



Connect

03

September
2021



AUTONOMOUSLY THROUGH THE HALL

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Automated Guided Vehicle (AGV) systems support material flow



VIRTUAL TRIAL RUN

----- Page 16

Accelerate commissioning of installations

THE BEST OF BOTH WORLDS

----- Page 12

Strong together: linear technology and robotics



Easier around the curve: MiniTec- segmented chain conveyors

Optimal for special routes

When workpieces are transported, it's not always straight ahead. No problem with our flexible link chain conveyors. Even inclines are easy to realise.

The GKF series with link chains made of durable plastic or low-corrosion stainless steel has already proven itself in the most diverse industrial sectors: Whether in clean rooms or in food processing, in shipping or assembly, whether in work stations or

testing facilities - the GKF series meets the highest demands.

The GKF conveyor system is available in various sizes, either for self-assembly or as a ready-to-use system.

When will you discover the art of simplicity?



Learn more at the
MiniTec Expo:

<https://minitec.expo-ip.com>



DEAR READERS,

machine and plant construction is a central area of business for MiniTec. Most of the projects involved are individually tailored to the very different customer requirements. Here we are required to reconcile functionality, efficiency and profitability.

Apart from the creativeness and experience of our technicians and engineers, Industry 4.0 and IT play a large role in this area.

Digitalisation is not a new topic for MiniTec. We opted for digital tools and processes many years ago. We have been using CAD/CAM, simulations and PLM software as well as digital twins in our product development and for projects for a considerable time. New products and entire installations are created on the screen with CAD software (Computer Aided Design), many production parts are manufactured with CAM software (Computer Aided Manufacturing), assembly, installation and transport runs on conveyor systems are tested with simulation tools and data are managed with PLM software (Product Life Cycle Management).

These digital tools are used when we design machines and systems, agree them with the customer and test and commission them virtually in advance. This is a major advantage, for example, when we combine the use of robots and linear technology. In the title story from page 12 you will read about the advantages that result from the interaction of these two technologies.

Another topic with future potential is based on Industry 4.0: Automated Guided Vehicle (AGV) systems. Find out more on page 14 about new possibilities in intralogistics that are opened up by use of this technology. We are already implementing material flow and assembly concepts ready for practical use in this area. The possibilities that result are varied and numerous.

Let yourself be inspired, also by attending our virtual MiniTec World from 12 to 14 October 2021. You are warmly invited!

Yours sincerely

Andreas Böhnlein
Director of Engineering



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TITLE STORY THE BEST OF BOTH WORLDS

The combination of linear technology and robotics opens up new possibilities in production and can provide significant increases in performance and cut costs at the same time. Different combinations of both technologies are possible. MiniTec searches for the best solution for its customers.

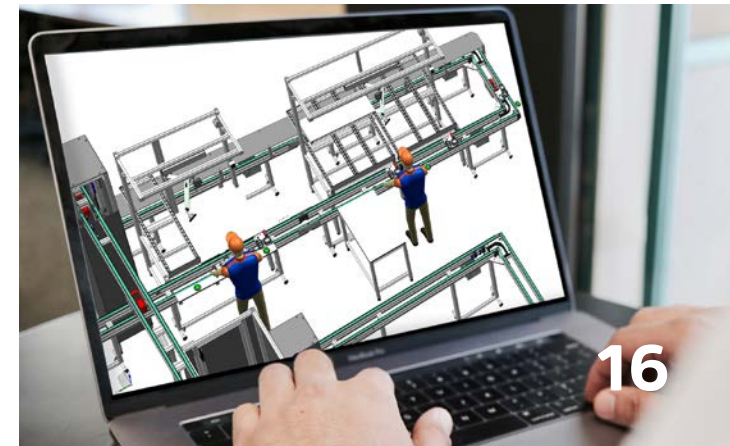
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INNOVATION

Autonomously through the hall
Automated Guided Vehicle (AGV) systems are playing an increasingly large role in internal material flow. MiniTec is not only keeping an eye on this development, but has also implemented solutions with the help of the new technology. It offers diverse possible uses.



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INNOVATION

Virtual trial run
Machines and systems are often designed and implemented under a great deal of time pressure. A look behind the scenes shows how MiniTec uses new methods and digital tools to accelerate the commissioning of installations.

VIRTUAL MINITEC EXPO & CONFERENCE

The first MiniTec World international expo will take place from 12–14 October 2021. The online expo & conference offers visitors online talks on MiniTec products and solutions as well as overarching topics, at different times. At the exhibition, virtual expo stands inform about the MiniTec range of services. This gives anyone who is interested a good opportunity to inform themselves.

Although participation in real expos and conferences is gradually becoming possible again, potential visitors are very often still sceptical. Corona continues to be very present. In addition, especially for the international audience, the question of the cost and benefit of an expo visit is also a real issue. The enormous progress made in digital events has brought home to many participants that these often offer a significantly better relation. We at MiniTec have therefore decided not to participate in the Motek in October and to offer a digital alternative instead – the MiniTec World.

MiniTec WORLD expo & conference

The MiniTec World is a three-day international online expo & conference from 12–14 October 2021. On all three days, online talks on MiniTec products and solutions will be given at different times, as well as on overarching topics, for example, our site in China. Due to the international audience, the talks will be given in German and in English and (due to the different time zones) will be offered at different times.

First international expo

The exhibition will take place at the MiniTec Expo virtual expo. It already has a hall with exhibition stands for all the MiniTec ranges of services, which provide presentations just like at real expos, videos on practical examples, application examples in the form of photo galleries as well as interesting documents to download. The exhibition area will be extended to include an additional area for the MiniTec World, in which each national company will be represented with its own Info box.

New technologies and solutions – the latest topics

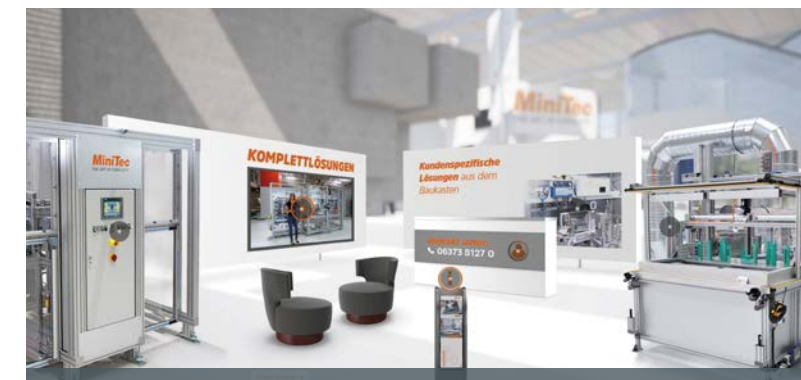
As is the usual practice at real expos, visitors to the MiniTec World can also expect interesting talks and presentations on new and up-to-the-minute topics, for example:

- current MiniTec developments and innovations
- problem-solving approaches to renewable energy and battery production
- new conveying solutions such as the UMS light
- the worker assistance system MiniTec Smart Assist
- new components for firefighting technology
- plant construction with MiniTec in China

The current programme as well as the opportunity to register free are available on the information page www.minitec.de/minitec-world.



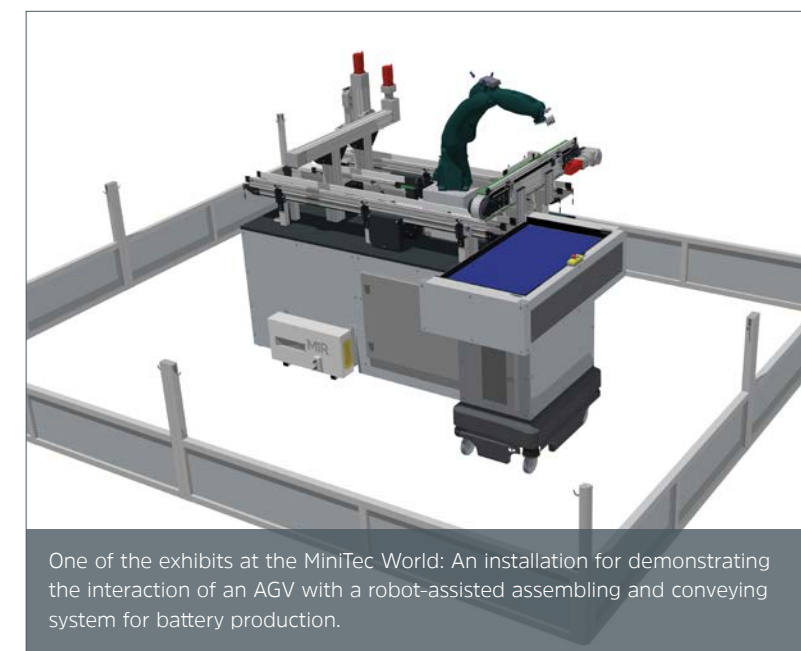
12 – 14 October 2021
Register at
www.minitec.de/minitec-world



Virtual expo stands enable visitors to obtain a virus-free insight into current MiniTec solutions.



The MiniTec Expo forms the exhibition platform for the MiniTec World.



One of the exhibits at the MiniTec World: An installation for demonstrating the interaction of an AGV with a robot-assisted assembling and conveying system for battery production.

