



moment[®]

Climate

"Living Wall" ensures a good climate and less emissions

Light

Intelligent vehicle headlights not only illuminate the road

Future

Values are important for apprentices and students at EJOT



Dimensions

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Aenean commodo ligula eget dolor.



Dear partners of the EJOT Group,

The sheer number of 26,000 different EJOT products is already quite a dimension. A closer inspection of the products reveals additional dimensions. In terms of extension, size, distance or effect.

Usually the fastening technology of EJOT is not even visible but considerably contributes to helping people or increasing their safety. We have identified some particularly interesting applications in our cover story on dimensions.

Including the three millimetre-long micro screw with miniature thread and the big brother of all fastening elements manufactured by EJOT, the 1.5-metre long LIEBIG ULTRAPLUS undercut anchor, with a maximum diameter of 36 millimetres. The accurate piece of precision engineering is used in a cochlea implant that takes over the functions of the damaged part of the inner ear, the cochlea, to transmit audio signals to the brain. The powerhouse made of hot-dip galvanised steel is used for fastenings with the highest safety requirements – the construction of power plants that have to be designed earthquake-proof.

Safety is also the focus of the development of the vehicle light, which EJOT has accompanied for decades with innovative fastening elements, as well as fastening and adjustment systems. Precise calibration is ensured by headlamp adjustment systems such as the Micro Adjuster developed by the EJOT joint venture Asyst Technologies.

EJOT resolves a particularly tricky fastening problem with the fastening of particle foams to other components. This is an important prerequisite for the manufacturing of the world's most lightweight air conditioning and climate control series that is used in buses. Talking about the climate. It is improved quite significantly when building facades are greened. Fixing the complex structure of plants and irrigation requires a special fastening method. This is not easy to solve when a building envelope consists of different concrete or brick constellations in a confined space.

When it comes to materials technology, confined spaces reveal quite different dimensions. Usually, they consist of four dimension levels that strongly affect each other. The atomic scale is the smallest among these. It measures 10⁻¹⁵ m, the so-called femtometre, the equivalent of one billionth of one millionth of a metre. Or putting it differently: One quadrillion femtometres are equal to one metre. An application example in which a component was custom-built across all four structural levels can be found in the EJOT product catalogue.

Was everything better in he past? No, of course not. But it was different. An EJOT sales professionals tells us all about it. When the world of customers was analogue and two office employees had to share a single input station of the IBM AS 400 mainframe computer. Or when the price was not the decisive factor in customer meetings, as the design engineer decided on the order placement, not the buyer.

And how could a customer be informed about a delay while on the road? Look for a petrol station, offer the attendant 50 Pfennig and ask him if you may make a telephone call. Hard to imagine today. These are also dimensions.

Kind regards,

Christian F. Kocherscheidt
Managing Director

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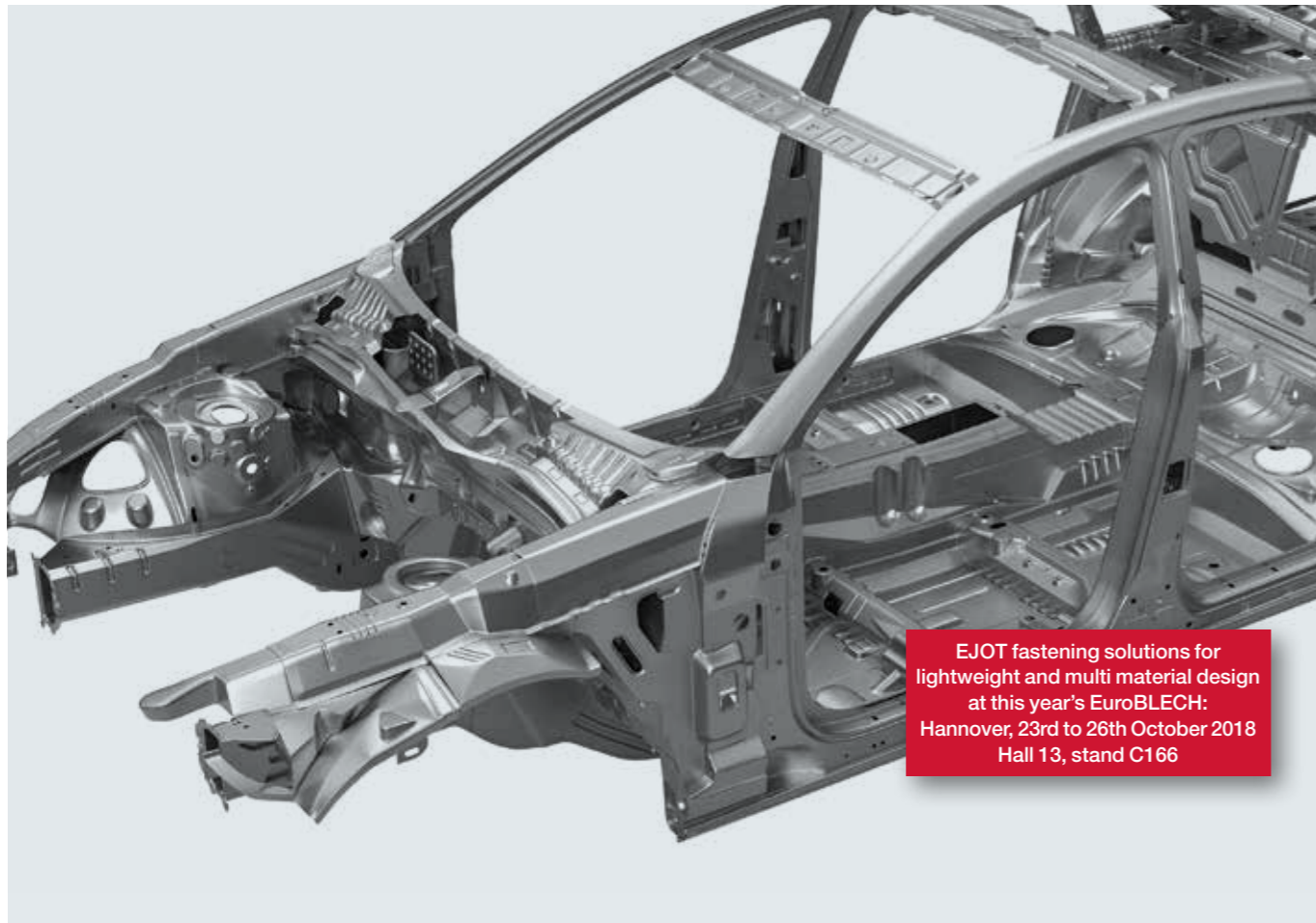


