

# Mechatronic systems for high-precision positioning.



Customised solutions from a single source

# Competence for over 40 years.

„Paths are made by walking.“

Franz Kafka

This guiding principle has accompanied ITK since it was founded in 1982 as an engineering office. What was once a service provider for developments in the field of hard- and software has now become a company focussing on the development and production of mechatronic systems with the highest precision. Customised positioning systems and their components are developed and manufactured completely in-house.



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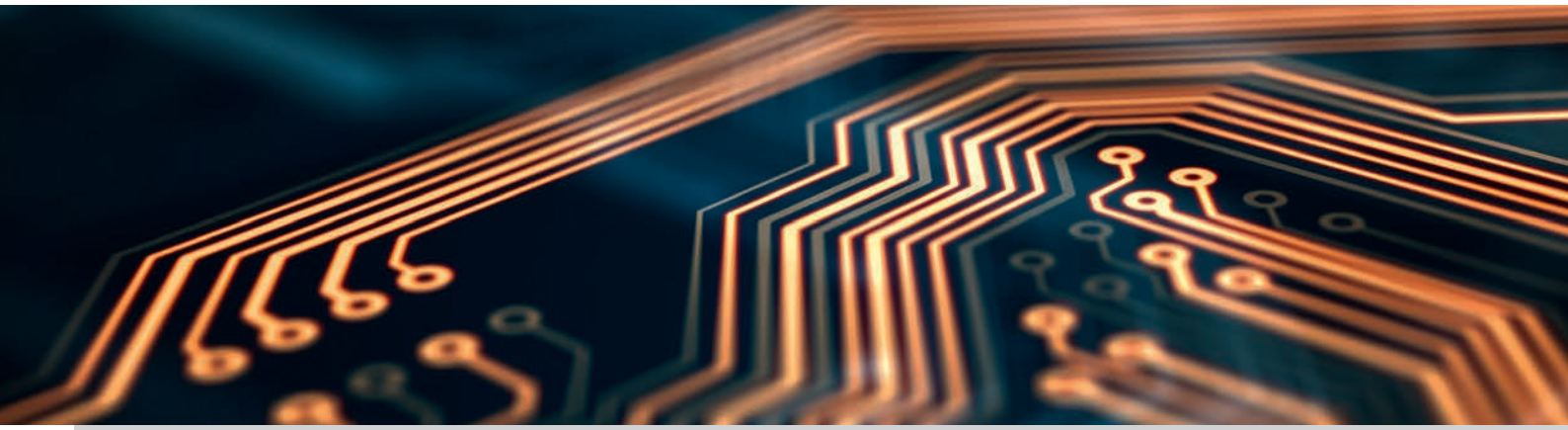
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Fulfilling demanding positioning tasks down to the nanometre range

# Measure. Control. Move.

Faster, higher, further: more throughput, higher resolution, even more precise. Increasing expectations regarding the efficiency and effectiveness of the samples to be examined are growing at a rapid pace. To meet these requirements, the equipment and applications used are also becoming more precise, faster and more dynamic.

Measurements „on the fly“ at increasingly high acceleration values and consideration of the resulting dynamic effects require a deep understanding of the motion sequences and cross-effects between the individual components. A high degree of integration for the machine and a deep understanding of the end applications are prerequisites here. In close dialogue with our customers, we work out the best solution for the respective application together.

Our products are used for demanding positioning tasks in the following branches:



