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Digitalization means teamwork | WITTENSTEIN shapes the digital transformation

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Galaxie®: Nominated for the Deutscher Zukunftspreis 2018 | Interview with Dr. Manfred Wittenstein and Thomas Bayer

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CAD POINT | Right to the point



Racks

**Made in Switzerland**

Center of competence for linear toothing

# move

The magazine for customers and partners of WITTENSTEIN SE

## Masthead

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Dear readers,

Some do, some dream and some do both. The author of these shrewd words is unfortunately unknown, but it's highly likely that he put them to paper based on his own experience. Doing one thing without neglecting the other – provided you know how to strike the right balance, you'll manage fine in the long run and lasting success will be yours. It's a simple fact – and one that fits in exactly with the strategy of an innovative, family-run firm. In the context of the WITTENSTEIN Group it means that our mechatronic drive solutions are, first and foremost, the outcome of the needs which you, our customers worldwide, have today. At the same time, they are guided by the needs you will probably have tomorrow. Technological visions and disruptive ideas will lay the foundation for our shared marketability in the future, on both a regional and an international level.

This latest issue of *move*, our customer magazine, demonstrates that this dual strategy is a valid one to prepare us optimally for the future: in the U.S. and Switzerland, for example, WITTENSTEIN's manufacturing facilities have been enlarged. We are responding to the consistently good economic climate by expanding our production space and our capacities across different locations. Proven gearbox or motor versions regularly undergo technological upgrades. Through unconventional thinking and the constant pursuit

of elementary improvements we create user and application-specific solutions together with our customers in the most diverse industries and markets.

Yet where does the main potential lie for tomorrow and beyond? In chance inventions like the microwave or photography? Hardly. In the engineering industry, fundamentally new technologies come about when bold, non-conformist thinking falls on the right fertile ground, when creative chaos is allowed to persevere and everyone follows the same guiding star. And when an invention becomes an innovation which literally "makes the impossible possible".

WITTENSTEIN's Galaxie® gearbox is one of those rare lighthouses: having already won the Hermes Award 2015 and the Innovation Award of the German Economy 2016, it has now been shortlisted for the Deutscher Zukunftspreis 2018, the Federal President's Award for Innovation in Science and Technology, under the heading "A radically new gearbox class – productivity leaps in the engineering industry". Galaxie® has long fulfilled the two crucial nomination criteria: an outstanding scientific innovation with the potential to create sustainable jobs.

Erik Roßmeißl

The WITTENSTEIN SE Management Board

The myth persists that digitalization will cause people to be replaced by machines and destroy jobs: Since the end of 2016, Patrick Hantschel's team of experts – combining specialist knowledge in sensors, electronics, software, data and the cloud – has grown to nearly 30 and is still growing. All of them are helping to lead the digital transformation at WITTENSTEIN.

# Digitalization means Teamwork

A group of people in a meeting looking at a screen with a digital network overlay. The image is a composite of several people's faces, mostly men, looking upwards and to the right. Overlaid on the image is a complex network of blue lines and nodes, resembling a data network or a digital infrastructure. The nodes are small, glowing blue circles, and the lines are thin, connecting the nodes in a web-like pattern. The overall color palette is light blue and white, giving it a clean, professional, and technological feel.



In the spotlight:

**Patrick Hantschel** (40) is a qualified mechanical engineer, electrotechnician and business administrator. He joined WITTENSTEIN in 2012 and was appointed Manager Digitalization Center at the end of 2016.

### 3 questions to Patrick Hantschel:

*Digitalization is meanwhile gaining a foothold in the engineering industry. How is that impacting on you?*

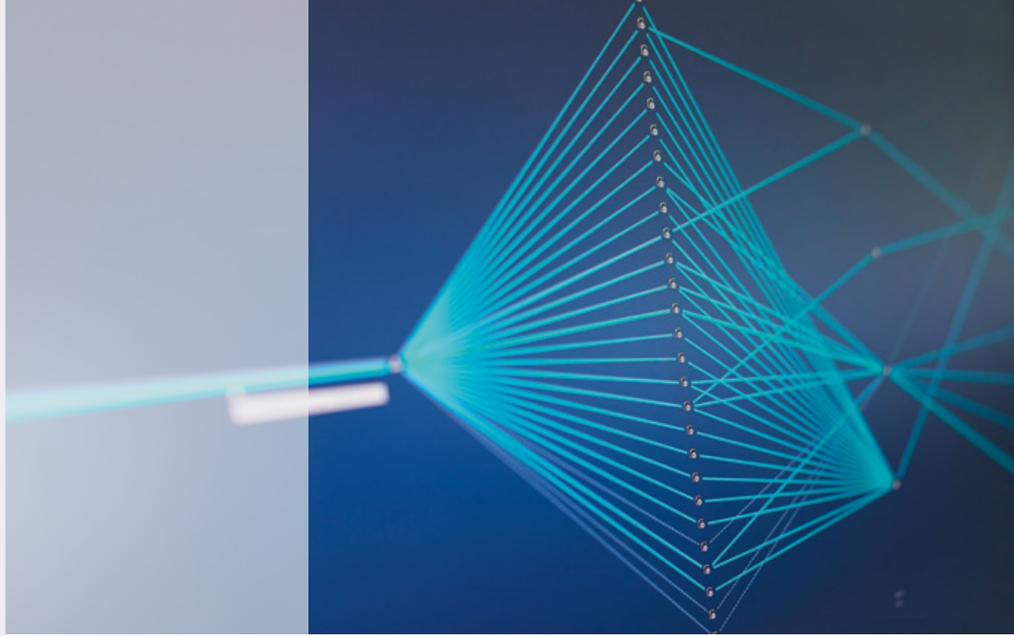
Hantschel: There's a strong motivation to create smarter products. In the future, systems will need to adapt quickly to changing requirements. That way, we can manage the trend towards mass customization. Expanding networking capabilities both within the machines and along the entire value chain is the biggest challenge next to data security.

*Will digitalization trigger an evolution in engineering?*

Hantschel: Yes, there's no doubt about that! Interconnecting products with self-diagnostic functions will be the core elements of integrated production systems. In the factories of the future, people – and indeed whole production lines – will have the ability to self-optimize thanks to decentralized intelligence. At the same time, more and more knowledge will be generated from data. WITTENSTEIN is already working on ways to offer that knowledge, and the resulting digital services, to customers.

*Will the digital transformation give rise to a new mental attitude?*

Hantschel: Absolutely. In the engineering industry, it's standard practice to describe a project's specific benefits upfront – that's not how the digital world works, though. It's full of surprises, both positive and negative. The benefits are often revealed in places where no-one ever imagined. I've lost count of the times people have asked me 'What's the point of it?'. It's an attitude that desperately needs to change. Digitalization is partly about having courage: courage to try out new things. Courage to fail at the first hurdle. Courage to start again.



#### Four agile trains

The Digitalization Center unites four strategy fields, also referred to as agile trains. "Each train represents a strategic focus and transports a whole series of initiatives and projects", Hantschel explains.

