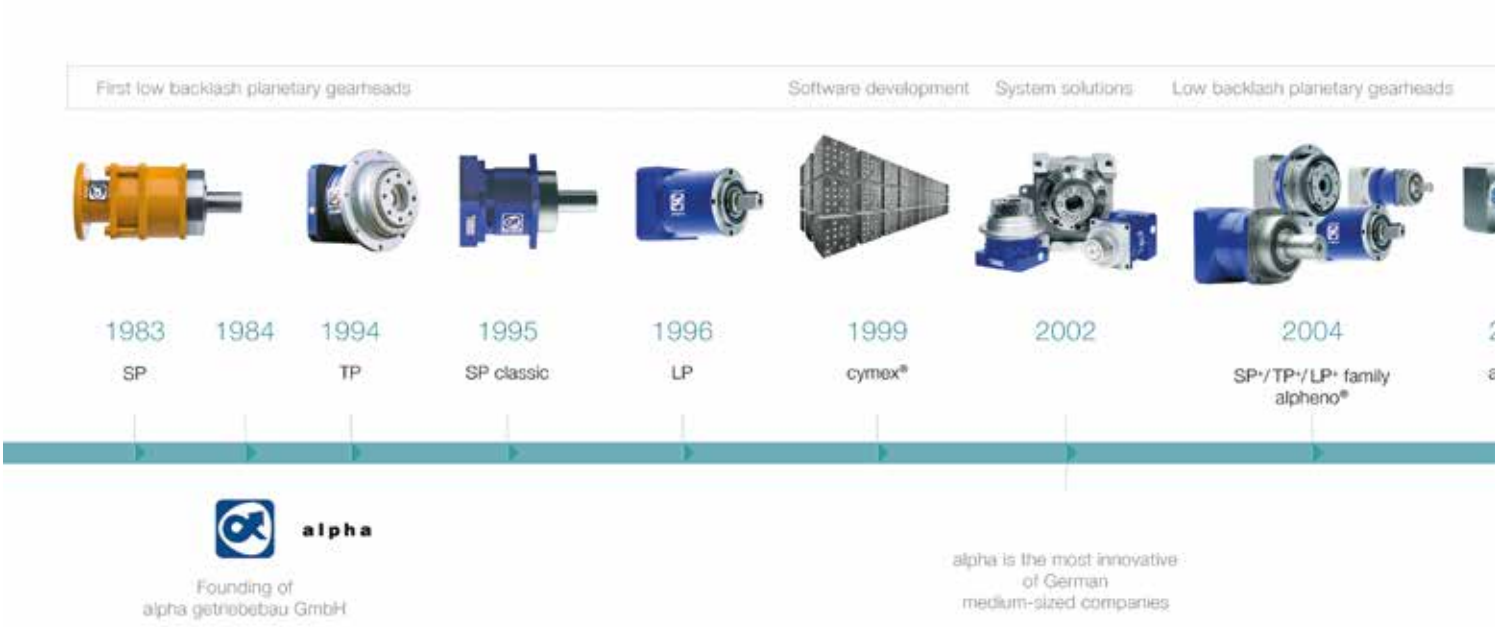
WITTENSTEIN – Innovation driver for mechatronic drive technology

Johannes Arnold Dieter Derr

Executive Management WITTENSTEIN alpha GmbH

Identifying new trends – setting new benchmarks!

30 years of innovation leadership in low-backlash planetary gearheads



Hanover Fair 1983: Dr. Manfred Wittenstein unveils the world's first low-backlash SP planetary gearhead at what by today's standards is a comparatively modest exhibition stand. In retrospect this event marks the birth of the WITTENSTEIN Group – meanwhile one of the world's top innovators in the field of mechatronic drive technology.

Anticipating the demise of the line shaft

The precision know-how accumulated in many years as a manufacturer of sewing machines coupled with technological and entrepreneurial foresight was the cornerstone of the company's success. At an early stage, Dr. Manfred Wittenstein sensed the decisive technology shift in the mechanical engineering sector away from a single, central drive via a line shaft to decentralized servo actuators. "I jumped aboard the servo train ahead of the rest", he is quoted as having said at the time.

"Backlash-free quality" – then and now

What the market needed all those years ago was low-backlash planetary gearheads that combined maximum precision with endurance. The challenge for the engineers involved in the project was to get the gear teeth to engage with hitherto unknown accuracy – a development objective that made precision manufacturing an obvious choice. The necessary expertise already existed at the company from the days of glove sewing machines. The SP gearheads lived up to the original advertising slogan – "Backlash-free quality" – from the outset: their low-backlash design and the know-how invested in the gearing technology added up to maximum precision, reliability and performance, very quiet running and a long lifetime. It was these attributes that propelled WITTENSTEIN servo actuators "from the back of the train to the driver's cab" – where the direction and market trends are determined.

Technology milestones

The first low-backlash planetary gearhead set the standard for the industry – and the mechanical interface is still established in the market today. For the past thirty years the company – alpha getriebebau GmbH, founded in 1984, was later renamed WITTENSTEIN alpha GmbH – has maintained its systematic pursuit of gearheads that deliver more performance with no increase in weight or dimensions, produce less operating noise, run for longer and – especially topical in 2013 – make optimal use of energy. Parallel to this, three decades of direct selling have seen a lot of customer requirements serving as input to the product portfolio. The TP

The world's first low-backlash planetary gearhead in hygienic design

series of planetary gearheads with an output flange, which first appeared back in 1994, was just one of the numerous highlights. Shortly afterwards, in 1999, WITTENSTEIN alpha released cymex®, the first sizing software to allow complete powertrains to be mechanically designed on a PC. Under the banner of the alpheno® planetary gearhead it was WITTENSTEIN's biggest subsidiary which once again offered its clients the unprecedented chance to design made-to-measure, optimally specified gearheads for customized applications using a standard set of components. Three years later, in 2007, WITTENSTEIN alpha introduced its servo right-angle gearhead family, followed in 2011 by the High Performance Linear System – an integrated drive solution featuring significantly higher controllable and usable feeding forces plus the option of downsizing complete drive concepts

Innovation leader into the future

In the year 2013 – almost thirty years to the day after the first SP gearhead made its début – WITTENSTEIN alpha will launch its Hygienic Design series. The world's first low-backlash planetary gearhead that consistently follows hygienic design principles is ideal for meeting the stringent requirements of the food and pharmaceutical packaging industries, for instance.