FASTER ACCESS: THE NEW MINITEC WEBSITE

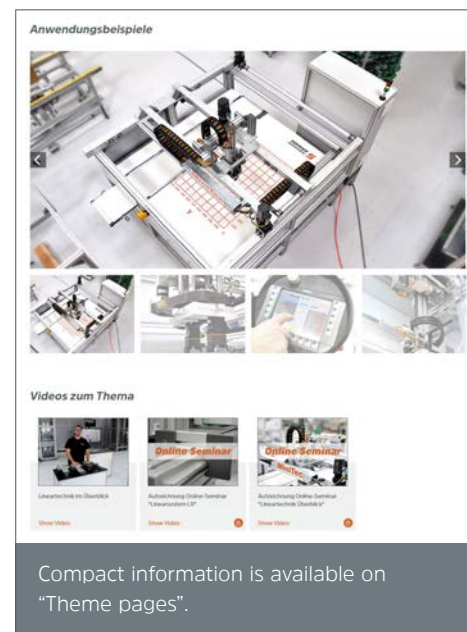
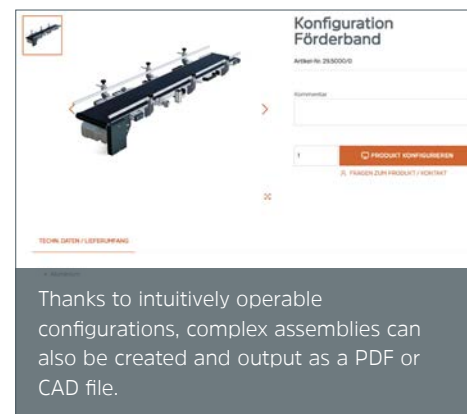
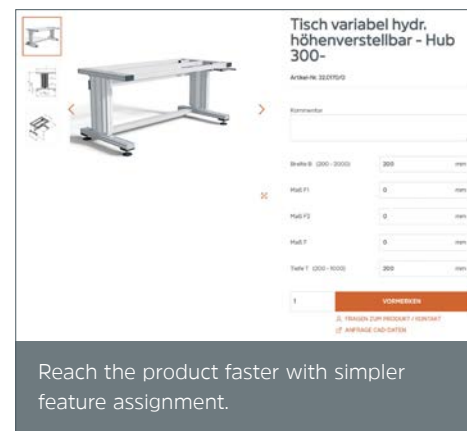
For MiniTec the focus is on simplicity. It is reflected in our modular profile system – with a deliberately limited number of profiles and connectors and ingenious connection technology – and runs through all our automation solutions. And simplicity was also the specification for our new website. Fully in line with our company motto: “The Art of Simplicity”.

Form follows function – the functionality of the MiniTec website was absolutely in focus for its new design. Ease of use, intuitive working, short paths to the destination. The complete design and structure was based on this.

The need for visual clarity of the interface and navigation was strongly emphasised, so that the user can orientate themselves and get to where they want to be quickly. Less is more – following this motto, the number of main navigation points was deliberately reduced and restructured. Operation became intuitive, not only optimised for normal desktop PCs, but also for all kinds of mobile devices. After all, an increasing number of users use their smartphone and tablet to surf the internet.

Faster to the required product

Time is money. If a customer requires a specific product, they want to get to the required article with the least number of clicks possible. We therefore paid particular attention to the product area and completely restructured it. This resulted in a new, innovative filtering technique, which leads the customer to the target product with significantly fewer steps. And enables them to compile products for a particular topic flexibly. Additional filter categories for new (“NEW”) or particularly recommended (“TOP”) products are also available.



The specification of the products, especially with regard to their dimensions, has been simplified significantly on the new site and can be made using appropriate predefined form fields. This avoids misunderstandings and accelerates the processing!

Convenient online configurators

Intuitively usable configurators are available on the new website for more complex products (e.g. linear axes or conveyor belts). Here the user can specify the parameters for their required product in a very differentiated way. As a result, they receive a summary in the form of a PDF file and can download the corresponding CAD drawing. They can then, naturally, place the configured product in their trolley and ask MiniTec about it!

User account with comprehensive advantages

Many processes and sequences have been simplified on the new site – for the advantage of its visitors. The user account plays a central role in this. For example, all product enquiries (including for configured products) are added to an enquiry history. This not only creates a better overview, but also enables previous enquiries to be re-submitted at any time (with changes too, if applicable). This means less effort and faster working! Your contact details are also added automatically, of course.

Direct access to online seminars

The “single sign-on” idea was pursued significantly more than in the past. That is, the principle that, as a logged in user, you have direct access to many services without having to enter your details again. Among others, the participants of online seminars benefit from this: They can log-in directly for all live seminars. As a logged-in user, you can also watch recordings of previous online seminars immediately.

Numerous downloads and videos

The new website offers numerous useful videos and downloads, and the range will be extended continuously in future. With a personal account, users have unrestricted access to all relevant offers (without an account the choice is limited).

Flexible structure of theme pages

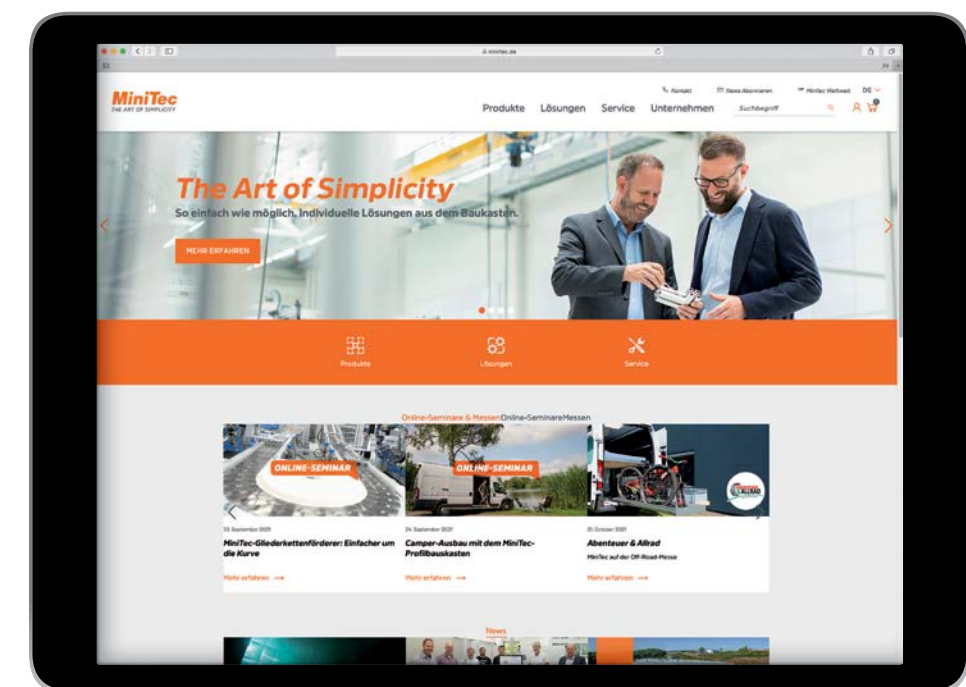
The digital world offers decisive advantages, especially when compiling relevant information on a topic. We have made use of this circumstance for the new website: Alongside the standard outline, by which downloads, videos or online seminars can be found in corresponding folders we will also additionally provide such content on relevant theme pages. This offers users the advantage of content on one topic being consolidated in one place. This saves time and improves the quality of the information!

The MiniTec website is intended to be a digital added-value platform for our customers and partners. It is scalable, i.e. open to future content, functional and technical enhancements. For example, in the foreseeable future, a separate content area will be available exclusively for customers (customer portal, extranet), where they will have access to enhanced downloads and information. Similar concepts are also being planned for MiniTec partners.



Experience the “Art of Simplicity” online, a free user account opens up all areas to you.

www.minitec.de



“ABENTEUER & ALLRAD” OFF-ROAD TRADE FAIR: EVERYTHING FOR THE CAMPER FIT OUT



Flexibility is needed when it comes to fitting out vehicles, this particularly applies to the fit out of recreational vehicles. The MiniTec modular system provides the ideal basis for this and creates room for creativeness. This was reported on in an online seminar in September and from 21 to 24 October 2021, anyone who is interested can find out more at the “Abenteuer & Allrad” off-road trade fair in Bad Kissingen.



A system for limitless creativeness in vehicle fit out, regardless of whether for the camper or the “Tiny House on wheels” – with the MiniTec aluminium profile system there are no limits to flexibility for vehicle fit out.