In the Smart Factory strategy field, activities got off the ground as long ago as 2012 at the Future Urban Production site in Fellbach. The lessons learned are now also helping us to realize projects in Igersheim. The most recent example linked to production is digital escalation management: problems on the lines can in future be instantly reported to the team leader at the push of a button and analyzed without any loss of valuable time. Overall equipment effectiveness can be improved by up to 15% in this way. And that's not the only reason Patrick Hantschel – and everyone else involved – has to be proud: "It was a bottom-up idea that came from a colleague in Production. That shows how the digital mindset is becoming increasingly commonplace in WITTENSTEIN's DNA."

The Smart Products and Data Driven Services train is no less exciting: "We want our products to have more and more integrated intelligence", says Hantschel when prompted to spell out the challenge. The first successes are already visible in a specific customer project: an XP gearbox has been extended with an intelligent WITTENSTEIN module in a shuttle and vacuum system for high-tech laser machines. The complete system now supplies sensor data on temperature,

acceleration, energy consumption, etc. to an IoT Edge Gateway, where it is collected, interpreted and made retrievable. Users thus have access to information on plant conditions, error diagnostics and predictive maintenance.

In the Smart Customer Journey strategy field WITTENSTEIN provides, and continuously develops, digital points of contact such as various online tools (cymex®, SIZING ASSISTANT and CAD POINT) or the future service portal.

All of this would be impossible without the Culture & People, Network & Strategy train. Hantschel: "Our style of working is characterized by a high degree of individual responsibility, the ability to respond rapidly to changing conditions and above all maximum transparency". Flat hierarchies, a results oriented approach rather than a project oriented one and regular public reviews are just a few examples here.

#### External cooperation

"If we didn't collaborate with external partners, we wouldn't be where we are today", Hantschel comments when the subject turns to cooperation, for instance with the German Engineering Federation (VDMA), the Electrical and Electronic Manufacturers' Association (ZVEI), the Industry 4.0 Platform, the Alliance Industry 4.0 Baden-Württemberg and the consortium of component suppliers. In particular, development partnerships with lead customers are an important building block on WITTENSTEIN's path into the digital future.

The multifaceted aspects of engineering solutions will be at the center of the WITTENSTEIN SE exhibit at the upcoming SPS IPC Drives in Nuremberg. Among other things, our various Business Units create user-specific solutions by consistently modularizing components and systems as well as through end-to-end project support combined with a high level of vertical integration.

Focused  
on your  
needs



## Portfolio of low-backlash right-angle and planetary gearboxes now complete

The WITTENSTEIN alpha General segment, to which the new CP and NP series and the right-angle stages belong, stands for performance oriented applications in the price sensitive markets of the engineering industry. Owing to the market-compatible output interfaces, the expanded range of possible coaxial and right-angle versions is suitable not only for rack-and-pinion systems but also for spindle and chain drives as well as coupling connections.

### alpha Basic Line:

#### Maximum economy and flexibility

The new generation of the CP series – with five different sizes, additional output variants and

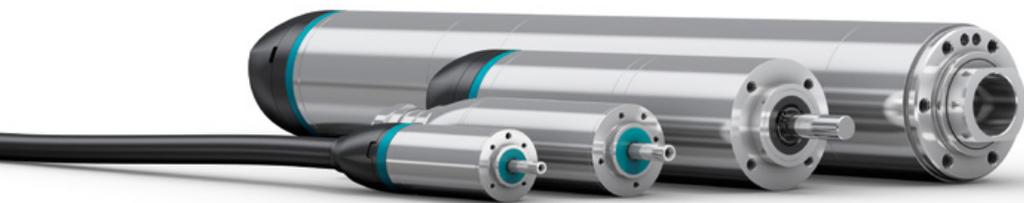
new bevel gear stages – combines  $\leq 12$  arcmin of torsional backlash in the coaxial version or  $\leq 15$  arcmin in the right-angle version with high application flexibility. New variants have likewise been developed in the CPS series, on the one hand with a replaceable B5 output flange and on the other with a long centering component – the only one of its kind in the market. The long centering option enables an even more compact connection between the new interface and the machine and simultaneously saves valuable space. The replaceable B5 output flange provides more design freedom and can be flexibly adapted to the application interfaces. This combination of performance characteristics

predestines the alpha Basic Line for feed axes for handling kinematics in the packaging industry as well as for belt drives, positioning axes on delta robots and machine tools with short, linear spindle motions.

### alpha Value Line:

#### “Individual talents” for driving any axis

Absolutely precise positioning, maximum configuring flexibility, lifelong reliability and economic efficiency – these features all help the modular NP gearbox series in the alpha Value Line deliver optimal performance in the most diverse axes and applications. Five different coaxial gearbox variants are available – each of which can now



## Toolkit for small servo drives – more than 12,000 possible configurations

Big performance, small footprint: more and more users are now praising WITTENSTEIN cyber motor's further expanded toolkit for small servo drives as the ideal solution for demanding tasks. One reason is that it enables configurations tailored to individual requirements, with no interface risks – in more than 12,000 different combinations.

### Scores of requirements catered for

Our small servo motors are available in four different sizes in the standard housing, a stainless steel version or the Hygienic Design version. A variant with an integrated screw also exists which – unlike pneumatic cylinders – permits precise and flexible position control irrespective of the application without any retooling on the machine. Furthermore, advanced, hybrid, single-cable technology is used for communication with the servo controllers, leading to lower connection costs. When it comes to power density, industry grade design, connectivity and innovativeness, the market gives only a very few adequate answers.

### Output ratings between 25 and 335 watts

The industrial grade small servo motors in the cyber® dynamic line are available for output ratings between 25 and 335 watts. When teamed up with the real-time capable servo controllers in the cyber® simco line, whose decentralized intelligence permits autonomous positioning regardless of the control system, they make a perfect couple for solving complex motion tasks.

### New developments the alpha Basic Line and the alpha Value Line

[LTR]: CP, CPSK, NPTK

also be supplied with the new right-angle stages. With umpteen possible reduction ratios from  $i=3$  to  $i=100$  and multiple interfaces to the motor and the application, they can be individually adapted to each customer's specific requirements. The performance range for which the alpha Value Line was designed is characterized by low torsional backlash of  $\leq 8$  arcmin – or  $\leq 15$  arcmin in the right-angle version – together with precision, dynamics and power density oriented to the application plus total freedom from maintenance.

### The small servo motors in the cyber® dynamic line

These small servo motors are offered in a rugged stainless steel housing with various diameters and are characterized by high torque density.

### The cyber® simco line

When teamed up with the servo controllers in the cyber® simco line, the small servo motors make a perfect couple for solving complex motion tasks.



Several different fieldbus interfaces are possible – CANopen, EtherCAT, PROFINET RT/IRT, EtherNet/IP or Sercos III – providing the small servo drive system with a high degree of connectivity, while the integrated safety functionality (STO) ensures the highest levels of safety to SIL3 and PL e. A whole range of tasks can thus be handled in a future-proof way – adhering and dispensing, positioning of small parts as well as positioning and bending during machining operations or automated gripping.

# Salmon at *high-speed*

50% higher throughput, maximum flexibility, optimum hygiene and cleanability, total freedom from maintenance: the new servo drive concept for the BAADER 144 salmon gutting machine combines all of these benefits. Highly dynamic, compact and low-backlash TPM<sup>+</sup> servo actuators from WITTENSTEIN alpha are responsible for this increased performance.