The innovation potential and market trends for the next few years have already been identified: more power density and energy efficiency, more specialization, more intelligence embedded in the drives, integrated drive solutions that include smart accessories and even more consulting expertise – all with the threefold aim of strengthening expert know-how in the individual Business Units, pushing ahead with the WITTENSTEIN Group's evolution to a mechatronics corporation and remaining a competent partner for customers in all areas of mechatronic drive technology.

IT endows mechanics **with intelligence**

WITTENSTEIN drives for Industry 4.0

Industry experts are unanimous – the fourth industrial revolution is on its way. WITTENSTEIN motion control, a subsidiary of the WITTENSTEIN Group and supplier of mechatronic drive systems, is already putting the Industry 4.0 concept into practice in its products. Configurable mechanics, sensors and software are the three vital ingredients.

A spectre has been rising over German factories, research institutes and development labs since last year's Hanover Fair: Industry 4.0. The basic idea is to make tomorrow's factories smarter. Production processes and the requisite machinery will in future be auto-controllable in many new ways and connected together in networks. Software, hardware and communication components such as sensors or the Internet will be key technology pillars. Of course, no-one at WITTENSTEIN motion control really believes in ghosts. The engineers and information scientists at the tool drives Business Division in Bad Pyrmont, all experts in mechatronic drives, are already realizing the ideas of the fourth industrial revolution in marketable systems today. Their goals are high flexibility, fast conversion and substantial cost savings if the machine tool unit needs to be adapted to new production requirements – for example for drilling or milling.

"First and foremost, smarter machines mean flexible control options as well as open communication interfaces", Eduard Pineker explains. An electrical engineering graduate who works for FERCHAU Engineering Hannover, he is currently supporting the WITTENSTEIN development team in the tool drives Business Division. He describes his specialist field as "embedded development, in other words programming and testing software for microcontrollers".

Customer demands for more flexibility and intelligence are put into practice by the engineers as follows: flexibly exchangeable, optionally connectible direct drive machining modules – the drives – are one aspect. The other is a distributed control unit, which WITTENSTEIN refers to as the "Control Box". "All information about the machine tool's actual status converges in this control centre", Pineker continues. Which job is being manufactured right now, what condition are the tools in, are any changes scheduled, which upstream or downstream steps are necessary and have any tools broken? The Control Box provides answers to all these questions and keeps the operator permanently up to date with the help of the integrated Life Cycle Management functionality.

Pineker's experience as an electrical engineer at the dividing line between hardware and software stands him in good stead when it comes to developing communication between the microcontrollers. After writing the programs in C++ with "Eclipse", the open source tool, he then tests them with software tools using an oscilloscope to analyze and optimize the signal waveform. Mechanics meets IT – the entire breadth of his engineer's art is called for here. Communication across different machines or production centres is controlled by real-time protocols such as EtherCAT or Profinet. Another innovative feature of Control Box 2.0 is that, in contrast to conventional controllers where the operator must be familiar with the PLC programming language, the machine tool can in future be controlled from a browser via a web interface. A few clicks of the mouse are all it takes for technicians to set the required parameters. Inventive thinking combined with a play instinct – a perfect combination for an engineer like Eduard Pineker. "Every program I develop translates something physical into motion, which means I get instant feedback on whether or not it does what it's supposed to", he says when

Electrical engineer Eduard Pineker supports the development team at WITTENSTEIN tool drives.
Photo: FERCHAU Engineering GmbH

Meets even the highest requirements for flexibility and intelligence: the tool drives mechatronic system construction kit

Rotary and linear servo systems form the backbone of WITTENSTEIN motion control's product portfolio. Motors, gearheads, electronics, sensors and software are optimally integrated and matched to one another, setting new benchmarks for mechatronic drive systems in terms of functionality, reliability, dynamics and precision. These drive systems are used in automation, robotic and handling systems, direct drive spindle systems, machine tools and production machinery as well as in special applications in extreme ambient conditions.

They are developed, produced and marketed by three separate Business Divisions: Industrial Systems, Special Applications and – the newest addition to the family – tool drives. The latter integrates all mechatronic disciplines in an intelligent, scalable and flexible system construction kit for direct drive spindle systems in the CNC machining sector.

Using the mechatronic tool drives system, WITTENSTEIN will give visitors to the Hanover Fair 2013 a chance to experience the meaning of mechatronics and Industry 4.0 close up. Come and see for yourself at our Stand No. F08 in Hall 15!

HANNOVER MESSE

prompted to sum up what makes his job so fascinating. WITTENSTEIN's strong involvement as a core enterprise in "it's OWL", the German leading edge cluster for intelligent technical systems, is the proverbial "cherry on the cake" of his work. A total of 174 cooperation partners – traditional and applied science universities as well as industrial companies – are endeavouring to transform the spectre of Industry 4.0 into smart products and production processes designed to make our lives easier.

Every detail matters

Riding the success trail with integrated drive solutions from WITTENSTEIN alpha

Christian Deppisch
Product Engineer, WITTENSTEIN alpha GmbH

Every detail matters – particularly to designers of high performance drive systems. However, it's not just the technical finesses of servo actuators that give WITTENSTEIN alpha solutions that crucial edge over competitor products: the focus on drive systems with individually tailored accessories means users are assured optimal performance every time. What's more, the holistic development approach guarantees maximum future security and cost-efficient administrative processes for customers.