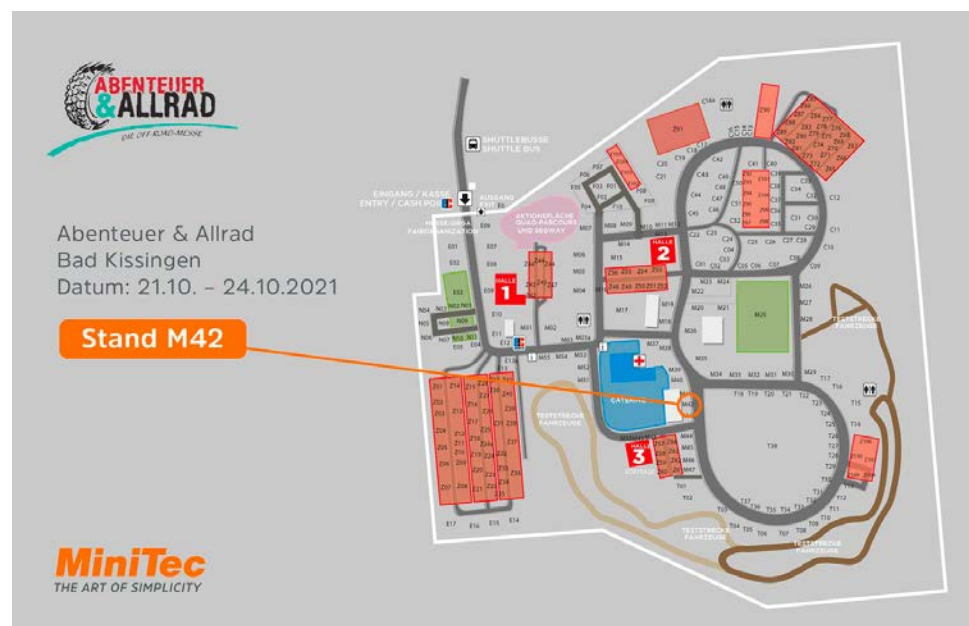
Anyone who occupies themselves with the topic of camper fit out should therefore take more than a passing glance at the modular system with its innumerable possibilities. A good opportunity for this is provided by the “Abenteuer & Allrad”, which will take place from 21 to 24 October 2021, in Bad Kissingen. MiniTec will be exhibiting there on stand M42 – with concentrated information on the topic of vehicle fitout. Further info is available at www.minitec.de/abenteuer-allrad-messe.

An online seminar on this topic was also held in September: MiniTec employee Philipp Ritthaler, about whom the “Connect” has already reported often, and Marco Küster (film-maker and travel enthusiast) explained the advantages of the modular system and gave tips for camper fit out. For information, visit www.minitec.de/camper-seminar.

For individual standards

The name of the game when fitting out campers is “everything in its place”! Innumerable things not only have to be stowed away safely, order and ergonomics are also required. Therefore, each vehicle fitout is also a one-off at the same time, as precisely the right fit out variant for the required uses is not available “off the peg”. With the modular system based on the MiniTec profile system, wall and ceiling constructions, furniture, heavy-duty equipment racks and everything the camper heart desires can be designed easily and individually.

The free iCAD Assembler design tool can be used to create designs and parts lists in advance, so that nothing more stands in the way of the implementation.

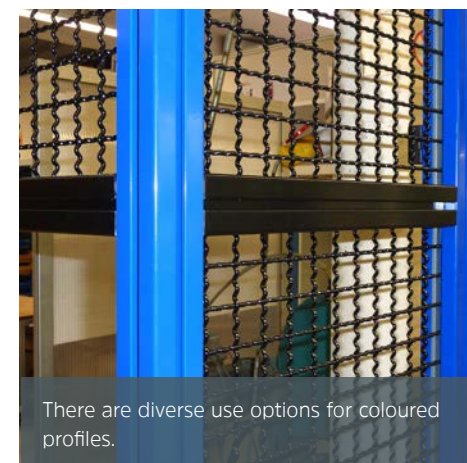


COLOURED PROFILES FOR CREATIVE IDEAS

The MiniTec aluminium profile system has already proven its worth thousands of times in industry. United in a well equipped modular system, profiles and components can be combined with each other easily. This assortment also includes coloured variants. There are therefore virtually no limits to creativeness.



They are omnipresent in companies: profiles Not only in the production department, but also in the stores or warehouse and even in offices, profiles form the basis for innumerable constructions. Workplaces, conveying equipment, machines and even entire plants are based on profiles. In general, aluminium profiles with a metallic-silver appearance are installed. But MiniTec also offers alternatives: coloured profiles. This make sense, as nowadays an increasing number of customers opt for individuality and modern design, including for their



There are diverse use options for coloured profiles.

profile constructions. For example, in this way they want to implement their corporate design in a specific colour. This colouring plays a large role, particularly in trade fair exhibits. Not only the profiles are delivered in the required colour, but also surface elements or other parts of a construction.

Individual design

On the other hand, in production, different colours are necessary for technical reasons: black or gold-coloured anodised profiles are required, for example, in systems that operate with cameras to prevent light reflections. The oxidation of the surface forms a dense and very hard protection layer. However, the colour range of the coloured oxide layers is very limited. In practice, applications which signal hazards and make escape routes easily identifiable through particular

colouring also occur frequently. MiniTec supplies profiles with powder coating for these applications.

Signal profiles made of plastic are also suitable for subsequent marking. These profiles are available in flame red, yellow-orange and signal yellow. They are simply clipped into the profile groove and cover the entire profile width of 45 millimetres. Powder-coated profiles are available in numerous colours of the RAL colour chart. The “surface texture” is also available in different variations: as a smooth texture, fine texture or coarse

texture. The gloss level can be implemented in matt, satin matt, glossy or silky gloss.

Experts tend to opt for powder coating for coloured profiles, as this surface is resistant and ensures a high degree

of colour diversity. The colour fidelity is also significantly higher than with anodised surfaces.

COLOUR FOR THE CORPORATE DESIGN OR MARKINGS

THE BEST OF BOTH WORLDS



The combination of linear technology and robotics opens up new possibilities in production and can provide significant increases in performance and cut costs at the same time. Different combinations of both technologies are possible. MiniTec searches for the best solution for its customers.

It is difficult to imagine modern production lines without automated loading and unloading. Among other things, handling equipment is widely used in the automotive environment. If these applications on the one hand require a large range and on the other movement geometry and flexibility, a combination of linear gantry and robot would seem to be the right option.

Depending on the application, two technologies used have established themselves: articulated arm robots and linear gantries. These can also be combined.

Both systems have their strengths. For example, when it comes to welding parts, positioning the welding guns in any spatial angle with regard to a sheet metal geometry, a robot with six axes and a freely-programmable path curve for the robot hand is the preferred solution.



Linear gantries are particularly suitable for linking machine tools.

On the other hand, when linking machine tools, linear gantries play to their strengths. The individual stations can be set up along the line in the plant hall with optimised space. In such a case, the loading and unloading of the workplaces can take place via a linear gantry. A single gantry, for example, can transport a part 10, 30 or even 50 metres from machine to machine. With one or multiple slides, each with a vertical servo axis, the part flow and thus the cycle time can be optimised.

Useful combination

Applications in which neither the robot nor the linear gantry forms the optimum solution are also feasible. The movement geometry and flexibility of the robot hand are required, however, the individual machining points are sometimes so far apart that they cannot be reached economically with one robot. Instead of using two robots in such a case – to switch to a robot with a significantly larger range, the combination of both systems would

appear to be the right answer. The solution consists of combining the robot with one or two additional linear axes, in order to extend the possible work area of the robot. It doesn't matter whether the linear axis is on the floor and the robot is moved upright – or whether a robot solution hanging on a gantry axis is used. Because the length of the linear axes is not limited, in this way the work area of the robot can be extended as required. The limiting criterion is the cycle time. Such solutions are often the best economic solution. An additional axis costs far less than a second robot; the existing robot control can be extended easily and cost-effectively by plug-in cards. In recent years, robots are being used increasingly often. On the one hand, this is due to technological progress, on the other hand it is also because of the increasingly favourable prices.

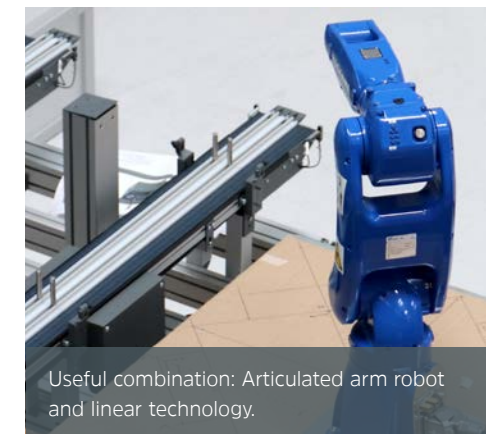
MORE PERFORMANCE WITH REDUCED COSTS

Virtual tests

In such cases, the MiniTec engineers decide which variant is the most useful and economic solution for the customer. MiniTec has been working with robot manufacturers for several years and can make the right decision based on empirical values and the use of digital tools. In addition to virtual 3D models of the system with digital twins, simulation is also used here. It enables a system to be tested before it is completely designed and built.

By linking the two technologies, MiniTec always finds the right solution for its customers. Here the users benefit from the advantages of a modern industrial robot combined with proven linear technology.

Numerous application examples from different industries testify to the benefits.



Useful combination: Articulated arm robot and linear technology.



AUTONOMOUSLY THROUGH THE HALL

Automated Guided Vehicle (AGV) systems are playing an increasingly large role in internal material flow. MiniTec is not only keeping an eye on this development, but has also implemented solutions with the help of the new technology. It offers diverse possible uses.

Large car manufacturers are currently working intensively on autonomous vehicles. Automated Guided Vehicles (AGVs) are already in use in industry. Not only can they be used in work areas with people traffic but also in fully-automated work areas and they are enormously flexible in their design.

The AGVs have a whole range of advantages, especially in the automation of workflows: They are ready for use around the clock, can move in (almost) all operational areas and are flexibly usable through different configurations. They are also suitable for transporting heterogeneous goods with different weight and specifications.