4 Moments

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- >> Successful title defense
- >> Safety in underground construction
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- >> Strong partnerships are better than protectionism

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Values play an important role for trainees and students – this is one result of the EJOT future camp



EJOT fastening solutions for lightweight and multi material design at this year's EuroBLECH: Hannover, 23rd to 26th October 2018 Hall 13, stand C166

Scale down (vehicle) weight

Flexible fastening solutions for multi material and lightweight design

The lightweight and composite design is continuously being integrated into almost all the components of future vehicles. In particular, the multi-material body shell design is characterised by the large number of materials used. In addition to various types of steel and aluminium, modern ultra high-strength steels are also used in this area for structural and safety components. These heterogeneous raw materials meet the highest demands on safety and torsion resistance. The same also applies for the fastening elements used, as they are also exposed to the highest loads and are therefore essential for the vehicle safety. To meet these special demands, EJOT has developed two different systems.

If, in addition to one-sided accessibility during assembly, the removability of the fastener is also important, the FDS® screw is the fastener of choice. The screw fastens steel sheets and aluminium without the need of a pilot hole and with exceptional quality. This makes the FDS® particularly suitable for joining highly complex space frame structures. Another option for joining different materials and semi-finished goods is the so-called EJOWELD® "friction welding". This innovative development now offers the possibility of joining composite designs, in particular lightweight materials and ultra high-strength steels, with a friction element installation tool suitable for robots.



Phase 1: Penetration of the cover sheet (lightweight material)



Phase 2: Surface cleaning and activation



Phase 3: Plastification of friction element and base sheet



Phase 4: Compression and forming of the welded joint

Successful title defense

The EJOT Team TV Buschhütten defended both team titles in the 1st Bitburger 0.0 % Triathlon Federal League at the Baltic sea resort of Binz/Rügen, Germany. Both the women's and the men's team secured daily wins in front of an impressive spectator backdrop. Among the men, the EJOT athlete Anthony Pujades (FRA) was successful in the individual evaluation. Following his starting success in the Kraichgau region, he already secured his second win of the

season in the fifth and final race. His EJOT team colleague Felix Duchampt (FRA) came in third place. Among the women, Lucy Hall of Britain fought courageously right from the start and was only beat across the sprint distance by Hungarian Zsófia Kovacs (SG Triathlon Witten). Winning the men's title for the ninth time, the team from Buschhütten now holds the league's record for the most titles. For the women it was the 7th German championship.



Safety in underground construction

In canal and shaft construction, high demands are placed on the safety and durability of the installed materials. They have to withstand aggressive waste water, high congestion and climate influences. So-called grappling irons, which are anchored on the concrete walls of waste water and inspection shafts, offer people a safe way up and down.

The LIEBIG grappling iron anchor can be used especially to embed these grappling irons. This is a self-undercutting mechanical anchor which provides the highest tensile and shear strength. The extremely high load bearing capacity is generated by the mechanical gear tooth system in concrete (form-fit). A special plastic sleeve prevents contact corrosion between the grappling iron and the anchor.

Many manufacturers of grappling irons recommend the LIEBIG grappling iron anchors for mounting their products.



Intelligent support for lightweight design

Connect innovative lightweight materials with self-threading technology

With the development of plastic components, foamed thermoplastics are enjoying increasing popularity on the market. The automotive and aviation industries in particular appreciate this innovative material, as it is very easy to handle in production and offers clear weight savings – depending on the component, 5 to 15 percent is possible. This opens up a wide range of possible applications for microcellular foamed thermoplastic materials, while for the automotive sector, for example, the whole interior is predestined for their use.

