

# SENSOR.KOSMOS.

Issue 28 | May 2022

## The global economy in change

How we may use the crisis as an opportunity

# SENSITEC IS CHANGING

**10:35 a.m.** – I'm off on my little morning tour to coordinate a few things with colleagues in person. After a long period of remote work in the coronavirus pandemic, during which we as a company kept our employees distant from each other where possible, personal contact and a conversation on site is feeling really good again. Remote work, or mobile working as it should possibly be called more accurately, was not installed out of necessity during the coronavirus crisis at Sensitec. We had been using it for a while before.

Other companies had to go to much greater efforts to ensure a working IT structure and stable and secure access to the company network. Changes to the shift model, creation of hygiene concepts, strategies for dealing with alleged contact persons - a change that had to be made out of a crisis that came very quickly, characterised by uncertainty in how things were done, and an ever-changing political environment. It was a tour de force for many companies. Unfortunately, some companies and industries have found it impossible to solve and lost the basis for their existence overnight due to restrictions.

A crisis always is an opportunity at the same time, they say – however, that takes time and money to identify and take advantage of these opportunities. In connection with remote work, video meetings were discovered as a “new” communication medium and established for customer meetings to supplement the usual discussions with colleagues. Initially characterised by typical questions such as “Can you hear me?” or “Can you see my screen now?”, a video meeting is now as normal for most as picking up the phone for a call. Only the partly strange virtual backgrounds some participants use continue to make me uncomfortable in such conversations ...

**On my way** across the corridor towards the development department, I pass by the purchasing department. It's a good opportunity to say hello and find out how things are going around here. In the time of the mandatory remote work, purchasing didn't quickly give you a call before they started the video call with the development manager. In addition to the important social aspects, a few important pieces of information were lost here and there. A brief “hello” turns into a more intense conversation. How could it be otherwise? It turns to issues – which is not to say that issues only happen in purchasing. Once again, it's a matter of material scarcity. Delivery dates are delayed, and at times components are no longer available at all. We can't even tell for certain whether it's the effects of the lockdown in the pandemic, or the freighter stuck in the Suez Canal in 2021, or if it's just everyone stockpiling, or a combination of all of these. The task now is to prioritise, look for alternatives, and work out solutions together with customers and suppliers. In any case: There will be additional effort in time and cost.

**Shortly after 11 a.m.** – the development department is already bustling with activity. Demonstrators are still being put together and programmed for the trade fair in Shanghai. Since the change of ownership in late September 2021, the winds of change have also been blowing here in many places. A number of things need to be reorganised, investments need to be planned and imple-

mented, and the strategy needs to be readjusted. This opens up new access to a market in China that has to be mastered in terms of size and speed.

The bad news for developers: The Shanghai show was cancelled due to the major lockdown and postponed until further notice. The work of the last few days was not done in vain. Nevertheless, it is frustrating since they had worked quickly and intensively to complete new products for the fair. We briefly discuss a few more project tasks in a further conversation with the development manager and our package specialist.

With Sinomags as our new owner, we now have significantly more resources at our disposal for the further development, production, and distribution of our products. Getting together is a challenge due to the distance, language, culture, and time difference. “Can you see my screen now?” is no longer an issue, however – we've all practised video meetings well since, but teams still work quite differently work, under consideration of the previously mentioned aspects.

**On the way back to the office,** I cast a quick look around the production area on the first floor. Production planning also reports issues due to material availability – purchasing, planning, production, and sales, however, coordinate closely and cyclically, so that many issues have so far been absorbed. The increasing scarcity of skilled workers is more likely to worry production and HR departments in the long term. This is a change for which development and scope suggest a rather long-term alignment but that needs to be faced in order to be able to continue to keep pace as a company. Increasing automation helps absorb simple activities with machines. Complexity and variety are increasing, however, as is the demand for reliability and cycle times. Simple activities are reduced, while the requirements for accompanying and monitoring tasks become more stringent.