MiniTec opted to use the AGVs of a leading manufacturer some time ago. As the basis for AGV concepts, the mobile robots are used as a flexible platform in which MiniTec integrates attachments and platform add-ons for material flow.

Flexible in use

For example, a mobile robot is in use with which internal transport and logistics tasks for small parts can be quickly automated. To this end, MiniTec equips the vehicles with add-on modules such as containers, racks, lifting gear or conveyor belts and integrates the units in the customer's material flow. Special belts ("ModSort") even enable the alignment of parts, for example, for assembly.

The platform add-on modules are easy to exchange, so that the robot can be quickly retooled for other tasks. Highly flexible mobile robots transport a payload of up to 200 kg autonomously. This can also be increased by replacing the robot.

Safely on the move

The control unit of the AGVs plays a particular role. They are equipped with sensors, 3D-cameras and laser scanners so that they can navigate through the factory halls safely and reliably. In practical use, a safety system based on a large number of sensors feeds the data into a complex planning algorithm, for a safe robot travel pattern. The algorithm informs the robot where they are currently travelling to, and decides whether the robot has to adjust its route or must possibly stop immediately and safely to avoid a collision.

The paths of the AGVs are "taught" by the control unit before they are used for the first time. A PC, tablet or smartphone can be used for this. The MiniTec engineers make the adjustment to the customer's respective requirements.



Markus Jung, Head of electrical design/programming, teaches the AGV to drive.

WORKPLACE FOR MASTER TRADE STUDENTS

MiniTec has been committed in social areas and training establishments in its home region for many years. MiniTec is cooperating with the "Meisterschule Kaiserslautern" vocational college, in a project to optimise assembly processes and donated a high-quality workplace system to the training college in recognition of the good cooperation.

Contact with schools, universities and training establishments plays an important role for MiniTec. Both sides benefit from the cooperations, as MiniTec is an attractive employer in the region and at the same time has already completed a large number of joint technical projects. One successful example of this is the cooperation with the "Meisterschule für Handwerker" - the master school for trades - in Kaiserslautern.

A workstation with an assistance system was installed there, which simultaneously functions as a learning

resource for the state-examined technician students specialising in production automation. One project goal of the group was to implement the substeps of the assembly of the kit of a "Lego technology car" in the form of flow production (assembly line production) in the equipment software. Ultimately, the assembly instructions defined by the group should enable smooth assembly of the model. At the same time, the trainees were familiarised with the possibilities of digitalisation in industry and modern assistance systems. With these instruments, the training time

of employees (including unskilled workers) for assembly work can be reduced significantly. Production companies can therefore plan and implement assembly tasks within the production process faster and more flexibly, which leads to more efficient and cost-effective production. At the same time, new opportunities open up for low-qualified or disabled people, to be reintegrated in the work process. A win for both sides.

PRACTICAL TEST FOR ASSISTANCE SYSTEM

Successful cooperation

During the course of the project with the Meisterschule Kaiserslautern, the course instructors Dirk Masonne, Andreas Hammen and the principal Steffen Hemmer acquired important experiences, which they shared with MiniTec. This knowledge will help the company's subsidiary, MiniTec Smart Solutions, to further optimise the system, so that it will soon be able to implement a marketable assistance system in future projects. MiniTec thanked the college for the good cooperation by giving the high-quality workstation system to the training establishment. This means that future master trade students will also be able to work with state-of-the-art technology and are ideally prepared for the employment market.



Successful project: MiniTec supports the Meisterschule Kaiserslautern with a modern workstation system for training. In the photo (left to right): Frank Stattaus, Andreas Hammen, three students and Dirk Massonne and Steffen Hemmer.

VIRTUAL TRIAL RUN

Machine and plant construction is an important area of business for MiniTec. Machines and systems are often designed and implemented under a great deal of time pressure. A look behind the scenes shows how new methods and digital tools are now helping to accelerate the commissioning of installations: to achieve this, the programming, testing and optimising took place at the virtual model.



In special machinery construction there is hardly any time for the commissioning, as soon as the machine is finished the handover date is imminent. At this time the control unit still has to be programmed, sensors set up and workflows tested. This cannot be started properly until the machine has been completely assembled and set up. Virtual commissioning offers an alternative. To this end, MiniTec uses Siemens' Mechatronic Concept Designer supplied by BCT.

Several years ago, MiniTec's efforts in digitalisation and Industry 4.0 led to its working with BCT and Siemens. At the time, the manufacturer and systems firm jointly presented a software solution for virtual commissioning: The NX Mechatronics Concept Designer (MCD). This is a solution based on the Siemens CAD system NX, in which the mechanical model of a machine can be created and kinematised. The electronic components of the system such as drives, sensors and actuators are

modelled using the Simit simulation software. The S7-Plcsim Advanced software, which simulates a Simatic S7-1500 control, is used to simulate the control unit. This software provides extensive simulations of all functions including communication, safety and web server, whose signals are in turn used in Simit and MCD, to bring the virtual machine to life.

More time through simulation

With the combination of the three software packages, it is possible to simulate the complete program development and testing of the system in the interaction of software, electronics and mechanics within the virtual space.

"We design our systems in another CAD system and import the CAD geometries into NX MCD, where the kinematics of all assemblies are defined. However, it is also possible, for example, to simply define rough blocks for functional tests, to assign them kinematics and to control them via Plcsim Advanced. In this way, new ideas can be tested quickly for their practicability", explained Jochen Hellbrück, Engineer in the automation technology department at MiniTec. "Previously the automation had to wait until the system was completely set up", remembers Hellbrück, "to have more time, we often started with the commissioning in one corner of a system while the assembly work was still in progress in other places."

Testing in an earlier phase

The automation specialists at MiniTec can now start their work as soon as the CAD model is sufficiently advanced. "This also has the advantage that we become less dependent on delivery dates", added Hellbrück, "we once had the case that drives were delivered six weeks too late – a real problem with only five weeks for the commissioning! We therefore could not have stated until the system should already have been on the customer's premises for a week. With the virtual commissioning we have become practically completely independent of such problems."

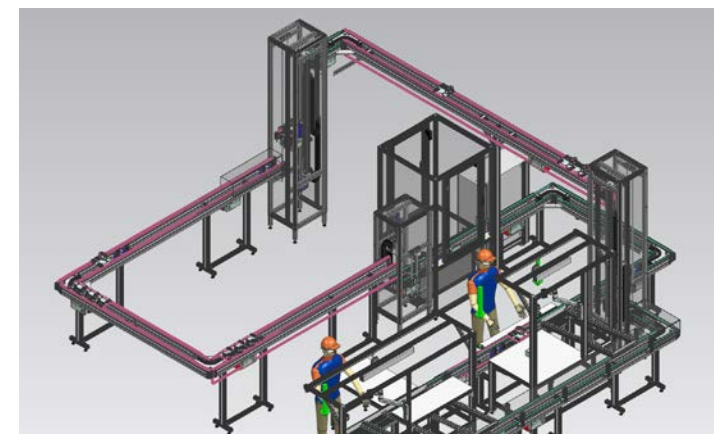
At the same time, the automaters have more time to optimise the systems and workflows and to add or lay sensors to make processes more stable. "The simulation shows us the real expected workflows far more precisely than if we simply imagine the workflows", added Hellbrück. And finally, a video of the virtual system, which demonstrates the kinematic sequences, is an excellent opportunity for presenting the system to the customer.

Fruitful partnership

Heilbrück experiences with BCT have been top: "The introduction went smoothly, the starter training was a real highlight. It was not standard training, but was precisely adapted to our requirements and was even based on our own data.



Extensive tests are necessary before commissioning complex systems.



The virtual 3D model draws attention to potential collisions and conflicts at an early stage.



The virtual commissioning ensures that the real system functions fault-free later.

Christian Strauß, responsible for MiniTec at BCT, added: "MiniTec always provides important feedback and suggestions for improvements, which we pass on to Siemens development, where they are often taken into account."

"NX Mechatronics Concept Designer, Simit and Plcsim Advanced gives us the opportunity to carry out the commissioning of handling systems, robot applications or conveying technology, realistically and in detail using the virtual model. The real commissioning is therefore no longer a complex process step undertaken under time pressure, but is only the confirmation of what we have defined, tested and optimised in the virtual commissioning calmly and with the time needed. The handover to the customer can take place punctually, we have prepared the machine optimally and the customer receives a system that functions optimally and runs reliably from day one", summarises Hellbrück.

ART WITH PROFILE

“It isn’t happening” – surely a somewhat idiosyncratic name for an event. Yet an art and culture festival took place in Nuremberg at the end of July under this precise title. Participating: Art student Simon Schallé, who designs light installations and concepts for event locations passionately and uses MiniTec profiles for the implementation.

The young artist presented his latest creation "Caustic Shards" to the audience. Simon Schallé worked on the project with the sound designer Zoe Mahlau from Frankfurt and the Nuremberg visual artist Tobias Rauch. The idea behind the exhibited object is to reinterpret the history of the material used – visually, graphically and through sound. The material is the former ceiling panelling of a logistics centre, made of polished aluminium surfaces.