Systematic added value

Thirty years ago the world's first low-backlash planetary gearheads laid the foundation for the establishment shortly afterwards of alpha getriebebau GmbH, the company known today as WITTENSTEIN alpha GmbH. Those three decades have seen a continuous evolution away from single products towards optimally interacting systems and solutions. This ability to think and act in terms of system solutions is something more and more customers nowadays take for granted when purchasing servo drives – and the pillar of WITTENSTEIN alpha's success. Although high-quality gearheads remain its core competency, the portfolio also includes a wide range of related accessories for specific applications as well as services to facilitate drive solutions with a reputation for maximum performance, availability and future security. By bundling all key aspects of drive technology in the hands of WITTENSTEIN alpha, customers also derive tangible cost benefits with regard to administrative processes compared to independently developed drive solutions comprised of individual components from multiple suppliers.

Accessories lift servo drives to the highest level

WITTENSTEIN alpha offers a broad array of connection and transmission elements that can be attached as intelligent accessories in order to align a gearhead to individual applications and round off the complete powertrain. Couplings and shrink discs with optimally adapted technology enable the full power of each planetary gearhead to be unleashed with no losses. At the same time, these accessories allow powertrains to be fine-tuned. Torque limiters protect the powertrain and drive components against overload.

High-end gearheads and optimally interacting accessories all from a single supplier: WITTENSTEIN alpha

After the overload has dropped, a TÜV certified switching mechanism permits fast re-engagement of the coupling, so that the machine is up and running again in the shortest possible time. Backlash-free, torsionally rigid metal bellows couplings compensate shaft misalignment and simultaneously ensure dynamic, precise power transmission. Elastomer couplings for dampening torque surges and vibration provide excellent concentricity and smooth running throughout the powertrain, even at high speeds.
Protect, compensate, dampen, connect – fine-tuning of each individual gearhead adds up to perfect performance: thanks not least to the cymex® sizing software, all components are designed to fit to one another exactly in a harmonious drive solution.

Everything from one source – practical benefits for customers

Reduced complexity, increased efficiency, lower costs, higher customer satisfaction – trusting in system solutions from a single supplier is a wise choice, not only from the technology perspective. Accessory items and C parts for powertrains tend to give rise to disproportionately high costs for internal processes compared to the actual value of the goods. In contrast to drive components procured from several different manufacturers, single-source systems are an effective way to optimize. After all, turnkey delivery of the gearhead and accessories means comprehensive consulting, only one purchase order, full documentation – and only one work order, one delivery note and one invoice. By integrating internal activities according to the “everything from one source” principle, business processes such as design, purchase, logistics and accounts can be significantly streamlined. Sample calculations prove that the time and effort saved can total as much as 80% of the administrative costs for the accessories concerned. This is not simply a one-off economy – on the contrary, it’s a recurring benefit that pays dividends for the customer every time a new order is placed!
In the world of servo drives holistic solutions are comprised of many different details; our success proves it’s these details that ultimately determine the quality – and the optimal choice for the customer from both a technical and a commercial point of view.

Emission-free **emotions**

eMotorcycle driven by WITTENSTEIN on course for the World Championship

Around 150 electric horsepower, more than 155 mph and lap records – the magic of motor racing is guaranteed when Matthias Himmelmann of the Würzburg Münch Racing Team races for the world title on his electrically powered motorbike. In a contest packed with emotions but completely free of emissions he once again made it onto the podium in the 2012 World Championship – thanks to the WITTENSTEIN electric powertrain specially tailored to the requirements of motor racing in his eBike.

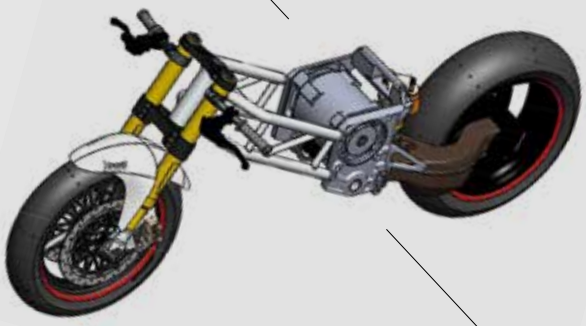
Mobility: learning from motor racing

Like any high-level sport, professional motor racing on eBikes makes extremely tough demands on both driver and materials. If, therefore, the challenges can be mastered in a motor racing vehicle, the potential for production-ready innovations that enhance the performance of eMobile drive concepts is high. This is also WITTENSTEIN's strategy as a pioneer in the electric motor racing world. "Electric motorcycle racing in general, and our cooperation with the Münch Racing Team in particular, represents an ideal experiential field to assess exactly how electric drive technology can support the eMobility cause", says WITTENSTEIN's Christian Lutz. As systems engineer for the Münch motors and their power electronics, he is very closely involved in the development of powertrain concepts for motor racing together with the racing team. Insights gained in this way are directly aiding the development of close-to-series powertrain solutions for electric vehicles. As one instance, WITTENSTEIN is currently supplying a complete powertrain for high performance electric scooters to a major automotive manufacturer in its role as development and project partner.

Pole position in electric motor racing

The World Championship Final 2012 provided renewed confirmation of the fantastic performance that is meanwhile realized by WITTENSTEIN powertrains in motor racing vehicles. "In the course of the free practice sessions and the qualifying race, Matthias Himmelmann and his electric racing machine

High performance powertrain for the electric racing machine: with motor and power electronics made by WITTENSTEIN



Matthias Himmelmann on his Münch eBike (main photo) and at the podium ceremony of the TTXGP international racing series in Daytona, Florida (small photo, right), together with WITTENSTEIN systems engineer Christian Lutz.

outsped more than twenty other contestants riding conventional IC bikes, set new lap records and attained maximum speeds in excess of 150 mph", reports Thomas Petsch, Manager of the Münch Racing Team. Although already explicitly designed for motor racing, the WITTENSTEIN electric motor was further fine-tuned during the practice laps to meet the special requirements of the Speedway. As a result, the Münch eBike achieved a top speed of 155 mph on the straights. In the "all-electric" final Himmelmann's only view of all the other eBikes was in the rear mirror – all except one, that is.

