

# Connect

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2023



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Flexible solution for more speed in the climate chamber

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## BREADBOARDS

Precise test setups on optical tables

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## WITH PRODUCTION CELLS TO MODULAR PRODUCTION

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## More productive with assistance: **MiniTec assembly workstations**

The importance of ergonomics in the workplace has been proven time and again by studies: employees are less likely to fall ill, and at the same time their motivation and satisfaction increase. An ergonomically optimised working environment demonstrably ensures higher performance, efficiency and processing quality.

That is why **MiniTec** assembly workstation systems have extensive options for ergonomic

adaptation. These include topics such as height adjustment, lighting, sound insulation, gripping space optimisation, tool provision, logistics and material provision. And of course **MiniTec SmartAssist** with the helpers Edi and Buddy. Our assistance system supports your employees with the help of texts, graphics, photos and interactive assistance modules during assembly, and thus guides them safely through the process.

**When will you discover  
the art of simplicity?**



**Visit us ...**

... at the Motek in Stuttgart and  
the all about automation in Düsseldorf!  
More info at: [minitec.de/en/service/trade-fairs-events](http://minitec.de/en/service/trade-fairs-events)







## DEAR READERS,

MiniTec has been very active in machinery and plant engineering for many years. Here, many of our product areas go hand-in-hand: Our modular profile system as the basis of designs, linear technology, conveying, handling and assembly technology and our many years of experience in automation.

We maintain permanent discussions with our customers and potential customers, always with the intention of making products and systems even more efficient, economical and easier, always true to our motto "The Art of Simplicity".

Especially in plant construction, this is often difficult, because the requirements are mostly very complex and different. And yet within plants and systems there are repeatedly areas in which the technical processes are similar or even the same. Assembly tasks are only one example. It is not necessary to permanently "reinvent the wheel".

The knowledge acquired from a large number of projects in these areas has motivated us to implement standards in special purpose systems construction. To this end, among other things, we have defined and built production cells, which follow standards but are customisable and can be used very flexibly. We see this as an important reform of MiniTec, which – in our judgement – will play an important role on the market. Many customers have already given us very positive feedback in discussions already held. The advantages are obvious: The standardisations increase the efficiency and possible uses of such systems while at the same time their costs are lower. The error rate can be reduced as important parts of a system are based on tried and tested designs, which can also be completely preassembled. This not only cuts commissioning times, but also enables the systems to be combined with numerous variations.

You can get an initial, exclusive view of this concept and see real exhibits at the Motek trade fair. Further information is available in the cover story from page 8.

Yours sincerely  
Andreas Böhnlein

A handwritten signature in black ink, appearing to read "A. Böhnlein". The signature is written in a cursive, flowing style.

Director of Engineering

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The construction of special purpose systems is characterised by the fact that each project is specifically aligned to the customer's requirements. MiniTec has now developed an innovative concept, which enables individual systems to be realised on the basis of standardised cells. This results in many advantages for the construction of special purpose systems. It premieres at the Motek.



## USER REPORT: SHUTTLE FOR FIRST CLASS CLIMATE

Wipotec needed an automated test facility for its heavy-duty weigh cells, consisting of a climate chamber and a feed and handling system. An extremely challenging project, successfully realised with MiniTec.



## TEST SETUP WITH THE BREADBOARD

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# MINITEC AT THE AUTUMN TRADE FAIRS AND EXHIBITIONS



all about  
automation  
chemnitz

**Autumn is almost here and with it, several interesting trade fairs and exhibitions. MiniTec will again be presenting itself at the most important trade fairs of its industry.**

all about automation | Chemnitz and Düsseldorf

27 to 28 September 2023, Messe Chemnitz | 18 to 19 October 2023, the Böhler site in Düsseldorf

all about  
automation  
düsseldorf

The theme of the regionally focussed trade fairs for industrial automation is systems, components, software and engineering for industrial automation and industrial communication.

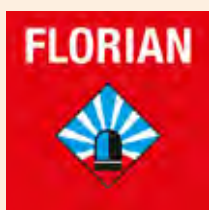
At the trade fair, MiniTec will be presenting systems, components, software and engineering for industrial automation and communication.



**Motek, Stuttgart | 10 to 13 October 2023 | Messe Stuttgart, Hall 3 – Stand 3115**

The Motek International Trade Fair is the leading event in production and assembly automation, feed technology and material flow, rationalisation through handling technology and industrial handling.

Apart from the new production cells, MiniTec will also be presenting its MiniTec SmartAssist worker assistance system at the trade fair.



**Florian Trade Fair | Dresden | 12 to 14 October 2023 | Messe Dresden, Hall 1 on Stand F10**

The Florian trade fair in Dresden is all about fire brigades, civil protection and disaster control. Individual solutions are required for the equipping of fire and rescue stations.

The modular aluminium profile system of MiniTec offers diverse options – be they mobile container racks, vehicle fitouts, breathing protection workshops or equipment storage.





# BRIQUETTING SYSTEM FOR MORE ENVIRONMENTALLY AWARE CNC PRODUCTION

**Chips of metal and their adhering metalworking fluids are not bothersome residual materials, but instead are valuable raw materials. Briquetting is a useful and also sustainable approach to dealing with them, because the metalworking fluids are reused – as at MiniTec.**



For the Works Manager Stefan Geyer, briquetting offers important advantages.

At the beginning of the year, a robot cell for automatic workpiece loading of a DMG Mori CNC machine was installed at the MiniTec Waldmohr location (see report in Connect 1/2023). This extension also enables around-the-clock operation of the facility. In principle. Because Works Manager Stefan Geyer quickly noticed that there was still a challenge to solve. CNC milling of aluminium parts leaves behind a large quantity of metal chips. Until now, these were simply loosely directed into a collection container. Every twelve hours at the latest it was full, had to be removed and replaced by an empty tub.

What to do? Geyer had found out on the internet about machines that press the chips and compress them into small briquettes. Following an

initial contact with the manufacturer, Ruf Maschinenbau GmbH & Co. KG in the Bavarian village of Zaisertshofen, it sent the company a drum of normal aluminium chips for test purposes.

## **Astonishing result**

The specialists chose the Formica model for the test run, a particularly compact design suitable for small to medium throughputs. The drum provided by MiniTec had a volume of 200 litres and, full of chips, weighed 50 kg. When the drum was returned to Geyer he could not believe his eyes – it was now only 1/5 full, with the briquettes mentioned above. 12 kg metalworking fluid had also been pressed out, so that the weight had reduced to 38 kg.