It has an area of four times four metres and is divided into 42 squares, which are made of polished aluminium elements. The composition was implemented with the MiniTec aluminium profile system. In this way the weight could be kept low – an important aspect, as the system was hung from the ceiling at a height of

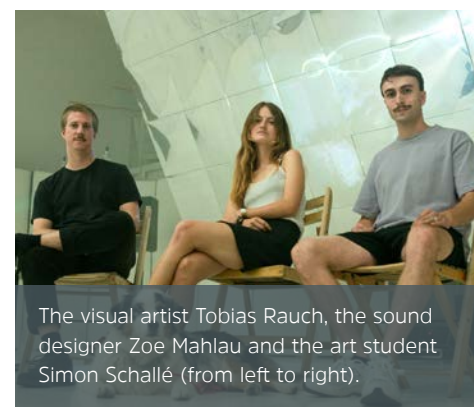
four metres. The projector positioned in the middle under the mirror surface shines light onto the aluminium mirror from below, which causes the light to be reflected into the room at the corresponding angle. As the light source is an animation, it is possible to specifically control the points at which the light is refracted. What is more, the projected video animation could be controlled by the inclination angle of the mirror surface.

Stable, flexible, lightweight

Simon Schallé had no doubt about the MiniTec modular profile system used in the project: “The size 45 profile system of MiniTec was chosen quickly to design and built the installation to be as mobile, flexible and above all as lightweight as possible for the installation.

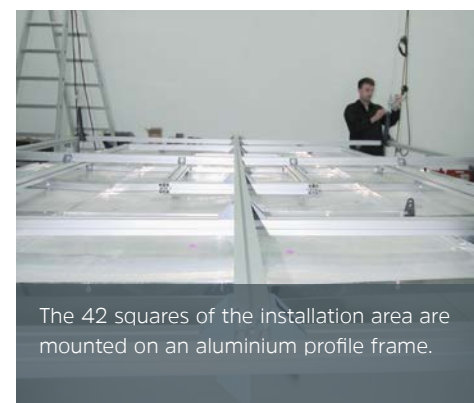
It provides the necessary stability to make the construction torsionally stiff, especially with its size of four times four metres. The connection elements can also be attached flexibly in next to no time. Even more exhibitions are planned, so that the modular structure of this system is really worthwhile.”

The artist was quickly able to win over MiniTec for his project quickly: “With my rather specific requirements, I was really pleased to fall on sympathetic ears during my first discussion with the company. Animated communication and a design drawing resulted quickly, to clarify the construction down to the smallest details. I was able to pick-up the material myself from the MiniTec branch in Zirndorf near Nuremberg. This was very important to me, in order to make person-to-person contact locally.”



The visual artist Tobias Rauch, the sound designer Zoe Mahlau and the art student Simon Schallé (from left to right).

Photo: Maximilian Pfünger



The 42 squares of the installation area are mounted on an aluminium profile frame.

Photo: Anika Maass

THE PENETRATING LOOK

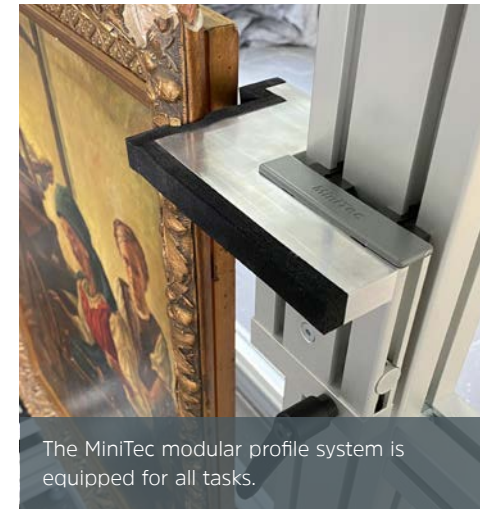
The North German company NTB is specialised in digital X-ray equipment for non-destructive testing in quality assurance, research and development as well as art and archaeology. The system components come from MiniTec.

The problem with conventional X-ray systems is that they can only ever expose relatively small X-ray images. Several images have to be taken of larger objects, which then each only show a small cut-out. And as the shot position has to be changed for each individual X-ray image, the work required increases exponentially with the size of the object. Unlike other X-ray systems, the Art X-Ray systems of NTB operate according to the scanning principle: The respective object is scanned along its length with a high-resolution x-ray line scan camera. In this way, a very large X-ray image is created in one pass. This reduces drastically the work required, for example, to examine a large-format painting.

The radioscopy of the objects is non-contact and does not leave behind any traces or damage to the work of art.

Customer-specific X-ray systems

The X-ray system is assembled to customer-specific specifications. X-ray sources with different outputs are used, depending on the requirement (painting only or other objects also). Thanks to the extensive range of MiniTec products, NTB is able to adjust the design of the base to the respective circumstances on the customer's premises. Components and profiles are also available with

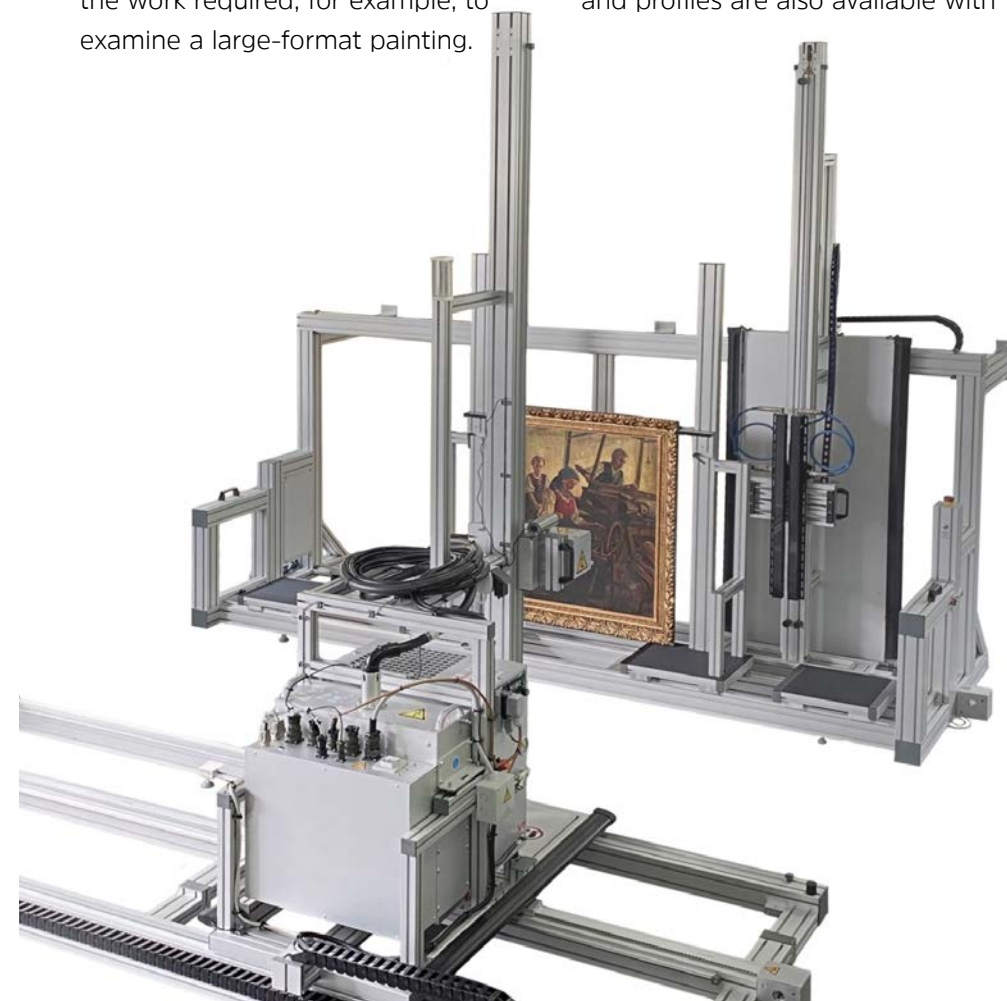


The MiniTec modular profile system is equipped for all tasks.

very small purchase quantities, so that exactly the required components can be ordered for each unit. Special parts, that differ from the standard products, are also produced and mounted by MiniTec.

X-RAY TECHNOLOGY FOR ART AND HISTORY

The Art X-Ray is usually delivered with workstation (PC and monitor). The company's owniX-Pect software, which was especially written for the operation of the system and evaluation of the X-ray images, is a fixed part of the delivery. Depending on the customer's wishes, the unit can also be retrofitted for 3D later on. The MiniTec profiles from the flexible modular system also enable subsequent adjustment and extension of the systems.