High tension in the race for the championship

The big day finally arrived: on October 21, 2012, the World Final of the TTXGP (Time Trials Extreme Grand Prix) World Championship racing series was held on the three-and-a-half mile long Daytona International Speedway. The winning teams are determined every year in three continental championships – in Europe, Asia / Australasia and North America – before battling it out in a single race for the top accolade in the season finale. As World Champion in 2010 and 2011 and European Champion in 2012, Matthias Himmelmann was tipped as top favourite – despite stronger-than-ever competition.

The World Final was decided amid high tension in every sense – with the Münch machine, or rather the motor side of the drive, spinning around the track with 500 amps and 370 volts, the race turned out to be incredibly exciting. After starting from third place, Himmelmann gradually closed up lap for lap on the eBike of leader Steve Atlas of the American Brammo team, but could not find a way to get past him.

Petsch recalls the thrilling event: "Himmelmann crossed the finishing line as runner-up – a tremendous success in view of the totally different opportunities available to the US and Chinese teams with their optimal financial footing."

Award winning
The »body conscious« pcb

Michael Matthes
Expert for New Electronic Technologies / EDA Systems
Engineering Office Electronics, WITTENSTEIN electronics

From electric toothbrushes through mobile phones to countless other everyday items: life today would be unthinkable without electronics – or printed circuit boards. They are also essential for active medical implants, which perform the function of muscles, for instance, inside the human body. Yet would you really want to have a pcb the size of a postcard fitted inside you during an operation? And how can you be sure it will function absolutely reliably? After all, "repair ops" are something to be avoided if at all possible.

Finger-sized miniature electronics, not a postcard-sized pcb

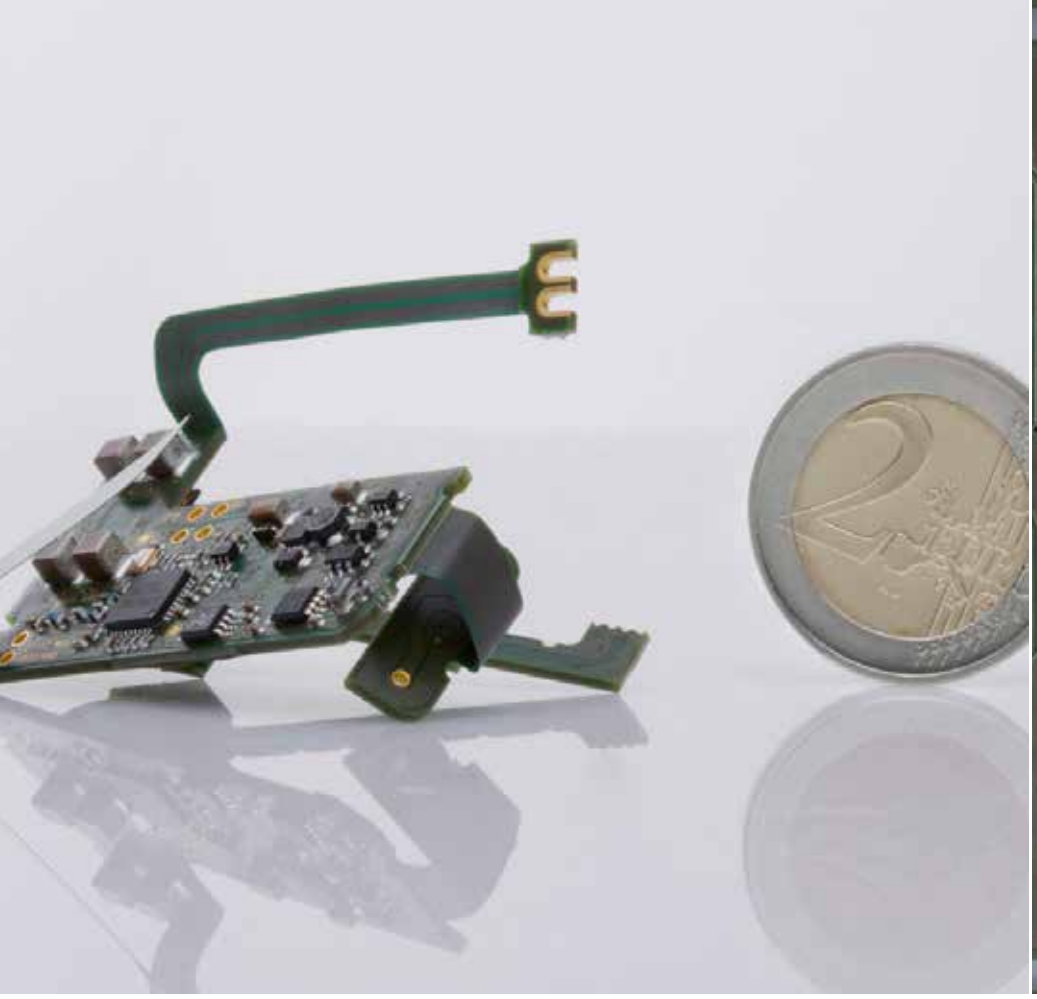
WITTENSTEIN electronics has the answer – a compact, "body conscious" 3D printed circuit board. The development of this novel pcb design was sparked by a WITTENSTEIN intens project, where work is currently in progress on a new kind of active implant featuring wireless power and data transmission. Michael Matthes, Expert for New Electronic Technologies at the WITTENSTEIN electronics Engineering Office Electronics, and his team have come up with smart, miniaturized 3D pcbs for precisely these implants. "They're no bigger than your little finger, which means they can in future be integrated in many different implants and save considerable space", Matthes explains.

Flexible conductors and "hidden" components

In order to achieve a pcb that is sufficiently small and reliable to enable the implant's electronics to be fitted inside the patient's body, WITTENSTEIN electronics trod completely new paths. Using various embedding processes, active components such as circuits and passive components like resistors are accommodated not only on the top and underside of a Starrflex pcb, which is composed of a combination of rigid and flexible regions, but also in the board structure itself. "Embedding these components cuts down the amount of space they require enormously and makes the board much more compact", Matthes continues. "What's more, the pcb can be bent into a 3D body at the flexible conductors, so that it then measures just 39 x 25 x 7 millimetres."