This reminds me of the conversation I had with my colleagues from Mainz yesterday: They are concerned about the dramatically increasing energy costs. In the end, this affects all of us privately as well. Renewable energies must be expanded and advanced in terms of development in order to slow down climate change. Energy prices are rising to finance this and to achieve a rapid phase-out of fossil fuels. In addition to this, prices are increasing suddenly due to the war in Europe. In addition to economic loss, it brings unbearable suffering to the population.

All in all, it is growing increasingly clear how strong the dependencies in our global world are and, above all, how quickly the effects of small problems and crises can be felt. Crises bring change, change also leads to crises. At the moment, it feels like one crisis is changing the next – are we “changing” too quickly and too much, or are we simply too hesitant?

**Back at the office.** First take a deep breath. Tomorrow I'm finally off to visit a customer in person again. For now, however, we have a video meeting coming up.

René Buß

>> Crisis is a productive condition.

It must lose the subtone of

being a disaster

(Max Frisch)

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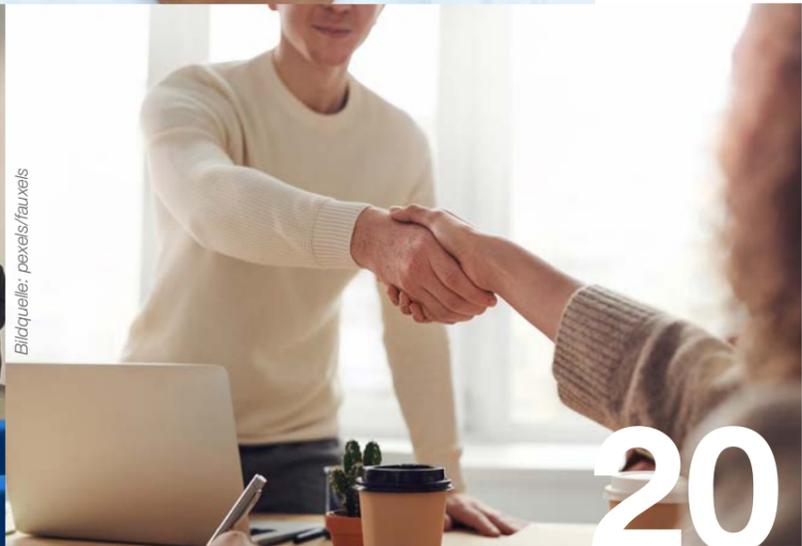
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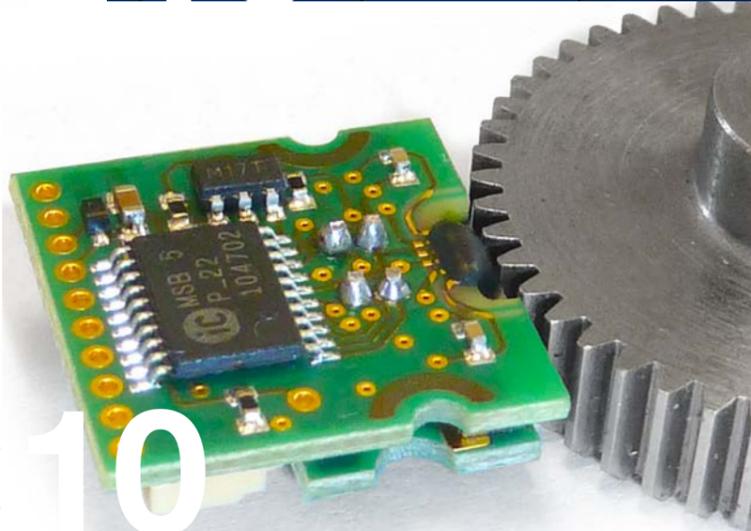
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# UNIFORM SPECIFICATIONS FOR DESCRIPTION OF MAGNETIC DIMENSIONAL EMBODIMENT

The rather sober title not only conceals an exciting project that raises magnetic measuring standards to another level in the state of the art, but also a joint activity of many companies that have been dealing with the topic for many years.

The INNOMAG Innovation Platform for Magnetic Microsystems, of which a large number of the companies involved are members, was commissioned by the German Institute for Standardisation (DIN) with performing a project in order to develop "Requirements for the technical representation of magnetic dimensional standards in design drawings" in a DIN SPEC.