The knife which is used to open the fish hangs on a swing arm, the height of which is adjusted by means of the TPM<sup>+</sup> actuator.



Processing time  
per salmon:  
2.4 seconds –  
processing quality 1A

The BAADER 144 can gut up to 25 salmon per minute. Our TPM<sup>+</sup> servo actuators have enabled a significant productivity improvement in terms of both quantity and quality. Several efficiency gains have also been achieved: the servo actuator can be designed one or two sizes smaller compared to conventional standard servo motors with right-angle gearboxes or timing belt side drives without compromising the power output. It is thus possible to manage with smaller and less expensive servo controllers and the energy balance is better. The bottom line: lower overall costs and superior performance. What's more, the servo drive technology is more easily accessible and very simple to replace (plug & play).

“  
Thanks to the TPM+,  
we are able to  
boost our productivity  
and redefine the  
technological standard.  
”

Carsten Paulsohn  
Development engineer at BAADER

### TPM+ dynamic servo actuators in all axes

Centering device, belly knife, sucking tool, scraping tools A, B and C – a TPM+ dynamic, and in some cases two, in size 025 is installed in each processing module. The eleventh servo actuator is the main drive. It moves the chain that pulls the salmon through the machine. A SIMOTION automation system controls the drives and synchronizes their motions. The platen on which these drives are mounted separates the actuators and the wiring from the machine's process side by means of an absolutely tight shaft gland. The TPM+ are provided with a stainless steel output as well as a special three-component paint for protection against corrosion.



#### TPM+ dynamic servo actuator – impressive in all disciplines

The rotary actuator units used in BAADER's machines are shipped with increased corrosion protection. They also have a special mechanical design: the connection between the precision gearbox and the synchronous servo motor is coupling-free. This enables a short installation length and simultaneously sets new benchmarks for dynamics, torque, torsional and tilting rigidity and smooth running. This power density made an equally convincing impression in BAADER's own comparative tests. TPM+ had no trouble beating standard servo motors with right-angle gearboxes or timing belt side drives.

#### BAADER: Integrated solutions for fish, poultry and meat processing

The BAADER Group, which has its headquarters in the North German Hanseatic City of Lübeck, specializes in the manufacture of machines and processing lines for fish, poultry and meat. When it comes to fish processing machines, BAADER is the global market leader. The company is also the third largest supplier of poultry processing technology worldwide. The Group employs nearly 1200 people at approximately 70 sites in a network covering all continents. BAADER focuses on total solutions that deliver premium product quality in all phases of processing.

#### Ambitious development goals

The demand for salmon is rising steadily and BAADER had already been looking for ways to boost the productivity of its salmon gutting machines for some time. The development goals were ambitious: to virtually double the throughput from between 12 and 16 to 25 salmon per minute, to make even complex motion sequences controllable, to improve hygiene by increasing corrosion protection and to reduce maintenance and cleaning to a minimum – and to reconcile all of that with the dimensions of the proven BAADER 142. These requirements could only be met by replacing the existing motors with more powerful servo models: for example, TPM+ enable the height of the tools inside the new BAADER 144 to be dynamically adjusted according to the natural shape of the salmon. The sucking and scraping tools are simultaneously moved through the machine as the fish are fed into the system.

#### TPM+ delivers extra performance

Whereas with other drive concepts, up to 15 millimeters of backlash at no load are the norm for the lever kinematics, these servo actuators have practically no backlash, so that the tools are moved with exceptional precision. “The two scraping tools, for instance, can be synchronized in this way, to allow operation only a few millimeters apart without colliding. Less space is required as a result of this and the process as a whole is more efficient”, says Carsten Paulsohn, a development engineer at BAADER.



Established in the year 2000, WITTENSTEIN's Grüşch subsidiary currently employs around 70 people at the new facility which has been its home since 2010. Today, approximately 100,000 racks per year are manufactured there on about 1000 square meters of office space and 2000 square meters of production space. "Our team mainly cater for clients in industries like machine tools and automation. However, thanks to our blend of passion and unrivaled know-how, our products regularly succeed in firing the enthusiasm of customers in other industries and tapping into new markets", explains Andreas Tinner, who is Managing Director of WITTENSTEIN Switzerland together with Gerhard Horn.

**Huge leap in productivity**

"Following several years of uncertainty and all the negative impacts the exchange rates have had on the Swiss market, the last fiscal year was fueled by a very positive economic climate – both on the domestic front and in the international markets", says Horn. For the two Managing Directors, there was good justification for adapting their production capacity to the changed market requirements. It is not least as a result of their investments in new milling and grinding machines that induction hardened racks in quality class 6 can now be manufactured independently. When prompted to sum up the advantages of insourcing, Tinner replies as follows: "Apart from reducing our production and material costs, we've also managed to increase our productivity enormously". And the figures prove him right: the average weekly output of racks has risen from 250 to 2000 compared to the 2017/18 fiscal year. "And we haven't gone as far as we can go yet. We want to carry on investing up until the end of FY 2018/19 and we're reckoning on an output of around 2600 racks a week", he adds. His customers are reaping the benefits: "Despite the higher volumes, we consistently record more than 90% on-time deliveries, with an average delivery time of five to six weeks", Horn confirms.

**alpha Linear Systems**

A suitable rack is an essential precondition of any machine concept. Depending on the smooth running, positioning accuracy, feed force and installation requirements, you can find the perfect rack for any application among our alpha Linear Systems.



**Tremendous commitment by the whole team**

"It takes far more than just new machinery and equipment to achieve that kind of success story", Tinner continues. He's referring to changes in the production processes, which have the backing of all employees. More than 20 new people had to be inducted during normal three-shift working without compromising the high quality standard in any way –



The Grisons canton is particularly familiar to winter sports enthusiasts. However, Switzerland's easternmost region has far more to offer than that: among other things, it is home to the WITTENSTEIN Group's center of competence for linear toothing.

# Racks

## “Made in Switzerland”

after all, the Swiss subsidiary was aiming to follow the example set by WITTENSTEIN's U.S. plant by obtaining certification under the new EN ISO 9001/2015.

“We owe our success first and foremost to our team's tremendous personal commitment and vast expertise. Their flexibility when taking on new assignments, their tenacity when optimizing proven processes or integrating new ones and their support whenever new recruits need to learn the ropes – these are all mainstays of our success as a business enterprise”, Tinner asserts.

Not surprisingly, the two Managing Directors are looking forward to the future with considerable optimism: if all of the 100,000 racks which will have been manufactured by the end of the fiscal year were lined up end to end, they'd stretch from Grüşch virtually all the way to Lake Zurich.



### Racks

Productivity and flexibility are top priorities in rack manufacturing alongside high precision.

For example, racks could be prefabricated anonymously in a standard weekly mix and then stored temporarily as semifinished products in a so called supermarket (a parts store along the assembly lines).

So every sales order starts after the supermarket. This allows to respond flexibly to customer wishes and to get by largely without a finished parts warehouse.



## Applications

An after-work beer, a night on the town – there's no room for anything like that in 21 year-old Joris Ryf's life. A Swiss mountain biker, he turned professional two years ago and has spent his time ever since in pursuit of the perfect moment in a perfect race. A cross-country specialist, he won a silver medal for Switzerland in the team event at the European Championships only a few weeks ago.