Details embedded in the design

This printed circuit board design makes use of specialist know-how that has been continually developed and extend-



Hardly any bigger than a 2 euro coin: the Starrflex pcb from WITTENSTEIN electronics for medical applications

Components assembled on top of the pcb with removable test structure

ed by WITTENSTEIN electronics over the last few years. In addition to the board's intended functionality this design also has to comply with certain requirements and restrictions. Defined components are only permitted to be installed in defined positions on the pcb, for example, and contact holes in or through the board must be extremely precise, i.e. specified as a fraction of a millimetre. Matthes: "Finally, all of this has to be actually feasible to manufacture, to allow us to produce a real electronic product from the virtual computer model of the board". He and his team have succeeded in optimizing the electronics for use in the human body by reducing its size and increasing its reliability to an unprecedented level.

First place for the implant pcb

The "body conscious" 3D pcb is an award winning solution with multiple advantages for patients. At the end of last year, Michael Matthes and his team at WITTENSTEIN electronics were presented with the PCB Design Award 2012 in the 3D / Form Factor category by FED, the German Association for the Design and Production of Printed Boards and Electronics, in recognition of their development, design and manufacturing know-how. This honour for WITTENSTEIN electronics was shared with Würth Elektronik GmbH, where the miniaturized pcbs were produced in almost thirty different steps, many of them highly complex.

Not restricted to medtech

The novel technology opens up numerous opportunities for WITTENSTEIN AG because the miniaturized printed circuit boards are ideally suited for a host of applications – far exceeding the small segment of medical implants. Higher integration of feedback encoders in motors or smart sensors embedded in gearheads are just two examples that spring to mind.

Wireless power transmission
for active medical implants

The inductive power transmission system supplies medical implants with power wirelessly through the tissue.

The transmitter coil is attached to the skin; the receiver coil is fitted underneath the skin, from where it powers the implant.

Felix Grödl
Development Engineer, WITTENSTEIN intens GmbH

FITBONE®, the motorized intramedullary nail, integrates an innovative technology that WITTENSTEIN intens has been employing with great success for some time now: wireless power transmission through the skin into the implant. Another product the intens subsidiary's engineers are currently hard at work developing – a urological implant – will one day also have a wireless power supply. Yet how does this power actually get inside the human body? How reliable is the transmission method? And is the patient forced to put up with risks and side-effects?

Immobilizers and electric toothbrushes show how it works

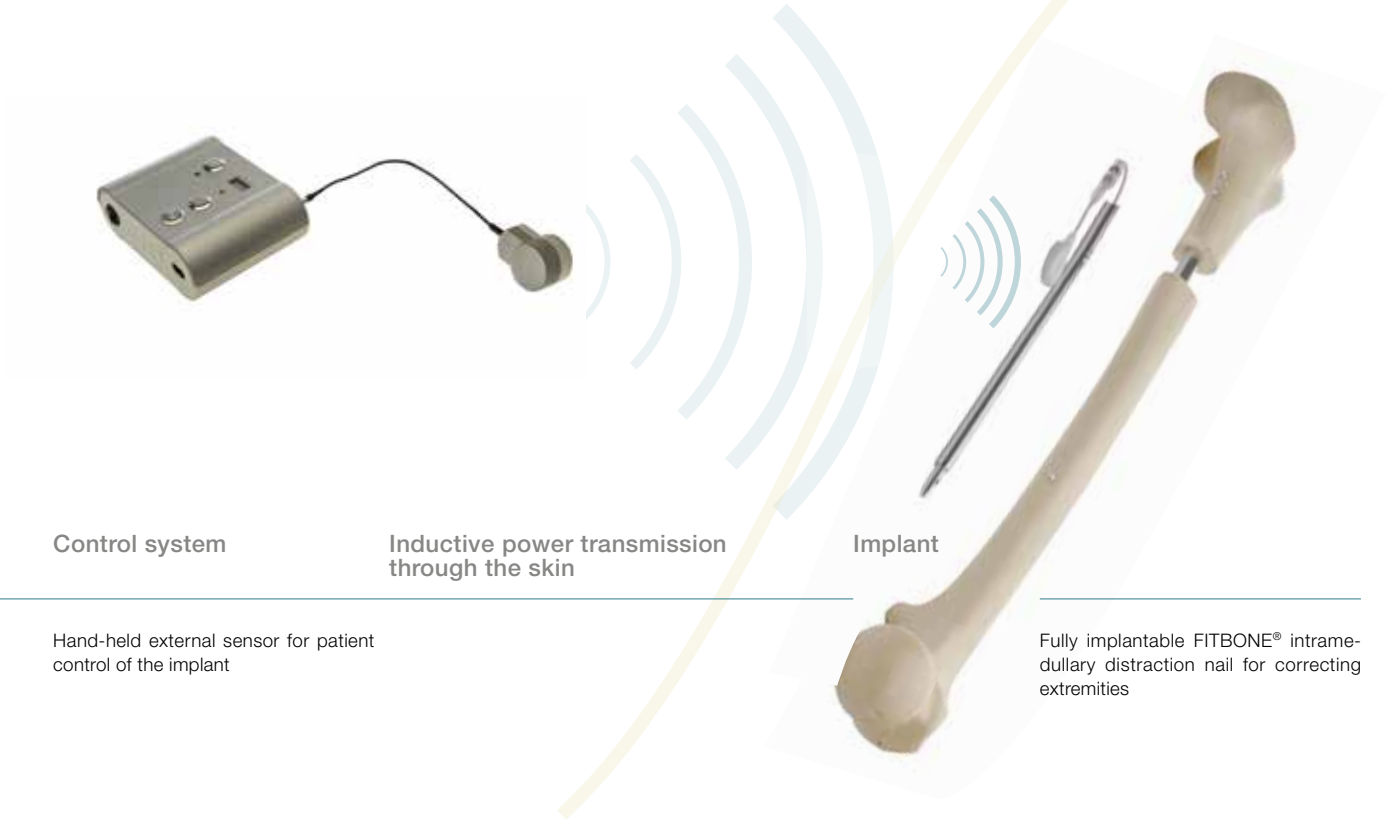
To enable each patient to be treated as comfortably as possible, WITTENSTEIN intens has developed a power supply system based on induction that operates wirelessly. The underlying principle is already very familiar – for example from lift passes in ski resorts, vehicle immobilizers, contactless badges and pass cards or electric toothbrushes. Two coils are required regardless of the application: one to transmit the power and one to receive it and supply it to the implant. With medical implants the transmitter coil is generally attached to the skin. The receiver coil is fitted underneath the skin, either in the fatty tissue or in an outer muscle layer. Power is transmitted through the tissue – completely invisibly and with no itching or pain.