The result was so convincing that the machine was purchased. Its advantages are diverse: The pressed out metalworking fluid is passed through a pipe, directly back into the milling machine. This is good for the environment and also very economical, because the lubricant is returned to the cycle and reused. In this way, MiniTec saves around 40 litres a day and therefore does not have to buy new lubricant as often. Furthermore, the recycling company now pays a higher price for the aluminium material because, the liquid having been removed, it is already cleaned and thus has a higher quality. And the company does not have to come as often, because the containers now fill more slowly. After three months of practical experience, the positive effects of the system are clearly noticeable and an important contribution is made to the sustainability of the production.



The aluminium briquettes have a far smaller volume than the chips.



# WITH PRODUCTION CELLS TO MODULAR PRODUCTION

MiniTec has developed an innovative concept, which enables individual systems to be realised on the basis of standardised cells. This results in many advantages for the construction of special purpose systems. It premieres at the Motek.



The construction of special purpose systems is characterised by the fact that each project is specifically aligned to the customer's requirements. MiniTec has set up extensive competence in this area over many years, including in automation. An issue repeatedly considered is how, despite the high degree of individualisation, serial production aspects can nonetheless be picked up and incorporated. With the goal of allowing standard solutions to be incorporated into the projects to achieve cost and time advantages for customers.

Against this background, the concept of modular production cells was examined intensively. I.e. self-contained boxes, which always have the same dimensions, have an identical basic structure, but are equipped for different functions and technologies. As a result, at the Motek 2023, MiniTec will be presenting an exemplary system with precisely this approach. It consists of two production cells connected by a conveying section.

#### Robot cell with hybrid welding

One of the cells contains a robot. The task to be performed within the unit is so-called hybrid welding – a new joining process, which MiniTec developed with other partners at Kaiserslautern University as part of the HyBe research project (see report in Connect 1/2022). This is a new type of hybrid connection technology between elements made of metal and those made from carbon-reinforced plastics.

The robot in the cell takes care of handling the elements during the hybrid welding. It has a pneumatic gripper with which to pick up the components from a feed technology and places them in the machining cell, where the joining



Peter Müller wants to use the standardised cell in future for all kinds of different projects.

process then takes place. Due to the specific task, the robot also has a second hand, which is equipped with different techniques. Apart from pure gripping, this also includes a heating function, which is needed for the process. There is also

special sensor technology integrated in the robot hand. The robot could of course also be equipped with any other gripper, to carry out completely different handling tasks. In the specific example, the robot cell could be equipped with a rotary indexing table and be used for special tasks of customers. In general, the robot cell was developed so that customers' specific applications can take place inside it.

## COMPACT CELLS, QUICKLY INSTALLED

Project Manager Peter Müller: "In principle, it represents an assembly cell. On the one hand, we have the pneumatic gripping unit in it, which simply picks up a component and does something with it. And on the other hand, due to the research project, this technology hand with the servo-axis, the inductor and the measuring technology for the welding procedure. In general, we use it to demonstrate that, with a robot in our compact cell, assembly and handling tasks can be carried out."

The robot unit is connected to a second cell by a conveyor belt – or to be more precise, by a modular belt chain conveyor, to demonstrate the possibility of linking between systems. For the presentation purpose, an oversized MiniTec profile connector functions as the component.



An oversized MiniTec profile connector is used as a handling object in the system.



A 3-axis gantry is installed in the linear cell.

### Linear cell with handling and logistics tasks

The second cell contains a classic 3-axis linear system, with which handling tasks can be completed. The oversized MiniTec profile connector mentioned is used as an object for it. In the cell, the part is picked up from the conveyor belt, added to a machining process, removed from the process and then placed back on the belt, to send it to the next machining stage. A logistics unit is also integrated. It is a special conveyor belt that can move in 2-D – a so-called ModSorter. “With this technology we show that it is not only possible to transport components, but also to rotate and turn them. Equally, within the compact cell they can be placed on a specific position, a certain point. And then made available to a gripper again, which accepts them. The gripper puts down the parts again somewhere else and moves back via the axis system to its initial position”, explains Peter Müller.

As an application example, in the second cell MiniTec therefore shows a transport task with different manipulations of the components and their subsequent positioning on a defined point, where they are again gripped by the linear system.

### Robots and linear axes as alternatives

In general, the setup shows that the new MiniTec cells can operate not only with a robot but also with a linear gantry. Both systems have their advantages and disadvantages and thus their specific areas of use. A robot is itself movable and can freely head for positions. On the other hand, due to its dimensions, it has certain limitations in reaching certain points. For example, its own standing place is not available as space for handling and positioning components.

The advantage of a gantry in this case is that it is located above the work area, almost as a floating system. Accordingly, the complete area is available for handling tasks. Furthermore, longer distances are easier to cover with linear axes. There are also solutions for robots here, but they are nonetheless more confining.

Ultimately, which technology is used in the MiniTec cells is a question of the task – both are possible.

### From the individual cell to the automation line

The basic structure of the cells is always the same:

- In the bottom area, under the tabletop, there is the base unit, which contains the whole electronic controls.
- The actual action takes place above the tabletop.
- The cell is enclosed by a protective cabin.

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## HIGH DEGREE OF INDIVIDUALISATION WITH STANDARD SOLUTIONS

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“The idea was for us to have a cell in which we can accommodate different technologies in the top in the machining area, while the control runs below it. In terms of the design, we have now set up two different systems. In this way we show that, with the same basis, we can equip such systems with different tasks”, is how Peter Müller clarifies the concept.

The MiniTec cells can work both separately (autonomously), as well as in an interlinked line, Müller says: “A single cell can be used for some assembly task or other, but it is equally possible to place two or three cells next to each other and connect them with a conveyor belt. In this way, multiple subprocesses, which take place in different cells, can be aggregated to form an overall process. And thus set up a modular, extremely flexible automation system.”

### Plug and play

The dimensions of the cells also ensure flexibility and speed. They have a square base area of 1.60 m x 1.60 m and are 2.40 m high. These dimensions were chosen deliberately, so that the cells are transportable. They can be moved by forklift truck and fit on any normal truck. Therefore, after their

assembly at MiniTec and acceptance by the customer, they no longer have to be dismantled, but can be transported directly to their final destination. There they then only have to be placed in the correct position, connected and work immediately. This not only saves money, but also extensive time.

Peter Müller added: “However, if a company decides to move its production internally, the concept is also extremely practical. Forklift removed, power section and socket off, transport to the new hall, briefly aligned, runs again – because it is a self-contained, stable unit! In addition, due to their compact dimensions, the cells can also be used in spatially limited production environments.”



The workpieces for the hybrid welding are transported in the robot cell to a rotary indexing table.

### Useful for diverse task

The range of uses for the new MiniTec cells is enormous and extends from assembly activities to testing tasks through to all kinds of different handling action. Thanks to the possibility of interlinking and the self-contained control circuits within the individual cells, fully automatic assembly and production sections are also feasible. For example, a project for the assembly of smaller lock systems is currently in progress. Each assembly step has its own cell, the components are passed through the cells, up to a test task at the end with camera and functional test.