## Called up for the national team thanks to FITBONE®

He was 15 years old when he took part in his first international race in the U17 category. From then on, while still at school, he put all his energy into mountain bike training as his performance improved steadily. Unfortunately, however, he soon started to feel severe pain in his back and his knee. His sports physician diagnosed a leg length discrepancy of three centimeters. Joris was advised to wear insoles and a special shoe construction, but he never really felt comfortable with them. "It felt like the shorter leg was wearing high heels."

“

Feeling the wind in my face again  
and being able to cycle on road circuits  
was an indescribable experience.

”

Joris Ryf

### A diagnosis that could have ended his career

He was also still in pain: "If you want to train to competitive standard, you can't afford to be over-sensitive. But the way that hurt was something different." He made the acquaintance of Dr. Andreas Krieg, an orthopedic specialist, at the university hospital in Basel. His verdict could have meant the end of all Joris's sporting plans: "He diagnosed a torn posterior horn of the left meniscus, caused by the pathological load. He also found out that I had Legg-Calvé-Perthes disease when I was a child and that this was the reason for the difference in length between the two legs."

Dr. Krieg recommended a limb lengthening operation with FITBONE® – a method he had already employed to treat more than 130 patients in the past. Shortly after competing in the Swiss Championships in mid-January 2015, Joris was admitted to hospital for surgery. Seven days following the operation, his leg was lengthened with FITBONE® for the first time. "The motor made a noise like a dull hum, which I could hear through a stethoscope, and my leg grew slightly longer straight away. On the ninth day, Joris was discharged from hospital. It wasn't long before he was able to start training again. He was allowed to swim, and he also attempted to develop his endurance by riding a handcycle over asphalted surfaces.





**Dr. Andreas Krieg,**  
Senior Orthopedic Physician and  
Co-Director of KWUB, the Sarcoma Center  
at the University Children's Hospital in Basel

*How did you first hear about FITBONE®?*

*Dr. Krieg:* I was awarded a fellowship with Professor Bruce Forster in Australia, and it was there that I had my first contact with this wonderful motorized nail system. I've been performing operations with FITBONE® myself for twelve years now.

*What pathological conditions can be treated using FITBONE®?*

*Dr. Krieg:* You can treat any condition that is accompanied by bone contractions or defects, and bone segment transports are also possible. Many of these disorders are linked to tumor treatment. Bone defects as a result of an accident, or associated with tissue death or an insufficient blood supply, are likewise amenable to FITBONE® treatment.

### **The wind in his face again**

The progress the treatment was making was monitored regularly in Basel. Everything went according to plan. By March 6, both of his legs were the same length. And by the beginning of May, his meniscus had healed too and he was able to bend his knee properly once more. Three weeks later the big day finally arrived: Joris was given permission to mount his beloved bike. "Feeling the wind in my face again and being able to cycle on road circuits was an indescribable experience." By the end of the season, Joris had returned to fitness and was getting good results.

He was taken on by the Wheeler Team and selected for the U23 national team. The FITBONE® intramedullary lengthening nail was explanted in winter 2015. Six months later, Joris passed his Abitur school-leaving examination and launched into a career as a professional athlete.

Joris can continue cycling in the U23 team for one more season. After that – or so he hopes – he'll manage the leap into the elite adult team. He has his sights clearly set on a long-term goal: "Taking part in the Olympics is any athlete's biggest dream".



### **FITBONE®**

FITBONE® – the fully implantable, intramedullary lengthening nail from WITTENSTEIN intens – is a unique mechatronic system for compensating leg length discrepancies and simultaneously correcting deformities.

CAD POINT:  
Gearbox configuration  
and selection

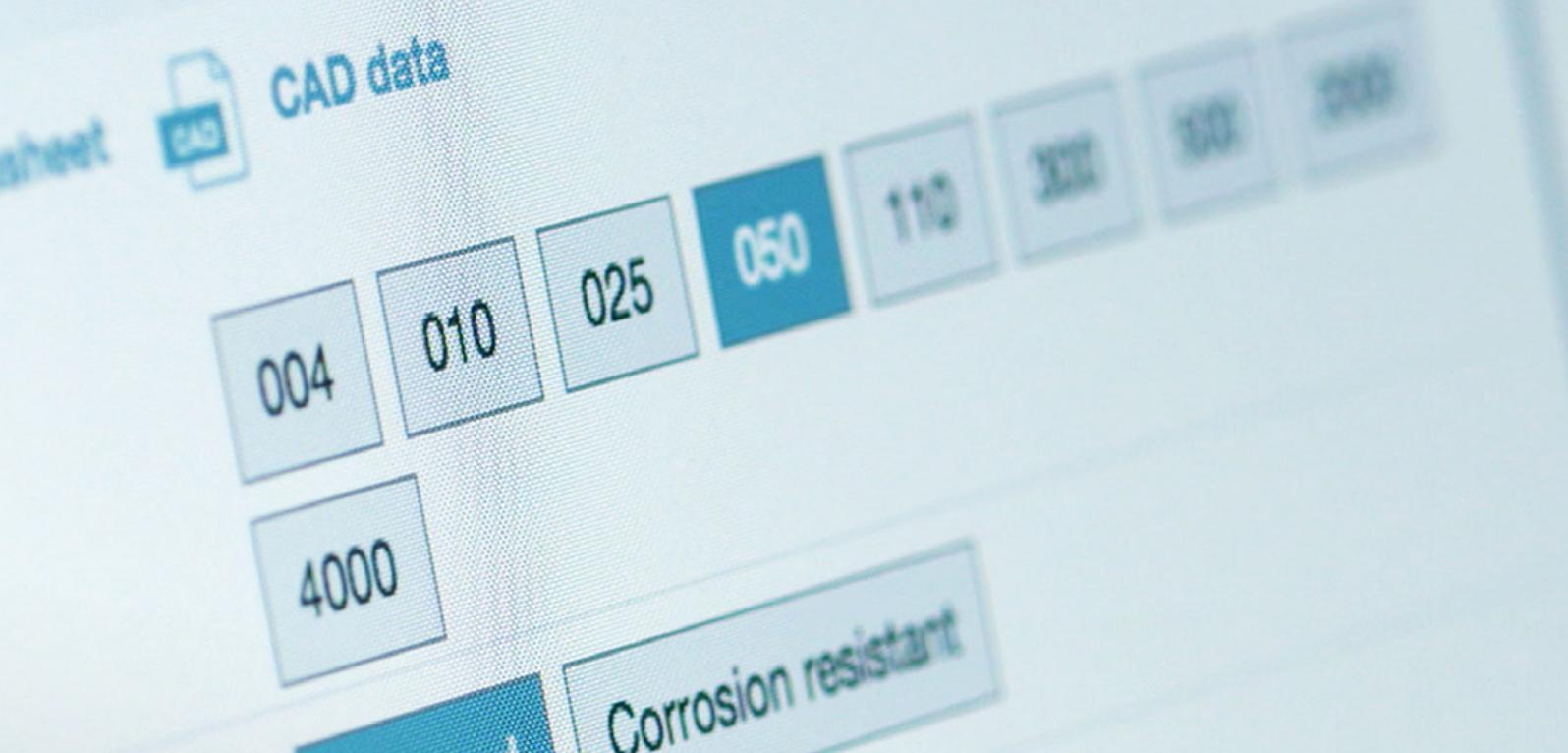
## Simple and to the point

This new online tool expands WITTENSTEIN alpha's software portfolio for efficient drive configuration and selection.

