Then as now…a 40 year success story of Micro-Epsilon

Micro-Epsilon's roots go back as far as **1968**. At that time, Micro-Epsilon was founded in Hanover by Mr. Franz Frischen. The company's business was the sale of high temperature resistance strain gauges and sensors for mechanical values. Back then, the target for these products was the power plant sector particularly nuclear power plants, turbine and motor manufacturing, offshore technology and pipeline monitoring.

The seventies

In **1975**, Mr. Frischen decided to spend the last years before his retirement in the Lower Bavarian city of Ortenburg, where he met Mr. Dipl.-Ing. Karl Wisspeintner (born in Ortenburg) in **1976**. Micro-Epsilon's first business premises in Ortenburg were located on the ground floor of a side wing of the "Gasthaus zum Koch". Mr. Wisspeintner had just finished his university studies as a young electrical engineer with the focus on communications engineering. The creative urge of both people very quickly spurned the idea of combining development and production with the Micro-Epsilon sales activity. In addition, in 1976, Mr. Johann Salzberger, a young physicist, was employed as the first sales engineer of the company.

In 1977 and **1978,** the company's first electronics laboratory was set up in the cellar of the private home of Franz Frischen. Previously in **1978,** the Wisspeintner family joined the company as a partner.

In **1979,** the company's first office was built and occupied. The main structural features of the company's existing offices in Dorfbach were established at that time. As well as Mr. Wisspeintner, Mr. Salzberger was appointed as an executive director in **1979.** At this time, the resistance strain gauge and high-temperature sensor business was running very successfully. This created the necessary financial support for the company to begin its investment growth plans.

The eighties

In **1980**, the first multiNCDT eddy current systems were presented at the Interkama show in Düsseldorf. For that time, the sensors operated very fast and were immune to electromagnetic interference. The sensors were wear-and maintenance-free and did not exert any force on the measurement object. Relatively quickly, Micro-Epsilon developed a diverse range of sensor products for special measurement tasks required by the customer. In the same year, the single-channel and multi-channel system, together with the resistance strain gauges and high-temperature sensors, were introduced for the first time at the company's exhibition stand at the Interkama exhibition. In the following year, Micro-Epsilon was involved in establishing the AMA (Association for Sensor Technology). Also in the same year, the company participated in a sensor-specific exhibition, 'the Sensor', for the first time. As a result of successful developments in this area, the S05 was introduced as early as **1982** and was the first miniature eddy current displacement sensor in the world. The digiNCDT was introduced in **1984**. This extremely reliable measurement system was considered truly innovative because it was based solely on digital technology. Digital measurement technology was not particularly common at this time. Therefore, this state-

of-the-art system had very low acceptance in the market and despite the high degree of innovation, was finally deemed a commercial failure. However, from a technical viewpoint, the digiNCDT was the first milestone in a new digital world of measurement technology.

Since its formation, Micro-Epsilon has focused its business activities on sensor systems. The company's experience with high temperatures and harsh operating environments in power plants have greatly contributed to this knowledge In the early days, the main focus of the company in the operational areas was on research and development. As early as **1984**, management steered Micro-Epsilon in the direction of industrial applications, with the focus being on displacement measurement. Public discussions about the further expansion of nuclear energy did not show any positive future prospects. So Micro-Epsilon began to focus its efforts on industrial applications.

Many values relevant for the measurement and automation technology can be derived from changes in displacement or distance.

The increased use of automation has been responsible for the increased demand from industry, which now requires an ever increasing degree monitoring of both movement and position.

In **1985**, Micro-Epsilon attempted to diversify its business activities. The effects of technological synergy rapidly enabled the expansion of these activities and to continue with three future fields of activity: sensor systems, energy management systems (EMS) for buildings, and non-destructive material testing.

The new areas of EMS and materials testing quickly emerged as being less profitable than sensor systems and so the two business segments were soon discontinued and sold.

In **1985**, Micro-Epsilon exhibited for the first time at the world's largest industrial exhibition, the Hanover Trade Show, which due to its worldwide appeal signified the start of the German economic miracle and the "Made in Germany" label that would be appreciated all around the world for many years to come. Due to the positive response, the company continues to participate regularly in the fair.
In **1986**, for the first time, the company's premises needed to be expanded due to strong growth. A new workshop was built for the production of sensors and electronics, as well as for shipping and despatch. In **1986,** the capaNCDT product group was introduced to the market as a new product line. Even back then, these sensors were considered to be high precision. At that time, the products were partly manufactured by Micro-Epsilon itself or procured from Eichhorn & Hausmann as a "badged" product. In **1987**, the LVDT range of linear, inductive displacement sensors were included in the production and sales range. In the same year, optical measurement technology was introduced High-precision analogue triangulation sensors from Swiss company Haenni were sold as a "badged" product. Analogue sensors from MEL Mikroelektronik GmbH were later added to the Haenni products The optoNCDT 1607 analogue series is still part of the product range today.
Due to growth and new product launches, Germany was divided into three territories and serviced by three sales engineers.
In 1988, due to very exciting developments in eddy current technology**,** the company was now able to launch the world's smallest eddy current displacement sensor U05 (08). This

sensor was the result of a further reduction in size of the U05 standard model, which had been successful for many years. The trend towards miniaturisation and more compact sensors that started at this time, has been an important success factor to this day.