Optimized system design for reliable power transmission

The distance inside the patient's body over which power needs to be transmitted between the two coils can vary considerably depending on the implant site. Added to this, the position and orientation of the internal coil can easily change whenever the person moves. These two factors – the distance and the alignment of the coils relative to one another – are crucial for the design of the inductive power transmission system. It is possible to simulate the actual transmission characteristics and then select the coil type – air or ferrite core – that promises the highest efficiency. The implant also determines other key data for the transmission system by means of the operating voltage and the power input. Once these parameters have been defined, the optimum coil geometry can be calculated with the help of a special simulation tool. In other words, the system is perfectly matched to the future application as early as the design stage – with the result that efficiencies of well over 90% are consistently achieved even in case of angular errors or coil misalignment.

Power transmission in measured doses

No matter how vital reliable power transmission may be from a technical point of view, there is one aspect that ultimately takes precedence over all others, namely tolerance or – put another way – the patient's health. To rule out unnecessary damage to the tissue through which the power passes, the



Control system

Hand-held external sensor for patient control of the implant

Inductive power transmission through the skin

Implant

Fully implantable FITBONE® intramedullary distraction nail for correcting extremities

system is always designed so that the implant only ever draws as much power as it actually needs. A constant voltage of between 8 and 24 V is typical. The temperature is monitored continuously based on the simulated temperature rise in the implanted components: even with a high transmitted power of 20 W, the components never heat up more than 1.8°C – in line with the requirements for active implants.

When power transmission is simulated in the framework of the system design, account is additionally taken of potential error scenarios, for example due to conductive materials such as orthopaedic screws or intramedullary lengthening nails in the vicinity of the transmission site. Since the simulation also shows the optimal arrangement of the components relative to one another, eddy current losses or undesirable temperature rises are excluded along with electromagnetic interference acting on the implant electronics. Possible malfunctions of the individual components in the body can thus be detected early on before they have a chance to harm the patient's health.

Broad array of applications

The power transmission system for active implants developed by WITTENSTEIN intens is CE-compliant and meets all safety and ergonomic requirements for electrical medtech equipment and systems. The general conditions and constraints for use in urological implants are currently under investigation: assuming a 30 mm transmission path and a transmit power of 5 W, an implantable coil with a diameter of 35 mm and a height of 3 mm would appear to be ideal. Even if the coils have an angular misalignment of up to 20 mm with an angular error of 20°, this would still facilitate optimal power transmission. There are already plans to transpose the inductive power transmission principle to other medical applications such as an adjustable gastric band or in order to measure stress in implants, drug pumps or heart support systems. The same technology is also suitable for non-implantable medical products. The fact that no cables are required not only offers the patient increased ease of operation and movement; it also allows the devices to be completely encapsulated – a huge advantage for cleaning, disinfection and sterilization.

A perfect match:
Brushless DC motor and compact amplifier combined

Siegfried Wallauer
Product Manager,
WITTENSTEIN motion control GmbH

An unbeatable doubles team with high performance potential – WITTENSTEIN's new, compact "simco drive" servo amplifier and the innovative brushless DC motors in the "cyber dynamic line" family are tailor made for anyone seeking a space-saving actuator solution. They are primarily targeted at applications where precise traversing and positioning at high speeds is a must, for example in the machine tool, electronics and packaging industries or in robotics and handling systems.

simco drive: A trendsetter among servo amplifiers

The simco drive servo amplifier was developed by WITTENSTEIN motion control for electronically commutated (EC) servo motors with up to 500 W continuous power and 1 kW peak power. Designed with IP65 protection, the amplifier can be installed in the field at distributed locations, i.e. directly adjacent to the actuators. This not only means far less wiring for users compared to centrally arranged amplifiers; it also allows the entire actuator solution to be flexibly integrated into the architecture of a wide range of machines. The operating personnel are guided by an intuitive graphical user interface whenever the machine is started up, diagnosed or serviced, enabling integration or maintenance work to be completed very efficiently in minimal time. simco drive offers maximum openness and flexibility when data is transferred to the control level or when communicating with the actuators.

cyber dynamic line: Brushless DC motors with high dynamics

The new brushless DC motors in the cyber dynamic line family enlarge the WITTENSTEIN cyber motor portfolio of three-phase permanent magnet synchronous motors. This electronically commutated motor series, which was designed for performance ranges between 25 and 335 W, creates new opportunities for machine design with a set of advanced and innovative features. Thanks to the high dynamic factor, it achieves higher acceleration values as a starting point for correspondingly higher throughputs and cycle rates. The high

Motor and controller from a single supplier
The performance potential is optimally matched for maximum dynamics and investment security with no interface risks regardless of the application.

Dieter Uhl
Sales Engineer,
WITTENSTEIN cyber motor GmbH

torque constant is another advantage of all cyber dynamic line motors. It paves the way for smaller cable cross-sections and more compact servo controllers – saving space and money. The high torque at low speeds – plus the large shaft diameters at the output – also makes the motors suitable for use as gearless direct drives.