CAD POINT is designed as a smart catalog for customers wishing to access product information, data sheets and CAD data precisely with just a few clicks. The ordering code provides a quick route to specific gearboxes as an alternative to selection via the product overview. CAD POINT puts not only WITTENSTEIN alpha's entire portfolio of gearboxes and actuators but also some 16,000 motors from many different manufacturers at users' fingertips. The CAD POINT tool, which supersedes the old Info & CAD Finder, simultaneously convinces with a significantly improved user experience, more than halving the time needed to configure individual products.

### Online access to product information and CAD data

CAD POINT's predecessor tool was already very popular with customers and users alike. In particular, the high performance of the new software and the linked databases for gearboxes, actuators and motors – not to mention the significantly enhanced user experience provided by the GUI – add substantial value for users in terms of CAD data, product information, data sheets and the ability to request a quote directly.



#### Built-in convenience

CAD POINT offers considerable added convenience to users who start off with a known gearbox type or a preferred size and want to compare different gearbox and drive configurations: once selected, the characteristics are subsequently remembered throughout the configuration process, even after switching to a different size. The ordering code can be copied from the customer's program, for instance, and then pasted directly into the CAD POINT GUI, so that the desired product is located in the electronic catalog in next to no time. If the ordering code is entered manually, this input is automatically validated, enabling data entry errors to be instantly detected and corrected.



CAD POINT, SIZING ASSISTANT,  
cymex® 5:

#### Three paths to one goal

The CAD POINT online tool, the web based SIZING ASSISTANT and the cymex® 5 sizing software, which requires a license – three different software concepts developed by WITTENSTEIN alpha to support the selection and sizing of gearboxes and actuators and allow you to request a quote immediately.

CAD POINT is mainly targeted at customers who already use drive solutions from WITTENSTEIN alpha. They are familiar with the applications and benefits and would like to compare configurations or retrieve CAD data with just a few clicks.

The SIZING ASSISTANT is designed for users searching for the quickest way to select the most suitable gearbox for their servo drives or their kinematics based on a specific motor or a predefined application.

The multifunctional cymex® 5 sizing software is the perfect tool when it comes to more detailed sizing tasks – like main axes involving shaft and bearing calculations, the simultaneous definition of any number of axes in one project, an examination of electrically preloaded drives or the optimization of design spaces.



9th Classical Singing Competition

# DEBUT 2018





**The winners of the 9th Classical Singing Competition  
DEBUT 2018:**

Vasilisa Berzhanskaya, winner of the Golden Victoria and 10,000 euros in prize money (center).  
Yajie Zhang, winner of the Silver Victoria and 5000 euros in prize money (right).  
Konstantin Krimmel, winner of the Bronze Victoria and 2500 euros in prize money (left).



Under the artistic direction of Clarry Bartha, more than 30 young opera singers from 14 nations kicked off the competition week with the qualifying rounds at Weikersheim Castle Music Academy. The week ended with a festive gala concert in the Bad Mergentheim Wandelhalle. Professor Barbara Bonney, the well-known soprano, acted as patron for the competition together with Carl Martin Welcker, President of the German Engineering Federation (VDMA).

For several years now, the DEBUT competition, first staged in 2002, has attracted considerable international attention in the opera world. The concept and idea formulated by Dr. Manfred Wittenstein (sponsor, initiator and Chairman of the WITTENSTEIN SE Supervisory Board) have prevailed: the competition has become established as a unique contribution to the classical music scene, forging an unusual but highly successful link between industry, technology and culture. It manages without any form of public funding.

For more photographs and videos, see  
[www.debut.de/en](http://www.debut.de/en)

WITTENSTEIN gearboxes guarantee precise positioning at a Dutch machine tool manufacturer

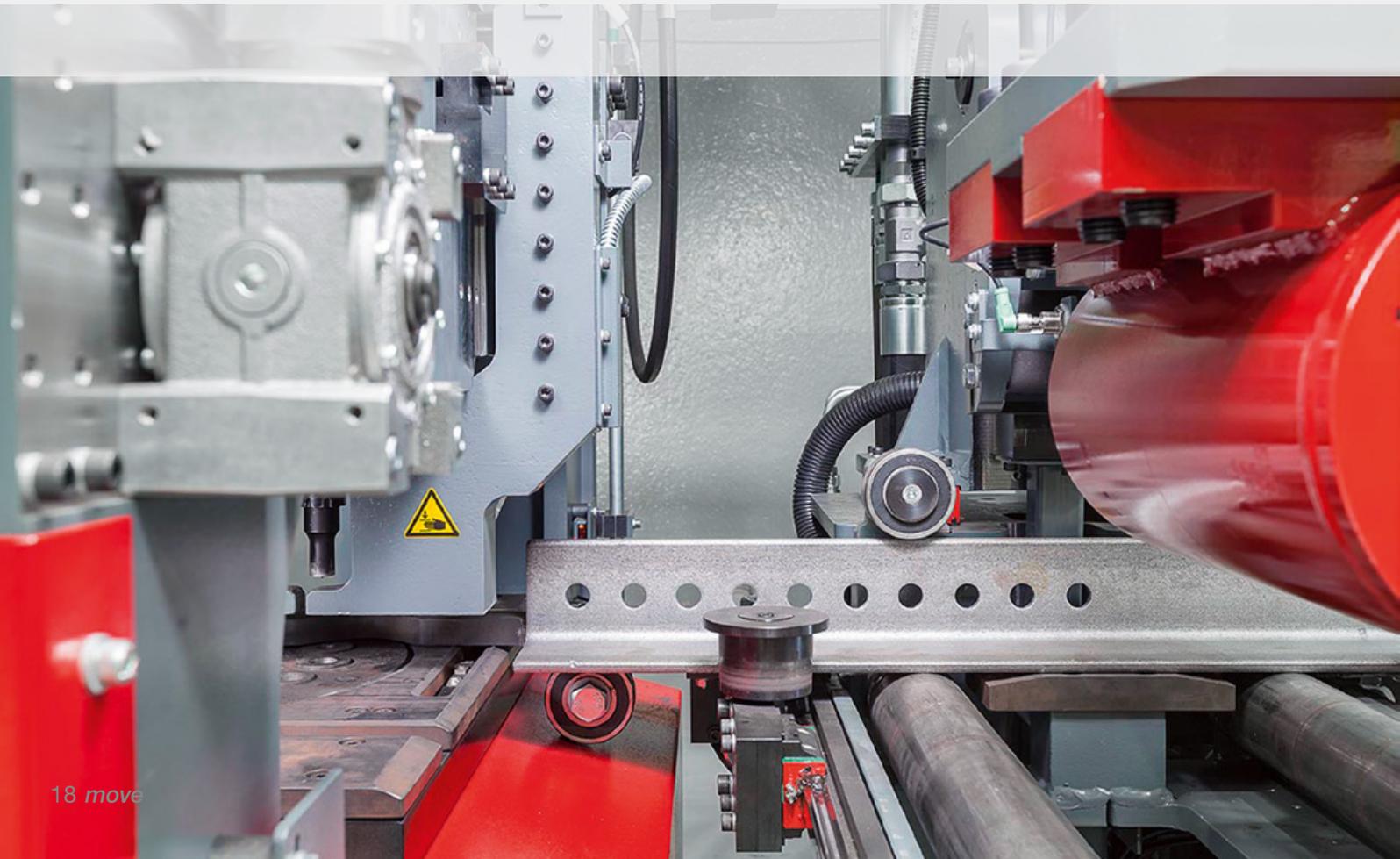
## Voortman trusts in WITTENSTEIN

“

Thanks to WITTENSTEIN gearboxes,  
we are able to continuously specify positioning on the machine  
with great repeatability.