### Standardisation in special purpose system construction

The standardised basic concept is a general advantage, Müller explains: “Until now, we have always built such systems individually. Our intention is to use the standardised cell in future for all kinds of different projects, so that we are more flexible and cost effective. After all, most of the design already exists and does not have to be developed. We will also acquire empirical values from the cell production over time and then allow these to be incorporated into future projects. Just like with a serial product!”



Fully automatic production lines can be realised by linking production cells.





# SHUTTLE FOR FIRST CLASS CLIMATE

**Wipotec needed an automated test facility for its heavy-duty weigh cells, consisting of a climate chamber and a feed and handling system. An extremely challenging project, successfully realised with MiniTec.**

Wipotec is a worldwide leading supplier of intelligent weighing and inspection technology. At its headquarters in Kaiserslautern, the company develops and produces a broad portfolio of checkweigher systems, X-ray machines, track & trace products and innovative systems for the main & logistics industry.



Linear system in the ceiling area for handling the weight chains in the chamber.

Precision naturally plays a major role in weighing technology. The Wipotec scales must always display the exact, correct weight even in different conditions. This particularly also applies to temperature fluctuations: No matter whether it is hot in the summer or icy cold, the measured value must always be the same. Wipotec makes a great deal of effort to ensure this: At the end of the assembly, each weigh cell – which is the technical core of the cells – must be passed into a climate chamber, where it is exposed to a cycle with different temperatures between 0 and 40 degrees. If deviations from the set weight occur, appropriate correction factors are added until everything is right.

## Heavy-duty scales on course for growth

Heavy-duty scales is a product division at Wipotec that is experiencing particularly strong growth. These can be loaded with up to 150 kg and are used in particular in the logistics industry, for parcel dispatch. But cement works for example, where heavy sacks are filled, are also buyers of the scales. To meet the increasing demand and optimise the internal processes at the same time, the testing of these products should be located in the same hall as

where they are assembled. To this end, Wipotec planned a new test system, consisting of a generally dimensioned climate chamber and a feeding and handling system for carrying the weigh cells in and out.

## Faster throughput time and greater flexibility

MiniTec was brought on board as a partner for the project at a very early stage. Both companies are connected by cooperation over many years. For example, Wipotec has used the MiniTec modular profile system in its own equipment building for a considerable time – including specially designed kits for workplaces. In addition, steel shafts from the MiniTec linear technology are used in the scales. The company has also carried out plant engineering projects with MiniTec.

The climate chamber to date had a disadvantage: It was only possible to move in all the weigh cells to be tested at once, expose them to the temperature cell and then, after the test was completed, remove all the units again together. This process took two days and made the company extremely inflexible. If one weigh cell was long

since finished, say, it was necessary to wait for the other, although its space could have been used for a new workpiece. Vice versa, rush orders could also not always be processed quickly. Because, if the chamber was loaded on a Monday morning, it was not finished until Wednesday. If a weigh cell was then urgently needed on Monday

afternoon, it could not be placed in the measurement until Wednesday and taken out again on Friday. And was then not available until the Monday in the following week.

Here, Wipotec wanted significantly more flexibility and faster throughput times for the new climate chamber.

## Reaching the goal through partnership

To overcome the complex challenges, it was necessary to work together closely with tasks clearly divided between the project partners. Tobias Stellwagen, Research & Development at Wipotec, remembers: “The whole task was set up as a large project. The components of the overall system, i.e. the climate chamber, as well as

the feed and handling system, were designed together. We defined the climate chamber we need – i.e. the size and the resulting space requirement. Equally, we took care of the workpiece carriers and the weight chains. MiniTec supplied the conveying technology and the linear axis, which moves the weight chain to the right position within the climate chamber.”

A shuttle concept was developed to enable greater conveying in and out flexibility in the future. This enables each weigh cell to be handled individually, independently of the others. In the initial approaches, the weigh cells could only have been placed on one side. This would have made the climate chamber much longer. The proposal of the MiniTec Project Manager, Peter Müller, was therefore backed. This introduced a shuttle solution with a fork bracket, where the workpieces can be placed on the right and left. The advantage for Wipotec was a significantly compacter climate chamber.

## INTELLIGENT WORKPIECE CARRIER FOR OPTIMUM CAPACITY UTILISATION



Tobias Stellwagen is delighted with the advantages of the new system.





Inlet (right) and outlet (left) of the weigh cells – in the background, the climate chamber with considerable dimensions.

### New system with high degree of automation

The new system is located directly at the end of the production line. After the assembly, the relevant weigh cell is placed on a workpiece carrier on a roller conveyor (RMS = roller conveyor system) and signalled to the climate chamber. If a space is clear in it, the workpiece carrier (WST) moves autonomously to the entry. Here it is collected by the shuttle, and carried into the climate chamber where it is exposed to the climate cycle. If the measurement is ended and everything is ok, the shuttle moves back in again automatically, picks up the finished weigh cell and ejects it again on the other side of the RMS. Here a worker removes it and makes it ready for dispatch.

Problem cases have also been anticipated, Stellwagen explains: “We installed a kind of bypass, a small circular route. If we discover a problem somewhere, we can easily remove the product concerned.”

### Flexible workpiece carrier

here are twelve measuring stations for workplace carriers in the climate chamber. And there are an equal number also always outside on the RMS.

So whenever a WST comes out, a new one can be moved in again. A different number of weigh cells can be placed on the WST, Stellwagen explained: “We have three different sizes. On the WST, we can either place four of our smallest units, two medium-sized ones or one large one. And also combinations between. We can therefore also run mixed loads, so that we are very flexible.” To make this possible, the WST was assigned a certain intelligence. In the

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**30 PERCENT MORE  
WEIGH CELLS  
PER WEEK**

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middle there is a contacting. If the carrier is lowered, current is passed through all units above it. Each has a specific position on the EST and accordingly, also an address. From the number of the WST and the address, it is therefore clearly identifiable which weigh cell is which. This is also displayed visually to the worker, when the WST exits the chamber later, explained Stellwagen: “Either all are green and

they can remove them and make them ready for dispatch, or one is red, which then completes an extra round and is then moved in again.”

### Variable loading via weight chains

In the climate chamber, test weights are attached to weight chains automatically, variably between 10 and 110 kg – depending on the measuring range of the weigh cells. 10, 20 or more kg are then attached, depending on how far the weight chain moves downwards. The weight chains hang on linear axes (Z-axes), so that they can be moved within the chamber.

The respective weight is then compensated for with the climate factors. The measurement cycle was extended for the new system, it now ranges from 0–40 degrees (previously 5–40 degrees). The reason is that the lower temperatures also play an increasingly larger role for the heavy-duty scales, for example, in the hygiene sector.