Semi-conductor



Material Sciences



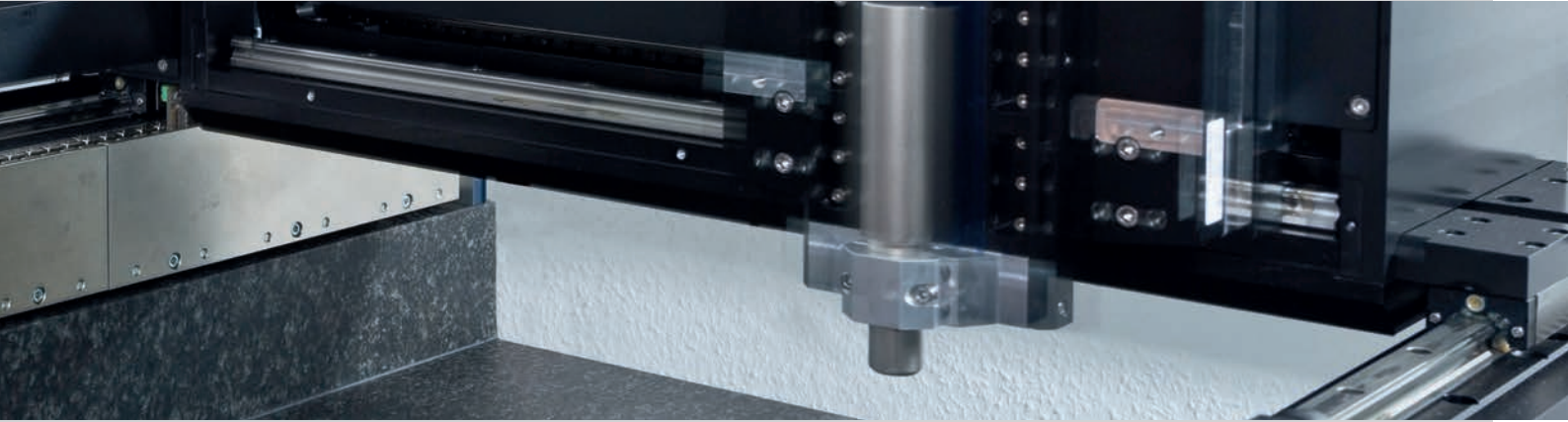
Life Sciences



Metrology



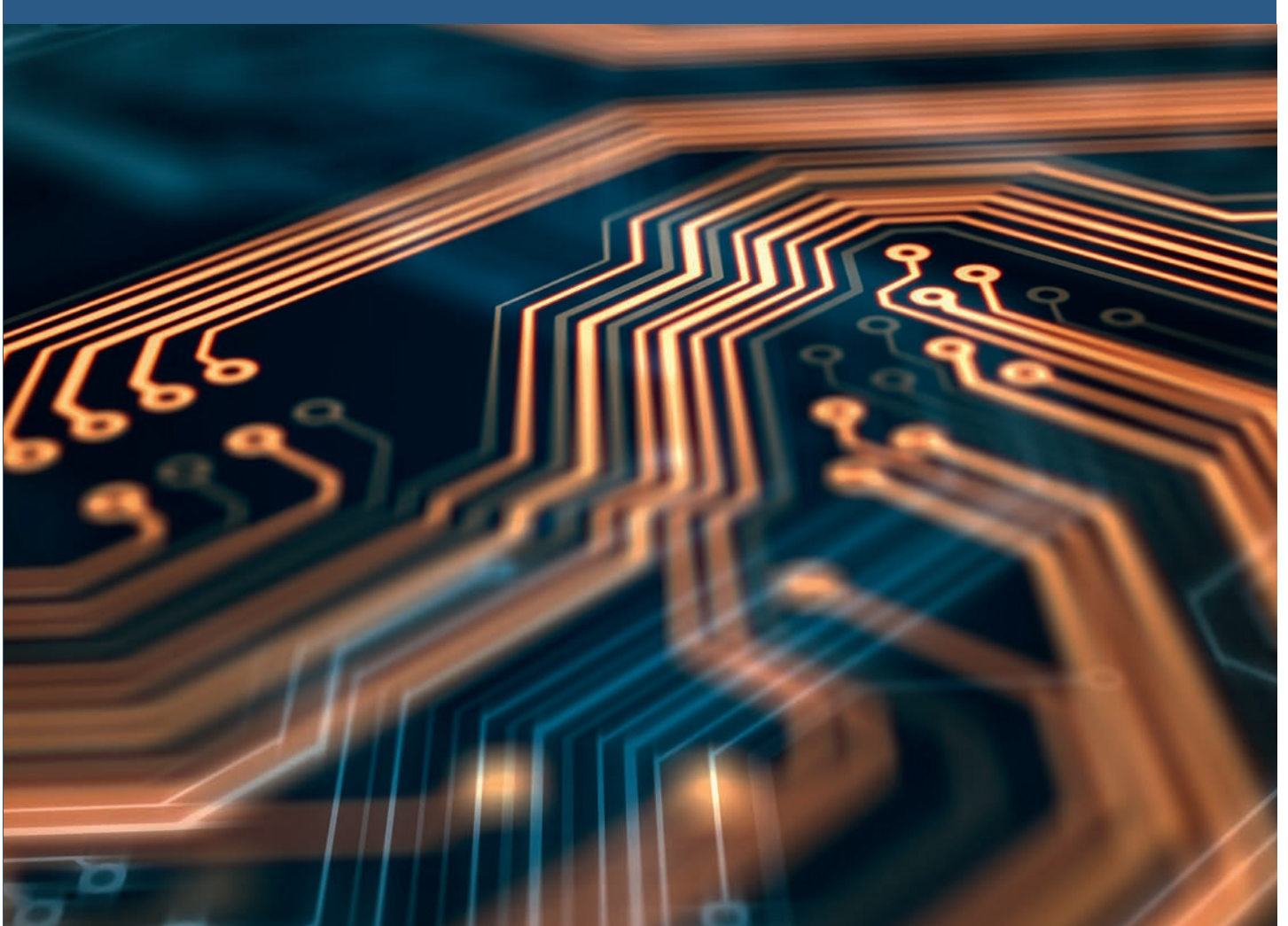
Magnetics



for a wide range of applications

## Position.

A good balance between continuous improvements to existing solutions through the use of the latest technology and algorithms and disruptive solutions is a central element of development activity at ITK. In this context, the close dialogue with the user often creates the breakthrough to novel and groundbreaking products, which are only possible through the willingness for open exchange. Off-the-shelf catalogue products are the wrong answer here, because we have often found: There are no off-the-peg solutions for demanding applications.