”

Bart de Jong, Lead Engineer at Voortman





Among other things, Dutch company Voortman Steel Machinery manufactures machines for beam and plate processing. For customers, it's important that their products comply with the specified tolerances precisely. To guarantee this, Voortman's designers must develop robust and highly reliable systems. It's vital, for example, that workpieces can be positioned precisely in the machine. To this end, the machine tool manufacturer relies on low-backlash gearboxes from WITTENSTEIN. For instance, with their high repeat accuracy, they ensure that holes can always be punched into the workpieces at the intended locations.

In addition, the servo technology enables very lightweight and very heavy plates to be processed with the same drive motor. Positioning is consistently precise and is slowed down only slightly by very heavy plates.

#### **Voortman – CNC machines for steel processing**

Voortman Steel Machinery of Rijssen in the Netherlands has been designing, developing and manufacturing machines for steel fabrication and plate processing for more than 45 years. In total, over 1000 systems from this globally recognized supplier have been installed. Voortman is continually developing its products in order to remain at the forefront of technological progress.

#### **Comprehensive analysis ensures optimum component selection**

At an early stage of the design process, Voortman takes into account all forces and loads that the machines have to stand up to during operation. Thorough analyses of the frame enable the company to select the right material types and thicknesses. The machine tool manufacturer also invests a lot of time in process control. The smoother the system runs, the better the forces are conducted through the frame. As a result, Voortman customers get a machine that works as well and for as long as possible.

#### **Our software saves time during the pilot study**

Right from the pilot study phase, Voortman's designers incorporate our gearboxes in their planning. They are used where very high loads and vibration levels with spikes occur. It's crucial for proper operation of the machines that the components which are selected are reliable. And this is an area in which the machine tool manufacturer has had very positive experiences with WITTENSTEIN products.

Voortman trusts in cymex® 5 to calculate all drives – regardless of whether a gearbox is used or not. The sizing software offers the developers a comprehensive assortment of filter options to help them find the perfect set of components. This saves Voortman a lot of time when dimensioning and designing the complete drive train.

#### **Personal communication – indispensable for Voortman**

Following the sizing calculations using cymex® 5, Voortman always calls our experts at WITTENSTEIN Benelux for a personal consultation. In this way, the company ensures that the best components possible have actually been selected and that no unpleasant surprises arise during operation on the customer's premises.

Voortman greatly appreciates this intensive interaction – precisely because WITTENSTEIN does not automatically insist upon using the most expensive components or the absolute highest degree of accuracy, but rather weighs up exactly what is really required for the specific application.



“  
Experience has shown that  
WITTENSTEIN components more  
than meet our strict requirements.

”

Bart de Jong,  
Lead Engineer at Voortman



“Make the impossible possible” is the title we chose for the last issue of our customer magazine, in which we demonstrated some of the new opportunities that are opened up by the revolutionary Galaxie® Drive System for high performance engineering. It has been scientifically proven that Galaxie® is a new gearbox class which is superior on principle and a milestone in engineering. Our invention’s success could now be crowned with the Deutscher Zukunftspreis 2018, the Federal President’s Award for Innovation in Science and Technology, for which WITTENSTEIN has been nominated. Frank-Walter Steinmeier will personally announce the winners on November 28 in Berlin.

The nominated team of inventors – Dr. Manfred Wittenstein (left), Chairman of the Supervisory Board, and Thomas Bayer (right), Manager Innovation Lab – describe the long path this kind of innovation must take before it experiences such high recognition



The Deutscher Zukunftspreis is the Federal President's Award for Innovation in Science and Technology. It has been presented annually since 1997 in recognition of outstanding scientific achievements that are simultaneously marketable and have the potential to create jobs.

## Galaxie® is nominated for the Deutscher Zukunftspreis 2018

move talks to Dr. Manfred Wittenstein and Thomas Bayer

*What was your motivation to take such an innovative leap forward as you achieved with the Galaxie® gearbox?*

Wittenstein: It's one of our corporate business principles to conserve resources for future generations. If you think that right through to the end, it's obvious that you have to tread new paths. The technologies previously in existence had already been stretched to the limit, which is why we decided to search for something totally different. We wanted all of its features to be far better than those of any known gearbox type and it had to consume fewer resources. We were determined to break with the centuries-old status quo – as a paradigm.

*What form did the development process take?*

Bayer: A number of good ideas were floated in the beginning that we could have had patented too – but in the end, all of them were compromises. It's not surprising, really: after all, what Leonardo da Vinci described in the 15th century was merely optimized by later generations. Why should we in Igersheim, of all people, suddenly find a better way? Mr. Wittenstein never once put me under pressure and he never insisted that I have my suggestions ready to put on the table by the next quarter. He gave me the freedom I needed to propose after we'd already been working for a while that we start again from scratch! The second time round, we used TRIZ, which is a method based on the theory of inventive problem solving that had interested me for more than 15 years.

*With the development work taking such a long time, you presumably felt frustration on more than one occasion. What did you do to get over it?*

Wittenstein: We didn't have any tangible results to start with. Yet Mr. Bayer had an art of making you feel that you'd get there in the end. You can't rush things in that kind of situation; what you need is someone with experience, energy and stubbornness. That was our decisive advantage; we would otherwise never have succeeded in reinventing something that had been the state of the art for five hundred years.

Bayer: Mr. Wittenstein kept telling me, "You can do it!" That was vitally important – the whole thing would have been dead and gone long ago if there hadn't been that trust between us.

*So what does the future hold for Galaxie®? Have you reached the point where the development potential is exhausted?*

Bayer: No, not at all. We've only just begun. We now have plans to produce a plastic version – the specific characteristics are such that it's a suitable product for that purpose – so that in the future we can manufacture it in high volumes and break into huge new markets.

Wittenstein: Steel's characteristics have been refined over the centuries but that isn't yet the case with plastic. This is a long-term objective and we're currently looking for like-minded partners and specialists, who we can put our heads together with to develop a suitable synthetic material.

*One last question: aside from technology and manufacturing, can you reveal us something about your private interests?*

Wittenstein: The company is my private interest, of course. I'm now at an age where I have to retire from the front line and hand over responsibility to others. I still enjoy it, though. I love taking calculated risks and sounding out boundaries. That's why I like driving fast cars.

