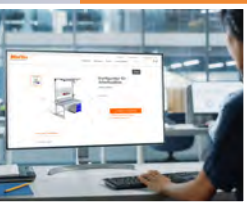




Connect

02

June
2023



NEW CONFIGURATOR:

Achieve your ideal workplace
more easily

___ page 8



THE CIRCULAR ECONOMY IS ENVIRONMENTAL PROTECTION

MiniTec backs sustainability

___ page 14

ROUND FOR ROUND:

A comparison of pallet
transport systems

___ page 10



Easier from A to B: **MiniTec conveyor technology**

When it comes to getting workpieces to the right place and in the right position at the right time so that they can be machined, assembled or fitted,

MiniTec is your

competent partner: We offer a wide range of components and conveyor systems that meet all requirements in the areas of factory automation, material flow, material handling and intralogistics. What all solutions have in common is their

flexibility, because the **MiniTec** modular profile system allows them to be changed and reconfigured at any time. You can either design your conveyor systems yourself or make adjustments to them.

make adaptations to them, or you can entrust **MiniTec** with the implementation of turnkey systems up to commissioning on site.

When will you discover the art of simplicity?

When will you discover the art of simplicity?



10.- 13. Oktober 2023 | Fair Stuttgart | www.minitec.de/motek-2023





DEAR READERS,

Conveyor technology is a central business activity of MiniTec. Our extensive product range includes solutions for different industries and applications. Pallet transport systems play a focal role in this area. Our range extends from the UMS pallet circulation system to the TSG transfer system and the FMS flexible assembly system and RMS roller conveyor system as a flexible solution for heavier workpieces. From page 10 you will find an overview of what MiniTec has to offer and for which tasks which system is suitable.

When designing these systems we always keep their economic operation in mind. We opt for high-quality components and always develop solutions on the basis of our modular system in order to ensure that the installations run failure-free and for as long as possible. This philosophy makes sure that all parts and components used are compatible with each other. Our conveyor technology solutions can therefore be extended at any time. They can naturally also be changed and their components reused in alternative conveyor systems.

We pay attention to energy-efficient operation from an early stage in the development and “tweak” the necessary options to achieve the best outcomes: As few drives as possible, smooth and easy running conveyor belts and our patented pulleys for uninterrupted transport around curves are the technical ingredients. Optimally programmed system controls also have a significant influence on operation. With us you receive all this from a single source!

Pallet transport systems work most efficiently when they are tailored to the customer's tasks; our specialists are on hand with help and advice to deliver this.

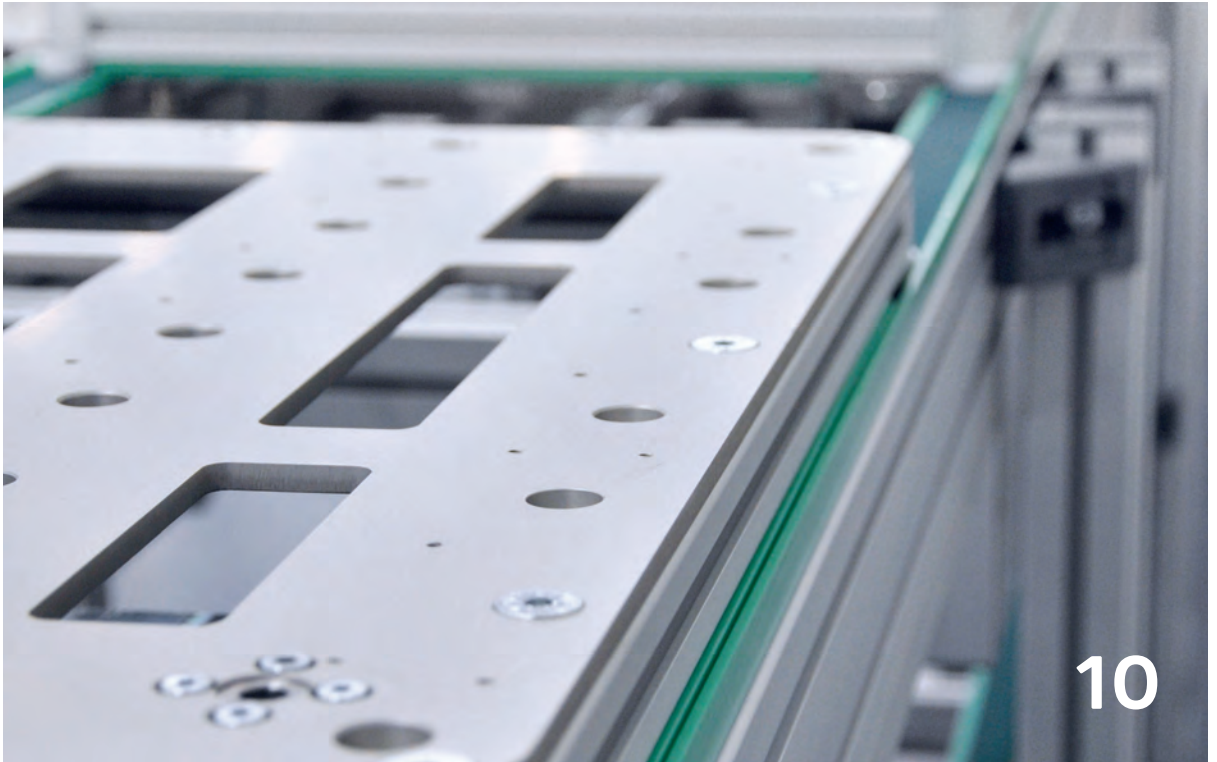
We look forward to your enquiries.

Yours sincerely
Andreas Böhnlein

A handwritten signature in black ink that reads "A. Böhnlein". The signature is written in a cursive style and is positioned above a light blue rectangular stamp.

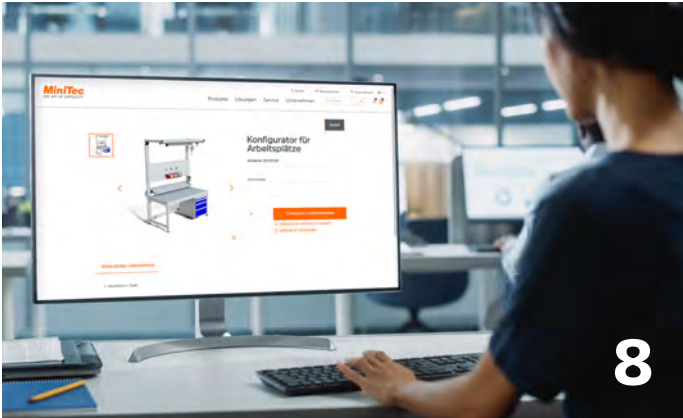
Director of Engineering

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Pallet transport systems are used whenever manual or automatic machining, marking or testing of workpieces takes place in production lines. They combine conveyor technology with workstations and are used to set up assembly and machining lines for assemblies. Which system is the optimum solution for the respective use depends on different factors. This issue's cover story gives you an overview and makes the choice easier.



NEW CONFIGURATOR: ACHIEVE YOUR IDEAL WORKPLACE MORE EASILY

The MiniTec website now has a new, thoroughly convenient online configurator to make it easier for our customers to design their workplaces. Use it to configure precise-fitting workplaces quickly and easily.



THE CIRCULAR ECONOMY IS ENVIRONMENTAL PROTECTION

The circular economy is the departure from the previous linear economic model of the throw-away economy. For MiniTec, the circular economy is a central topic that is integrated in all areas of the company.

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INHOUSE 2023 IS VERY POPULAR



The InHouse trade fair offered a good insight into the MiniTec range of performance.



Experts explained techniques and products in technical talks.



A separate display area was dedicated to the topic of vehicle fitout and customisation.



The guided tours of the factory met with a great deal of interest.

After a pandemic-induced, three-year forced break, the day finally arrived on 23 March 2023: MiniTec held its traditional InHouse trade fair at its company headquarters in Schöenberg-Kübelberg. Numerous customers, partners and MiniTec fans accepted the invitation. They numbered so many that we had to stop registrations almost a week before the event – for the first time ever.

The guests were rewarded with an event that was successful all round. The participants experienced MiniTec “live” on the open day and found out lots worth knowing about new products and solutions – in technical talks and in practical demonstrations.

The visitors were particularly enthusiastic about the guided tours of the company and the diverse exhibition. One highlight was the vehicle fitout themed area where, among other things, a Unimog fit for expeditions could be inspected.

MINITEC RECEIVES ERGONOMICS INNOVATION PRIZE 2023

For many years, MiniTec has offered individual, ergonomically optimised workplaces and workstations for assembly, order picking and other areas. With the innovative MiniTec SmartAssist worker assistance system, employers are given numerous options for interactive support in manual assembly. The system reduces on-the-job training time significantly and achieves a noticeable increase in productivity. The error rate becomes lower, the quality better. During times of a shortage of skilled staff, it also offers the possibility of integrating unskilled personnel into assembly



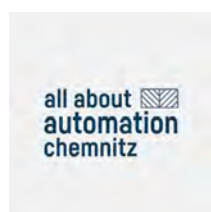
INNOVATIONSPREIS ERGONOMIE 2023

processes. Disabled employees are also given the opportunity to participate in working life again. The solution can also be usefully deployed in other areas apart from assembly, such as in the goods receiving area, order picking or dispatch departments.