The nineties

In order to develop new markets for its products, Micro-Epsilon began to expand further in **1990,** initially in Europe, but later across the globe, with new sales offices or additional production sites. At first, the company gained a foothold in the UK with its own sales office in Worcester. During that time, Micro- Epsilon presented itself to the public for the first time with an open house day in Ortenburg.

From very early on, Mr. Wisspeintner realised that more than just standard sensors were required in order to achieve above-average sector growth. In order to enter the OEM business, highly productive start-ups were acquired to produce higher volumes. In **1991**, Micro-Sensor spol. s.r.o. was founded in Bechyne in the Czech Republic. Today, Micro-Sensor operates under the name Micro-Epsilon Czech Republic.

In addition to sales of bought-in analogue optoNCDT sensors, since 1989 digital sensors have also been developed. Two conditions made this possible: on the one hand, the constant progression of digital technology had made access to new electronics and optical components possible. And with political change, contact was made with three young engineers who had already acquired experience in this area in companies in the former GDR. In **1992**, the optoNCDT 2000 was introduced as the first fully digital optical sensor. Rather than using PSD lines for acquiring measured values, innovative CCD elements were

used, which achieved new levels of precision that had never been seen before.
A further innovation was made in electromagnetic techniques. The first combi-sensor that still features the lowest noise ratio was developed. Two measuring principles, eddy current and capacitive, are integrated in one housing and arranged on a single measurement axis for this combi-sensor. Also in **1992**, Micro-Hybrid Electronic GmbH was established in Hermsdorf to produce micro-electronic circuits, components and sensors. As well as supplying the Micro-Epsilon group, Micro-Hybrid also supplies its own customers with in-house developed electronic products.
In **1993**, the product range was expanded to include wireSENSOR draw-wire sensors. The complete draw-wire expertise of ISTwas acquired and further developed for this. Together with the LVDT sensors, which measure on contact, draw-wire sensors make up the company's tactile measurement range.
In **1993**, Micro-Epsilon, together with the three development engineers who developed the first digital triangulation sensor, founded Micro-Optronic Messtechnik based in Langebrück near Dresden. Here, the state-of-the-art laser-based optical displacement sensors are being developed and manufactured. The company operates today under the name Micro-Epsilon Optronic, which produces point-type and line-type laser sensors, as well as speed sensors.
In **1994**, the VIP sensor was introduced as a major innovation. This new type of inductive sensor can be manufactured very flexibly in different compact designs and is therefore ideal for customer-specific OEM applications.
The next geographical expansion of the company was in France in **1995**. The Micro-Epsilon France subsidiary was

established in Orsay and tasked with the sale of all Micro-Epsilon products.
As well as the sensor business, a new division of Micro-Epsilon emerged in **1995**: the Systems Division. Since this time, this division has been developing, planning and manufacturing completely new mechatronic measurement systems for many different industrial sectors A specific characteristic of the division is its combined in-house skills and experience in sensor systems, mechanics and software.
Exactly 10 years after last extending the Micro-Epsilon premises, in 1996 another extension was required . Today, the new building houses the department for development of systems and sensors. Due to the successful integration of several companies, Micro-Epsilon was awarded the Technology Transfer Award of the OTTIe.V. in **1996** (Ostbayerisches Technologie Transfer Institut). In 1997, the first version of the GMS was introduced as an ERP system.
In 1998, the developer software ICONNECT was created by the Systems Division, and was launched on the market as an in-house product. To this day, ICONNECT is considered the all-round talent when it comes to measurement and control tasks with many different requirements.
Micro-Epsilon also made some strategic decisions in response to increased globalisation. In **1998**, the step to a new continent was taken and Micro-Epsilon America was founded. The employees of this company are responsible for selling all Micro-Epsilon products to the American continent.
In **1999**, Micro-Epsilon's Swiss representative, Rikenta AG, was taken over and renamed Micro-Epsilon (Swiss).