As the lower density, which is what provides the weight advantage, has direct effects on the stability, this also has

to be taken into account in the component design. The fastening concept therefore needs reconsidering, since conventional self-tapping screws are not designed for these demanding material properties. EJOT has developed the Cell PT® precisely for this purpose. This new screw has a special thread contour, which allows a the thread to be coined within damaging the material, due to an elastic deformation. Due to this innovative thread coining process, which is unique on the market, the compact outer layer in the core hole is merely deformed and not destroyed. The result is the highest fastening technology safety – even for this demanding area of application!



“Strong partnerships are better than protectionism”

“Strong partnerships are better than protectionism.” This was the clear message of the 6th EJOT Suppliers’ Day. To the applause of numerous guests from Germany and abroad, the companies Hieber & Maier GmbH from Bretzfeld-Schwabbach, WHW Walter Hillebrand GmbH & Co. KG from Wickede, the hardening shop NABI GmbH from Remscheid and Alex Screw Industrial Co Ltd. from Taiwan were honoured.

>>Text: Andreas Wolf

Strong partnerships are the better answer to the challenges of globalisation and digitization. “This is why we strive for strategic partnerships in many areas that are characterised by trust, quality, service and innovation,” explained Wolfgang Bach, CFO of the EJOT Group. The importance of these partnerships will continue to grow in the future, especially as the digital revolution has only just begun.

and fastening elements with zinc flakes and to the chemical deflashing of metal parts.

Hieber & Maier (HIMA) has distinguished itself for many years through a consistently high level of quality, very good service and very high delivery reliability. The company from Bretzfeld-Schwabbach in northern Baden-Württemberg, Germany supplies EJOT with rolling dies for the thread production of fastening elements.

The NABI hardening shop was honoured in the “Newcomer of the Year” category. For two years the company from Remscheid, Germany has had an important function in the area of heat treatment of EJOT industrial products.

Alex Screw Industrial Co Ltd. comes from Taiwan and has been an extremely reliable partner of the EJOT Group for almost 20 years with its production of screws for the construction industry.

Throughout the long-term and intensive partnership between EJOT and WHV Hillebrand many new innovations have been developed. During this time, a highly professional co-operation has grown at all levels. This applies both to the coating of screws

Before the award ceremony, the guests received interesting information about the current development of the EJOT Group. The managing partner of the EJOT Group, Christian Kocherscheidt, presented products, application engineering and technologies which have been the reason for the continuing good growth of EJOT.

Premium quality corrosion protection

WHW Hillebrand – Traditional, Innovative.

For more than 80 years, WHW Hillebrand has been the leading coating provider in the area of cathodic corrosion protection. Offering the highest quality in Europe, WHW Hillebrand is the first choice of many leading automotive supplier fastener manufacturers as well as companies in the stamping and forming sector. The company employs processes involving zinc, zinc alloy, duplex and organic coating protection. Headquartered in Werl, Germany, the corporation is the sector's largest and highest performing provider, particularly in the area of protective surface finishing of mass articles with zinc/nickel alloys.



The entire corporate structure of WHW Hillebrand is focused on a single goal – the success and satisfaction of its customers. Its consistent central customer orientation allows it to offer the suitable solution for practically every individual surface coating system requirement. The customers not only benefit from the surface protection expertise but also from a complete range of coating services. Of course, including comprehensive customer support from A to Z.

Consistent quality management

Hardening shop Nabi of Remscheid

“We master what we know. We know what we master.” This is the motto of the hardening shop Nabi GmbH, established in 2015, headquartered in Remscheid. A member of the Italian Pasello Group, the company is specialised on heat treatment and materials technology.



Highly qualified staff with long-time experience, extensive consulting expertise, a wide scope of services, cutting-edge system technology with fully automated furnaces, consistent quality management and quality assurance form the basis for offering customers the best possible performance for small and large-scale production. Specialised networks ensure the constant technological upgrade of processes and treatment methods.

The company's aim is to optimise the system and process quality effectively from the outset for maximum customer satisfaction, to prevent or detect early on any errors and risks in the manufacturing process and the delivery chain and to eliminate their causes, and to test the effectiveness of corrective actions and preventive measures.

The use of the latest hardening technology ensures that the highest quality standards are offered at economic prices for both large and small series. Customers of the hardening shop Nabi hail mainly from the mechanical engineering, automotive industry and other industrial sectors.

Everything for the perfect product

Hieber & Maier GmbH / HIMA® – The specialist for flat rolling dies

As a specialist for the development and improvement of flat rolling dies, HIMA offers state-of-the-art technology, first-class service and constant optimisation. The company produces quality tools in all sizes and shapes tailored to customer's wishes. In addition, the company cooperates closely with customers in finding innovative solutions for joint and fastening problems.



Established in 1991 by Bernd Hieber and Ralf Maier, HIMA, located in Bretzfeld-Schwabbach in the German state of Baden-Württemberg grew steadily and developed into a medium-sized business with currently 30 employees and a state-of-the-art production site. Innovative manufacturing processes guarantee a high degree of reproducibility.

Its long-term experience, optimised production steps and high quality standards turned HIMA into highly valued partner of the sector. HIMA initially identifies and analyses the crucial problems to develop sustainable and reliable bespoke solutions in the next step.