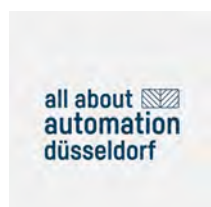
The innovative approach and extensive advantages of MiniTec SmartAssist were also recognised by the IGR Institut für Gesundheit und Ergonomie e.V. in Nuremberg. In April it awarded MiniTec the much sought-after "Ergonomics Innovation Prize 2023".

TRADE FAIR CALENDAR 2ND HALF-YEAR 2023

This year, MiniTec will again be presenting itself the most important trade fairs of its industry.



all about automation
Chemnitz and Düsseldorf
28 to 29 September 2023,
Messe Chemnitz
18 to 19 October 2023,
Böhler site in Düsseldorf

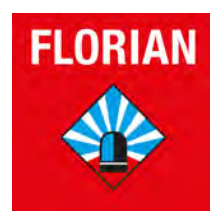


The theme of the regionally focussed trade fairs for industrial automation is systems, components, software and engineering for industrial automation and industrial communication.



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

At the international trade fair for automation in production and assembly, MiniTec will be presenting solutions for assembly, handling and conveyor technology.



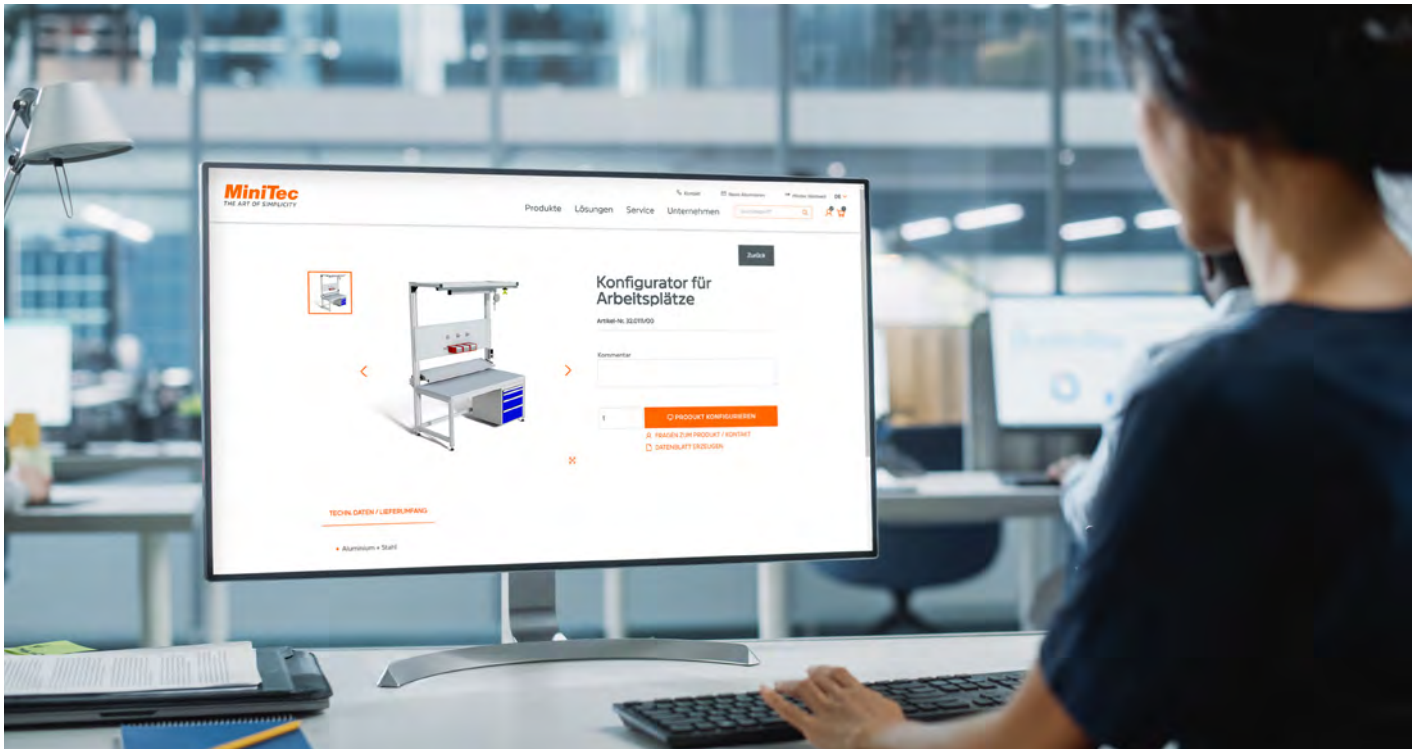
Florian trade fair, Dresden
12 to 14 October 2023
Messe Dresden, Hall 1, Stand F10

MiniTec will be presenting its firefighting technology solution for industry at the trade fair for fire safety, rescue and civil defence.



For an up-to-date overview of all trade fairs visit www.minitec.de/service/messen-events

ACHIEVE YOUR IDEAL WORKPLACE MORE EASILY



The MiniTec website now has a new, thoroughly convenient online configurator to make it easier for our customers to design their workplaces.

MiniTec workplaces and workstations are in use in an increasing number of companies and organisations. The areas of use are very different and range from assembly to order picking, testing and inspection or packing through to the classic office environment. This diversity is made possible by the flexible workplace system based on MiniTec's modular profile system, which provides a comprehensive assortment of accessories. Whether height adjustment, gantry setup, lighting, toolboards, base cabinets or other attachments – the options for individual design are almost unlimited.

But how do I, as a customer, achieve "my" workplace? For precisely this purpose, the MiniTec website has a large choice of table frames and individual components, which can be filtered by product category. Having said that, a certain amount of technical knowledge and experience is needed if you want to put together a complex workstation. MiniTec has now created a new configurator for this area, which is

already available to use on the MiniTec website and makes it significantly easier for its customers to assemble their own individual workplace.

Focus on easy operation

True to "The Art of Simplicity" motto, attention has been paid to the most convenient and intuitive ease of use possible. The result is impressive: The customer is guided step-by-step through the compilation of their workplace. They need no MiniTec product knowledge whatsoever, but instead can fully concentrate on their own use requirements.

Starting with the definition of the baseframe (dimensions, height adjustment, gantry, ESD capability, ...) the assembly continues with the tabletop, base cabinet, lighting, cantilever shelf, monitor mount and toolboard. Each selection is immediately visible in the preview – naturally in 3D and with the option of rotating the design any which way you want. The positioning of many attachments can be moved freely until they precisely match the user's own ideas. In the assembly of the components, the system also thinks for the benefit of

the user – on the one hand by only showing options for the individual steps that also make sense – depending on what was selected beforehand. On the other hand, the design is also checked for plausibility. Errors are identified in the preview – and only after they have been corrected can the workplace be placed in the Trolley and a quotation requested.

Guide price information included

To keep the customer informed about the budget, during the configuration they always see the price reached to date. Important: This is only a rough guide price, which can differ from the actual quotation price. Nevertheless it is certainly a valuable indicator for the user.

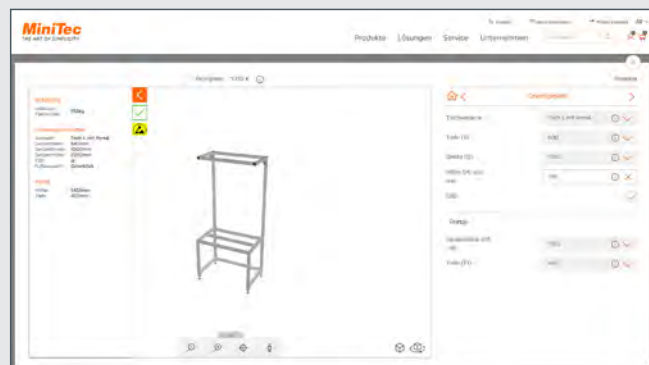
CONFIGURING WORKPLACES EASILY, STEP-BY-STEP

When everything is just right, the customer can download the design as a product data sheet (pdf format) and send the enquiry.

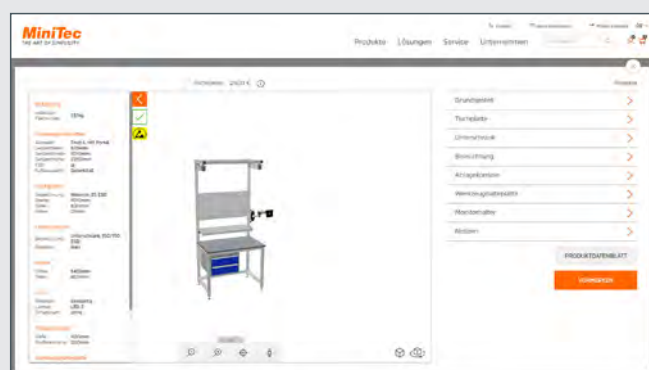
They then receive an email with a link to open the configuration online and to the pdf summary. In addition, the enquiry also ends up in their enquiry history, where they can open, examine and request it again at any time. Another option for accessing previous configurations also exists in the configurator itself: All previously generated designs can be viewed via a “Projects” tab. To use one as the basis of a modified version, generate a duplicate with a new project number, which can then be edited.