ITK Competences

# Systems for high-precision control & positioning.

Systems are much more than the sum of their parts. Only the integral technical understanding of the individual disciplines among each other – i.e. electronics, mechanics and software – creates the necessary added value. ITK was already developing mechatronic solutions on this basis before this artificial word was created. Knowing which department can provide the most suitable solution for which function ensures that the optimum is always achieved.

The constructive interaction of these three areas has a great influence on the final product. Consequently, co-operation was defined as a strategic task and a profound technical understanding was built up over the years. The result: through in-house development and production of the core components, ITK is able to supply highly accurate and efficient positioning systems at the highest technical level for industry and research – not just with modules from a construction kit, but individually adapted.

Our **product development** – consisting of mechanical design, analysis and simulation, electronic and software development – is the initiator and first point of contact for new developments that are brought to us by customers.

Our high manufacturing depth enables us to carry out the mechanical machining of the individual components, the electronic production, the final assembly of the positioning systems and the testing in-house.

The **quality** of our products is already ensured in the product development phase and is ultimately defined by the final area of application. Through permanent quality monitoring in all areas, we guarantee our customers products handmade in Germany. This is also demonstrated by our certification according to the DIN EN ISO 9001:2015 quality management system.

**TOP LEFT: Excellent products through permanent quality monitoring.**

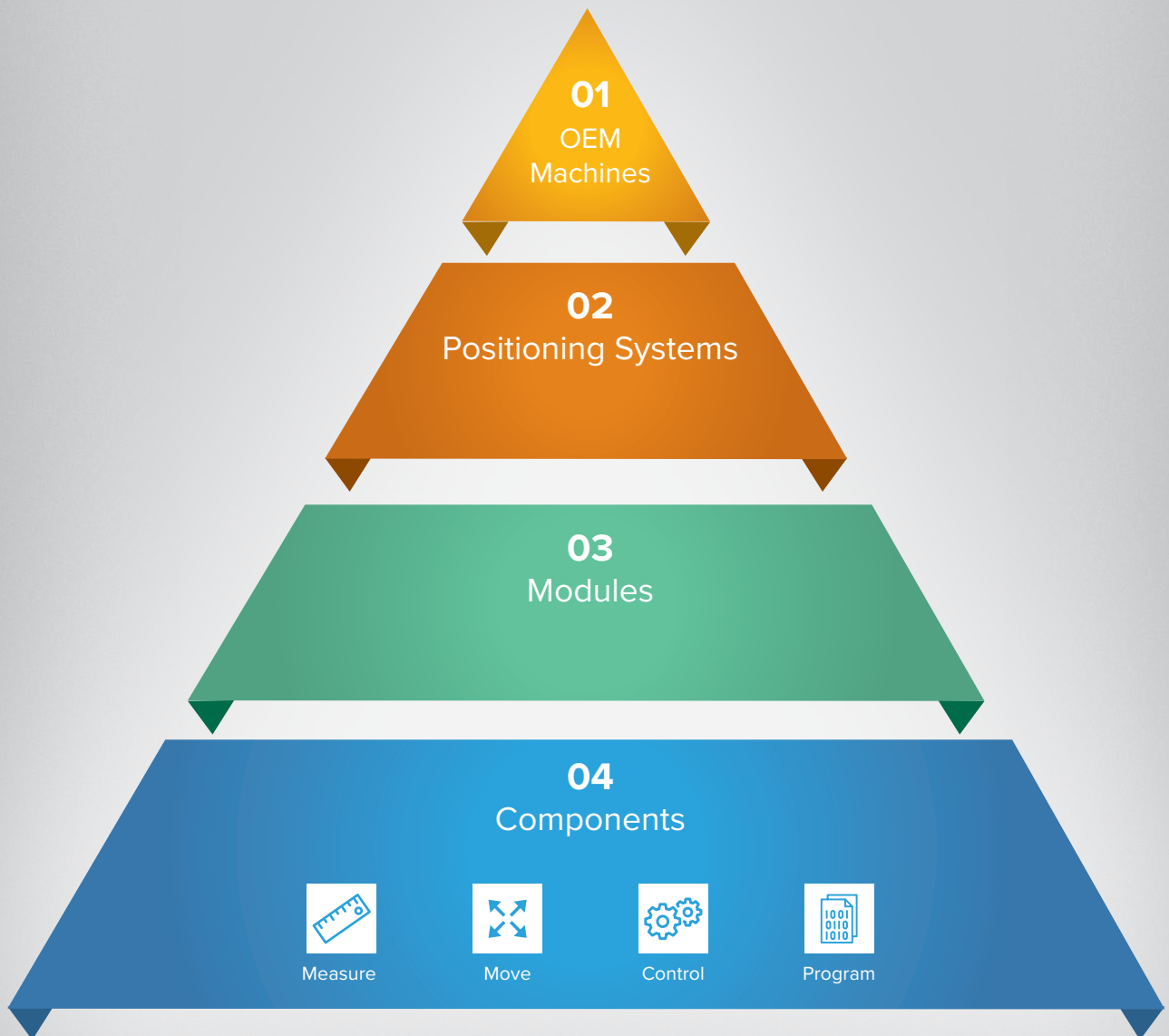
**BOTTOM LEFT: Printed circuit board for the control of a motorised microscope stage.**