The 21st century

Directly after the turn of the millennium, it was once again necessary to enlarge the Micro-Epsilon premises . This time, an additional area for production of sensors and electronics was built. These enlarged buildings were celebrated directly after completion with the company's second open house event.
The marketing of vision4A image processing sensor systems started the industrial image processing in **2001**. Due to the modular hardware design and the use of standard components, vision4A is always able to keep pace with the latest technical standards. The software concept is based on the visually programmable ICONNECT modular system.
The three optical micrometers of the optoCONTROL series were introduced in **2002**. The sensors complement the range for automation solutions.
In the following year, the industrial image processing area was expanded by the scanCONTROL product group from Micro-Epsilon Optronic. At the same time, the optoNCDT 2400 measurement technology using white light was introduced. And for the first time, Micro-Epsilon employed more than 100 staff.
As a strong partner in the area of measurement technology, particularly colour measurement technology and endoscopy, in 2003 Micro-Epsilon obtained a controlling interest in Eltrotec Sensor GmbH, which was originally set up in 1971.
A subsidiary was also established in China very early in order to participate in the fast-growing Chinese market. In **2004**, Micro-Epsilon China was founded in Bejing to market all Micro-Epsilon products. The dynamic growth of this subsidiary resulted in the expansion of the administrative building very shortly afterwards.
In the following year, the new entrance hall of Micro-Epsilon was presented to the public with the company's third open house event.

In 2001, initial results of a joint project with Delta Engineering to develop a medical assistance robot started to emerge. The robot is a medical assistance system for camera guidance during minimal invasive operations. In **2005**, the Aktormed company was founded as a member of the Micro-Epsilon Group to further develop and market the medical assistance system. The extension of the administrative building was also completed, which established a modern reception area for customers and guests. In 2005, in order to increase its portfolio of products, Micro-Epsilon obtained a holding in the newly founded Optris company from Berlin. Since then, the range has also included IR sensors for temperature measurement, as well as displacement sensors. Also in the same year, Micro-Epsilon was awarded the Cross Border Award for cross border activities in the Lower Bavarian, South Bohemian and Upper Austrian area.

In 2006, further development of confocal measurement technology enabled Micro-Epsilon to launch a world-first , a confocal miniature sensor with an outer diameter of just 4mm. In 2007, this joint development project between Micro-Epsilon and the University of Passau, resulted in the reflectCONTROL product for defect inspection of reflecting surfaces.

As far as company growth was concerned, ME-Inspection was founded in Bratislava in **2007**. This company is responsible for the development and manufacture of systems for tyre and rubber web measurement and the sale of these products into Eastern Europe.

Micro-Epsilon also obtained a controlling interest in ATENSOR in **2008**. ATENSOR is responsible for system solutions for surface inspection and their industrial integration. The CEO Dipl.-Ing Karl Wisspeinter has been awarded to the Order of Merit of the Federal Republic of Germany in July **2008.**

Reasons for this award are his entrepreneurial skills, different voluntary works as well as the high involvement in several networks, universities and education.

Orders as milestones in the development of the company

In1982, the “sawCONTROL” product contributed significantly to the company’s expanded eddy current displacement sensor range. An order from the Wacker Burghausen company was received for the monitoring of the inside of hole saws for wafer production. The course of the saw blades during cutting of the silicon wafer ingots was monitored and documented.

At the end of the 1980s, Micro-Epsilon received a large order over several years from Ruhrgas AG for the supply of enclosed resistance strain gauges. These units have been installed for monitoring a large gas pipeline in areas where there is a risk of subsidence

The company Schubert und Salzer, now Rieter, commissioned Micro-Epsilon to supply high volumes of eddy current displacement sensors, for measuring the thickness of yarn. This was the first large OEM order that has been repeated annually since.

An OEM business for eddy current sensors was established with Heidelberger Druckmaschinen AG. These sensors are used for detecting double sheets in paper feeders for sheet offset printing machines.

Both these orders were particularly important in establishing volume production in Bechyne and the stabilisation of the young MICRO-SENSOR company in the Czech Republic.

The first real low cost series product is used by Miele for its washing machines. The displacement sensors are mounted in parallel with the vibration dampers of the washing drums and detect the load in this position. They also monitor the imbalance during the spinning process. For the first time, several hundred thousand sensor units were sold.

Important for the performance of Micro-Epsilon as a mechatronics company was the development of systems for measuring the thickness and profile of bearing shells since 1991 for use in car engines. The accuracy of 0.2µm with Six Sigma repeat accuracy during the operating process is still unsurpassed by competitors anywhere in the world.

For safety applications, forklift truck manufacturer Still Wagner invested in Micro-Epsilon wireSENSOR sensors. These draw-wire sensors ensure that it is virtually impossible to tip over the forklift truck during operation. The production of draw-wire sensors at the Bechyne location was also strongly supported by these orders.

Due to the development of turbocharger speed sensors from eddy current displacement sensors, a new market in the automotive industry opened up for Micro-Epsilon. After initial applications on test benches and in road tests at Daimler, the sensors were also able to establish themselves at all well-known car and turbocharger manufacturers.

The latest achievement in terms of customers is an image processing system developed to inspect wafer edges for key suppliers to the semiconductor industry. In a non-contact process, the system inspects the state of the wafer edge in

seconds at high resolution and precision. These volume orders have made a valuable contribution to the expansion of the image processing and system division within Micro-Epsilon.

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