More speed for processing

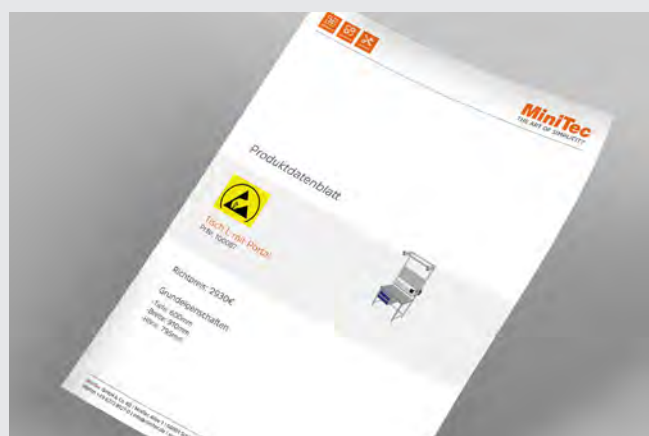
The workplace configurator not only has advantages for customers. MiniTec can also process enquiries generated from it significantly faster, as there are fewer questions and the documentation is much better. Which ultimately also benefits our customers, as they receive their quotation faster and can issue an order accordingly. Important: To use the full functional scope of the workplace configurator as a customer, you must have a free account on the MiniTec website and be logged in via it.



The configuration begins with the baseframe.



Everything correct? Then add it to your trolley and request a quotation.



A PDF product sheet summarises the configuration.



CURIOS?

Then try it out now:

*To reach the configurator on the MiniTec website, simply go to the **Service → Configurators** menu – or use the direct option with the following link: www.minitec.de/produkt/konfigurator-fuer-arbeitsplaetze*

ROUND FOR ROUND: A COMPARISON OF PALLET TRANSPORT SYSTEMS

Pallet transport systems are used whenever manual or automatic machining, marking or testing of workpieces takes place in production lines. They combine conveyor technology with workstations and are used to set up assembly and machining lines for assemblies. Which system is the optimum solution for the respective use depends on different factors. This article gives you an overview and makes the choice easier.



The RMS workpiece carrier transfer system was designed for heavy-duty transport.



The Delta deflection system of the RMS enables uninterrupted transport around curves.

Conveyor technology is a central business area of MiniTec. The extensive product range includes solutions for all kinds of different industries and applications. Pallet transport systems play a central role. The product range extends from the UMS pallet circulation system for conveying in the smallest spaced to the TSG transfer system as an economical solution for lightweight transport goods through to the flexible FMS assembly system as a modular layout for a large number of system concepts and the RMS roller conveyor system as a flexible solution for heavy workpieces. Yet which system is the right one for your own application? After all, conveyor systems are almost always special designs for very different tasks.

After in-depth analysis of the task at hand, the MiniTec experts for this topic always have the right answer. In this article you will find an overview and a comparison of fundamental information on which solution is the right one for your conveyor technology task.

When developing its pallet transport systems, a very high priority of MiniTec was to create very economical solutions, which can also be integrated with the minimum space requirement for the interlinking of machine tools or in production processes.

Their use plays an important role in production processes, since they are a combination of conveyor technology and workstation and are used to set up assembly and machining lines. They are also the perfect solution for accumulation mode, positioning, turning and lifting workpieces.

Use of pallet transport systems is a good idea where the machining, marking or testing of workpieces takes place, and in the manual or automatic production of serial parts.

AN OVERVIEW: MINITEC PALLET TRANSPORT SYSTEMS

RMS roller conveyor system

RMS is a workpiece carrier transfer system based on heavy-duty accumulator rollers, which ensure free circulation for assembly, testing and machining tasks. It is possible to accumulate and buffer the workpiece carriers, manual workplaces can also be easily integrated into the conveying section. The carrier pallets have a standard width of 400 or 500 millimetres and are designed for a maximum load of 500 kilograms. The system ensures smooth material flow and is typically used in production lines, assembly technology and factory automation. The RMS roller conveyor system is used, among other things, in the production of vehicle components such as car seats or drive trains, the production of large household appliances as well as the conveyor infrastructure of a warehouse logistics system. A special feature of the RMS is its option for uninterrupted transport around curves based on the Delta deflection system. With the three patented Delta pulleys, all types of 90° curves and branches can be implemented easily:

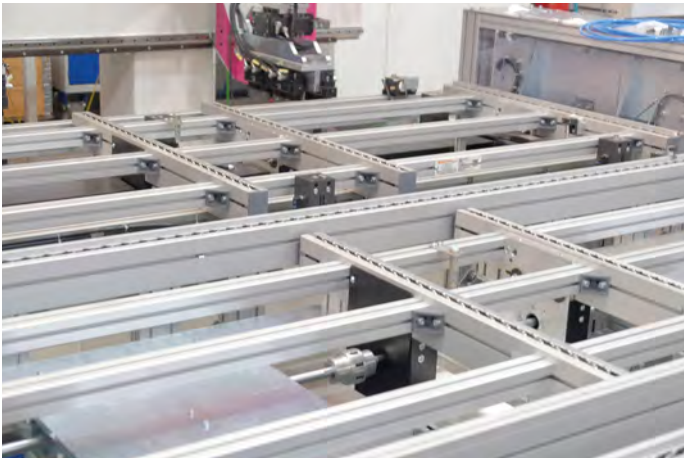
Delta 1 is used for 90° curves. The inner roller threads into the pulley and becomes the "pivot" for the pallet.

Delta 2 is used for inward transfers, is spring-mounted and can steer pallets around a curve.

Delta 3 was developed for branching in goods transport.



The TSG transfer system is based on standardised modules and is a particularly economic solution for small piece weights.



The FMS flexible assembly system is suitable for the transport of light to medium workpieces.

TSG transfer system

The TSG transfer system is a particularly economical solution for small piece weights. It is made up of standardised modules, which can be combined in any way required to form customised systems. Robust timing belts ensure low-maintenance and safe handling and continuous use without retightening. Easy stopping and accumulation of the workpiece carriers, travel around curves with retention of orientation and the positioning of transported goods are all possible. Thanks to its high-quality components such as robust toothed belts, the system is designed for continuous use over a long period.

Among other things, manual stations as well as complex automated processes can be implemented with the TSG.

FMS flexible assembly system

The FMS is a flexible assembly system with workpiece carriers, which are transported on accumulating roller chains, special belts or chains. Standardised modules for exact positioning, lifting or rotating enable very quick implementation of complete assembly lines.

Numerous installations for renowned automotive industry suppliers have been proving the reliability and economic efficiency of this transport systems for years. The patented deflection technique reduces the control costs for the entire plant to a minimum.

COMPARISON OF THE SYSTEMS

	RMS	TSG	FMS
AREAS OF USE	Heavy and large components such as engines, transmissions, axles, washing machines, heaters, etc.	Small and medium-sized components, for example, mobile phones, electric motors, etc.	Small, medium and large components, for example, shock absorbers, instrument panels, seats, headlamps, etc.
LOADS	up to 350 kg/WP	up to 300 kg/section*	150 kg/m
GUIDE WIDTHS	Standard 400, 500, 600 mm	200 mm	160 mm to 1000 mm
WORKPIECE CARRIER LENGTH	400 mm to 2000 mm	200 mm	160 mm to 2000 mm
SPEEDS	up to 15 m/min	between 5.5 – 21 m/min	up to 18 m/min
ACCUMULATION MODE	Accumulating rollers with internal friction	Toothed belt 25 T5	Accumulating roller chain or belt
DRIVE	E-motor, tangential chain/accumulating roller	E-motor, toothed belt drive	E-motor, pulley, chain wheel (sprocket)

* Note: Weight is theoretical. In practice, the system is intended more for smaller and medium-sized components up to approx. 150 kg, as WP dimensions are a fixed 200x200 mm.

UMS pallet circulation system

The UMS pallet circulation system is a very cost-effective solution with minimum space requirement for linking machine tools, workstations, handling equipment or robot feeders.

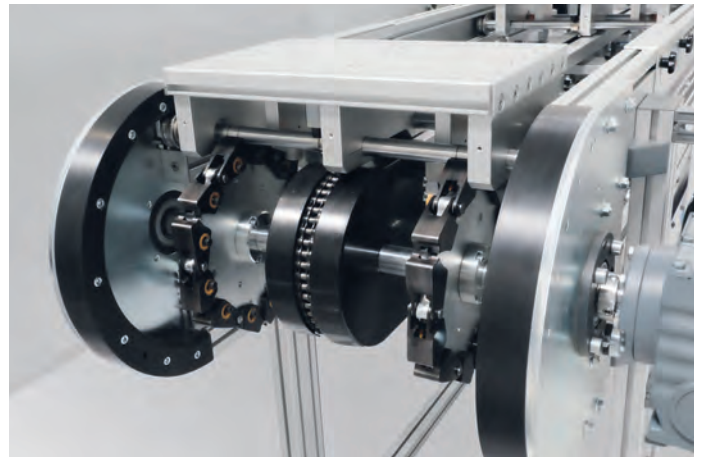
It is a double lane roller chain conveyor which returns empty pallets below the conveying level: At the end of the conveyor section, the unloaded pallets are deflected vertically by a positive form-closed gripper and are returned in a hanging position. The pallets cannot only be accumulated on the conveyor level, but also on return of the unloaded workpiece carriers. The system can even be used as an overhead conveyor, with which the pallets are returned at the top.