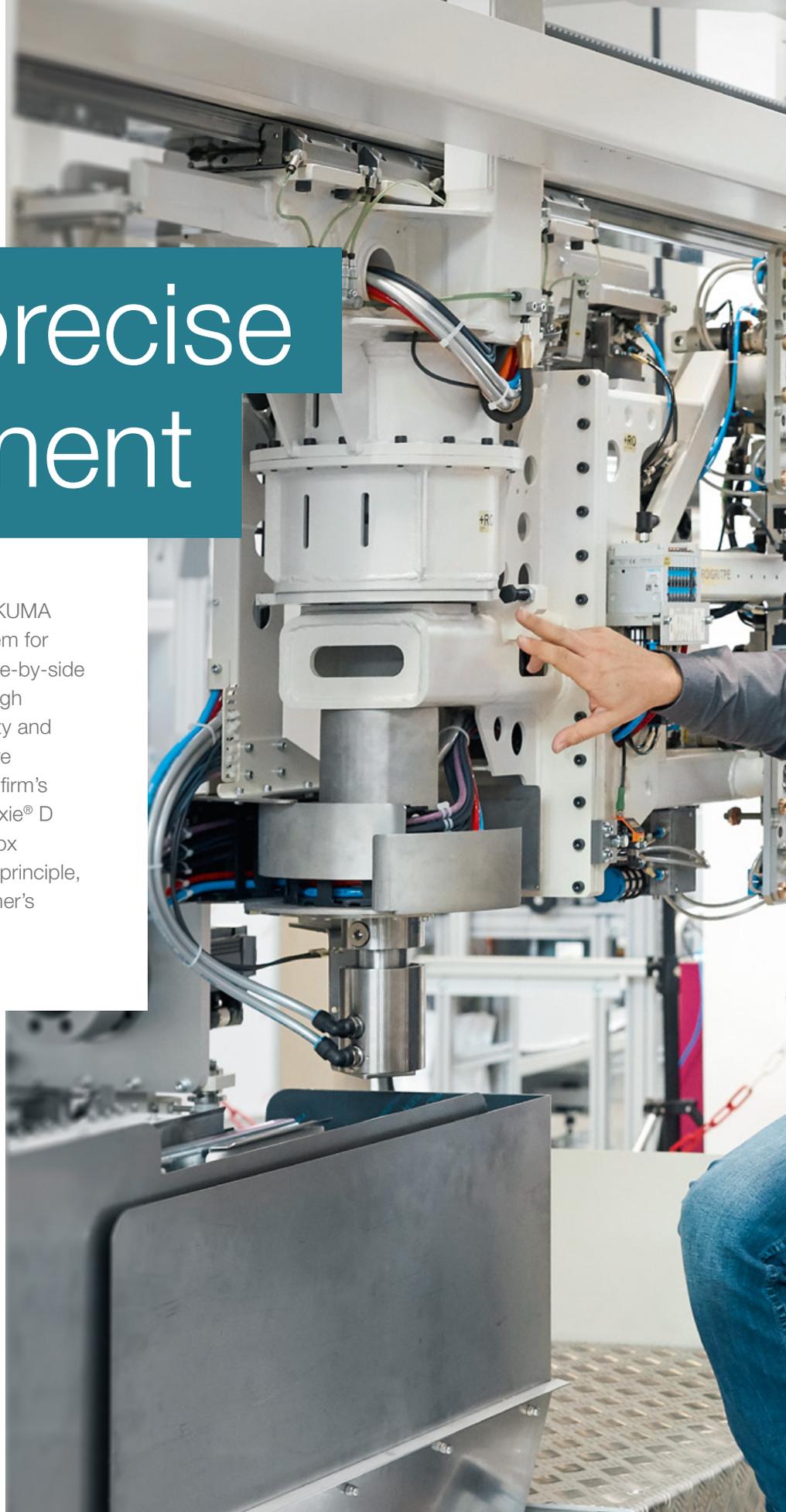
Bayer: I've got an artistic trait, which makes a very good contrast to what I do here. I also walked another stretch of the Way of Saint James recently; I find that's a great way to help me wind down and refuel in preparation for the next challenge awaiting me at work.



Don't miss the presentation of the Deutscher Zukunftspreis on November 28, 2018; the event will be broadcast as a live stream on ZDF television from 6 p.m. onwards (<https://www.zdf.de/live-tv>).

# Ultra-precise movement

German automation specialist HEKUMA was looking for a servo drive system for a swivel arm that operates two side-by-side injection molding machines with high dynamics. Maximum torque density and excellent positioning accuracy were the decisive selection criteria. The firm's design engineers favored the Galaxie® D Drive System. Thanks to its gearbox kinematics, which are superior on principle, Galaxie® D meets all of the customer's requirements with ease.



# Servo drive system for swivel arms in injection



## HEKUMA: First in high performance automation systems in the environment of injection molding machines

HEKUMA GmbH of Hallbergmoos, near Munich, is a leading manufacturer of high performance automation systems for injection molding processes. The company's core business areas comprise powerful take-out systems, injection molding machine and mold integration and complete, turnkey solutions for the take-out, processing, assembling, labeling, testing and packaging steps.

Since HEKUMA was founded in 1974, more than 5000 machines have been shipped to customers in the medical, automotive, packaging machinery and consumer goods industries.

From left to right:  
Reinhard Steinhoff (Mechanical Construction, HEKUMA), Nadine Hehn (Sales start-up Galaxie) and Alexander Kappes (Team Leader Mechanical Construction, HEKUMA).

# Galaxie®: Superior on principle

### The ideal choice for high-availability automation

The HEKUMA swivel unit serves as a connecting element in a two-stage injection molding process with thermoset and thermoplastic substrates. Each insertion and take-out element has 32 cavities. The cycle time is 20 seconds and the machine operates 340 days a year in three shifts. In a twelve-month period, in other words, the transfer unit with the Galaxie® D moves more than 47 million items.

Yet it wasn't just the Galaxie® D's dynamics that convinced HEKUMA: the swivel arm of the transfer unit turns 180° in the Y direction and has a mass of 270 kg in movement. In order to position the cavities exactly in front of the injection molding machines, therefore, the drive had to combine extremely high stiffness with minimal torsional backlash. In addition, only a defined, limited installation space was available for the mechanical integration of a new motor / gearbox unit – and with its compact dimensions, the Galaxie® D was once again clearly superior.

### Galaxie®: Radically new gearbox class

Galaxie® is a radically new, independent gearbox class. Its decisive features are dynamic teeth instead of a rigid gear ring, tangential and hydrodynamic contact by multiple teeth over the full surface with mathematically precise synchronous running and a new type of bearing with a segmented outer race ring. All of these innovations add up to a novel design principle, with the result that the Galaxie® gearbox kinematics are clearly superior to established planetary, cycloidal, eccentric and standard strain wave gearboxes in all key technical disciplines compared to the market standard. Totally new productivity opportunities are created in this way for high performance engineering. It is now up to engineers and designers to realize genuine developmental leaps.