### Automatic climate calibration

The temperature cycle in the chamber runs so that, starting from the room temperature, it is heated up to 40 degrees and then cooled again until room temperature is reached again. While this is happening, weighing takes place and the results are compared. If it is found, say, that there are no 10 kg weights at 40 degrees, correction factors are calculated automatically and are stored as a matrix.

Stellwagen explains: “The temperature compensation in our weigh cells is so important, because we always have a material mix. This is a mechatronic system. It consists of different metals that are installed (aluminium, stainless steel, brass). We have screwed-on electronic components in the inside. The system naturally “works” over the



temperature gradients, and this can lead to the the weight value at 20 degrees being different to the value at 40 degrees. We want to prevent this.”

The system is controlled by a “Master brain”, control software developed by Wipotec for all the test processes. Interfaces were defined for this, not only with the climate chamber, but also with the conveying system, which represent both closed systems.

### Safety first

To ensure occupational safety, a light curtain was installed, which switches off the system automatically if it is penetrated. Here it was found that this would have required a safety distance of over 2.5 m. The reason was that the heavy workpieces needed up to a second before they stopped. A second light curtain was therefore installed, which enabled the safety range to be reduced to 1.2 m. “This is accommodating to us for space reasons. But to make sure that we know that there is no one within this light curtain, we also monitor the floor with a floor scanner. The system only restarts automatically, if the scanner says that the floor is clear”, explained Stellwagen.

### Advantages already noticeable at the introduction

The new system showed noticeable advantages from the outset in the test and introduction phase: “The background was also the goal of increasing capacity. With the new climate chamber we can pass through 30 percent more weigh cells per week. And the handling is also significantly better. As mentioned, with the existing system, we loaded



Heavy Metal: A MiniTec RMS conveyor system is used to transport the heavy-duty weigh cells.

and unloaded our climate chamber three times a week. We are nor very much more flexible, because we can move in and out separately each individual weigh cell or each workpiece carrier.”

Stellwagen also assesses the project itself very positively: “The work together was very much based on partnership and was very satisfactory. We therefore already have a follow-up project in sight. It involves a further handling system, which places the preload plates on the weigh cells automatically, before they are moved into the climate chamber. And are then removed automatically on moving out and are parked on a stack somewhere. This reduces the number yet again and improves the efficiency as we do not have so many preload plates and are also variable.”



The weigh cells are installed in such heavy-duty scales of Wipotec.

# CLEANROOM WORKPLACE FOR RESEARCH ON ULTRA-COLD ATOMS



**Cleanrooms are frequently needed in universities and research institutes, to enable certain tests and projects to be carried out error-free. They ensure a very low concentration of airborne particles, which is indispensable in many areas, for example, in semiconductor production or optical and laser technology.**

The renowned Humboldt University of Berlin with its over 200-year history is one of Germany's eleven Universities of Excellence. The Institute for Physics mainly carries out research in the areas of elementary particle physics, solid-state physics, macromolecules/complex systems as well as optics/photonics.

In the optical metrology workgroup, a cleanroom workplace was needed for the BECCAL (Bose-Einstein Condensate and Cold Atom Laboratory) project, at which a laser system is to be developed and built for subsequent research on ultra-cold atoms on the ISS (International Space Station).



View of the laser protection plates.

### Cooled atoms

What ultra cold atoms are? For certain applications, for example, atomic clocks, the atoms may not move too fast. To achieve this, they must be cooled to close to the absolute temperature zero in a highly diluted gas, which can be achieved by using the laser cooling method (Nobel Prize for Physics 1997). The atoms are radiated with precisely matched laser light so that faster atoms preferably absorb its atoms and are braked and cooled by the rebound occurring.

The university and the physics department have opted for the MiniTec modular profile system for many years for their designs, as thanks to its flexibility, it is ideal for research purposes. Accordingly, MiniTec Berlin was given an order to realise the workplace in a cleanroom of the university, which is also based on profiles.

### Extensive requirements

The requirements set for the workplace were diverse. For example, it had to be conductive to protect against electrostatic discharges (ESD), which was explicitly tested and released by the university. Furthermore, the central, localised large optical table had to be equipped with special laser protection



Cable routing from the roof to the workplaces.

plates. These are intended to prevent laser beams from leaving the table in an uncontrolled way.

## MODULAR SYSTEM FOR RESEARCH PROJECTS

The workplace had to be positioned in the cleanroom under the FFU (filter fan units) so that the work area can be cleaned by the air current and is not contaminated by the fans of the equipment placed above the optical table. The baffles therefore extend up to 10 mm under the cleanroom ceiling. Equally, due to the electrical fusing requirements, the 230 V cables for a

large number of multiple socket outlets had to be laid individually, inside the profiles. Eight inlet holes were therefore made in the 90x90 L profiles used, and then a further eight milled cuts were made in the 45x90 profiles in the position of the multiple socket outlets. Like the power cables, the network cables were also laid "invisibly" behind cable ducts. The challenge here was that in media routing area 1, the network cables had to be laid through the 45x90 profile.

The metal sheets of the laser protection plates were glass bead blasted to remove the contour of the rolling direction and were then anodised matt black. The standard laser protection plates hung on the edge of the optical table had to have sufficient space under them for the air from the FFUs to flow away downwards. The same laser protection plates can also be alternatively screwed on in the central area of the optical table, to separate off individual areas for the tests.

### Modular system technology

After the professional assembly in the cleanroom of the Humboldt University of Berlin, the customers were delighted. Marc Kitmann of the optical metrology workgroup said: "The realisation and implementation of cleanroom workplaces requires particular knowledge of materials and techniques. The individually adaptable MiniTec modular system can be extended perfectly to further constructions required and therefore provides the ideal basis for our applications. Together with the know-how of the MiniTec Berlin team, a solution was therefore created that is optimally suitable for our research project."



The clean room workplace from the outside.



# MORE PHOTOVOLTAIC YIELD WITH SPACE



The Energy and Information Department of the HTW Berlin uses a test setup to determine the optimum back ventilation distance of PV modules.

**The Energy and Information Department of the HTW Berlin build a test station for testing the optimum back ventilation distance for PV modules as part of the StaGiMo research project – and benefited from the flexibility of the MiniTec modular profile system.**

Photovoltaics in the building sector is booming without end. Apart from the classic attachment of modules on roof tiles (on-roof systems), the electricity generators are also increasingly used on façades and as direct roof areas – without ties – (so-called in-roof modules).