Open communication and trust are the basis for excellent co-operation with customers. Sustainable operations are the key to securing the future. To ensure this HIMA improves the social, ecological and economical aspects of its operations

on daily basis. The introduction of environmental management according to EMAS (incorporates ISO 14001) was a matter of course. Backed by the applied quality management system acc. to DIN EN ISO 9001:2008 the day-to-day business is distinguished by constant improvement processes.

Customers can rely on HIMA for innovations, quality, high-valency, adherence to deadlines and customized solutions.

Customer orientation and quality

Alex Screw Industrial Co. Ltd

Alex Screw Industrial Co. Ltd. is a manufacturer of fastening elements for the construction sector located in southern Taiwan. The company was founded in 1983 by Alex Cherng. Currently, the second generation is also well integrated into the company. With a clear focus on customer orientation and quality, Alex Screw has been a very reliable partner of the EJOT Group for almost 20 years.



From the

The significance of

atom

dimension levels in

to the

materials technology

screw

Materials technology is one of the key technologies for the design and safe application of building components.

>>Text: Prof. Dr.-Ing. Matthias Oechsner
Centre for material science, Darmstadt Technical University

The work of material technicians focuses on turning a raw material into a technically useful material with defined characteristics regarding functionality, economy and environmental compatibility across the entire life cycle of a component. The behaviour of the material and components is affected by the geometric details of a component, such as the structure of intersection radii or the location of boreholes, as well as the choice of manufacturing and processing methods. Only the correct combination of basis material, manufacturing process and constructive design will result in a successful product.

To understand and utilise the interactions among these influencing factors it is essential to comprehend the raw material at various dimensions, i.e. different length scales.

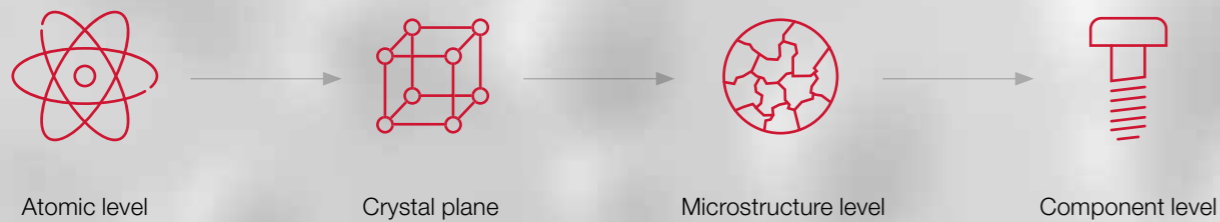
The four dimension levels

Usually in materials technology, we distinguish four dimension levels that strongly affect each other. The atomic scale is the smallest among these. The geometric dimensions of an atomic nucleus is 10^{-15} m, the so-called femtometre, the equivalent of one billionth of one millionth of a metre. The interaction of atomic nuclei with their electron shells, determines, for example, the type of bonds that atoms enter into with neighbouring atoms, how strong the bond force is between them and whether a material is a good or poor thermal or electric conductor. This scale also

determines the distances among the atoms and how they are spatially arranged, which brings us to the next scale. In metals and semi-metals, but also in many non-metals, the atoms are arranged in a regular structure. This is called a crystalline arrangement or crystal structure. The smallest unit that fully represents the arrangement of the crystal structure is called the elementary cell and its dimensions are in a range of 10^{-10} m, the so-called angstrom, i.e. the ten millionth part of a millimetre. Among other characteristics, the crystal structure determines how closely the atoms are arranged. This in turn determines the size of the gaps among the atoms, which atoms or elements can be fitted in what way in a material or can move through it. Characteristics such as the susceptibility to corrosion or the structural behaviour under exposure to heat are already essentially determined on this scale. This scale also already indicates how easily materials can be formed and how the mechanical properties of materials can be fundamentally changed by a targeted disruption of this regular arrangement.

Most metals and semi-conductors have a grain structure in the third dimension. This is known as the texture or microstructure of the material. Individual grains consist mainly of crystalline sections that can differ from each other in their spatial arrangement and thus also their characteristics. The grain size and alignment of the individual grains significantly affect the mechanical

The four dimension levels



properties such as the strength or hardness of a component. Typical grain sizes of high strength steels are in the range of a few micrometres (10^{-6} m). Thus, a cubic millimetre of such materials consists of many thousands of grains. For high temperature applications, such as those used for the turbine blades of aeroplane turbines, so-called monocrystalline materials can be used, in which the entire component consists of a single grain. In these high temperature applications, the areas in which the grains abut, the so-called grain boundaries, constitute weak spots and must be eliminated or completely avoided by resorting to the above-mentioned mono-crystalline manufacturing variation. The choice of process parameters in the original shaping or reshaping or the heat treatment within the scope of the manufacturing of a component, strongly affects the structure of the material. Only in-depth knowledge of these effects allows the component manufacturer to optimise the material structure in line with the specific requirements and to sufficiently safeguard it against failure.

be increased by 100 %, which was achieved by the targeted activation of mechanisms on the microscopic and macroscopic level.