After nearly two years of cooperation, as many as 20 employees from 12 companies are pleased to be able to present DIN SPEC 91411, a document containing clear specifications and nomenclatures for representing magnetic dimensional standards in drawings.

The field of magnetic displacement and angle systems had no uniform terminology or common drawing rules so far – neither for the mechanical nor for the magnetic parameters. This often led to misunderstandings or even errors in design drawings. This mainly affected manufacturers of magnets, dimensional embossing, and sensors, as well as machine and equipment manufacturers.

The intended solution was to create a glossary with corresponding auxiliary graphics for mechanical and magnetic parameters regarding dimensional standards (pole rings, scales).

Based on this, the goal was that of developing a standard document in which the specification for dimensional standards is defined and described in more detail. Example drawings of different dimensional standards that include essential elements, such as

magnetic parameters and mechanical views, help the user quickly apply the DIN SPEC for their magnetic dimensional standards as well.

A constructive exchange between the various working groups occurred in the course of the project. Creation of a document by means of DIN SPEC is considered the shortest way to establish standards on the market directly from research. The consortium considers use of the new DIN SPEC an option for saving time and costs in future by uniform technical representation of magnetic dimensional standards.

## THE CONSORTIUM MEMBER COMPANIES (IN ALPHABETICAL ORDER):

- » Balluff GmbH
- » Bundesanstalt für Materialforschung u. -prüfung (BAM)
- » Baumer Hübner GmbH
- » Bogen Magnetics GmbH
- » Elsona GmbH
- » Festo AG & CO. KG
- » Fritz Kuebler GmbH
- » Magnetfabrik Bonn GmbH
- » Innomag e.V.
- » Sensitec GmbH
- » TE Connectivity Sensors Germany GmbH



DR. JIANGUO WANG

王建国 博士

**Marion: Hello, Dr. Wang! How nice that you managed to come to Germany in spite of the difficult coronavirus conditions.**

**Dr. Wang:** Yes, it was not easy. All of Shanghai is in lockdown – 26 million people, including my wife in our flat. I wasn't in Shanghai before my trip. It wasn't easy to get my ID card, though, when everything was at a standstill.

**Marion: Your last visit here was exactly one year ago. What has changed since?**

**Dr. Wang:** Yes, there clearly is change. We have ramped up production in Mainz and had **the highest monthly wafer production since the old IBM days** in March. We got some good new people at both sites and did a little restructuring. Our annual target is ambitious. We are in the green zone in spite of the coronavirus and the Ukraine war.

**Marion: Last year you entered Germany via Portugal. Do you still have some friends there from your time at the INEC Tec?**

**Dr. Wang:** Yes, of course! Prof. Paulo Freitas, my doctoral supervisor back then, continues to be a good friend to this day. My wife and I look back fondly on our time at INEC Tec; we worked hard, but it was great fun. We also have maintained production facility in Braga. Of course, I drop by there when I get the chance.

**Marion: Your wife holds a doctorate in physics herself. She clearly shares her professional passion. Is that good or bad?**

**Dr. Wang:** >>Laughs<< That's good. We complement each other here! Well, we are both fascinated by the magnetoresistive effect. The magnetic tunnelling resistor or TMR effect was the focus of my doctoral thesis, while my wife was writing on the matter of giant magnetoresistance or GMR effect. This technology has great application options. After the time at INEC Tec, we went to the US and developed biosensors at the University of Minnesota, also based on the MR effect.

**Marion: What then?**

**Dr. Wang:** Then we had our daughter and went back to China. I was looking for a solid job in the hard disk industry. I powered through that for about 5 years.

**Marion: You mean you didn't like the job?**

**Dr. Wang:** It wasn't enough for me, I'd say, I knew our technology was capable of more than reading and writing to hard drives. I went into business for myself and founded Lertech, with a handful of friends and colleagues back in 2009.

**Marion: Did you have a strategy for it?**

**Dr. Wang:** No, we developed wildly, positioning systems, switching sensors, magnetic scanners, everything someone requested. We had little success initially. The turning point happened with the expanded function of ATMs, allowing to deposit banknotes as well, and the associated need for banknote authentication systems. Our scanners based on a specifically developed TMR sensor are able to perform this task very quickly and very precisely. This brought success for Lertech.