## **Adequate back ventilation is important**

In normal façade cladding, adequate back ventilation is needed to remove moisture caused by condensation, etc., so that mould does not form in the insulation. This is also significant for PV modules on façades; in addition, here the air flow causes the temperature to lower – and thus provides more yield. Because, on average, only 20 percent of the solar energy is converted into electricity, the rest becomes heat. The hotter the PV modules, the worse their efficiency. An adequate space is therefore twice as important. However, there are also building restrictions. The roofer guidelines and the association for back ventilated façades specify a minimum distance, and there is also a maximum distance for back ventilated curtain walling with metal substructure.

## **Test station for different scenarios**

The Energy and Information Department of the HTW Berlin set itself the goal of determining the optimum back ventilation distance for façades and also for in-roof modules. A test station was therefore designed on the basis of the MiniTec modular profile system, which is suitable for both application areas. For this, the test area must be able to be tilted as necessary from the vertical (façade) up to a roof of different slope.

Prof. Dr.-Ing. Susanne Rexroth, Head of the Subproject at the HTW Berlin, explained the concept: “We test and measure the influence of the back ventilation distance of the flow velocities, and how the heat is then transported away. Based on the first test, the aim is also to determine how the test stand itself is to be developed further. It is a prototype, which is repeatedly revised and optimised. The MiniTec modular profile system is the optimum basis for the design, because it makes the frequent changes very easy to carry out.”

### MiniTec modular system as the ideal basis

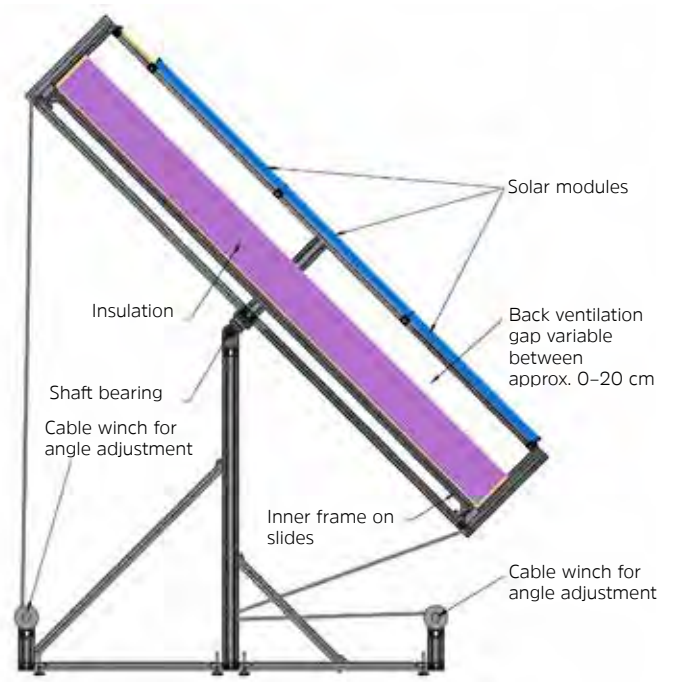
The HTW carried out the design using CAD software. The results were imported into the MiniTec iCAD Assembler, in order to generate the parts list from it automatically. “This was very helpful. We then sent the parts list to MiniTec, and the finished parts were delivered to us quickly. They also fitted excellently. We initially considered sawing the profiles ourselves, but we wouldn’t have been able to do this as accurately”, explained Ingo Wiederoder, Project Member and Project Coordinator. In principle, MiniTec could also have built the complete system, but this was not necessary due to HTW’s extensive experience with the system, said Wiederoder: “For us as a team, this was the first time, but on other courses of the HTW there are numerous laboratory test facilities and similar based on MiniTec. The laboratory engineers are therefore very familiar with it.”

### Design and function

The station is around 3.60 m high. Size 45 profiles are used for the substructure, size 30 series profiles are used for the frame itself (for weight reasons). The frame construction consists of an outer frame, on which the solar modules are fixed and an inner frame, on which the insulation is attached. The whole frame is supported, pivotable on a stand.

The inner frame can be moved via slides. The distance from the insulation to the solar modules can therefore be varied. By supporting the frame structure on two shafts, the whole façade can be tilted. The tilt angle is set and fixed by four cable winches, which are attached to the corners of the stand.

The solar modules on the frame can be freely replaced. The insulation used is EPS insulation. The back ventilated space is sealed from the environment by HPL boards and sheeting. Like the modules used, the corresponding substructure is freely selectable and is mounted in the back ventilation space without a load-bearing function.



Design of the measurement stand with explanation of the function.

### Simulated sun rays

To simulate the sunshine, the HTW experts apply electricity to the modules so that they heat up. The procedure is comparable with the electro-luminescence tests on PV modules, in which invisible damage is diagnosed.

The station is equipped with numerous sensors for measuring temperature and air current. There are also sensors on the modules (six per module), also on the insulation, where two air current sensors at the top and bottom measure how the air flows. At the back of the test bench there is a box with a server, which records all measured data. The results can then be downloaded in CSV format via WLAN and further processed.

### Indoor approach with many advantages

Ingo Wiederoder describes the particular advantages of the indoor test stand: “Until now, such tests are only carried out outdoors. If we can also achieve useful and reliable results indoors, this would be a major step forward, because then we are independent of the weather. In addition, we can then also create reproducible basic conditions. We always have a relatively uniform room temperature. There are no day and night phases, no seasonally induced differences. We also have no wind, which blows onto the test stand from the outside and therefore swirls the back ventilation air current and distorts the measurement results. We can now optimally determine what for an air current develops when the modules heat up.”



# THINGS ARE GOING WELL AT PROMINENT

**To improve the cycle time as well as the process quality for the assembly of membrane caps, ProMinent successfully automated the process with a system from MiniTec.**

The ProMinent Group of companies based in Heidelberg offers dosing technology, water treatment and disinfection and measurement and control solutions. Within the measurement and control technology, ProMinent sees itself as an innovator and world market leader for membrane-covered amperometric sensors, whose products are renowned for their reliability and quality. They can be used to measure the content of disinfectants such as chlorine, chlorine dioxide or ozone in water, which are used for

example, in drinking water, cooling towers or swimming pools.

#### **Shorter throughput times and higher quality**

The membrane cover of the sensors is realised by screw-on caps with attached membranes. These caps were previously produced very elaborately in multiple manual steps. Here ProMinent is aiming to improve the process through automation. The intention is to shorten the cycle times significantly and at the same

time also improve the process quality. After contacting various suppliers, the decision was finally made in favour of MiniTec as the project partner – not least due to the many years of good experiences with their products and solutions. For example, the modular profile system has been used for the company's own equipment building for a considerable time, with which assembly lines, workplaces and all types of constructions are implemented for the main location as well as for the international branches.





For Project Manager Michael Hardung, the system provides important advantages.

### Rotary indexing table as space-saving solution

ProMinent had described the basic membrane cap assembly process in a requirements specification and also defined what was needed for the future. One requirement related to the weight of the system due to the limited ceiling load. The room area was also limited. MiniTec therefore changed the concept from the original idea of a line into a compact rotary indexing table, which was located on a square base area.