All from one source

# From component to system.

## ITK as a partner of complete systems for high-precision positioning tasks.

On the way to ever more accurate and flexible systems, we have continuously expanded and optimised our product portfolio. The result is impressive. But it can also be measured: We can achieve a position resolution of down to 5 nanometres at system level.





## 01

**ITK OEM Machines**

The reason for the production of our first magnetization system for coding scales fits into our history: Own demand! The development of the machine over 20 years ago was the birth of a new business field for ITK. Since then, the demand for solutions from OEM customers has increased year after year. We meet this demand with high-precision, high-performance systems – developed and approved in accordance with the Machinery Directive. Today, a team of experts from various disciplines at ITK implements special projects based on the pillars of „Positioning. Measure. Control. Move.“ are the cornerstones. Rotary and linear magnetization systems make up the largest share.

## 02

**ITK Positioning Systems**

Gantry and microscope stages form the foundation of all ITK positioning systems. Gantry tables are usually of classic gantry design and are used wherever relatively light workpieces and specimens have to be positioned with high precision and dynamically.

The same components are used in microscopy, but in a much more compact design. The latest microscope stages are equipped with five active axes to provide the best possible support for fully automated laboratory operation. Our product portfolio thus ranges from small dimensions under the microscope and samples in the gram range to four-square-metre scanning systems with up to eight active positioning axes.

## 03

**ITK Modules**

The modular design of all ITK systems is the basis of our flexibility. Our assemblies are subdivided according to type of movement. The three main categories result in a wide range of linear stages, cross stages and rotary stages. In this context, the interaction with the ITK controllers developed in-house should be emphasised.

The control technology is our origin and the decisive factor in exploiting the full performance potential of the mechatronic assemblies.

Talk to us about how our in-house software and electronics development can implement your special requirements in a customised manner.

## 04

**ITK Components (our foundation)**

The basis for every ITK system are real-time capable multi-axis controllers for the high-precision control of stepper and linear motors. In addition, we offer you further components as stand-alone products (OEM variants).

Our own developments and in-house produced components include:

- Controllers (up to 6 axes)
- Position measuring systems according to the magneto-resistive principle (MR sensors and measuring scale)
- Ironless linear motors with patented ITK functional principle
- Software and motion algorithms



Everything from a single source - with highest manufacturing depth

# From raw material to high-tech product.

In order to be able to react quickly and flexibly to all customer requirements, we have an extensive stock of raw materials: granite as a solid foundation, aluminium alloys for normally loaded components and trim parts, titanium for particularly demanding components and high-tech materials such as carbon fibre composite.

For us, material competence means not only the knowledge of the right combination of basic elements, but also experience in the field of surface coating for corrosion and wear protection as well as conductivity.

All electronic components and mechanical parts naturally comply with the RoHS and REACH directives and the applicable requirements for conflict minerals. Long-term partnerships and cooperation with our highly qualified suppliers ensure a stable supply chain.

Innovation – ITK home-made

# Technological advantage through own components.

With new technology and innovative functionality we set standards in high-end microscopy. Central components such as linear motors, controls and measuring systems are not bought in at ITK, but manufactured in-house, so that comprehensive adaptations can also be made without any problems and customised solutions can be offered.

Thus, the patented linear motor concept creates a clear gap to other solutions available on the market in terms of compactness and positioning accuracy. We master all key technologies ourselves and thus not only have our

products technically under control, but also do not have to make any compromises. The high manufacturing depth makes us less dependent on suppliers and allows a much higher degree of vertical integration.

Through decades of experience, we understand every end application in detail and involve our customers at an early stage in the creation of the concept - a basic prerequisite for innovative products. Together we break new ground and deliver concepts and ideas today for the tasks of tomorrow. This is how we secure our technological lead in the future as well.