Similarly, the susceptibility of high-strength fasteners to hydrogen-induced cracking (hydrogen embrittlement) is significantly determined by the microstructural setup of the material. Practical observation suggests a direct connection between the strength properties of the material and its susceptibility to hydrogen embrittlement. However, latest research studies found that the microstructural setup and not the strength properties as such is responsible for the susceptibility. Based on this, materials and heat treatment processes can be specifically developed, which despite high strength properties of 1,400 MPa and more have a more limited susceptibility to hydrogen embrittlement than conventional materials with strength properties between 1,000 MPa and 1,200 MPa.

The final and largest dimension level is the macroscopic component level. At this level, the characteristic length scale does not necessarily have to comply with the dimensions of the component. Rather the scales should be considered that, for example, result from the treatment of the component surface and that significantly affect the behaviour of the component. For example, edge-zone hardening based on the mechanical processing of the component or partial hardening based on thermal treatment can locally affect and optimise the properties of a component.

An application example in which a component was custom-built across all four structural levels can be found in the EJOT product catalogue. The duoHARDtip fastener is equipped with an extremely high-strength self-tapping point and a conventionally hardened shaft. For this purpose, on the atomic level, the number of carbon atoms required for the target strength were selected in such a way that in the point on the crystallographic level a tetragonal distorted cubical space-centred elementary cell with a martensitic hard structure is formed. The shaft, however, consists of ductile tempered martensite. This results in an ideal combination on the macroscopic level that allows the direct fastening of advanced high-strength steel, while the ductile shaft eliminates the danger of embrittlement.

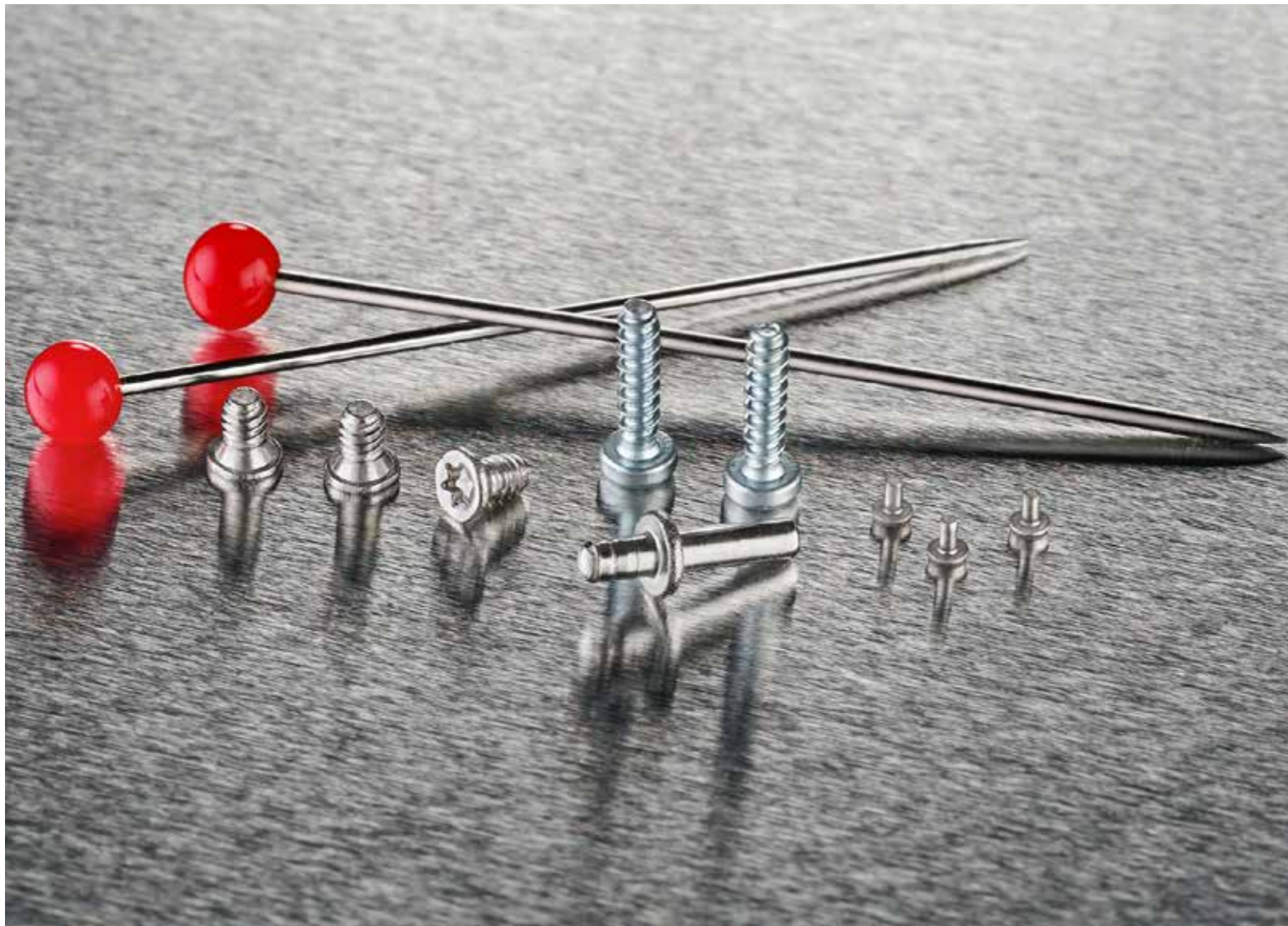
Potential applications in fastening technology