The individual stations and their sequence resulted from the requirements specification – supplemented with various optical tests performed by camera, which were previously carried out visually, for example, whether the gauze has been inserted correctly or the membrane is positioned correctly. In the technical implementation, including selection of the individual components – camera types, etcetera – ProMinent placed its trust fully in the expertise of its project partner, said Michael Hardung, Project Manager Global Industrial Engineering: “MiniTec delivered a complete solution from a single source, including automation and control.”

### Automation in the tightest of spaces

After diverse coordination meetings, the system was implemented gradually and finally put into service in January 2023. The processes in it are highly automated. The membrane caps are in a magazine in the machine. They are singularised on the rotary indexing table. A colour marking is now applied – for optical differentiation because there are different types. A milling cutter is installed at the next station, to remove an injection moulding radius in the cap. The gauze punched to a diameter of 7 mm is inserted at this point later.

The gauze (delivered on wide paper strips), is now punched out, removed by a vacuum gripper and placed in the component. A camera then checks whether it is positioned correctly and whether the colour marking has been applied.

The adhesive is applied next. To do this, it is necessary to wet a felt stamp uniformly. Constant wetting is important to ensure that the membrane is bonded correctly in the next step. To do this, the magnetic membrane dosing pump gamma/X was chosen – naturally a ProMinent dosing pump, which meets the required accuracy and reproducibility optimally.

The punching out of the membranes (also arriving on wide paper strips) also occurs in the same place. This is then positioned and pressed onto the cap with defined force so that the materials bond. After these processes, a camera system again checks by image comparison sensor, whether everything is present.

## PROCESS IMPROVEMENT THROUGH AUTOMATION



The control circuit of the ProMinent system: The sensor measures the content of the disinfectant in the water and passes the data on to the controller. This tells the pump by how much it must increase or reduce the dosed amount.



Complexity in the tightest of spaces.

In the next step, different air flow rate measurement is used to check whether the membrane is correctly bonded or whether there is still an exit point where air escapes. If everything is correct, a handling system presses on a protective cap and the assembled unit is placed in the ok-part container.

#### Cycle time of 5 minutes reduced to 45 seconds

After commissioning the system, some “fine tuning” was required initially. This was due, for example, to the different climatic conditions (air movement, temperature) of the final location at ProMinent compared to the assembly building of MiniTec.

During this time, the machine had already fitted several hundred membrane caps with noticeable improvements, Hardung said: “The shortening of the cycle time is already very clear – we have reduced what used to take around 5 minutes in the manual process to 45 seconds now. This gives us very many advantages. We therefore get a higher output and can therefore generate higher sales, i.e. sell more sensors. And the machine helps here absolutely! The system also creates more capacity for the employees, in which they can carry out other tasks.



Punch out and insert the gauge.



Adhesive application with felt stamp.

In addition, there is a qualitative improvement, said the Project Manager: “The reject rate was previously 6–8 percent. By integrating the pressure difference measurement in the system, we now have a significant improvement in quality.”

#### Praise for the work with MiniTec

The whole course of the project was absolutely positive for Hardung: “We were engaged in intensive exchange with MiniTec from the outset – by phone and on site. Overall, we were very, very satisfied with the cooperation. This also applies to the after-sales.”



So simple and yet so demanding: The gauze is placed on the membrane cap, then the actual membrane.



# MINITEC PARTNER IN CANADA CELEBRATES ANNIVERSARY



Manage the Canadian partner company of MiniTec: Heather (le) and Brenda Mortimer.

Central Industrial Solutions in Canada celebrates its 30-year existence. The company based in Cambridge, Ontario, Canada, was founded in 1993 by Brenda Meredith and is now run by Brenda and her daughter, Heather Mortimer. At that time Brenda began with the same and production of industrial plastics and in 2000, became the Canadian sales partner of MiniTec. The company now services a wide range of markets, including the automotive, production, automation, food, pharmaceutical, architecture, construction and technology industries. In May this year, Central Industrial was named Company of the Year by the local Chamber of Commerce. Another milestone will be the company's move into a new building in September 2023.

MiniTec congratulates its partner and wishes it continued success in North America.

## UK: MODULAR REFECTORY FURNITURE

The MiniTec UK subsidiary offers tailor-made solutions based on the MiniTec modular profile system. This also includes factory and operating equipment. Even though the focus is on workplace fixtures, other solutions are definitely also possible: A local school had ordered 20 black anodised tables and 40 bench seats, which were assembled and delivered in lightning speed – within two days. The furniture for the school's refectory was produced from a combination of G-series profiles and can also be folded away for flexible use.



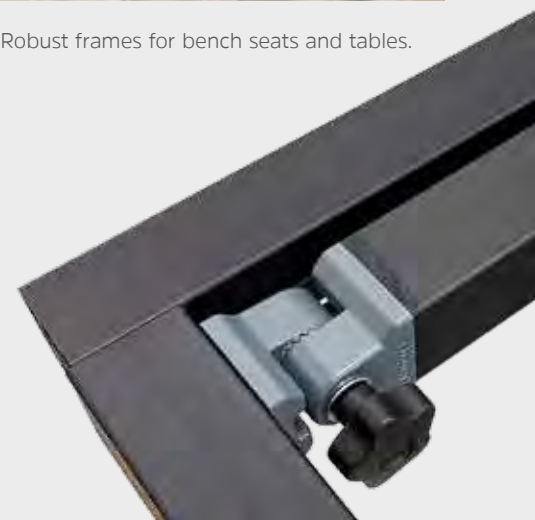
Fast assembly at MiniTec UK.



Robust frames for bench seats and tables.



Attractive seating for the school refectory.





# TEST SETUP WITH THE BREADBOARD



**A breadboard is used as a base on which to mechanically fasten and electrically connect electronic components for test circuits and experiments. MiniTec Framing in the USA has thus successfully established a new product area.**

The term “breadboard” comes from a time when electronic applications were handled very robustly, as in the past, nails were hammered onto small wooden boards so that components and wires could be fixed on them. The “professional breadboard” is a further development, which enables precise test setups on optical tables via a breadboard. Contact terminals have been installed in metal, which can establish electrical connections.

If the function is considered, the breadboards have optimised properties for experiments, because the electrical connections can be set out or rather fixed on them exactly. In optical tests in particular, the breadboards are used as an accessory for the optical table or in a smaller form as a single worktop for optical experiments.

Breadboards are used as variable fixing boards for test setups.