TWO IN ONE SWEEP

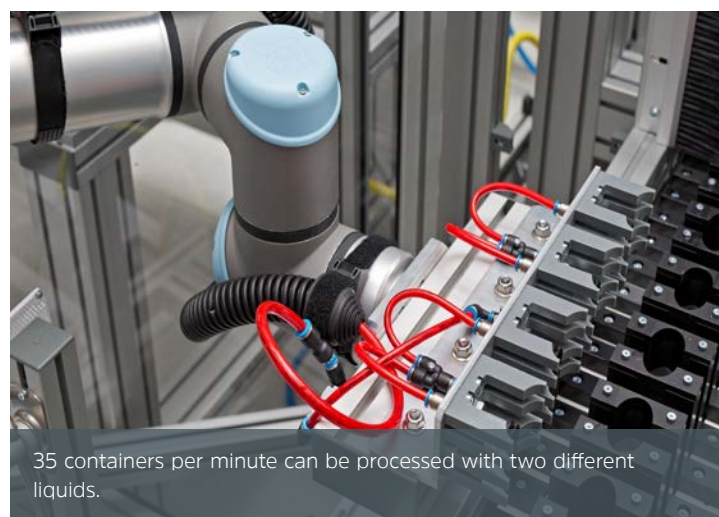
In special machinery construction, each design is a challenge. MiniTec is specialised in this. For one customer in the cosmetics industry, a fully-automatic filling plant was planned and implemented, which dispenses two different liquids simultaneously in own work operation. Individual stations in the modular conception filling line can also be operated separately. It can therefore be used flexibly.

The competence of MiniTec as a solutions provider for machines and system regularly leads to enquiries for special machines, for example, a filling plant for liquids. A fully-automatic filling plant was implemented for one customer, who offers an innovative product with two different liquids in a single, completely new developed plastic container. Like all solutions from MiniTec, this line is also modular. Individual stations can therefore also be operated separately.

The filling plant consists of a double belt conveyor with retaining cams for two different container sizes. This conveyor connects the different workstations (seven in total). Following manual loading of the containers, the first liquid is added at the first filling station. The dispensing of the liquids is time-controlled. A lid is then transferred from a belt bunker by a pick-and-place unit. A camera system with orientation detection ensures the screw cap is in the correct position.

Fully-automatic filling

After the closure has been attached by a rotation module, four containers each are transferred by a collaborating robot and are placed in position for the filling of the second liquid. The control unit stops the



35 containers per minute can be processed with two different liquids.



The dispensing and the screwing with lid is time-controlled, a camera system with orientation detection ensures the correct position.



Four containers each are transferred by a collaborative robot and are placed in position for filling with the second liquid.

process automatically if an obstacle appears. Advantage: The system therefore does not require a protective enclosure. The steps are then repeated in the following station. The finished containers are then transferred to a tray.

Simple operation

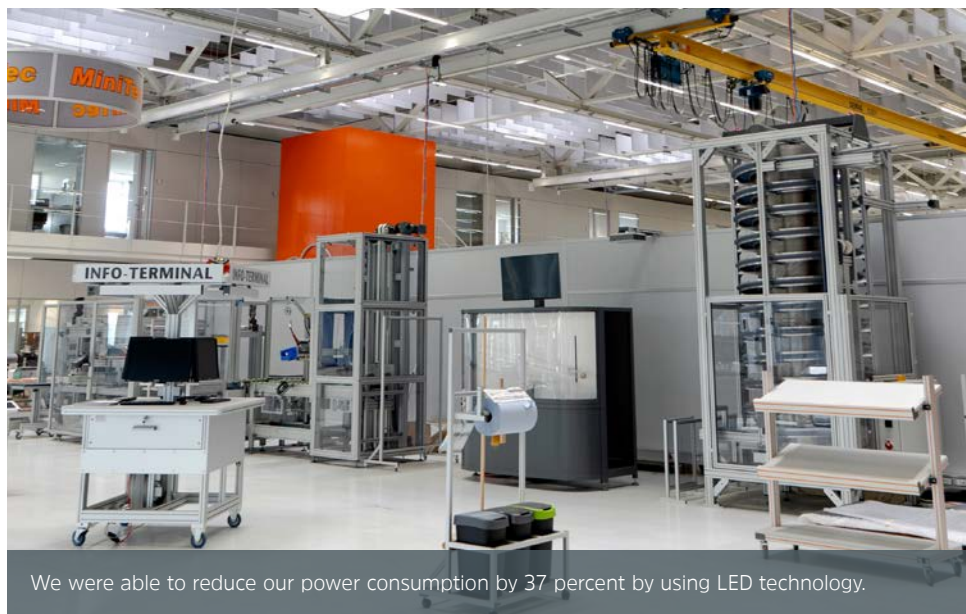
The entire system is controlled by a Siemens S7 PLC. All operator functions are visualised on a mobile touchpanel. The system can therefore be operated easily and intuitively. Each minute, 35 containers are processed with two different liquids.

FLEXIBILITY THROUGH MODULAR STRUCTURE

“The filling plant once again documents our technical expertise when it comes to special requirements”, says the person at MiniTec responsible for the project, Reiner Krück. “In this way we help our customers to implement innovative product ideas in practice. The standard we set ourselves is always not only to meet their basic expectations, but to implement solutions, which offer them optimum efficiency, flexibility and ease of use.”

ENERGY MANAGEMENT IN MECHANICAL ENGINEERING

Sustainability and careful use of resources remains a long-term challenge for companies. Customers, investors, employees and other interested parties are increasingly sensitised and recognise the importance of a credible contribution in the form of effective climate management in the company.



We were able to reduce our power consumption by 37 percent by using LED technology.

The question, how to successfully change over to climate-neutral production, is not only of central importance for the long-term goal of greenhouse gas neutrality, but also for the industrial location Germany. MiniTec operates as an enabler and offers its customers climate-friendly technologies and solutions. However, we must also analyse, scrutinise and optimise our own company activities in the interests of climate change. Here the certification to EN 16247-1 helps, which has been implemented and certified at MiniTec since April 2016.

In the MiniTec corporate culture, climate and environmental protection are permanently anchored objectives of the company's environmental policy, which are also pursued consistently and – where meaningful – are implemented. For example, two photovoltaic systems (180 kWp in total) supply renewable

electricity. Over 80% of the electricity generated by plant 1 (93 kWp) is consumed in-house. The electricity generated in Waldmohr (87 kWp) is 100% fed into the public grid. In this way we are able to achieve an average CO₂ reduction of a good 110 thousand tonnes of harmful emissions per year.

Changing over the hall lighting to LED in 2019 – 2020 was a major success. With this measure alone we were able to reduce electricity consumption by 37 % and the measures are not yet comprehensively completed. For the future it is planned to also change over the office areas to LED lighting. This and other energy and technical measures in all locations contribute to consistent reduction of our energy consumption and CO₂ emissions. In the energy audit to EN 16247-1 from February to April 2021, MiniTec was certified a very good energy standard by the environmental expert.

Climate friendly and low emissions

MiniTec offers its customers energy-saving solutions for systems and machines. These are characterised by energy-saving drives and intelligent software solutions. Fast capacitive storage modules can also be used, which store the electrical energy temporarily. Also, intelligent controls which ensure, for example, that braking energy is not lost but can be used, among other things, for accelerations and especially startup energy peaks. In addition, fast storage modules are used, in the form of capacitors in the drive system, in which the electrical energy is buffered. This is possible due to so-called regenerative modules. These return electrical energy (produced, for example, on braking a servo axis) back into the customer's system. In this way, peaks in electricity consumption are flattened. The customer saves cash and acquires a very efficient system.

By intelligently averaging energy over the whole operating cycle also enables power peaks to be reduced so that a constant energy flow results. This enables expensive load peaks to be avoided. The use of synchronous linear motors also ensures energy efficiency.



Energy for our own requirements: Photovoltaic units on the hall roof of the MiniTec headquarters in Schönenberg-Kübelberg supply renewable electricity.

110 THOUSAND TONNES OF CO₂ PER YEAR SAVED

Planning intelligently

Another important aspect lies in the planning and concept of systems, right at the very beginning of the development. Here the aim is to switch off unnecessary drives when they are not needed. For example, by using control systems for automated switching off of machines or electrical assemblies or compressed air units in low load periods, for example, by means of PROFlenergy. This principle is followed in particular in our conveyor systems.

On request, MiniTec also offers its customers performance and energy measurement systems for ISO 50001 energy management systems. A module delivered with the system measures the performance data and provides energy meter values. These can be integrated into ISO 50001 energy management systems and evaluated.



Bernd Hoffmann is the author of the article and is the management representative at MiniTec.

When designing a moved system, an equally interesting question to ask is whether energy supply is necessary at all. Can we not use all the free energy of gravity? Thus, purely mechanical applications are also used at MiniTec, for example, roller conveyors, lifting doors, incline or gravity conveyors. So-called Karakuri mechanics function without electrical or pneumatic energy, is part of the concept of lean production and is called "Low Cost Automation" (LCA).

Bernd Hoffman, management representative at MiniTec, is convinced that the trend in the direction of more environmentally friendly systems will continue to advance in the future: "In my opinion, in the foreseeable future, an energy label similar to the one already required for fridges, washing machines and similar consumer goods will also exist in plant and machine construction that provides a statement about energy consumption at a glance. We will be prepared for this."



PRECISE ON THE STRAIGHTS

The linear modules LMS 90 and LMZ 90 are compact, modular units, in which all elements required for operation are integrated. They are driven by spindles (LMS) or timer belts (LMZ). These units have confirmed their reliability in numerous uses in gantry robots, handling equipment or pick-and-place applications.

Like all products of the proven MiniTec profile system, these LMS 90 and LMZ 90 linear modules are strictly designed in line with the modular principle. They are absolutely compatible with all MiniTec construction profiles and can be combined with other axes to form multi-axis systems. Both series are based on the standard grid size 90x90 mm and are immediately ready for installation. The high-precision rail guides with high rated loads ensure a long life with minimum maintenance. The modules are completely closed, the guide groove of the support profile is sealed with a masking tape made of stainless steel or the timer belt to protect the rail guides from spray water and dust. The profiles have standard lateral grooves for integration in constructions for the mounting of external switches.