**Marion: 4 years later, in 2013, you founded Sinomags. Was Lertech not enough for you?**

**Dr. Wang:** No, that wasn't the reason. At the time, the issue of air pollution and carbon dioxide reduction measures was omnipresent in the world, and in China specifically.

As a young father, I felt the need to contribute to improving the living conditions of future generations. Specifically developed TMR sensors helped us measure current very quickly, precisely, and cost-effectively. Our target customers have come exclusively from the renewable energy and electromobility sectors so far. This is what we specialise in. **This is how we want to help make the world a little better**

**Marion: That means you developed Sinomags products from scratch?**

**Dr. Wang:** No, these products have been on the market for some time from a number of suppliers, but not based on MR technology. Reverb or fluxgate technology is used here traditionally. We strongly believed that our TMR sensors would improve current measurement.

**Marion: Do they, though?**

**Dr. Wang:** >>Laughs<< Yes, of course, and as they do, the sensors have higher dynamics, which gives us more freedom in design. We are usually faster and more accurate with our current measurement

**Marion: Sensitec GmbH has been part of your group of companies since the end of 2021. What is your plan, Dr. Wang?**

**Dr. Wang:** It is important to exploit the synergies that this imaginative alliance brings with it.

This means an additional portfolio of more than 50 different current sensors for Sensitec, as well as an unprecedented market entry into Asia. The centrepiece is the MR sensor production facility in Mainz, where several million euros have already been invested, and that was just the beginning.

**We want to develop the most cutting-edge, strongest, and most flexible waferfab in Europe here.** For Sinomags, the connection means a second production facility in addition to Portugal, as well as an additional range of position measuring systems and market access for Europe and the USA. It means internationalisation for both sides. Both sides have some great people, experts who are passionate about their job, connected to our MR sensors, whose possibility is not yet exhausted, and waiting to be discovered.

**Marion: Is there any growth target that you are pursuing? How big do you want Sinomags group to be?**

**Dr. Wang:** Yes of course ... we want to be a one-billion-dollar company!

**Marion: Thank you, Dr. Wang.**

**Dr. Jianguo Wang, 49 years old, married, one daughter. Graduate physicist, PHD in TMR Effect. More than 50 publications on the subject of MR**

# HIGHER RESOLUTION AND EVEN BETTER PERFORMANCE FOR TOOTH SENSOR MODULES



The **EBx7811 sensor module series** by Sensitec is currently being revised. Soon, it will be available with improved performance and higher resolution options. The product series will also be expanded by an additional tool to make setup during assembly much simpler. Like virtually every sensor and system at Sensitec, the sensor modules depend on the magnetoresistive principle and use magnetic fields for highly precise angular and longitudinal measurements. A magnet integrated into the EBx7811 sensor module permits use of gears, racks, or

tooth-like structures as dimensional embodiment – which is particularly interesting if already-present machine parts have a suitable tooth structure. A measurement signal is generated in the sensor module during operation. The “Focus” reconciliation tool determines the relevant parameters after installation of the encoder in the application and adjusts them in the sensor module so that an optimised signal quality, and thereby a high-quality measuring signal, is produced by the sensor module in operation.

**Improved signal processing and expansion, as well as an adjustment and parametrisation tool, provide greater performance and possibilities for use as a non-contact, magnetic speed, and position encoder.**

The **EBx7811 sensor module family** with various output interface options and selection of different sensors for optimum adaptation to the encoder tooth structure has been in Sensitec’s portfolio for quite a long time. Now there will be a signal processing overhaul for even greater power. The **additional tool FOCUS box** for automatic recalibration of the relevant sensor parameters in the application also lowers effort in installation and higher accuracy in speed or position measurement.