A characteristic feature of the UMS series is the continuously circulating chain, which serves as a carrier as well as to drive the system. The control required is limited to a minimum, as there is no need for time-consuming programming for deflecting or infeeds or discharges. The UMS system is suitable for workpiece carriers from 400 to 600 millimetres wide and 100 to 300 millimetres long.

PALLET TRANSPORT SYSTEMS: COMBINATION OF CONVEYOR TECHNOLOGY AND WORKSTATION

UMS Light

The UMSL (L for light) was developed as a compact alternative to this. It is the solution with the smallest space requirement. It is suitable for workpiece carriers from 158 to 600 millimetres wide and 180 to 250 millimetres long. The total length of a system can be up to ten meters with a maximum load per pallet of 15 kg. The UMSL is suitable for interlinking machine tools, workstations, handling equipment or for robot feeders. With the UMSL, pallets are conveyed on a continuously circulating segmented chain. The slide bars under the pallets enable them to be stopped and accumulated on the segmented chain that continues running. The pallets are stopped by stoppers attached to the side.



The UMS pallet circulation system is suitable for interlinking machine tools, workstations, handling equipment or robot feeders.



UMSL is a very economical solution with the smallest space requirement.

i

THE MINITEC SOLUTIONS AT A GLANCE:

- *RMS roller conveyor system: Flexible solution for heavy workpieces*
- *TSG transfer system: Economic solution transporting for lightweight goods*
- *FMS flexible assembly system: Modular structure for a large number of system concepts*
- *UMS pallet circulation system: Conveying in the smallest space*



THE CIRCULAR ECONOMY IS ENVIRONMENTAL PROTECTION

At this year's Hanover trade fair, the circular economy was the dominant topic, alongside artificial intelligence (AI). Delivery chain disruptions during the pandemic and the dependency on individual countries that were made clear as a result have shifted the focus onto the importance of this topic.

The circular economy does not require any special technology, rather it is a question of responsibility and the motivation to use material more sustainably. The circular economy also has many advantages, not only for the environment but also for consumers and industry.

Each year, the EU produces more than 2.5 billion tonnes of waste. In view of this enormous quantity, the EU Parliament has updated the circular economy law

with the new Directive 2018/851/EU and has given the circular economy a new, mandatory basis. It is mainly about waste prevention and secondly about reusing material after its original use. Recycling material is only the third step of material use. For a functioning circular economy, manufacturers must make the most environmentally compatible and qualitative reuse of the material possible an integral aspect of the design and product planning.



The circular economy at MiniTec itself – existing profiles are reused for the renovation of the warehouse.

The throw-away economy was yesterday

The circular economy is the departure from the previous linear economic model of the throw-away economy. This model is based on ever-larger quantities of cheap raw materials and energy that are readily available. The planned shortening of the life of a product or making repairs difficult are also characteristics of this model. The opposite of this is the circular economy.

Alongside their economic relevance, the reuse and planned recycling of products are also important contributions to environmental protection. Responsible use of natural resources reduces the destruction of landscapes and helps to limit the loss of biodiversity. Another advantage is the reduction in greenhouse gas emissions, which can be achieved without limiting production.



Secure fit without prior machining and simple dismantling with the profile connector.

The circular economy begins with the design

For MiniTec, the circular economy is a central topic that is integrated in all areas of the company. From the outset, all products are planned for reuse or the most environmentally friendly recycling possible. An estimated 80 percent of the environmental effects of a product are

THE CIRCULAR ECONOMY IS A QUESTION OF RESPONSIBILITY

determined by its design. Our engineers keep this knowledge in mind all the time when designing new products.

The MiniTec profile system is strictly set up as a modular system: Consistent compatibility, the greatest possible simplicity, unlimited possible uses and assembly without machining are the unique attributes of the system. Pointless product diversity should also be avoided.

Reusable parts

With the patented profile connector, the profiles are assembled without prior machining, which also highly simplifies the dismantling of constructions. The dismantled profiles can be reused limitlessly without disrupting drillholes or machining. Dismantling was already considered during the design of the

system. Damage-free dismantling of structures made from the MiniTec system is therefore easily possible. The reusability of the products is planned down to the smallest detail. For example, the cover caps are secured by a pin. The pin is simply pushed out for damage-free dismantling. Replacement pins are available for reuse of the caps, the function of the product is retained with no restrictions. 'The Art of Simplicity' also applies here without limit.

Easy recycling

If the recycling of system components is unavoidable, the choice of material is an important requirement for the most quality-maintaining results possible. All MiniTec profiles are therefore made from the same alloy. The plastics used are also harmonised and clearly marked.

The circular economy is not only a business management necessity but is also an active contribution to environmental protection and against global warming. This is also the creed of the MiniTec customer, the Max-Dorn Institute in Berlin Adlershof.



The circular economy is not only a business management necessity but is also an active contribution to environmental protection.

THE CIRCULAR ECONOMY IN PRACTICE

The Max-Born Institute in Berlin has been working according to the principle of sustainability for almost 30 years. The establishment is located on the grounds of the technology park in Berlin-Adlershof and carries out pure research in the field of non-linear optics and short-term dynamics.

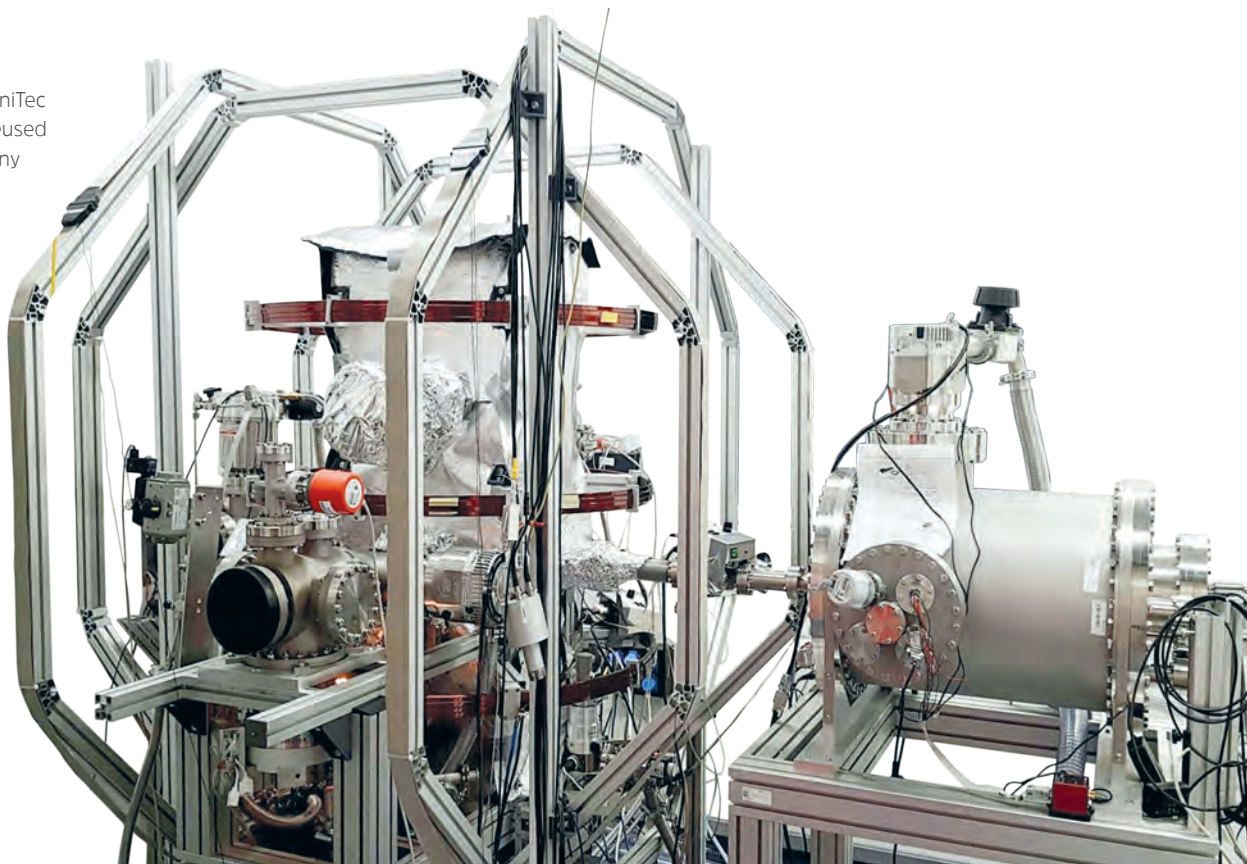
The researchers used to use welded frames made of steel for their test setups. This involved considerable effort for cutting to size, drilling, welding and surface treatment. At the beginning of the 1990's, they therefore switched to aluminium profiles as the basis of their constructions. According to the Institute, use of the MiniTec profiles has simplified everything enormously. Since then, the constructions are only screwed together and everything can be mounted in the all-round grooves.

The Max-Born Institute is a typical test laboratory. Large optical tables with hole patterns are used for its tests on the interaction of matter with laser light. Lasers with mirrors for controlling

the beam path are located on the tables as test setups. Due to the hazard nature of the lasers, light-tight enclosures are necessary, which are made with the MiniTec profile system. Furthermore, the profiles are used for suspension elements for flow boxes and ventilation systems, which are installed in the laboratories.