All units of the LMS and LMZ series can be delivered as completely ready to install modules with motors, gear units and controls, which are optimally matched with each other. On request, the units are delivered including application programming and commissioning.

LMS with spindle drive

The carriages of the LMS modules are guided on two high-precision, size 15 guide rails. Each rail is fitted with one or two guide trolleys according to the application. Two types of use are possible: With fixed carriages for traversing the axis or with fixed axis for traversing the carriage.

The spindle drive ensures high precision and loading capacity with small installation space. This linear unit has important advantages, particularly for use as a Z-axis in multi-axis systems. The axis is fitted with ball screws with tolerance class T7 has a repeatability of 52 µm/300 mm and a maximum axial clearance of 0.04 mm for the highest standards. The modules can be supplied with trapezoidal thread spindles with 4 mm pitch for particularly economical applications. The maximum

COMPLETELY READY TO INSTALL MODULES

stroke length of the spindle-driven units is 2800 mm with traversing speeds up to 0.8 m/s.

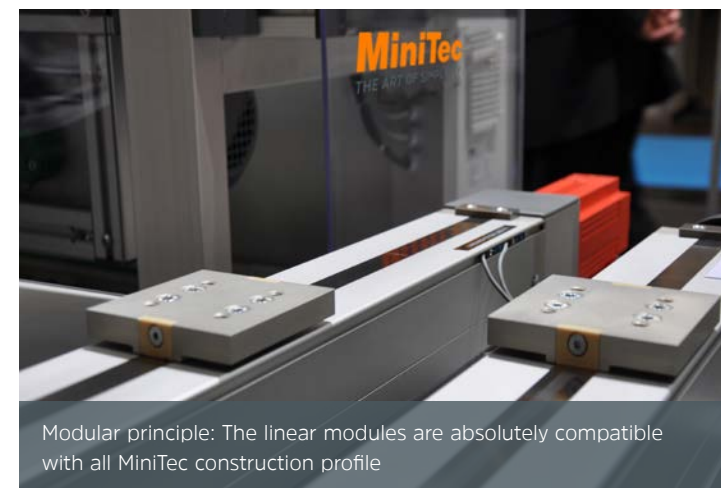
The guides are easily accessed for maintenance work due to their removable cover profiles.

External position detection sensors can be easily attached to special lateral grooves of the support profiles. The carriages are precision-machined on all sides and are optionally fitted with four or six connection threads M8 at the spacing of the grid size 45.

LMZ with timing belt drive

The modules with timing belt drive are available for larger traversing distances. This linear unit is guided on a high-precision rail guide size 20 with two guide trolleys. The guide trolleys with front-mounted lubrication units are maintenance free are permanently lubricated and maintenance free up to 10,000 km.

They are driven by steel wire reinforced, wear resistant timing belt 25 AT10. At the same time, the timing belt covers the guide groove to protect the rail guide. The timing belt is reversed in compact units, which are made for motor attachment with connection shaft or adapter plate. Precision ball bearings in the units ensure fault-free operation of the modules. The maximum allowable belt tension force is 3500 N at traversing speeds up to 3 m/s.

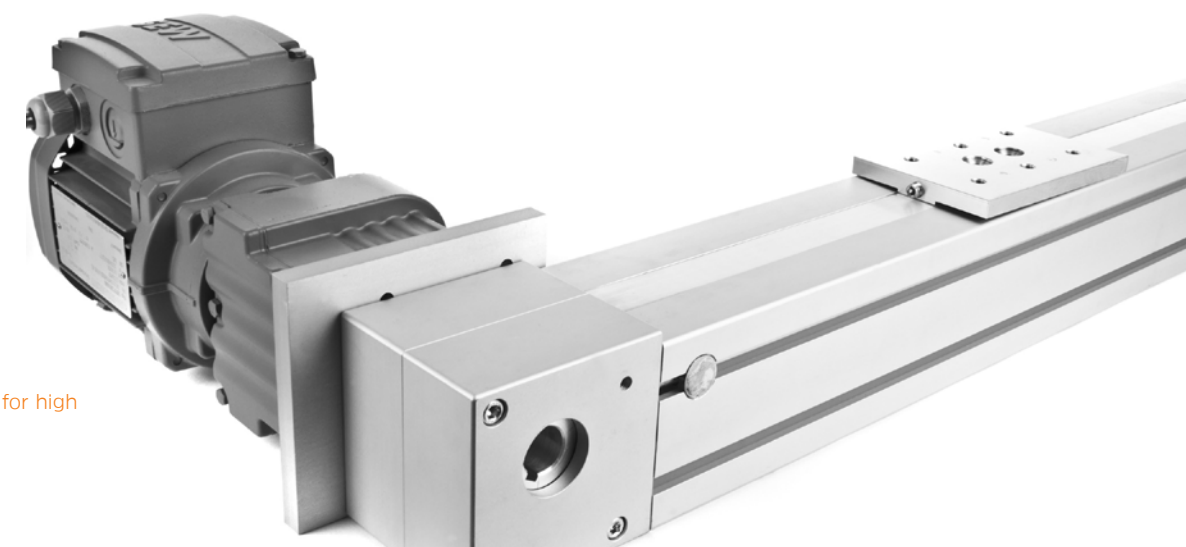


Modular principle: The linear modules are absolutely compatible with all MiniTec construction profile



With the help of adapters, all linear axes can be easily and economically combined to form multi-axis systems.

The carriages made of aluminium are precision-machined on all sides with six connection threads M8 in grid spacing 45 mm. Two timing belt tensioners, each with 25 mm take-up, are integrated in the carriages. This design enables simple replacement of the timing belts.



The LMZ linear module is intended for high loads and accuracies.



ON THE CHAIN AROUND THE BEND

When workpieces are transported, the route is not always straight ahead. Segmented chain conveyors are a good choice here. They enable flexible routing, in which even curves are also easily implemented. The curve angle can be individually adjusted with different elements.

Segmented chain conveyors (GFK) are used for a large number of in-house transport tasks. Their modular structure enables diverse components such as reverse units or rotating, turning and lifting devices to be integrated into the conveying section. Depending on the link type, MiniTec segmented chain conveyors can be routed without interruption in curves or changing pitches. Compact routing is

also possible, which use the available space optimally. Segmented chain conveyors are particularly suitable for large, complex installations, for example, for setting up production lines or assembly and testing systems, which are divided between multiple stations. In addition, they can also be easily combined with other MiniTec conveyor technologies, for example, with conveyor belts or spiral conveyors.

MODULAR CONVEYOR TECHNOLOGY

Flexibly usable

The GKF series is available with several different plastic and stainless steel chains, as flat, accumulator or driver chain; thanks to the special surface texture, small components can also be transported. If the conveyor system is fitted with stainless steel chains, the GKF withstands extreme temperatures and can be used within the range from -60 to +120 °C. All chains have in common that they are not only suitable for direct unit load but also for workpiece carrier transport. The system is designed for conveying speeds up to 30 m/min depending on the conveyed goods, the routing and chain. All drive motors are fitted with overload protection, optional frequency converters are available for speed adjustment.

Like all MiniTec system designs, the GKF series is also based on the variable and robust MiniTec modular system. Based on this, the possible combinations are almost limitless. Existing production lines can also be easily extended.



Segmented chain conveyors are particularly suitable for large and complex system.

ALL ON BOARD FOR THE RACING CIRCUIT



Special vehicles weighing several tonnes are the lie of work of the Homburg firm A6 Jung Fahrzeugbau. A speciality of the Saarland company is race shuttles. The enormous, individually fitted out articulated transport trailers travel to the world's racing circuits with the Formula 1 teams. MiniTec aluminium profiles are used for the fit out.

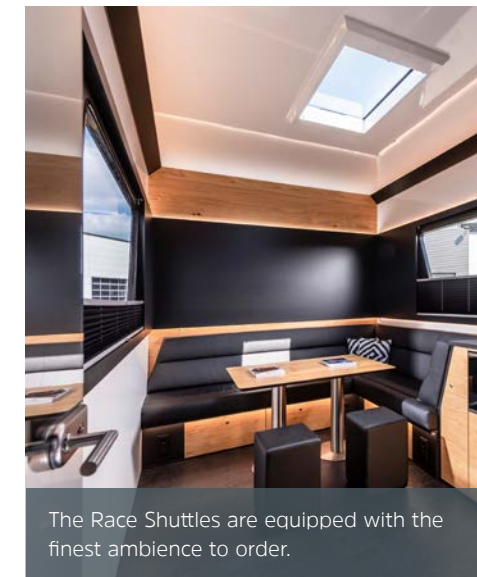
The Homburg company A6 Jung Fahrzeugbau combines tradition and innovation in a special way. Since it was founded as a blacksmiths in 1925 by Robert Jung, the company's history has been closely linked to commercial vehicles. Today the SME offers the complete range of services for every aspect of commercial vehicles, starting with a truck and trailer service with partnerships with Mercedes-Benz, Unimog and Iveco, through to painting and surface technique services and spare parts trade. One speciality of the Homburger, combined with plenty of passion, is special vehicle construction with the special Race Shuttle, Promotion Shuttle and Hospitality Shuttle ranges.