Magnetoresistive technology has been used as a core technology at Sensitec since the beginning and has been continuously developed further. A team of chip and system developers is constantly designing new sensor products for automotive, industrial, and medical applications. In this case, the magnetoresistive effect can not only be powered by a typical magnetic measuring standard that is, for example, alternately coded with north and south poles. The principle can also be shifted so that a magnet is positioned at the sensor element and a soft magnetic tooth structure changes this magnetic field. If the constellation between magnet, chip or chip position and tooth structure is designed correctly, this generates a sine and cosine signal at the sensor output, so that one signal period is generated for each tooth structure during movement.

However, this principle is not new and has been used in systems for a long time. The EBx7811 product family offers further signal conditioning and processing to a standardised interface in addition to the ideally matched sensor-magnet arrangement. The sensor signals are adjusted with regard to amplitude, offset, and phase here within the production at Sensitec, so that the most ideal possible signal quality is produced on a tooth structure. The shape of the tooth structure plays only a minor role here. It is important to have a uniform, periodic structure with, for example, a pitch of 2 mm. The sensor element is designed so that the gradients of the tooth structure that generate a deformation of the field lines of the magnet integrated in the sensor module result in a sinusoidal or cosinusoidal signal at the sensor output.

The advantages of this measuring principle with a purely mechanical tooth structure as dimensional scale are manifold. For example, an existing machine element such as a gear can be used as a dimensional scale, or a tooth structure can be applied to a shaft in the form of bores. Another advantage is the mechanical robustness of the gear. It is less affected by centrifugal forces at high speeds than a dimensional embodiment with an applied magnetic layer of, for example, plastic-bonded hard ferrite bearing the magnetic coding. Furthermore, a serrated structure can also be introduced into a system with minimal additional mass, which is an advantage for a rapidly rotating or moving or dynamic system.

In addition to the many advantages of such an encoder solution, there are, unfortunately, also limitations that lead to increased effort in the assembly and adjustment of the sensor module. The working distance between the sensor and the tooth structure depends on the dimension of the tooth pitch, so the sensor should be adjusted to a distance of one quarter of the tooth pitch with only a small tolerance. Deviations from an ideal alignment influence the sensor parameters. A non-optimal tooth structure also slightly influences the signal shape and signal quality. As a result, it is quite difficult or even virtually impossible to obtain the same sensor system performance in the final application as in the final adjustment at the final test station after the manufacturing process.

A new tool comprising an electronics box and PC software has now been developed as a solution to this issue, enabling the end user to calibrate the sensor module again after installation in the application, taking into account the installation conditions. The sensor parameters influenced by the assembly are determined again in this adjustment process and stored in the integrated memory of the sensor module. Adjustment of tolerances of the installation and the influence of the tooth structure are thus largely compensated. Assembly does not require the highest precision and can, therefore, be performed in a shorter time. The adjustment itself is made in only a few seconds and requires only a uniform rotation of the shaft during the process.

The end user does not have to determine and evaluate any complicated parameters because the adjustment is performed fully automatically by the tool and is displayed on the screen with a simple and clear visualisation. The matching process and result are also logged in a file including all parameters. This also allows documentation of the sensor installation, e.g., during the production process or a service call. The sensor signals are clearly displayed in a Lissajous figure with a target corridor with the supplied PC software (GUI). The installation situation can be assessed immediately then. The signals are also displayed before and after the adjustment in comparison during an adjustment process. The adjustment parameters within the possible adjustment range are displayed as well. This can serve as another indicator and be used as one.

If the adjustment is possible but already at the limits of the adjustable range, the user may consider subsequent adjustment to bring the system from a limit range of adjustment parameters to a more stable range. Furthermore, an open interface (API) is planned for the adjustment tool so that the electronics box can be integrated into the production environment at the end customer's own software user interface.

Looking at typical applications where the tooth sensor principle is particularly well suited – also because there are some general conditions explained above that pose disadvantages for the sensor principle – applications with quick movements and high speeds with little guide or position play turn out to be very suitable.

The sensor module is, therefore, often used to ensure reliable speed control even at very high rotation speeds in the high-frequency spindle sector. This is also where the advantage of a less pronounced and flat tooth structure becomes apparent. A coarser structure causes extreme noise development at high speeds as well as additional temperature input into the system. Non-contact tooth sensor measurement solution is also suitable for applications where aggressive media may appear in the encoder environment, such as lubricating oils or bearing greases. Magnetic measuring standards that are often based on plastic or elastomer material can be influenced or destroyed by the aggressive media. A robust measuring scale made strictly of a ferromagnetic metal offers significant advantages here.