Best know-how and state-of-the-art CAx engineering systems

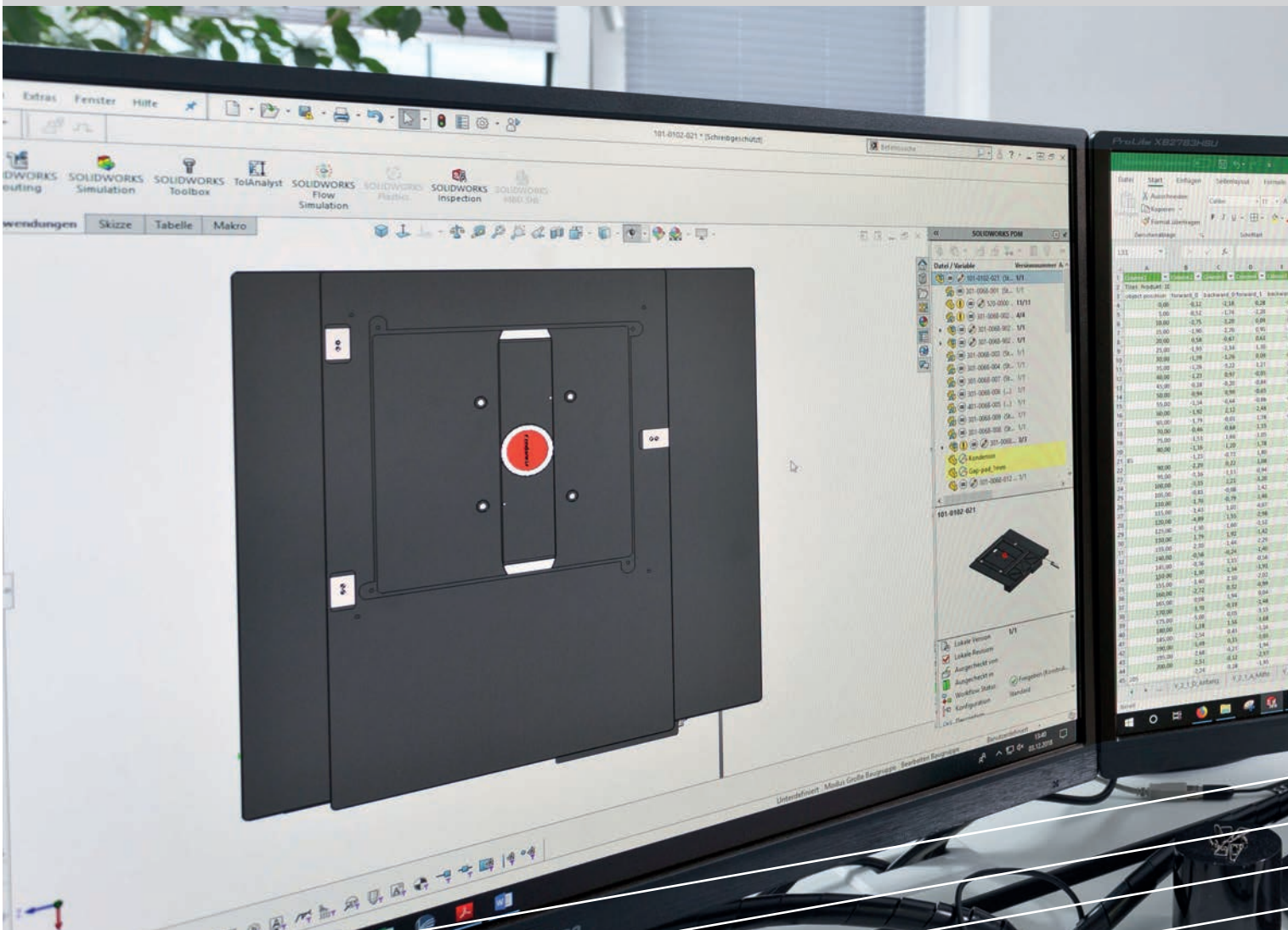
# Product development at the highest level.

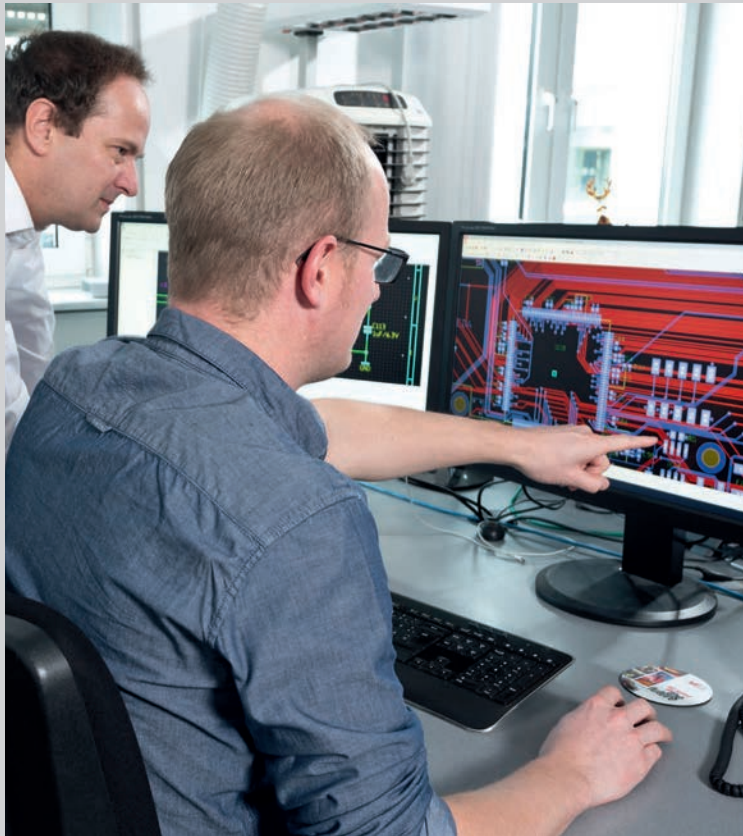
All electronics and software developments are created in our own research and development department. Experienced, curious and highly motivated employees are always looking for new challenges – with the aim of developing the best products on the market.