Sustainability is important for the researchers. The test setups are subject to permanent dynamics. They are set up and then, sooner or later, they are modified or completely dismantled. "The MiniTec modular profile system is therefore ideal for us", said one employee. "The system enables us to reuse the materials again and again, additional material or elements are only purchased occasionally. If profiles have to be adjusted for a new project, we take them to the MiniTec branch in Berlin where they can be cut to size for their next purpose. We have been doing this for 25 years. With MiniTec, implementing the circular economy is really easy for us – with advantages for the environment and resources, but also for our costs!"

A typical test setup of the Max-Born Institute with MiniTec profiles that can also be reused in other constructions at any time.



ROLLER CONTAINERS FOR BREATHING APPARATUS



The advantage of roller containers (demountable pods) is that they can be assigned for loading and unloading or use regardless of the transport vehicle.

To make the transport and handling of breathing equipment more hygienic, Hamburg's fire service engaged the specialists of Meindl to provide new wheeled containers. Their special concept based on the MiniTec modular profile system provides important advantages.

Meindl Fahrzeugbau GmbH in Hameln has applied itself to vehicle fitout and customisation since 1947, and now concentrates on fire service and special vehicles. Especially in the fire service segment, at Meindl the MiniTec modular profile system has proven its worth time and time again and is used as a default – including for an enquiry from Hamburg's fire service.

The fire safety headquarters of the Hanseatic city has a central breathing apparatus workshop where the breathing equipment of all associated fire departments is maintained. Until

now the equipment returned from deployment was transported and handled without packaging. However, depending on the extent to which it is contaminated, this can cause substantial hygiene problems for the personnel involved. To improve this system, boxes for storage and transport were recently introduced to improve this situation. A basic component for the changeover to transport boxes was the procurement of three breathing protection roller containers (AB) at Meindl, which had to be closely adapted to the existing basic conditions of the City of Hamburg. The result is a wheeled container,

which can hold and safely transport 74 transport boxes in total (divided between two different box types/shelving systems). The wheeled container or pod cannot only be loaded from the back when standing on the ground but can also be loaded on the swap body vehicle (WLF) using existing ramps.

More hygiene and storage space

To optimise the handling for both situations, the highly frequented shelving system for BITO boxes is located on an electro-hydraulically adjustable tilting platform. This shelf system has a load restraint system, which also allows transport when partly loaded. Both shelf systems have roller lanes in the shelving and manually operated separators for optimum handling. The shelf systems were especially designed for this customer and are set up on the basis of the MiniTec profile system.

According to the Managing Director, Lars Meindl, the customer is thrilled with the result: "Apart from the flexible adaptability due to the MiniTec design basis, the shelf systems also have a very practical advantage in everyday use: Due to the described concept with the "rocking kanban frame", the usual middle aisle to the shelves could be omitted, which ensures 50 percent more storage space for the load. With the roller containers, Hamburg fire service can now not only supply its associated fire services with breathing apparatus more hygienically, but also significantly more efficiently."

NEW COMPONENTS FOR CAMPER FITOUT



An increasing number of camping enthusiasts use the modular aluminium profile system of MiniTec for the individual fitout of their vehicles. Apart from completely independent designs, there is also an increasing wish for finished components. MiniTec now increasingly allows for this.

At the Abenteuer & Allrad fair in June, the different products were presented, which can be ordered as a kit for self-assembly or as ready assembled units.

Campers – living in a box

The campers of our partner, NuA Holz-Alubox, were presented in the last issue of Connect. Due to the large demand, MiniTec has decided to also offer such camper pods as kits.

The designers plan and design the camper pods to customers' specifications and wishes. The MiniTec profile system offers maximum flexibility for this, so that the construction can be exactly adapted to a vehicle. Special wishes are also implemented whenever possible.

The frame construction of the camper pod consists of MiniTec aluminium profiles and the specially developed corner connector for 90° and 45° connections. There are various options

for designing the outer skin and insulation, which depend on the personal



The campers are available as a kit for self-assembly.

priorities of the customer. A suitable outer skin made of aluminium sheet can be supplied. If the design ultimately matches the ideas and wishes of the customer, they receive the camper pod as a kit for self-assembly.

Folding bed for sleeping and sitting

Space-saving components are obviously extremely important, especially for campers. MiniTec has therefore developed a folding bed, which – when it is not being used for sleeping – also serves as bench seating. It also has a pull-out for Euro boxes, which provides additional storage space.

The folding bed consists of a stable frame made of MiniTec aluminium profiles. During the day it serves as a practical bench, in the evening it can be folded out to make a bed within only five seconds. The seat upholstery automatically changes into a comfortable mattress. The folding bed fits in all standard vans in VW bus size and can either be delivered as a basic module or with a Euro box pull-out (optional facing set also available).



Everything that the camper heart desires!



The frame construction of the camper pod consists of MiniTec aluminium profiles and the specially developed corner connector for 90° and 45° connections.

CAMPER AS A KIT FOR SELF-ASSEMBLY



The folding bed consists of a stable frame made of MiniTec aluminium profiles. The Euro box shelf is available in many variants.



On-request, the camper pods are assembled in the MiniTec factory.

The bed length, height and width can also be configured to the customer's wishes on request.

The Euro box pull-out and the matching facings made of birchwood are each available as optional extras. The pull-out makes optimal use of the storage space under the seat or lying surface. The Euro boxes can either be removed via the pull-out or from the side in the interior.

Many variants of the Euro box shelving

Storage space is often in short supply in camping vehicles. Euro boxes are a decidedly practical solution to this. MiniTec therefore offers many variants of the Euro box shelving, which can be supplied either as a kit for self-assembly or fully assembled.

Slide rails are inset in the profile grooves for smooth and easy guiding of the Euro boxes. When pushed in, the Euro boxes safely latch into position. This therefore prevents slipping or noises while the vehicle is moving. A matching set of facings made of oiled birchwood veneer plywood boards with milled handle and bevelled edges is available as an optional extra, and a matching tabletop. The construction made of MiniTec aluminium profiles can be individually extended. Other variants are possible on request.



PHOTOVOLTAICS IS BOOMING

Photovoltaics is currently experiencing a renaissance. This is not only a result of the extreme increase in demand due to the energy transition and decarbonisation. The energy and raw materials crisis in conjunction with global supply chain problems are also causing a boom for the German and European solar industry. MiniTec has been specialised in the development and production of systems for the production of PV modules for many years.

Having been almost completely relocated to China several years ago, the production of solar modules is now also becoming interesting again for companies here in Germany. MiniTec has been specialised in production systems for photovoltaics (PV) since the mid-nineties and offers them worldwide. The many years of experience in photovoltaic technology forms the basis for the development of modern production lines for photovoltaic modules. The modular solution concept ranges from individual component parts to complete production lines. The MiniTec flexible modular profile system makes sure that the system can be adapted to absolutely match the individual requirements. From the layout of the system to the design, assembly on site, commissioning and training of employees. MiniTec offers everything needed from a single source.