The magnetoresistive solution characterised above all by very good signal performance in terms of resolution, accuracy, and dynamic range. Various sensor types, adapted to different tooth pitches, are available. A version with a digital quadrature interface with freely adjustable resolution and an analogue version with a standard interface with 1 Vpp are available and cover a wide range of requirements. Tooth sensor encoder solutions can be implemented quickly and reliably together with the “Focus” alignment tool

*René Buß*



## 16. XMR-Symposium

At the international symposium "Magnetoresistive Sensors and Magnetic Systems" on 8 and 9 March 2023, speakers from science and industry will once again offer interested trade visitors a comprehensive exchange of information and experience.

### Call for presentations

Submit your subject proposal for a presentation to the 16. MR Symposium!

Present the results of your application-focused research and development and discuss them with an audience of experts from industry and research institutions or universities. We offer space for 24 presentations to dive into the rapidly evolving world of magnetoresistive sensors and magnetic systems.

Participation in the event and accommodation there are free of charge for speakers. Every contribution includes a 20-minute presentation and a publication in the conference proceedings. The conference language is English in consideration for the international participants. Participate with technical presentations, practical examples, and reports from projects. Subject your suggestions for contributions.

### The following main subjects are planned:

- Magnetoresistive sensors
- Magnetic systems
- Magnetic sensor components
- Basic technologies of magnetic sensors

You are also welcome to propose further subjects (enabling technologies) with an application connection to MR sensors and magnetic systems. Submit your proposal by 31 July 2022 (PDF file, abstract of max. three pages, including graphics) to our coordinator Dr. Joachim Hölzl.

Take advantage of the opportunity to network and exchange ideas with a community of experts.

All information on the program and registration can be found at [www.xmr-symposium.com](http://www.xmr-symposium.com).

### We look forward to your contribution!



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## CAS5000

We already introduced the CAS5000 current sensors as a new product family in our portfolio last year. The CAS5000 family has now been expanded in two places.

The CAS5075KRA expands the rated current range that can be covered with the sensor family from 50 A to 75 A. The new sensor also has a version with a routed-out reference voltage and, like the other types, offers a wide measuring range of up to 3 times the rated current.

All previous CAS5000 types between 15 A and 50 A are also being expanded and supplemented by a "K" variant. This provides a greater distance between the primary and secondary areas and thus a greater creepage distance.

### This is what Sensitec and the CAS5000 product family offers you:

- Many current ranges 15 A to 75 A
- Measuring range up to 3 times the rated current
- Compatibility
- Good availability
- Very good price-performance ratio
- Technical support

Sensitec GmbH has been part of the Sinomags Group since October 2021. We are united by our passion for sensor technology and magnetoresistive technology that forms the basic technology in all companies of the group.

Being a company of Sinomags Group, we have access to a broad portfolio of current sensors for a variety of different measurement tasks and offer personal and qualified support as a reliable partner.



The portfolio of our CAS5000 sensors will keep on growing in the future



## TRADE FAIR DATES

We will be at the Hanover Trade Fair from **30 May 2022 – 02 June 2022**. We look forward to welcoming you there again in person:



## MAGNEFI: PROMOTION OF INTERNATIONAL YOUNG SCIENTISTS AND ENGINEERS

Sensitec GmbH has been involved in training of young scientific and technical staff for years.

To this end, Sensitec is cooperating with universities, research institutions and industrial partners from European member states in the European **MagnEFi** funding project to provide young people with scientific and practical training as part of a doctorate. Like the other project partners, Sensitec has employed a doctoral student to gain practical experience at Sensitec during the three-year project period. They will work on the influences of mechanical stress on magnetoresistive structures.

This does not have the goal of avoiding stress, but of using it specifically to optimise sensor properties. In particular, we investigate how complex magnetic structures can be moved or held in place by global as well as local mechanical stress. With these findings, we will be able to develop a new generation of sensors that allow currentless, bit-by-bit counting of revolutions.