In addition to many years of experience in circuit design and control software, well-equipped laboratories are a guarantee for fast iteration cycles. A balanced age structure and a broad spectrum of skills result in a well-coordinated team at world-class level.

Mutual trust in the strengths of the other employees enables concentrated work on long-term projects as well as fast reaction times.

Top-class intelligent control technology for mechatronic positioning systems with positioning accuracies down to the nanometre range is our speciality. The mechatronic applications are created 100 percent in our in-house design department – in 3D CAD, of course. This work is supported by corresponding analysis and simulation work as well as the possibility of rapid prototype construction including





**LEFT:** This is where the perfect circuit design is created.

**BOTTOM:** Mutual exchange of experience and joint review according to the multi-eye principle.

3D printing. Our designers are often involved in the implementation and construction of samples and prototypes.

Optimal solutions are created in close cooperation with the electronics development and production or final assembly. The advantages are obvious: short distances and a direct line to all relevant departments, such as electronics development, production and assembly, lead to synergy effects. This results in short development times and high quality of the end products.



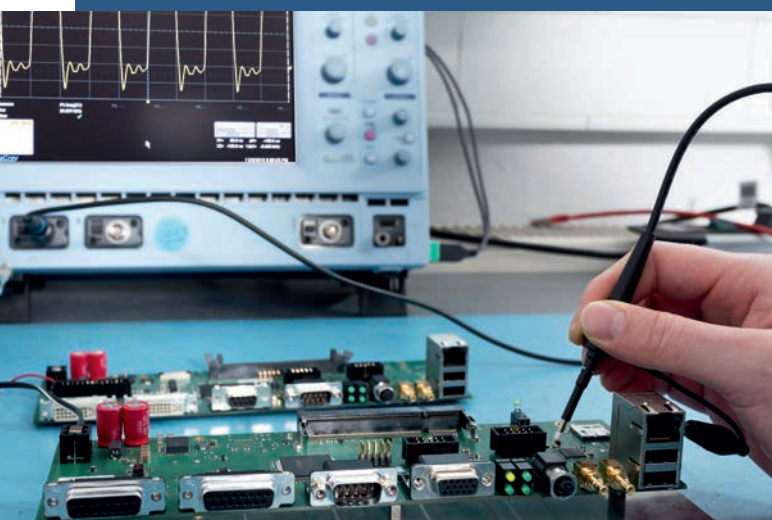
ITK Precision

# Permanent quality monitoring.

Quality is an integral part of our work. Because only uncompromising quality in all phases of development, design and production ensures that our products perfectly withstand the conditions to which they are exposed at all times.

That's why, from the very first day of development, we focus our quality assurance on the consistent application of tried-and-tested systems engineering methods, regular check-points and verification of what has been achieved against the defined target.

The involvement of customers and suppliers in this process is another element to ensure the reliability of products and services. The same applies to the intensive exchange between development and production as well as to logistics, clear handover points and the continuous improvement process. Thus, quality is not limited to retrospective testing and rectification within production and assembly, but is a self-image that is lived every day.