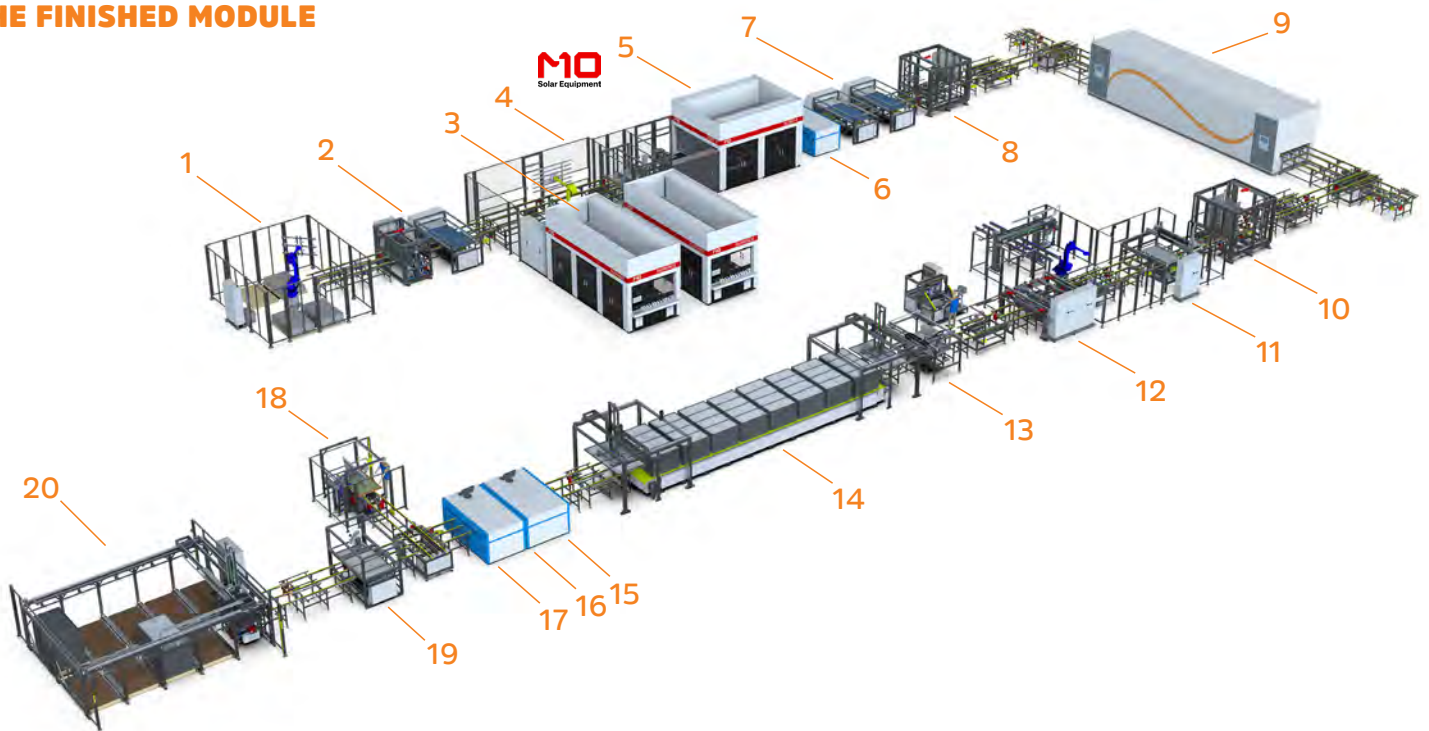
All processes in control

The production of photovoltaic modules takes place in typical substeps, the layout of MiniTec production lines is structured accordingly. Such a system basically consists of workstations, storage units and conveyor sections between them. In addition, special equipment is also required. MiniTec implements all this as an efficient complete solution. If an in-house product is not available for individual areas, for example, for laminators, MiniTec integrates the tried and tested components of efficient partners.



An increasing number of solar modules are being installed worldwide. Their economical and quality-assured production requires special production facilities.

FROM THE GLASS STORAGE TO THE FINISHED MODULE



Raw material preparation

- 1 Automatic loading of the glass (optionally with glass washing unit)
- 2 Cutting and automatic placing of the encapsulant

Stringer & lay-up

- 3 Stringer or shingling machine
- 4 Automatic lay-up

Connection & inspection

- 5 Interconnection
- 6 EL tester
- 7 Cutting and automatic placing of the encapsulant and backsheet film
- 8 FIFO storage (before lamination)

Lamination

- 9 Laminator
- 10 FIFO or LIFO storage downstream of the laminator

Framing

- 11 Automatic trimming
- 12 Automatic frame
- 13 Semi-automatic (connection) socket assembly
- 14 Curing line

Test

- 15 EL tester
- 16 Flasher (sun simulator)
- 17 High-voltage test
- 18 Visual inspection by worker
- 19 Labelling machine
- 20 Sorting unit for finished modules

The individual production steps:

1-2 The work process begins with the raw material preparation. The glass is loaded automatically into a glass storage module and is optionally cleaned in a glass washing unit. It is then taken to the cutting station and for automatic placing of the encapsulant.

3 In the stringing station the individual cells are now connected by busbars (conductor ribbons or tabs) to form strings. Bonding or soldering is possible. Soldering is used in most cases. An alternative method for this is shingling.

In this process the cells are placed in an overlapping arrangement, similar to that of roof shingles (which explains the name). This achieves a larger active area on the same module size. There are also additional advantages in case of clouding, as the cells are not only connected consecutively but also in a kind of series-parallel circuit.

4 In the lay-up the strings or shingle matrix is placed on the front glass covered with the encapsulant (EVA film).

5 In the interconnection station the

strings or matrices are not connected electrically. The conductor ribbons (tabs) are attached, which are contacted later in the connection sockets.

6 In the EL test, a voltage is applied. The cells then shine in the near-infrared range, which is recorded by special cameras. This enables cell fractures, for example, and other defects to be detected.

>>>

7 The cutting and automatic placing of the encapsulant and backsheet or rear glass now takes place.

8 Before the lamination, the raw modules are temporarily stored according to the FIFO principle (First In First Out).

9 From here the modules are moved to the laminator where the modules are “baked” in a vacuum. At the appropriate temperatures, the encapsulants interlink and the vacuum draws out the air and gases formed in this process from the module. It is important that the heating and drawing out by the vacuum are uniform. Otherwise so-called delamination occurs.

10 The finished, laminated modules are now returned to a temporary storage module where not only the FIFO but also the LIFO principle (Last In First Out) can be applied.

11 The next station is where the laminate edges are machined (“Trimming”). To this end, the modules are transferred via ball rollers or an automatic toothed belt conveyor and are fixed by vacuum

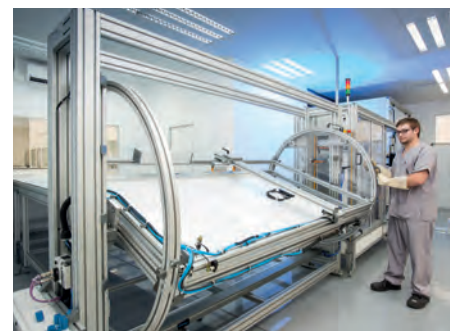
suction cups. The laminate can now be freely trimmed. The working height for the machining is freely adjustable.

12 After the machining the module is placed back in the home position and can then be carried further for automatic framing. Optional automatic siliconising of the frame and automatic corner angle assembly are also possible here.

13 This is followed by the semi-automatic assembly of the connection socket, optionally including potting. The module is then transferred into a temporary storage unit for curing. Once this is finished it is retested in the EL tester. For it is possible for cells to fracture or connections to become detached during the lamination process or before.

14–15 After the curing the module is forwarded for a renewed EL test.

16 The flasher (“flashing light sun simulator”) generates a flash with a specific light spectrum. The performance curve of the module is recorded. The module’s characteristics also result from



A righting or cleaning station for the PV modules.

this. This test is used to determine the performance class of the module. The characteristic curve can also be used to detect defects in the interconnection or cell failures, etc.

17 In the high-voltage test it is determined whether the modules are electrically safe. In a system of multiple modules (an array), very high voltages up to 1,000 volt and higher can occur. This test makes sure that hazards for people do not occur in case of a fault. In the test, a high-voltage is applied, maintained and the insulation resistance is measured. After the automatic evaluation, the OK/NOK decision can be made for the tested part on the basis of the test results.

18 After testing the condition of the cells, the panels are lifted by a pneumatically driven multi-articulated arm, placed in a vertical position and are presented to an employee for the visual inspection. The employee compares the information on the control screen with the panel. Depending on the result, the panel is assigned the relevant quality level and is labelled with a corresponding barcode. Based on this classification, a decision is made whether the panel is passed on to the next step or is sorted out for examination and repair.

19–20 If everything is okay, the panels are labelled in the labelling machine and are taken to a sorting unit for dispatch.



Ergonomics is also a factor considered in PV production and the systems are built accordingly.

RACING SIMULATOR WITH PROFILE

The fascination of racing simulation and how MiniTec became part of an impressive racing project. Through a cooperation with the Rudolf-Diesel technical college, an aluminium cockpit fully adaptable to individual needs was created, which meets the highest standards and provides authentic driving fun.

A team of four mechatronics technician students of the Rudolf-Diesel technical college in Nuremberg, named SimraceX2, tackled an ambitious project as part of their continued vocational development; the construction of their own driving simulator. The goal was to create an environmentally friendly opportunity to experience the racing sport feeling. The team decided to use MiniTec aluminium profiles as the basis of their design.

The idea for this project emerged from the wish to combine driving enjoyment and environmental awareness. The team wanted to develop a system that enabled users to enjoy the racing experience without exhaust and noise. At the same time, the simulator should be designed to be easy to operate and transport.

In the first step, the requirements and basic conditions of the project were defined. The team decided to use MiniTec aluminium profiles as the basis of their design, as they are easy to machine and are high-quality. With the help of a CAD drawing, the students designed the frame of the driving simulator, which was to be made of MiniTec aluminium profiles. MiniTec sponsored the project by providing profiles, brackets, caps and rails. By using MiniTec aluminium profiles, the setup of the driving simulator was simplified, which saved time and resources.

The project implementation ran smoothly thanks to the aluminium profiles from MiniTec. The substeps were precisely planned and implemented. The aluminium profiles were simply fitted together and fixed with the angle brackets and caps supplied. Attention was paid to ensuring that the simulator is stable and safe.



Authentic racing experience

The result is impressive: The driving simulator with MiniTec aluminium profiles is not only pollutant-free but also offers an authentic racing experience. The simulator is easy to operate and transport.

The SimraceX2 team is very satisfied with the result of the project. The use of MiniTec aluminium profiles proved to be a good decision and simplified the project enormously. The simulator will be used in future for trade fairs and events. The team is already planning other projects with the high-quality aluminium profiles from MiniTec.