Our Italian PhD student will be supervised and supported by the University of Mainz, the research group of Professor Dr. Mathias Kläui, closely linking science and technical practice in training. The training will be supplemented by secondments of

several weeks to the partner institutes and companies. In this context, Sensitec will provide doctoral students of the other partners with insights into the production processes of the waferfab in Mainz. Regular meetings of the doctoral students and their supervisors in order to practice the personal exchange but also the joint further education in technical topics as well as soft skills are another element of the training.

Sensitec GmbH has had very good experience with this type of training in the past and has thus gained junior staff who have contributed to innovations. Other companies in Sinomags Group also actively promote cooperation with universities and

the advancement of young scientists and engineers. The EU Marie-Sklodowska-Curie programme that uses MagnEFi has long been a suitable measure for countering the shortage of skilled workers in Europe and attracting talented young people from European and Asian countries.

For more information on the project, see

<https://magnefi.c2n.u-psud.fr/>

The MagnEFi project is funded by the European Commission (contract no. 860060)

*Dr. Joachim Hölzl*



Project meeting of doctoral students and supervisors in 2021.

## Working at Sensitec

In order to provide a small insight into the working world at Sensitec, we have invited Horatio Raul Schneider and Thomas König for an interview.

# Horatiu



**Marion: How long have you been working at Sensitec?**

**Horatiu:** Hey Marion, I have been part of the Sensitec family since the end of August.

**Thomas:** I have been with Sensitec GmbH since 2 August 2021.

**Marion: How did you hear about Sensitec?**

**Horatiu:** I had known Sensitec for a long time, as I used to work for a Sensitec supplier. I am currently acquiring my technician's degree in electrical engineering and was looking for an activity in the electrical engineering industry. As a result, I loved seeing a vacancy in sys-

tem-production.

**Thomas:** Through job ads in the daily newspaper and from friends.

**Marion: What tasks are part in your field of activity?**

**Horatiu:** My activities here at Sensitec include visual inspection, soldering, assembly, and testing of various modules in system production and simply operating the saw and visual inspection of the wafers on the wafer saw.

**Thomas:** I work as an operator in the electroplating division.

**Marion: What do you like about work and your work environment?**

**Horatiu:** Of course, my colleagues are great and also helpful. I have never seen this before in quite this manner. I was at ease immediately. From the very beginning, they were trying really hard to make sure that I'm steadily improving but also to give me enough

# Raul Schneider

# Thomas

time to study for my degree.

**Thomas:** I particularly love the variety and always having new projects, manufacturing processes in product production and other tasks to master. Of course, this also includes my colleagues at work, who are always there to help me with questions and problems. Thank you for that.

**Marion: What skills/training should a production employee at Sensitec have?**

**Horatiu:** I don't think there is any training you need for production work. It's a really good job for people just starting out. Previous experience in production or electrical production is helpful since learning the various assemblies takes a lot of time.

**Thomas:** They should have a good grasp and an open-minded approach to new things. They should be interested in the work – in short: they should identify with the work.



# König



Since 01/01/2022, 47-year-old Jun Lei has been heading the finance division of Sensitec GmbH as a new member of the Executive Board.

Lei completed his first degree in China and started his professional career in 1994. He came to Germany 22 years ago to complete his second degree in business administration with a focus on banking and finance.

He worked in the consumer goods sector as well as in industrial companies and other places. For eighteen years, he passed through decisive stations in the financial sector of major international banks. Domestic and international assignments at management level for medium-sized and multinational companies followed on this. In those places, he was responsible for the Sales and Risk Management departments.

Lei explains: "Our company is strong, and we will prove our resilience in the current crisis. As part of Sinomags Group, we have a clear strategic direction together: Our vision will remain relevant in future: We want to become the pioneer and market leader in our industry! We will focus on our goals: expanding even more deeply customer relationships and increasing production capacities, as well as promoting innovation in the R&D area. All of these areas are important to me."

Lei also is an avid chess player in his private life. He likes to read philosophical books to balance his thoughts. In his free time, he has enjoyed camping and athletic activities such as jogging and swimming for many years.



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雷军

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