The ideal doubles team for machine builders and end customers

The combination of the simco drive servo amplifier and the brushless DC motors in the cyber dynamic line offers many important benefits for machine builders, integrators and end users. The fact that the motor and controller are both available from one suppler results in technically optimized solutions – with no interface risks. The elimination of the parameterization step cuts the time for commissioning. The one-cable concept adopted for the amplifier-motor connection facilitates fast, economical wiring. Both components were incidentally also designed for use in adverse environmental conditions – which they withstand without any problems. Their functional surfaces are quick and easy to clean – a crucial argument in industries like textiles, paper and packaging. The performance of the servo amplifiers is perfectly matched to the performance potential of the brushless DC motors, for example to their fast current control and high current resolution. The outcome: maximum dynamics regardless of the application.

On the safe side with WITTENSTEIN technology

The simco drive servo amplifier and the brushless DC motors in the cyber dynamic line together form the backbone of high performance drive solutions in the ranges and applications described here. The unique synthesis of innovative technologies and perfect interaction guarantees optimal investment security.

Dr. Manfred Wittenstein welcomes the two scholarship winners for 2012 – a double intake year in Germany – to the WITTENSTEIN Headquarters in Igersheim-Harthausen. Katrin Michelbach of Bad Mergentheim embarked on a degree course in Electrical Engineering in Stuttgart last autumn. Lukas Hofmann, who intends to study Physics or Aerospace Engineering starting next autumn, mentions perseverance and dependability in all aspects of life as particularly important and valuable qualities.

WITTENSTEIN Foundation

Start-up support for a scientific career

Every year, thousands of youngsters leave school with good grades and the desire to study for a college or university degree. Unfortunately, they are often undecided about what to study or where – and above all how to pay their rent. The WITTENSTEIN Foundation provides a possible answer, at least to the last of these questions. It offers scientifically literate pupils at the Deutschorden-Gymnasium school in Bad Mergentheim the chance of a scholarship as a good way to finance their life as a student.

"It's more than just a monthly cash injection to cover at least some of the cost of being a student; you also have easier access to holiday jobs and placements", reports Andreas Rüdenauer, scholarship winner in 2004. He went on to study Mechanical Engineering and meanwhile works as a research assistant at the Institute of Vehicle System Technology at Karlsruhe Institute of Technology (KIT). Karolin Pusch, who was awarded a Foundation scholarship in 2009, is equally delighted to have "the backing of a strong sponsor like WITTENSTEIN" while she completes her course.

Talented youngsters from the Tauber Valley as global technology innovators

The sponsorship programme will come of age this year when a scholarship is awarded to a talented youngster from the Tauber Valley for the eighteenth time. It is the WITTENSTEIN Foundation's declared aim to promote promising young scientists and engineers and motivate them to take a degree in an engineering discipline. "Natural sciences form the backbone of our prosperity and to renounce our relentless pursuit of knowledge would be immoral", says Dr. Manfred Wittenstein, who initiated the Foundation, when asked about the reasons for his commitment. Rather than looking far afield, he elected to foster mainly local talent on his own doorstep. The success of this strategy proves him right: every one of the almost twenty scholarship holders to date – two of whom have also been awarded a doctorate – are currently studying attractive, cutting-edge subjects or working in future oriented professions: informatics, biotechnology, electrical engineering, mathematics, physics, chemistry, business engineering or aerospace engineering, not forgetting a few in drive engineering.

Andreas Rüdenauer, scholarship winner in 2004, has meanwhile graduated in Mechanical Engineering.

Karolin Pusch was awarded a WITTENSTEIN Foundation scholarship in 2009.

Award for outstanding achievements

Following an intensive scrutiny of the candidates' applications, the WITTENSTEIN Foundation Board finally decides which student from the Deutschorden-Gymnasium school will receive the coveted scholarship. The choice becomes more and more difficult every year as the standard of scientific achievement by school leavers continues to rise. Although the Foundation can only award one scholarship a year – the double intake year 2012 has so far been the only exception – it is nevertheless keen to honour the remarkable work and dedication of the many unlucky applicants.

They too therefore benefit from placement opportunities at WITTENSTEIN as well as various other forms of support. "We welcome any up-and-coming scientist or engineer who makes the effort to stay in contact with us", Dr. Wittenstein emphasizes.

Honour, motivation and launching pad in one

Once a year – just a few days before Christmas – current and former scholarship winners convene in the Tauber Valley to exchange ideas and experiences, engage in networking and reminisce about old times. Karolin Pusch has some excellent advice for the talented school leavers: "Pluck up your courage, keep your eye on the big picture and trust your intuition and your gut feeling". All scholarship holders up to now have taken advantage of the tangible and intangible start-up capital provided to them by the WITTENSTEIN Foundation as a launching pad for their future career. Some of the older ones among them are studying for their doctorate or have already completed it. Several have become successful entrepreneurs while others work in scientific or research institutes. Across the board they have made the most of their abilities and achieved their lofty goals – in mechanical engineering, the development of powerful batteries for electric cars, biotechnology, the IT industry and software development. Everyone to have profited in the past is unanimous on one point: a WITTENSTEIN Foundation scholarship is more than simply financial support – it's an honour, distinction, motivation and door-opener for a successful scientific career.

Sibiu – centre of an emerging region in Romania

Congratulations to Romania: Felicitări, WITTENSTEIN SRL

Is it only five years ago or five years already? Whichever way you care to look at it, the WITTENSTEIN production facility in Şura Mică, just outside Sibiu, will be celebrating its fifth birthday a few weeks from now. More than thirty staff are meanwhile employed at our Romanian subsidiary: an exciting time lies behind them – and a worthwhile future ahead of them.

A strategic response to globalized markets

Back in 2005, WITTENSTEIN took a strategic decision to set up a production location in Romania in order to create new resources for manufacturing drive components. Since then, the facility has been regularly extended in its capacity as a core competence centre for a new Economy series and a base from which to serve the international industry. "The market for Economy products is very price sensitive: a lot of our competitors hail from Asia", explains Markus Rothenfels, General Manager of WITTENSTEIN SRL alongside Andreas Faulhaber. "The Romanian site with its low-cost products 'made by WITTENSTEIN' is our answer to Asia's labour cost advantage."