The material characteristics can only be made to special order and thus solution-optimised components created if all four described structural levels are taken into account. The fact that a fastener with the same dimensions and same alloy composition according to the VDI guideline 2230, depending on if it was rolled before heat treatment or rolled after heat treatment can handle higher loads, can be explained on a macroscopic level based on the edge-zone characteristics. While the version that was rolled before heat treatment is free from internal stresses after manufacturing, the version that was rolled after heat treatment is in a state of internal compressive stress. Internal stress is mechanical stress that is present in a component without external loads and that interacts with load stress and thus significantly affects the capacity of the component. Rolling the thread results in internal compressive stresses in the macroscopic edge-zone of the fastener. The degree of such internal stresses and to which depth they are created in the manufacturing process is based on the microstructural level. In turn, this level is determined by the crystal level, which is significantly determined by the atomic level. For this reason, customised, technically, economically and sustainable component solutions require an in-depth understanding of the connections and interactions across these structural levels.

Current research findings at the centre for material sciences at the Darmstadt Technical University indicate that defined pre-loading of a fastener beyond yield strength can result in a significantly higher useful life. The permanently tolerable load amplitude could



EJOT duoHARDtip Spiralfarm® screw



Precision in the smallest of spaces – micro screws in medical technology

Viewing micro screws disparagingly as the “small brothers” of large fastening elements is not realistic. Micro screws are not just complete fastening elements and the result of accurate precision engineering – they place especially high demands on the process and the production environment.

>>Text: Heinrich G. Homrighausen

When you go into the details, the whole world, and not just production, gets much smaller, but at the same time it is also completely different. The raw materials, the machinery, the tools, the cleaning equipment, the measuring devices, maybe even the delicate hands of the machine operator. Everything is different. But the bit about hands is probably just a rumour.

It was the greatest German writer in history, not to mention a diversely-talented naturalist, Johann Wolfgang von Goethe, who recognised the true dimensions of “small things” and put it into verse: He who would refresh himself in full, must in the smallest things perceive the whole (from the poem *Gott, Gemüt und Welt* (God, Soul and the World)). Truly well written, and let's be honest, there seem to be no limits to much much further this reduction

in size can go. The Development Department of the innovative company provides its highly-interested clientele with more and more impressive examples: Smartphones, can today be seen as complete computers with a brilliant TV screen, which can fit easier into any pocket. Or the sensors you can find, for example, in sports clothing which monitor us, without any ulterior motives, and to send our vital signs to corresponding digital analysis equipment. And we should not forget our cars which, on the way to becoming autonomous entertainment and communication boxes with a transportation function, are equipped with sensors and cameras all over, to stay up-to-date at all times about the current traffic status as well as the status of the stationary and moving environment.

In areas where things are not getting smaller, there is a tendency to provide more and more output and equipment at a similar size. For all of that, you increasingly need very small screws.

With regards to the dimensions of the products, the differentiation between “normal” and “micro” screws is somewhat arbitrary, and is handled differently from manufacturer to manufacturer. EJOT sets the upper limit for this product area at a thread external diameter of 2.5 mm. But that's not really important either. What's important is the fact that the limit is getting smaller and smaller. Micro screws with self-tapping threads for metal and plastic screw connections with a thread external diameter of 1 mm are a reliable process reality.

Vitality, which has already been described using the example of sports clothing, as well as medical technology, are an ideal area of application for these “tiny connection elements”. Precision in the smallest space, the cleanliness of the elements, assembly safety, optimum corrosion protection and other requirements, which are fulfilled perfectly by the tiny parts.

A successful medical application will now be presented in more detail.

Talking with each other, discussing, making calls or simply listening to music or spoken word, alone or together – it is hard to imagine not being able to experience all of this, or only to a limited degree. However, for people who suffer from severe hearing loss or are hard of hearing and even close to being deaf, these seem like unattainable things. Classic hearing aids which work by amplifying sound cannot help people understand spoken word to a satisfactory level. **Abhilfe schafft in ganz vielen Fällen das Cochlea-Implantat.** Cochlear, the Latin word for snail, is what this part of the ear is called. The implant takes on the function of the damaged parts of the inner ear. In the 1960s the fundamentals for this revolutionary technology were researched by scientists from the USA, Australia and Austria, and it has become refined and made smaller with the advances in electronics. Normally the CI system, which is the common name



Micro screws in the sound processor



for the cochlear implant, consists of an external part, the sound processor and an internal part, which is the actual implant. This is a receiver, which itself consists of different components. The so-called stimulation electrodes are then surgically attached, in the cranial bone close to the ear muscle, underneath the skin.

In the sound processor, the external component of the cochlear system, there are electronic components, operating and optical display elements for the patients and one or more microphones, in addition to the button cell providing the power. Thanks to this highly-sensitive microphone, the sound processor receives sound waves and converts them into a digital code.

In this module, the task of the EJOT micro screws is to attach a plate with the battery contact spring onto a plastic holder, using direct plastic fastening. This needs to be vibration-resistant and durable, because only this can ensure the error-free transmission of the signals to the signal processor. The use of thread-forming micro screws has many benefits, which have been verified by tests with customers during development, and not just in this demanding field of medical technology.