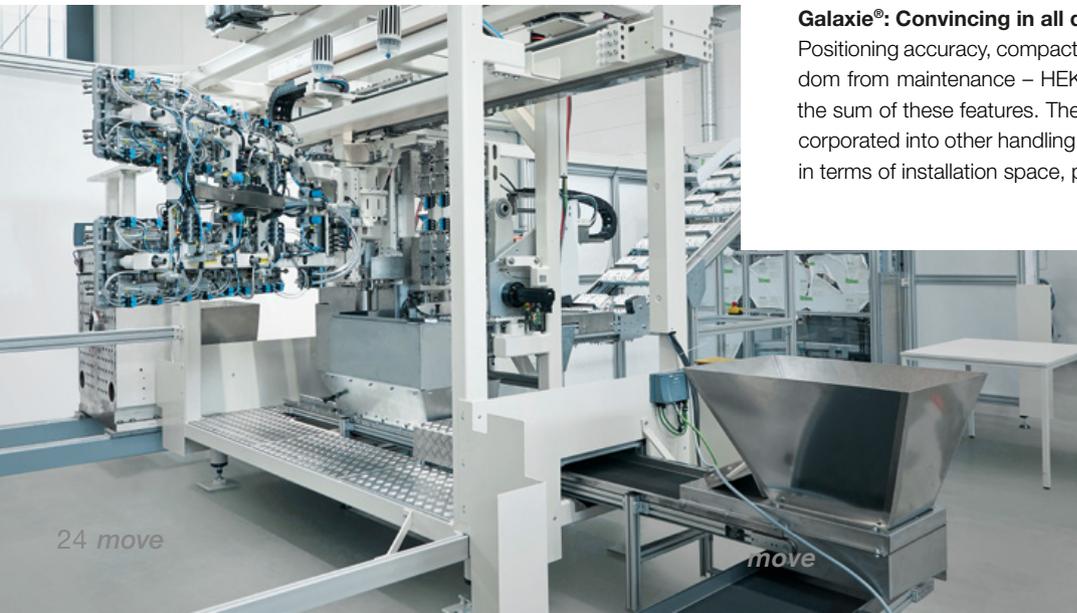


### Very high torsional rigidity due to separate thrust tooth kinematics and contact by multiple teeth over the full surface

The ability to provide excellent and constant positioning accuracy was a decisive factor for this swivel arm of HEKUMA's injection molding machines. The Galaxie® D complies with this performance requirement owing to its high torsional rigidity. The separate thrust tooth kinematics mean that almost all of the individual teeth now engage simultaneously during torque transmission and hence contribute to the stiffness. Furthermore, the flanks of the individual teeth and the ring gear are designed as a logarithmic spiral. Power is thus transmitted by multiple teeth in surface contact – with a significantly higher contact area ratio.

### Galaxie®: Convincing in all disciplines

Positioning accuracy, compact design, high dynamics and freedom from maintenance – HEKUMA was utterly convinced by the sum of these features. The gearbox is now all set to be incorporated into other handling axes with specific requirements in terms of installation space, power density and precision.



Alexander Kappes,  
Team Leader Mechanical Construction  
at HEKUMA

“  
We didn't  
have to make a  
single technical  
compromise  
thanks to  
Galaxie®.  
”

#### Galaxie®:

Permanently servicing and maintenance-free

When installed in the swivel arm, the compact Galaxie® D is completely inaccessible. That's why permanent freedom from servicing and maintenance was so important to HEKUMA.

With its high backlash stability and innovative motor feedback system, which requires no battery buffer in spite of the multiturn functionality, our innovative drive system meets another of the end customer's key requirements.





## Success needs space

“Center for Mechatronic Excellence” expands capacity in Bartlett



Space had become increasingly short over the years – since WITTENSTEIN was first established in the U.S. back in 1992, the workforce in Bartlett (Illinois) had grown to nearly 125, divided between three subsidiaries of the WITTENSTEIN Group and their respective business fields: WITTENSTEIN alpha, WITTENSTEIN cyber motor and WITTENSTEIN aerospace & simulation. It was by a stroke of luck that a building adjacent to the main site was put up for sale a few years ago. The “Center of Excellence” now stands on these premises – with extra space for manufacturing as well as for mechatronic product development, test rigs, laboratories and logistics.

### Local production

The “Center for Mechatronic Excellence” will enable WITTENSTEIN North America to respond more effectively to customer demands for shorter delivery times and lay the foundation for future growth. With almost 1200 square meters (12,400 square feet) of floor space, this energy efficient building is fitted out with the most advanced technology available and will mainly be used to expand production and service capacities. Apart from flight simulators and gearbox components for the global market, belt pulleys and corrosion resistant gearboxes destined exclusively for clients in the U.S. will be made there.

### Pioneer and model

“The new building does more than simply give us extra space to expand our capacity and our manufacturing options”, says Peter Riehle, President and CEO of WITTENSTEIN North America. “Optimum presence in the regional market is vital if we’re going to adapt successfully to its highly specific needs. Being able to show our innovations to our customers locally will further enhance our reputation as a technology leader and an expert for mechatronic drive technology.” After all, WITTENSTEIN North America is regarded as a pioneer for “training made in Germany” and is very much in demand as a recognized thought leader when it comes to personnel training and continuing professional development as well as to production technology and the “Industrial Internet of Things” (IIoT). Not only American firms but also industry associations in the U.S. set great store by WITTENSTEIN’s active collaboration. The “German American Chamber of Commerce of the Midwest” (GACC Midwest) in Chicago, for example, has just elected Peter Riehle as its new Chairman.

# Trade fair calendar

## 2018/2019

WITTENSTEIN is represented at numerous trade fairs and exhibitions worldwide.  
**We look forward to meeting you!**

SPS IPC Drives 2018  
[Nuremberg, Germany](#)  
WITTENSTEIN SE  
**November 27 to 29, 2018**

Indumation 2019  
[Kortrijk, Belgium](#)  
WITTENSTEIN BVBA  
**February 6 to 9, 2019**

LogiMAT 2019  
[Stuttgart, Germany](#)  
WITTENSTEIN cyber motor GmbH  
**February 19 to 21, 2019**

Embedded World 2019  
[Nuremberg, Germany](#)  
WITTENSTEIN high integrity systems  
**February 26 to 28, 2019**

TIMTOS 2019  
[Taipei, Taiwan](#)  
WITTENSTEIN Co., Ltd.  
**March 4 to 9, 2019**

Industrial Automation Fair  
Guangzhou (SIAF)  
[Guangzhou, China](#)  
WITTENSTEIN (Hangzhou) Co., Ltd.  
**March 10 to 12, 2019**

China West International  
Equipment Manufacturing  
Exposition (CWIEME)  
[Xi'an, China](#)  
WITTENSTEIN (Hangzhou) Co., Ltd.  
**March 14 to 17, 2019**

Praxisforum elektrische  
Antriebstechnik 2019  
[Würzburg, Germany](#)  
WITTENSTEIN cyber motor GmbH  
**March 25 to 27, 2019**

Hannover Messe 2019  
[Hannover, Germany](#)  
WITTENSTEIN SE  
**April 1 to 5, 2019**

China International  
machine tool show (CIMT)  
[Beijing, China](#)  
WITTENSTEIN (Hangzhou) Co., Ltd.  
**April 15 to 20, 2019**

OTC 2019  
[Houston \(TX\), USA](#)  
WITTENSTEIN motion control GmbH  
**May 6 to 9, 2019**



**WITTENSTEIN**