Starting with an ideas cooperation with the racing driver Timo Bernhard, for several years, they have produced

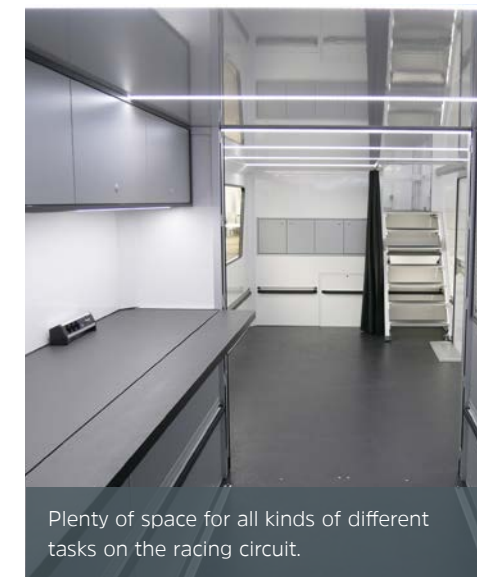
Race Shuttles with individual body and trailer solutions that meet the particular requirements in motor sport. The fitout is always completely individual and, among other things, includes offices, living units, conference rooms, through to transport options for the racing cars.

Fit out with profile

MiniTec aluminium profiles are also on board. Based on aluminium profiles with 30 and 45 grid size, with clever connectors and a large number of accessories, the MiniTec modular system offers numerous options. Although the components can be assembled quickly and easily, all kinds of different solutions result, which are extremely load-bearing, individually designable and can be changed at any time.



The Race Shuttles are equipped with the finest ambience to order.



Plenty of space for all kinds of different tasks on the racing circuit.

MiniTec products are also found in the workshop of A6 Jung Fahrzeugbau: Numerous special workstations based on the workplace system, some with considerable dimensions, are used. Here too, flexibility was required for the planning and setup.

GET TOGETHER IN CHINA



MiniTec Managing Director Michael Eicher explains "The Art of Simplicity".



Not only Chinese but also German customers took part in the event.

In June, MiniTec Managing Director Michael Eicher invited customers and interested persons to a "Get together" in the Taicang branch. The meeting was organised by the international SME association ("Verein Mittelstand International") and its representative,

Karl-Heinz Hessenthaler. The event motto was "The Art of Simplicity", and numerous participants learned plenty about the product philosophy and solutions of MiniTec. The "networking" was important for all", after all, we depend on good business contacts in China.

CONVEYOR TECHNOLOGY FOR BATTERY PRODUCTION

The Spanish MiniTec subsidiary was able to acquire an interesting order in the USA: The Iberian specialists for conveying technology will supply an FMS conveying system for a battery production facility. The system consists of conveying sections on two hall levels, which are connected by multiple lifts with up to 6 m lift. Furthermore, diverse automatic rotary tables 0°-180° and lift-cross-transfer units will be used to transfer and change the orientation of the workpieces.



A conveyor system for battery production in the USA.



More space for expansion: MiniTec France.



A new conference and seminar room.

MINITEC FRANCE STRUCTURAL ALTERATION

MiniTec France has completed its structural alteration and extension measures at the Saargemünd location (Lorraine). The complete French market is serviced from here. Business in the neighbouring country has developed well in recent years. A second production hall with 200 sqm assembly area, a logistics zone for several trucks and new office and event areas were added.



Profiles for the French market.

VOLLEYBALL IN KENYA



Around 40 volleyball players of the Arnold Jansen School in the slums of Soweto are active at the centre for promoting talent in Nairobi. The girls in the SASA team train together with their trainer, who enables them to take part in tournaments. MiniTec has supported the students for several years.

Women and girls are still highly disadvantaged in many countries. Particularly in the slums of Africa the situation continues to be precarious. Sport can strengthen the self-confidence of girls significantly and for the first time ever, gives them the feeling of solidarity.

MiniTec has supported an initiative of the Arnold Jansen School in the Soweto slum in Nairobi for several years. With our help, the school's SASA (Saint Arnold Sports Academy) volleyball team was promoted last year to the highest league nationwide in their age group.

SASA is a sports club that was especially founded for girls aged 10 to 16 from the slum. The team had five teams until now. Due to their successes, numerous other girls want to join the club. However, they often lack equipment and training possibilities. "We are very confident that with your sponsoring, several girls will strive for a professional volleyball career and will be able to leave the slum", writes our trainer, John Sakonyi.

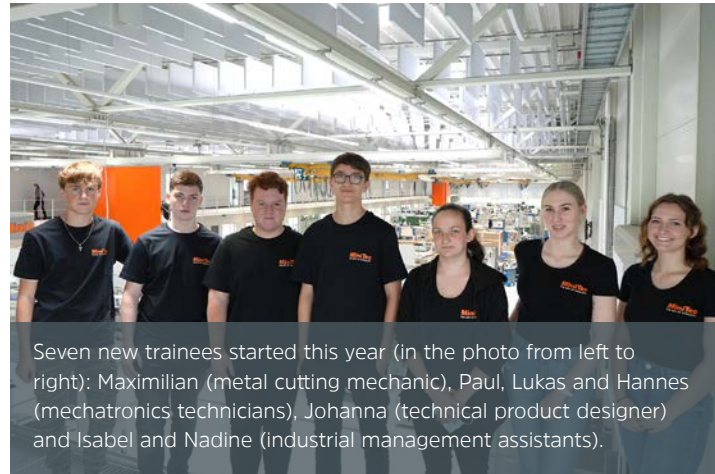
MiniTec commits itself here regularly, for example, in May 2021, to enable a one-week training camp. Both the camps and the balls, shirts, shoes, knee pads and tracksuits were completely funded by MiniTec. The school education is also supported and therefore contributes to preparing the girls for a better life outside of the slum.



TRAINING START FOR NEWCOMERS

MiniTec is seen as an attractive employer, which is reflected in the interest in training places in all kinds of different areas. The training rate of above ten percent is far above the average. In addition to attending vocational college, the trainees are also prepared for their future tasks in in-house manual training. Many trainees finished their training in the past with above-average examination results; this was often followed by further training as a technician or engineer. Today, employees from more than 20 nations work within the MiniTec group of companies. In August, seven new trainees started their training:

Welcome to MiniTec!



Seven new trainees started this year (in the photo from left to right): Maximilian (metal cutting mechanic), Paul, Lukas and Hannes (mechatronics technicians), Johanna (technical product designer) and Isabel and Nadine (industrial management assistants).

MiniTec
THE ART OF SIMPLICITY



MOVING INTO THE INSECT HOTEL

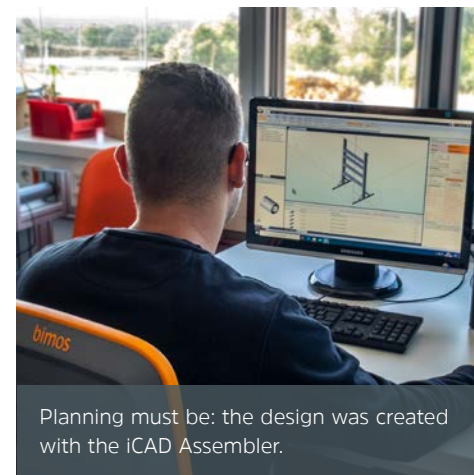


Now well-booked: the new MiniTec insect hotel.

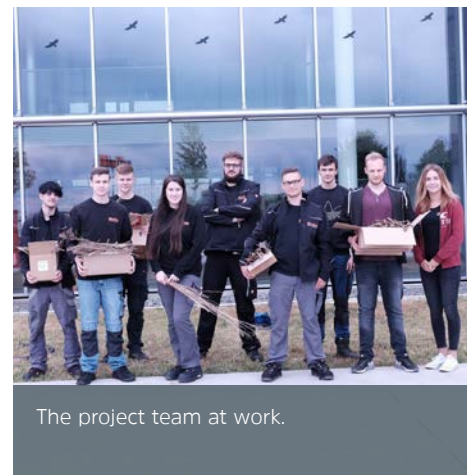
booked the job, generated orders for the required materials and took care of the marketing and project documentation.

At the start they had to procure construction materials, in this case sticks and fir cones from the forest. Before the actual construction phase, they used the MiniTec iCAD Assembler design tool to produce a 3D model of the insect hotel – the

frame is mainly made of MiniTec profiles. After the assembly and installation, the collected materials were then installed in the hotel so that the insects can nest in it. Since April, the insect hotel has stood on a specially created flower meadow on the company grounds and accommodates a large number of small residents.



Planning must be: the design was created with the iCAD Assembler.



The project team at work.

Even though the training at MiniTec is very focussed on occupational areas, there are also always unusual tasks for the trainees: For example, in the summer of 2020, these started with the construction of an insect hotel. The aim was for them to better understand the relationships of the integrated company departments on the basis of the project. The technical-industrial area designed and built. The commercial department



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expo & conference



Virtual conference MiniTec World 2021

From 12-14 October, MiniTec invites you to this year's virtual conference, MiniTec World 2021, which will take place at the MiniTec Expo - with many exciting presentations and online seminars.

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