The miniaturisation trend will continue to advance, because in the future, much greater performance will be able to be achieved with smaller electronic components. In particular in applications where the highest demands are made on the safety and reliability of the connection, micro screws are needed more than ever.

It will be exciting to see how small the world of screws will be in the future. **E**



The green air conditioning on the facade

Heat waves with temperatures of up to 40 degrees, ugly swathes of concrete and the concrete jungle absorbing the heat, traffic chaos with long jams, air pollution with high CO₂ emissions and fine dust particles. The stress on people in urban areas and the metropolitan areas reached new dimensions this summer.

>>Text: Andreas Wolf



Green areas and parks are being visibly pushed back. Is there enough green space left in the cities to balance out these stresses? "Less and less", says the Berlin-based architect Hans Bäumlein. And this trend will intensify further, especially as the number of inhabitants in cities is rising. The UN has also forecast this, assuming that in 2050, two-thirds of all people in the world will live in cities.

So where will we get the green from for our cities? "It's simple" says Hans Bäumlein, pointing to the green facades. "This will always work, regardless of the shape or materials a facade has." And the effect is immensely sustainable: A reduction of emissions, better insulation against heat in summer and cold in winter. In addition, each green building has its own individual appearance. "In cities we have huge potential when it comes to surface area," But although it may sound simple, the implementation is extremely delicate.

"Living Wall" is the name of the construction project, which Hans Bäumlein implemented with his company Myral Fassade (Berlin) as well as the partners Vertiko (Freiburg) and EJOT in and on different building facades in various regions. They are rear ventilated facades, on which a green mat is attached. Small bags are attached to this mat, which are filled with soil and plants. The bags are interlaced with an irrigation system in the form of small water hoses. Due to the building structure with its rear ventilated facade, plants and irrigation have no con-

tact with the actual building. Various plants can be used in the "Living Wall": groves, shrubs, and plants from the tropics and sub-tropics. This leads to various design opportunities.

Be it at Terminal II of Frankfurt Airport, on the building facades of a large multi-family residential complex in Berlin Kreuzberg, an interior facade of the Spreepalais in Berlin-Mitte or a sound barrier at the Krombacher Brewery, in the form of moss islands on an area of 270 square meters.