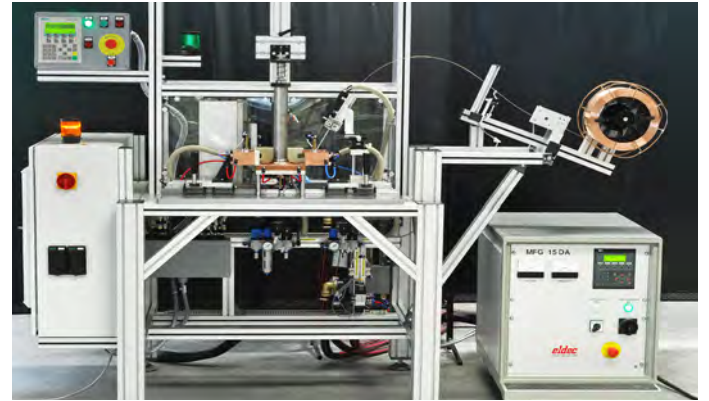


The SimraceX2 team with its racing simulator.

SIMPLY BETTER CONNECTED

Efficient welding and soldering technology play an important role in industrial production. MiniTec develops custom-built workstations for flux-free gas-shielded brazing. An innovative technology, which opens up diverse possible applications.

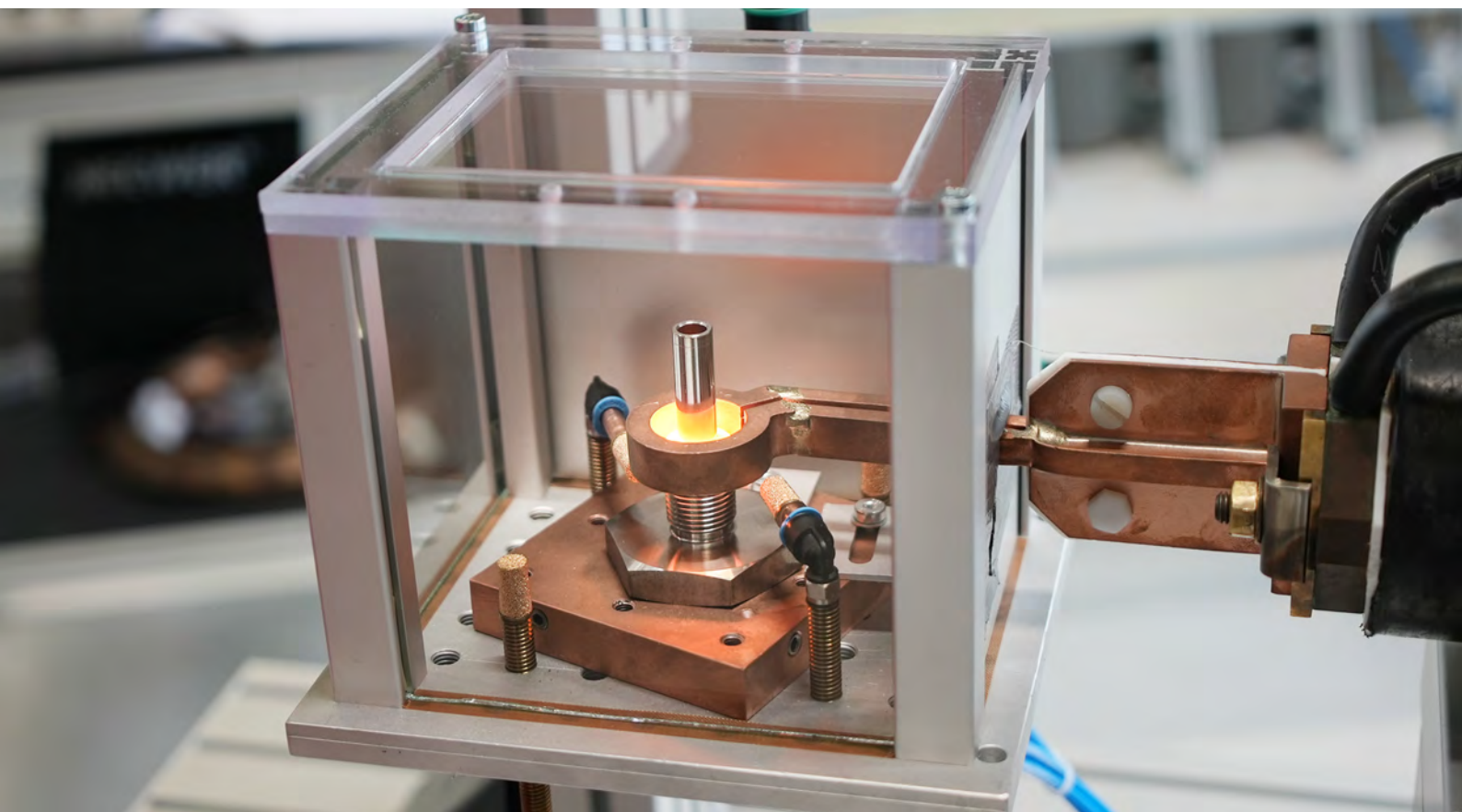
With the innovative joining technology, that of flux-free soldering and welding, MiniTec offers a method that can be applied in particular where small-dimensioned components are used. Relevant areas of application are found in automation and hydraulics systems, compressor building and the automotive industry. Direct electrical resistance heating or induction heating are always used as the heating methods. The special soldering and welding equipment can be used for gas-shielded flux-free soldering or diffusion welding of components made of steel, Cr/Ni steel, copper, brass or hard metal, either of the same materials or in combination.



MiniTec offers individual customised systems with welding and soldering/brazing technology.

How does this technology work?

In gas-shielded soldering with local heating, the components to be soldered are placed in a chamber where they are heated to the soldering temperature by resistance or induction heating in a shielding gas. If a solder is deposited near a gap, it is melted and flows into the soldering/brazing gap due to



the capillary effect. The wetting of a metal surface with a solder requires any oxide layer adhering to it to be removed beforehand. As this cannot be done by an inert shielding gas, another mechanism is responsible for the removal of the oxide layer. Consideration of the behaviour of the surface layers on metals when exposed to temperatures leads to clarification of the problem. Due to the different thermal expansion of oxide and the parent material, the oxide layers crack open. The resulting exposed surface areas of the components allow wetting with the liquid solder. Because the solder is

LOW THERMAL LOADING OF THE COMPONENTS

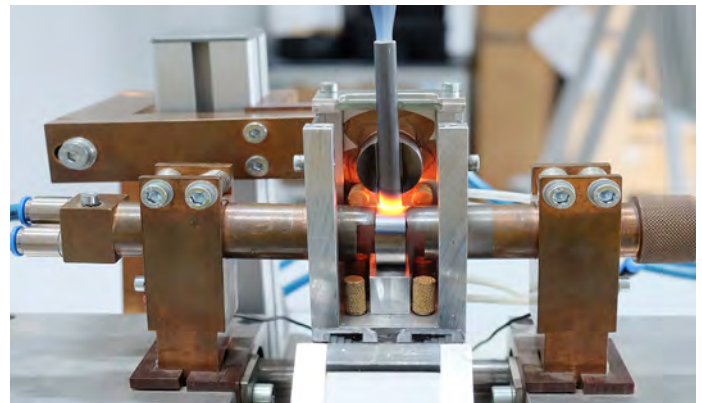
dissolving mechanism underneath the oxide layer. The oxide layers removed in this way are integrated into the solder.

While in furnace brazing the soldering/brazing process for the production of quality joints can only occur in an extremely dry and pure shielding gas, in the case of local heating a shielding gas with 100 vpm contaminants is also used. With such a material, quality soldering/brazing of Cr-Ni steels can be achieved with solders made of copper, copper-silver, copper-silver-zinc, copper-manganese-cobalt, copper-manganese-nickel, copper-nickel, silver-manganese, nickel-chromium and iron-nickel-chromium.

Components made of brass can now also be joined by flux-free soldering and brazing under the shielding gas conditions described above, as well as joining of hard metal on hard metal by diffusion welding and quality diffusion soldering of hard metal on steel for the production of drill bits without the addition of a solder.

Everything from a single source

The MiniTec range of services extends from problem analysis to applications advice including soldering test series, the development of different proposed solutions, project planning with our software developed in-house, design and production through to assembly and commissioning of the special machines – including training and after-sales service.



Environmentally friendly soldering process: No use of aggressive fluoride-based fluxes.

A very efficient use can be achieved thanks to semi-automatic induction soldering stations from MiniTec, including interchangeable component mounts. In these systems the components are heated in a shielding gas atmosphere and the solder is added at the exact time and with the required quantity thanks to intelligent wire feed.



MANY ADVANTAGES

Flux-free shielding gas soldering with resistance and induction heating offers the user the following advantages compared to traditional soldering/ brazing:

- *low jointing times*
- *local and targeted heating of the components only in the joint*
- *low environmental impact due to flux-free joining technology*
- *reproducibility of the joining qualities depending on the system configuration level*
- *process guiding with a controller or a PC*
- *solving of complicated joining tasks*
- *easy machine operation*
- *no need for time-consuming rework*
- *dimensionally stable soldering of the components without subsequent straightening*
- *reduction of production costs*
- *partly automated and fully automated workflows*

ERGONOMIC WORKSTATION FOR WORKSHOP FOR PEOPLE WITH DISABILITIES



More fun in the team – Tobias and Peter at work.

It doesn't always have to be a complex workplace. Ergonomic solutions can also be simpler designs, but nonetheless have a large effect. As with a device for the Heinrich Kimmle Foundation in Pirmasens, with which an employee can continue to work in its workshop.