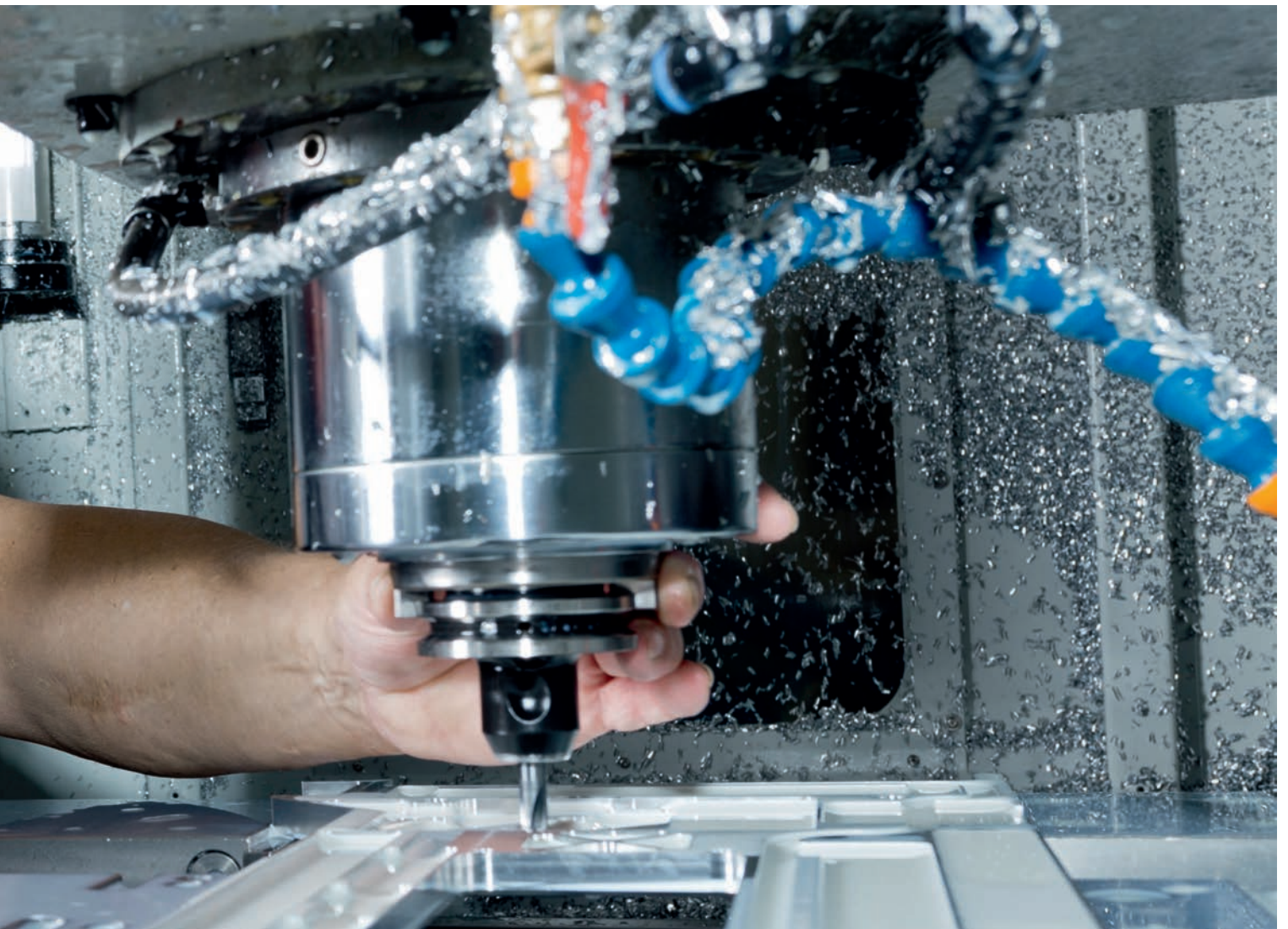
Milled from a block

# Handmade in Germany. ■

All products are handmade on our in-house production lines. After the successful prototype construction and any necessary adjustments, the final CAD drawings from the design department are processed and transferred to the latest 5-axis processing machines.

A team of highly qualified and experienced skilled workers manufactures the products according to the highest standards - and that already from quantity 1 up to series production. Through an intelligent approach to the preparation of CAD data, processes are optimised with regard to production and thus lead times are significantly reduced. Jigs and tools for the assembly of our products as well as specialised measuring and testing tools are also developed and manufactured in-house.