Transylvania – a perfect location

Why Romania and why Transylvania – after all, most people think of Asia when the objective is to shift capacity out of Western Europe? The reasons are complex. "We didn't construct the production facility simply to transfer capacity from A to B; on the contrary, we wanted to build up new capacity that would allow us to break into new markets", Faulhaber comments. "You could argue that our decision to invest in Romania is a logical continuation of the notion of an integrated, common Europe."

There were obviously also commercial aspects involved yet as Rothenfels adds, the fact that Transylvania offers an ethnic German setting is a benefit that no money in the world can buy. Many people there still speak German and so the

The WITTENSTEIN manufacturing plant in Şura Mică opened five years ago.

language barriers are much smaller – both in contact with the local population and with the firm's own staff. What's more, the Sibiu region also has a flourishing economy.

An attractive employer for people in the region

Since its foundation five years ago in June 2008, WITTENSTEIN SRL has developed into an altogether attractive employer. "I always look forward to going to work in the morning", says Production Manager Felix Szabo. His colleague Stefan Petres of Logistics Management continues: "WITTENSTEIN provides me with a good, secure job that fills up many hours of my life. It gives me a perspective for the future – and maybe my children will gain in the same way." Rodica Kornae of the Winding Shop makes another valid point: "What matters most to me is that the company empathizes with my situation and that it gives me the strength and security I need to fulfil my role as a working mother."

The staff in Şura Mică, for whom family is traditionally very important, find reassurance in the family-dominated corporate culture, which they actively help to shape. "For one thing, the people who work here are proud to belong to the company because clean workplaces, brightly lit halls, well looked-after recreation rooms and remuneration that isn't based on piecework are still far from standard in Romania", Andreas Faulhaber remarks. "For another, there's a relatively strong desire on the part of employees and their families to bond with one another. In summer or at Christmas, whenever we hold a party for them and invite the whole family, the children invariably beg their parents afterwards to let them visit the factory again soon."

The constructive cooperation and typical willingness to help of the Romanians in general are just as vital a part of the WITTENSTEIN culture as the firm's offer to identify and develop the personal strengths and aptitudes of each individual. "We offer a whole series of options for further training such as

Joint General Managers of WITTENSTEIN SRL:
Andreas Faulhaber (left) and Markus Rothenfels

First-hand inspection: Dr. Manfred Wittenstein (right)
and Stefan Petres in the Winding Shop

induction for new employees at the German headquarters in Igersheim, on-site training by colleagues from Germany or German lessons with all expenses paid", Faulhaber reports. "Motivated, dedicated staff who remain faithful to the company for a long time are our goal."

Not only the WITTENSTEIN SRL workforce, however, but also the people in the Sibiu region profit from the company's involvement. Together with the German Business Club Transylvania and other firms in the local area, WITTENSTEIN has launched various initiatives to promote dual training for staff and lend specific support to the nearby vocational training college: a CNC milling centre and several laptops for use in a classroom are about to be donated.

Strength from within – business success drives further growth

WITTENSTEIN is investing some fifteen million euros in its Romanian production facility in the long term – and it's definitely money well spent: from its humble beginnings with a mere ten staff in 2008 WITTENSTEIN SRL has meanwhile more than trebled in size to thirty-two and is predicted to stay on this rapid growth trajectory for the next few years.

The company is systematically pushing ahead with its evolution to a core competence centre for "Economy" products within the WITTENSTEIN Group: in addition to production and assembly it will in future also be responsible for developing and selling the series concerned. Space will not be a problem – the premises are big enough to extend the existing building with four additional production shops with room for up to four hundred employees.

At the latest when the fifth hall goes up, it will be high time to reiterate our congratulations: Felicitări, WITTENSTEIN SRL!

TRADE FAIR CALENDAR 2013 (selection)

Hanover Fair, Hanover (Germany)
Motion, Drive & Automation, Hall 15, Stand F08
MobiliTec, Hall 25, Stand K12 (02)
WITTENSTEIN Group
April 8 to 12, 2013

Indumation, Kortrijk (Belgium)
National Trade Fair for Factory, Process and Infrastructure Automation
WITTENSTEIN bvba
April 24 to 26, 2013

IFFA, Frankfurt (Germany)
International Trade Fair for the Meat Industry
WITTENSTEIN motion control GmbH
May 4 to 9, 2013

OTC, Houston (Texas / USA)
International Offshore Technology Conference
WITTENSTEIN motion control GmbH
May 6 to 9, 2013

LIGNA, Hanover (Germany)
The Most Important Event for the Timber and Woodworking Industry Worldwide
WITTENSTEIN motion control GmbH
May 6 to 10, 2013

SPS IPC Drives Italia, Parma (Italy)
Europe's Leading Exhibition for Electric Automation
WITTENSTEIN S.P.A.
May 21 to 23, 2013

Metalloobrabotka, Moscow (Russia)
International Exhibition for Materials Processing Technologies, Machines and Tools
WITTENSTEIN alpha GmbH
May 27 to 31, 2013

Paris Air Show, Le Bourget (France)
Salon International de l'Aéronautique et de l'Espace
(Joint stand of the German Aerospace Industries Association (BDLI))
WITTENSTEIN aerospace & simulation GmbH
June 17 to 23, 2013

EMO, Hanover (Germany)
The World's Premier Trade Fair for Metalworking Technology
WITTENSTEIN alpha GmbH
September 16 to 21, 2013

Motek, Stuttgart (Germany)
International Trade Fair for Assembly and Handling Technology
WITTENSTEIN Group
October 7 to 10, 2013

Forum Maschinenbau, Bad Salzuflen (Germany)
Trade Fair for Suppliers in the Machinery Manufacturing Industry
WITTENSTEIN Group
November 6 to 8, 2013

SPS IPC Drives, Nuremberg (Germany)
Exhibition for Electric Automation – Systems & Components
WITTENSTEIN Group
November 26 to 28, 2013