Tobias is sitting at his pressing station and is beaming from ear to ear. He obviously enjoys his work. Together with his coworker Peter, the 22-year old makes sure that two parts of an electric socket box are fitted together to form a complete unit. After Peter has equipped the device via a kind of drawer, Tobias presses a large button with his elbow, which triggers the pressing process. After each successful pressing he utters a kind of "chacka!" and appears to be completely satisfied.

"We wanted to keep the severely disabled Tobias in the workshop and enable him to participate with a suitable task", explained Hartmut Lelle, head of the packing and assembly department at the Heinrich Kimmle Foundation in the town of Pirmasens in Rhineland Palatinate. The foundation currently

maintains workshops for disabled people in nine locations. Around 900 disabled persons work here as well as 360 employees.

With the assembly of electric socket boxes, a suitable employment was found for Tobias. A bottom section and a cover must be pressed together without large, applied pressure. MiniTec supplied the



Hartmut Lelle will also bring MiniTec on board for future projects.



Equipping the pressing station.

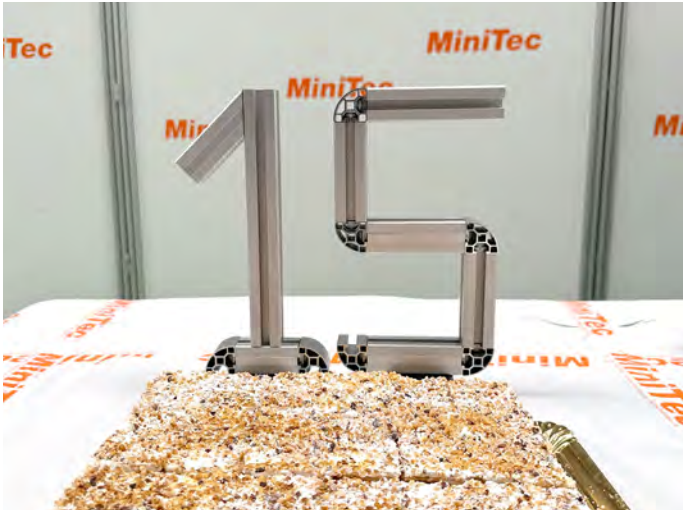
suitable machine or rather workplace for this. "We contacted MiniTec directly with our request thanks to very good experience with its tailor-made workplaces", said Lelle. Together they developed a suitable concept and the machine was then built.

Practical test passed

The station consists of an aluminium profile frame with a Plexiglas guard, in which the pneumatic press is located. The trigger button can be placed in the correct position by a multi-joint swivel arm. There is a drawer in the side so that the second employee can equip the unit. This draw has suitable inserts so that the individual parts are always placed in the correct position. The device is fixed on a table with castors, which means it can be moved at any time.

The unit has been in use since mid-May and has obviously passed the practical test. "We are very satisfied with our collaboration with MiniTec and will contact the partner again for other projects."

15 YEARS' MINITEC ESPAÑA



MiniTec España is celebrating its anniversary.

The Spanish subsidiary is celebrating a special anniversary: MiniTec España has been successfully operating on the Iberian peninsula for 15 years. During this time, a motivated team has supplied the market with components and solutions.



The MiniTec España team.

During its expansion, the focus of MiniTec 2008 was also on the international markets in Europe and South America. In March 2008, the Spanish company Profi-Team S.A. based in Alcalá de Henares near Madrid was taken over and has operated since as MiniTec España SL. With its own developments, it has specialised in conveying equipment with the focus on heavier piece weights. Since then, the conveying technology portfolio of the Spaniards has perfectly complemented the MiniTec product range.



SPAIN: WITH THE SUN'S ENERGY

Energy efficiency, sustainability, recycling and responsible handling of resources are important principles of MiniTec. For these reasons, a photovoltaic array has

now been started up at the Spanish subsidiary, which produces an output of over 100 kWp and will have a similar positive effect to the planting

of more than 10,000 trees. This avoids CO₂ emissions and supports the fight against climate change.

Spain is one of the countries in Europe with the most sunshine hours, around 2,500 hours per year. For this reason, photovoltaics has become a secure investment, which depends on a reliable and sustainable resource: the sun.

For MiniTec España, the investment is also worthwhile from a management point of view, as its energy consumption is reduced significantly, the CO₂ footprint is reduced and the location increases in value. The kudos and reputation of the company also increases as a result.

OFFICIAL OPENING OF LANDSTUHL FLOW TRAIL



Enthusiastic bikers are now also using the new flow trail.

A flow trail including pump track, i.e. mountain bike route, which can be ridden continuously was officially opened in the Palatinate town of Landstuhl on 29/04/2023. MiniTec supported this project.

The idea of building a flow trail for itself has now become a larger bike route with circuit with three levels of difficulty for children, youths and adults. The "Flowtrail Landstuhl e.V." association was especially founded for the construction of the flow trail in Landstuhl. The trail was built to the DIMB (Deutsche Initiative Mountainbike e.V.) specifications.



MiniTec Managing Director Sandra Geyer-Altenkirch (ri) was given a mountain bike tricot as thanks for her support.

COMPANY RUNS IN HOMBURG AND KAISERSLAUTERN



Our team for the company run in Homburg.

In May, MiniTec was represented by sports enthusiasts at two company

runs. As in the previous year, several employees were enthusiastic participants in the event. 15 runners started in Homburg this year. In Kaiserslautern, a small group of three people from MiniTec Smart Solutions GmbH started. With this number of runners, the company was well-represented at both events. The sporting team spirit and fascination for sport is a gain for us. The respective team result at the company runs was impressive and we are proud of our runners/employees. MiniTec's motto at



MiniTec Smart Solutions was at the start in Kaiserslautern.

such events is "In the thick of it, not just there" and thus links pleasant memories with a great event.

HOT RACING IN ESSEN



Concentrated on the racing track!



In May, MiniTec invited customers from the state of North Rhine-Westphalia to a rapid and petrol-loaded go-karting event in Essen. The participants demonstrated their skill on the course and demonstrated good handling in the fast curves. It took a few rounds before everyone was familiar with the course. And the more rounds that were driven, the faster the times became.

All the participants were divided into



Nippy little car versus Formula 1 model.

three groups so that everyone had the opportunity to achieve a good time for the subsequent racing. In the racing that ensued there were also three groups and the best three drivers in each group were honoured with a cup.

The technical aspect, in the form of the presentation of a MiniTec SmartAssist

workplace was not omitted from the event but shifted into the background somewhat. Nonetheless, interesting discussions were held. At the end of the event, all participants agreed that it had been a complete success.



Highly motivated leisure racers at the MiniTec go-cart event.

LONG-SERVICE EMPLOYEES AT MINITEC



"I am convinced by the simplicity and diverse possible uses of the profile system."

Thomas Göttel



"The secret of success is to understand the standpoint of the other." *Udo Polei*



"I am proud to be part of MiniTec and look to many more years of working together and growth."

Andre Hintz

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

- Thomas Göttel (Incoming goods): 20 years
- Andre Hintz (Field service): 15 years
- Udo Polei (Quality management): 15 years
- Zydrune King (Warehouse): 10 years
- Martin Schneider (Dispatch): 10 years
- Phillip von Ehr (Electrical design/programming): 5 years
- Johann Fuchs (Dispatch): 5 years
- Felix Hinkelmann (Shaft machining): 5 years
- Imer Qoroviqi (Dispatch): 5 years
- Stephan Schneider (Electrical design/programming): 5 years

MINISTER'S VISIT

Red carpet rolled out at MiniTec on 17 March 2023: Daniela Schmitt, Minister for Economy, Transport, Agriculture and Viticulture of the State of Rhineland Palatinate came to Schönberg-Kübelberg with a delegation, to get an overview of MiniTec on site and find out what challenges the company faces. Among others, Otto Rubly (Landrat Kreis Kusel (district administrator)), Christoff Lothschütz (Verbandsbürgermeister Oberes Glantal (mayor)) and Thomas Wolf (Ortsbürgermeister Schönberg-Kübelberg (mayor)) were also there.

After a welcoming and presentation on the corporate Group, the participants were informed by the company's founder, Bernhard Bauer and the management where the "shoe is tight" at MiniTec and where it would like improvements. Major topics such as the excessive bureaucracy of the EU and Federal Government, as well as the development of local passenger transport in the Kusel district and the wish for a bypass were discussed. Minister Schmitt appeared to be impressed by



Minister Daniela Schmitt and her delegation gets an overview of MiniTec's range of performance during a guided tour of the company given by Bernhard Bauer

MiniTec's success story and in her statement, she picked up on several of the items mentioned. During the subsequent guided tour of the company, she and her delegation acquired a good overview of the MiniTec range of products and services.



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If only everything were that simple! **The MiniTec profile system**

When it comes to flexible constructions for a wide range of applications, the **MiniTec** profile construction kit offers you decisive advantages. The system has many special features and differences in detail that benefit you in practice. This starts with the unique connection technology, which does not require any mechanical processing. Changes and extensions to constructions are possible at any time.

But also in the design of groove and central bore or in topics such as pneumatics and ESD suitability, you benefit from the intelligent basic concept of the **MiniTec** profile system. Particularly advantageous: thanks to uncompromising adherence to the modular principle, all components always fit together perfectly. This not only simplifies your design work, but also reduces your need for tools and small parts. and small parts.

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



www.minitec.de/produkte/profilsystem