### New products at MiniTec Framing

MiniTec has always been very customer and market focussed. This also applies to its American subsidiary in the State of New York. Customers and potential customers there asked about breadboards and triggered an internal process. It was quickly established that MiniTec Framing already had everything

## BREADBOARDS IN DIFFERENT SIZES

needed to produce this new product available in house: A large machining centre, which can machine aluminium plates up to a size of 2 by

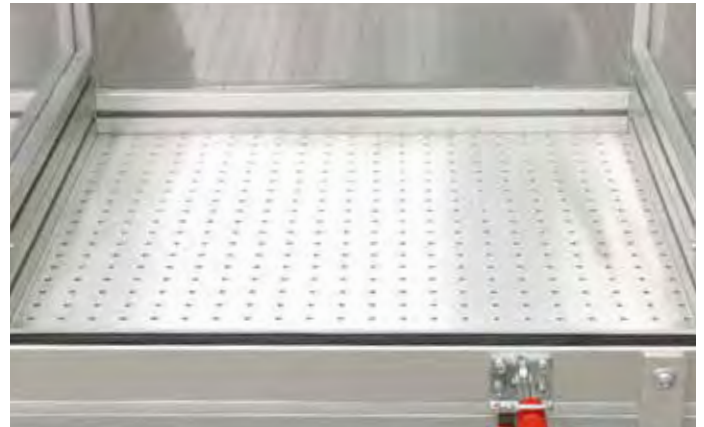
4 metres. As well as all necessary elements and the know-how for the realization of optical tables. Once again, the MiniTec modular profile system provided the perfect basis for this. A new product area has been created in the meantime, which includes optical breadboards as well as their integration into tables, housings and workstations. Customer demand for this area last year was enormous and continues to grow further.

### Optical tables

Breadboards to be integrated into optical tables are often requested. Optical tables are very widespread as an ideal basis for test setups. The stiffness of the tabletop keeps optical elements stable. These tables can therefore be used for tests in research and development. The breadboard is a useful design or addition to an optical table, because it provides the slots for the respective test.

Such optical breadboards can be mobile and are thus flexibly available at a respective required location. They also extend the area for the test layout on fixed optical tables.

The layout of breadboards and housings always depends on their planned use.



The aluminium plates can have a size of up to 2 times 4 metres.

Once again, the flexibility of the profile system is again an advantage here, because the optical tables are ordered in very different sizes. If very large setups are planned, correspondingly dimensioned optical tables are then also built with integrated vibration damping.

The shape of the breadboards is also variable, they can be round or angular, and naturally in (virtually) freely selectable sizes.

The technicians of MiniTec are there to provide advice for the planning and configuration.



Breadboards can be integrated in tables, housings and workstations.



# SPIRAL CONVEYOR OPTIMISES MATERIAL FLOW



The MiniTec WF 3000 spiral conveyor carries goods across different levels and at the same time serves as a buffer in the production or even as a cooling section. It was designed under the aspect of economy for use on the smallest spaces. By using high-quality components, virtually maintenance-free use is possible.

Flexibility and efficiency with simultaneously low operating costs are required in material flow. The MiniTec WF 3000 spiral conveyor meets these requirements in many ways: It is very easy to integrate into conveyor sections, enables height differences in halls or production lines to be overcome and with more than 50 metres conveyor length, it provides plenty of space for buffering products in production.

Another very positive property is reversing mode, which enables other possible uses: The material flow can therefore be upwards or downwards, reversible or clocked, with a continuously adjustable speed from 5 to 50 m/min. The tower is designed for a load up to 20 kg/m conveyor section and a total load of 300 kg.



**Convey economically**

All spiral conveyors are designed under the aspect of greatest economy. Only two electric motors are required to operate the installations, which has a positive effect on energy costs. State-of-the-art control technology is used for the synchronisation of the drives, which also enables dynamic speed applications. To save energy, the unit can also be equipped with automatic switching off when it has been run empty. The distance between the conveyor levels can be varied according to the dimensions of the material to be conveyed. Optimised

slide bars ensure minimum noise development. Due to the exclusive use of high-quality components, the unit is virtually maintenance-free; in the

latest version, interfaces for remote maintenance and display of the service intervals are now also available.

A range of options to match the task set are available for optimum use as a production buffer, cooling tower or for logistics. If used to feed production lines, part identification with image processing can be added upstream. Equally, an optional level control and display is

offered. In case of frequent product change, controlled running until empty is also a helpful option.

**Numerous possible uses**

For customers in food production, for example, the conveyor is used to convey the products from the packaging station up to below the building ceiling. From there, a segmented chain conveyor, also from MiniTec, then carries the products to the truck loading station. There a WF 3000 returns the parcels to hall floor level, where they are placed on pallets by a robot. The whole floor area therefore

remains clear for undisturbed forklift traffic.

Another example is its use in a production line for automotive components. In

this case, the tower is loaded manually with steel parts. The capacity of the tower is sufficient to load a connected production machine for 90 minutes fully independently. The finished parts are removed by a MiniTec gantry robot, which then supplies the subsequent process modules. With a total height of 2000 mm, this tower has a conveyor section of 40 m and a controllable

**VERY SMALL BASE AREA REQUIREMENT (FOOTPRINT)**

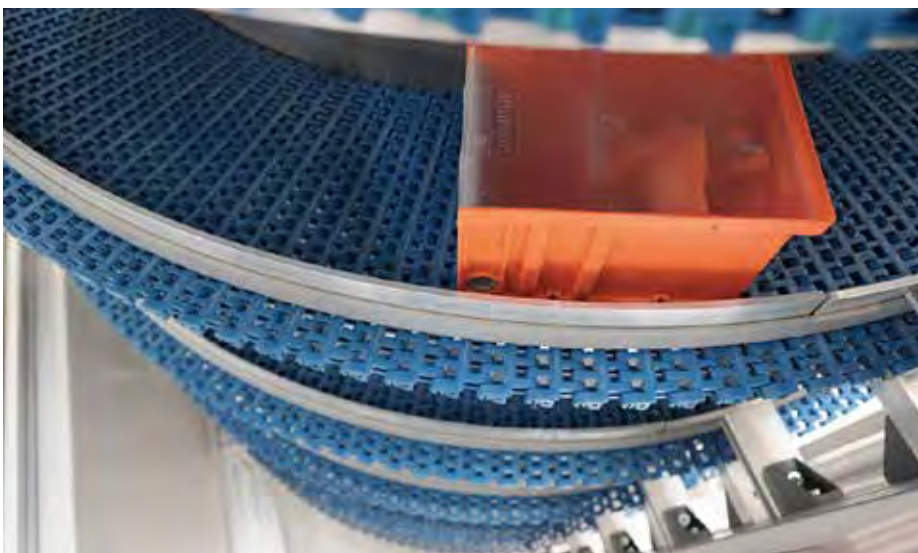


Thanks to the buffer capacity of the spiral conveyor, production machines can be loaded fully autonomously and the production thus automated further.

conveyor speed of 5 to 11 m/min. The conveyor process can be clocked variably.