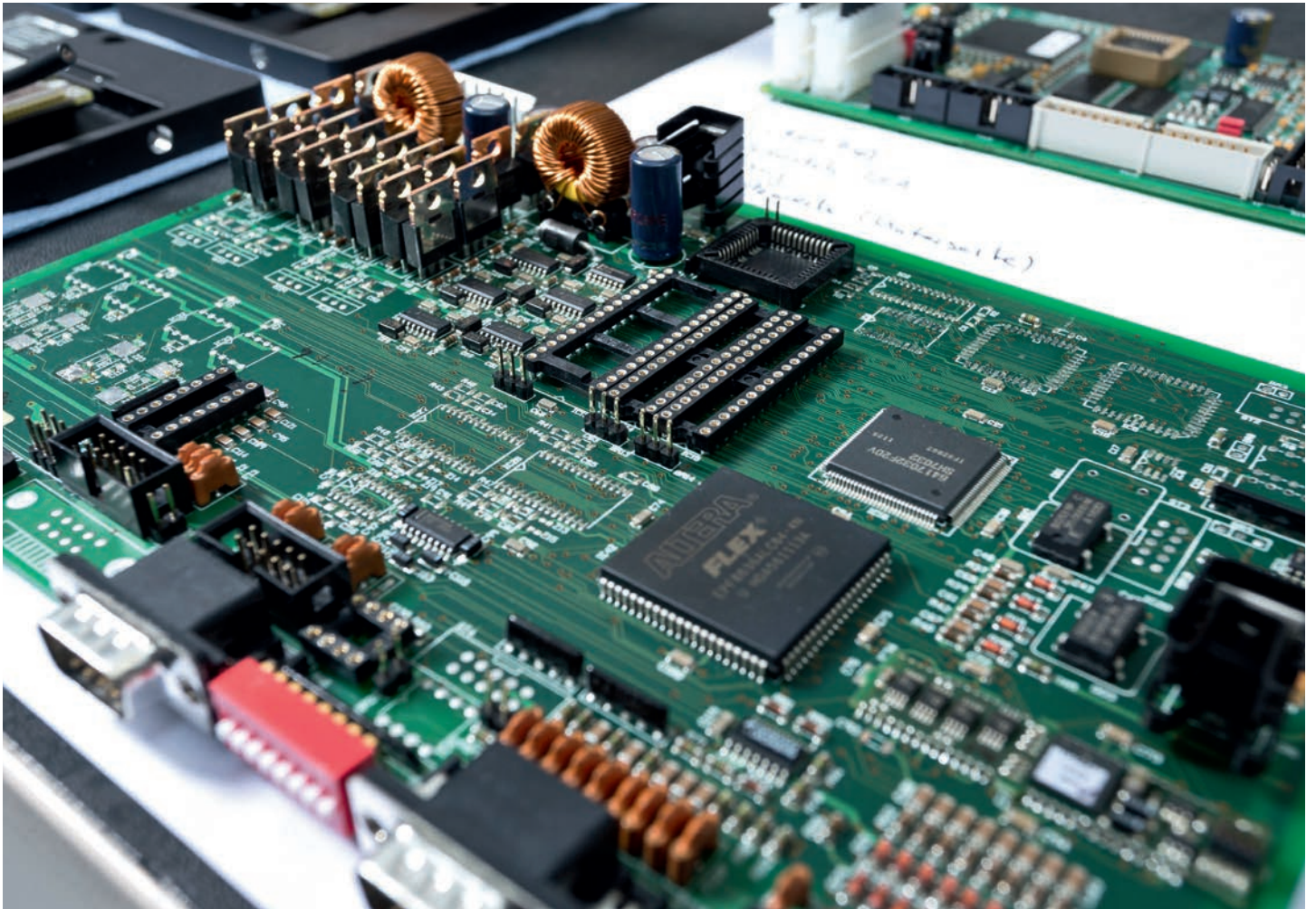


From raw material to high-tech product

# Design. Manufacturing. Assembly.

Our products pass through the entire value chain within ITK: starting with the design, through mechanical machining, to the assembly of the end products. Due to the high level of integration of the individual activities, we maintain an overview at all times during the creation phase of the product. In this way, we guarantee the optimal interaction of the individual components in order to provide the customer with the best performance characteristics.

Assembly in particular places the highest demands on the components and the skills of the employees. In many areas, years of training are necessary to achieve the required precision safely and reliably. The same applies to the final setting and checking of the control parameters, which is carried out individually to guarantee the desired system performance. Even many years after completion, each product can still be traced back through a „life file“.



Customised and ITK-specific

# System components.

In addition to complete systems, ITK also offers its customers individual components. This means that linear motors, complete linear actuators, measuring systems and controls can also be used for the customer's own developments and solutions, where they can bring their advantages to bear.

ITK develops and produces all electronic assemblies at its own site in Lahnu. The automated assembly of the PCBs is carried out to the highest standards by a service provider in the immediate vicinity. The assembly and final testing of the control units based on them is carried out 100 percent in-house at ITK. Experience gained with prototypes flows directly into series production.

# Reliable contact persons.

Our experienced, friendly and committed team is available for all your concerns. Because an intensive and regular exchange with our customers and suppliers is the basis for our products.

Direct exchange with developers and designers is also ensured at all times during project handling. During the start of series production, the focus is on logistical coordination and lean order processing - while at the same time ensuring flexibility for changes at short notice.

## Certifications

Our company is certified according to **DIN EN ISO 9001:2015** and **audit berufundfamilie** (2019).




# Efficient warehousing, short delivery times.

Over the entire life cycle of a product, we guarantee optimal delivery times and a high degree of adherence to delivery dates. This is made possible by sophisticated logistics and efficient supply chain management.

The delivery of spare parts for products that have already been in use with the customer for many years is also possible without any problems. Particularly in the field of electronics, discontinued components regularly have to be replaced by functionally identical alternatives.





**ITK stands for high-precision machines and assemblies for one to three dimensional movement.**

With over 40 years of experience, all key components are developed and manufactured in-house.

We understand the interplay of mechanics, electronics and software to ensure sub-micron accuracy and nanometre resolution.

This expertise helps our customers build chips more reliably, develop vaccines faster, make sensors more accurate and accelerate the energy transition.