**Cooled cosmetics**

At one customer in the cosmetics industry, the conveyor with the new option of reversing mode is used for production storage and at the same time as a cooling tower. More than 4000 products are cooled from 65 °C to less than 30 °C in the tower within an hour. At the constant conveying speed of 5m/min, a throughput time of eight minutes is achieved for the cooling process. The whole tower is encapsulated and is cooled to 5 °C by a chiller. The tower has a volume of 5 m<sup>3</sup> and cools 300 kg of production in one run through.



The conveyed goods load can be up to 20 kg/m conveyor length.

# TRAINING WITH EXTENSIVE PRACTICAL WORK AND A FUTURE

**Well trained and loyal employees are one of the most important assets of a business. MiniTec has also placed great value on in-house training.**

When it comes to flexible designs for all kinds of different areas of use, the MiniTec modular profile system provides the decisive advantage. At MiniTec, 420 experts worldwide in eleven locations develop intelligent systems and special purpose machines in all important branches of industry based on it.

The training options at MiniTec are as diverse and sustainable as the company's products and solutions. Whether in the commercial, technical or industrial sector – MiniTec offers excellent prospects for a successful start in the working life.

Modern training or "dual" (sandwich) degree course: in the MiniTec family our people are looked after well from the outset.



Workshop or office? What young people can find out at MiniTec.

## Training at MiniTec

How to continue after school? There are numerous routes and starts for the working life. MiniTec is aware of its social responsibility. In this awareness, it creates quality jobs at its locations and enables young people the optimum prospects for the future.



The training options are as diverse as the solutions and products: Industrial management assistants; marketing communication assistants; mechatronics; industrial mechanics; metal cutting mechanics; technical product designers are among the training careers available at MiniTec.

**“Dual” (sandwich) degree course**

As an international producer of profile, linear and workplace systems and an innovative solutions provider for factory automation, MiniTec does its best every day to ensure that training is well organised from the outset. And after it is completed, enables an entry into attractive fields of activity.

In the dual degree course option offered in mechanical engineering, automation engineering and mechatronics, MiniTec opts for the highest technical level, individual support and sustained backing. This ensures the decisive lead for career entry later.

Here the company cooperates with the Kaiserslautern University of Applied Sciences (“KOSMO”) or rather the ASW

University of Cooperative Education Saarland to offer optimum interweaving of theory and practice.

**THE FOCUS IS ALWAYS ON PEOPLE AT MINITEC**

**School student practical period and holiday employment**

It is important to acquire insights. At MiniTec, young people are therefore deliberately given the opportunity to try out work in the company. Vocational training or degree course? Workshop or office? Valuable insights often help young people to get to know the everyday working life at MiniTec and help them to make their career decision.



At MiniTec, technical careers are not areas purely reserved for men.



The new trainees took up their posts on 1 September.

They can use a period of practical work experience during the school year or during the school or university holidays to try out the different ranges of tasks at MiniTec.

For the new trainees, a special period in their life began on 1 September: MiniTec is pleased with the trust placed in it and wishes you a good start and many interesting experiences and projects. Welcome to the MiniTec family!



**GOOD REASONS FOR MINITEC**

- Future orientation:** In the parent company in Schönenberg-Kübelberg, investments have been made continuously since moving there. Sufficient space is available for expansion and thanks to the committed training and CPD of skilled personnel, MiniTec considers itself to be optimally prepared for future activities in all areas. This is equally applicable to its branches and subsidiaries.
- Internationality:** From Schönenberg-Kübelberg into the world. MiniTec is a global technology company and its personnel have optimum conditions for collecting valuable experiences for its further technical and personal development.
- With each other:** Together, making MiniTec a bit better every day. Team spirit is always in the foreground. Diversity and inclusion writ large.
- Appreciation:** Modern jobs and workplaces, equitable remuneration, trust and support in continued development and further training of the employees are the basic pillars of the company culture: The focus is always on people.



# LONG-SERVICE EMPLOYEES AT MINITEC



"It is the team spirit that makes the difference!"

*Manuela Huber*



"I am thankful that I can introduce my way of thinking and actions to drive ahead innovations and changes."

*Karsten Becker*



"With each other, alongside each other, for each other – that is the key to success.."

*Marcel Befeldt*

**We are pleased to celebrate with our employees who have work anniversaries this quarter and thank them very warmly for their long-time support and loyalty to the company:**

- Manuela Huber (Marketing): 25 years
- Ringo Dahl (Electrical design/programming): 15 years
- Andreas Schmidt (Control cabinet building): 15 years
- Andreas Schmidt (Sales/Account manager, firefighting technology): 15 years
- Karsten Becker (Process management): 15 years
- Marcel Befeldt (Purchasing): 15 years
- Christian Bischoff (Engineering & design): 15 years
- Lukas Becker (Shaft machining): 10 years
- Karl-Heinz Becker (Assembly): 10 years
- Alijoscha Julian Buch (Assembly): 10 years
- Katharina Fach (Dispatch): 10 years
- Marius Metz (Process management): 10 years
- Thomas Theobald (Assembly): 10 years
- Khira Harth (Dispatch): 5 years
- Patrick Paes (Shaft machining): 5 years
- Cora Reidenbach (Assembly): 5 years
- Alexander Surgies (Assembly): 5 years
- Markus Wagner (Assembly): 5 years

## INSIGHTS INTO WING CHUN

Wing Chun is a fascinating Chinese martial art, which is based on efficiency, speed and technique. Grandmaster Sifu Martin Hofmann is able to draw on more than 42 years of experience. Because the new training room of his martial arts centre is located directly next to the former MiniTec building in Waldmohr, he put together a special offer for MiniTec employees. They can take part in a basic self-defence course on special terms and also obtain permanent membership. In order for anyone interested to get a better idea of what awaits them, he explained the basic principles at an info event and introduced Wing Chun – naturally accompanied by practical exercises. Afterwards, the participants no longer had any doubts about the effectiveness of the martial art.



The practical exercises were a great deal of fun.



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## Simply more efficient: **MiniTec automation solutions**

Very different techniques are required for the automation of production processes. In accordance with the motto "The Art of Simplicity", **MiniTec** offers complete solutions from single source.

Whether robots, linear axes, conveyor technology or automated guided vehicles (AGVs): We combine the different worlds into optimal overall concepts with which we sustainably increase the productivity and efficiency of our customers.

Our solutions are just as individual as the requirements. Find out more now by visiting the **Motek** or the **all about automation**.

We will be presenting innovative concepts for the automation of processes at our stand. The focus will be on our new flexible production cells, which can be used for any task. Let us surprise you - **we look forward look forward to your visit!**



**Experience live now!**

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