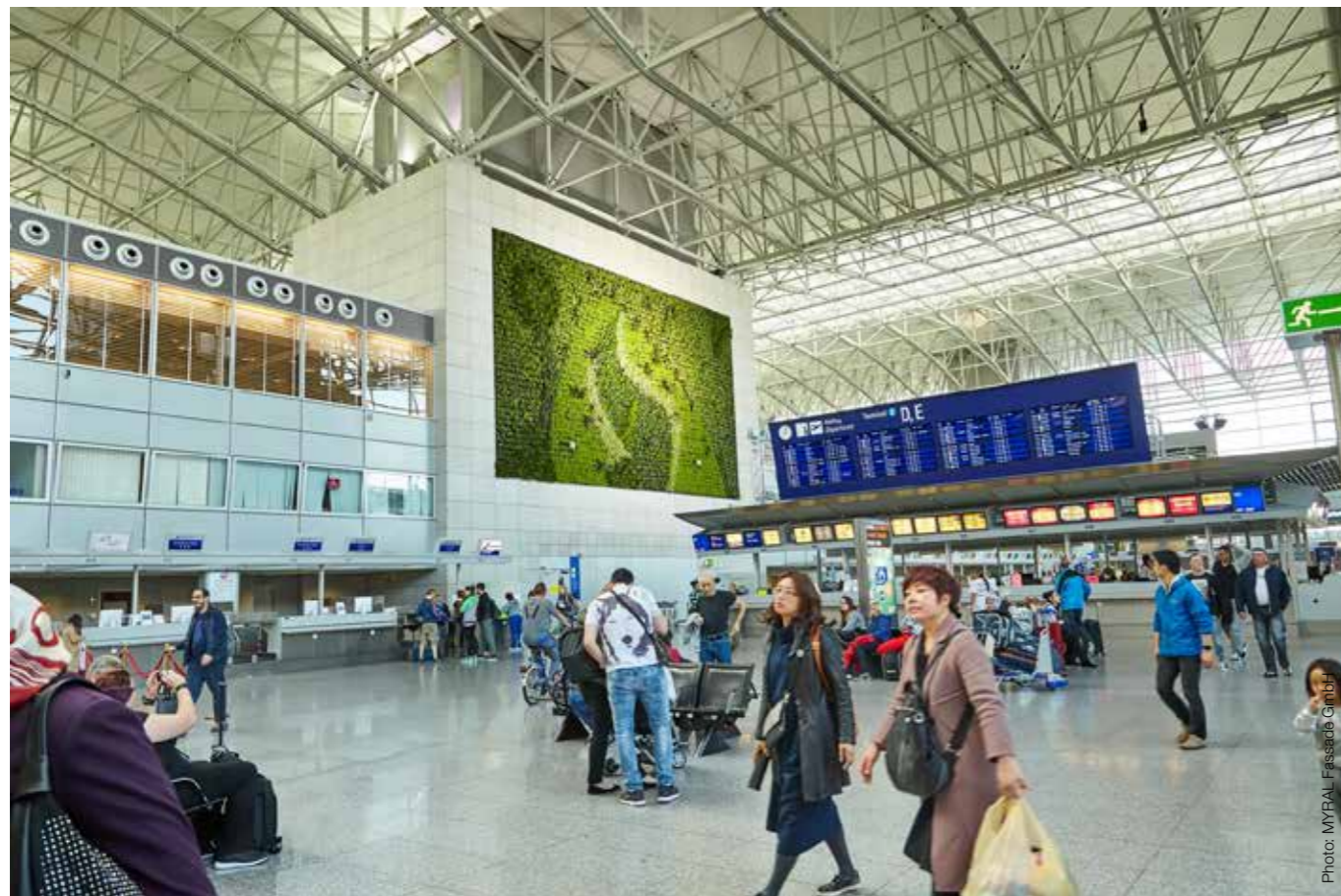
Complex project for a family business

This type of facade is somewhat unusual in the countryside. In the forest-rich region of Wittgenstein in North Rhine-Westphalia, just a few kilometres from the headquarters of the EJOT Group, Jan Roland Osterrath, the owner of the family company of the same name, decided to have a "Living Wall". Here the extreme conditions during the heat wave this summer did not had such a severe effect, reports Jan Roland Osterrath.

For Heiner Volkmer, an Application Engineer in the Building Construction sector at EJOT, the implementation of the "Living Wall" at Osterrath is a complex project. The different conditions of the building shell, from reinforced concrete frames to wooden perforated bricks and solid bricks of different depths, made the selection of the connection elements difficult, and required lots of application tests in advance, so that the safety of the sophisticated construction could be guaranteed. A suitable wall



The green wall in Terminal II of Frankfurt Airport.



Q&A



Dipl.-Ing. Jan Roland Osterrath, Geschäftsführer der Osterrath GmbH & Co. KG, about sustainability and aesthetics.

Why did you choose a green facade, a so-called living wall?

As we have had positive experience with green roofs in the past, the question automatically arose to find an equivalent vertical product. We found one, in cooperation with Belke (Lennestadt) and Vertiko (Freiburg).

Air-conditioning in the summer and winter, and a thermal buffer zone? Air quality? Aesthetics?

A little bit of everything. The focus is on the desire to not do everything in the same way as others. If there is a chance to achieve an aesthetic difference for a manageable additional cost, you should take it. The key value here, however, is sustainability, which is one of the core values of the Osterrath brand.

What part of your company's building has been re-designed with a green facade?

Our management building, which dates from 1910. An aluminium facade from 1970 had to make way due to age reasons, to allow us to generate a suitable image as a modern industrial company.

How large is the green area?

Around 650 square meters

What plants have you selected?

Generally, frost-resistant and evergreen shrubs were chosen, which were suitable for the location and the light conditions on the vertical structures. In most cases we used flowering plants, often with an attractive autumnal colour. This results in a constantly-changing, but always interesting, appearance at all times of the year.

Is the installation already in operation?

Yes, it has been since April 2018.

What is your initial experience, especially after the hot weather this summer.

Due to the artificial irrigation there are also no problems with heat and dryness, even under extreme conditions.

Facts

The company Osterrath has refurbished the facade at the company headquarters with a rear ventilated green facade. This represents a special form of facade design.

Owner

Osterrath GmbH & Co. KG, Bad Laasphe

Construction company

MYRAL Fassade GmbH, Berlin

EJOT products

- Mortar cartridges
- Anchor rods
- Facade anchors
- Insulation support anchors
- Vario screws





The green facade of a multi-family residential complex in Berlin-Kreuzberg.

bracket also had to be found for the load of 26 kilograms per square meter. "This could not be achieved with a normal facade anchor," explains Heiner Volkmer. In the end we used injection technology, a fastening system where a two-component casting resin is injected into a defined drill hole. Then an anchor rod is implemented to attach it to the substructure. An adhesive connection to the wall material is then created by the subsequent curing of the mortar. To securely attach the "Living wall" a whole range of elements came from the EJOT fastening technology program: From the EJOT insulation support anchor to the EJO-FAST self-drilling screw. "This competency and flexibility in fastening technology is precisely what I need for this demanding project," underlined the architect Hans B auerlein.



Noise protection wall of the Krombacher brewery in the form of moss islands on an area of 270 square meters

Study shows clear benefits

"Green facades in cities help with fine dust particles, nitrogen oxide and the heat." This was the conclusion reached by scientists at the University of Cologne and the J ulich Research Centre in a study.

For their study, researchers working with Hans Georg Edelmann at the University of Cologne compared facades which had been covered with ivy with classical plastered building facades. For several weeks the team recorded the changes in daily temperature and the air humidity close to the facade, as well as the level of absorption of nitrogen oxide (NOx) and fine dust with a particle size of 2.5 micrometres (PM 2.5) by the leaves of the ivy.

to 13 degrees Celsius in the summer, while the temperature of bare building facades varied by up to 35 degrees between day and night time.

The measurements also showed that ivy absorbs nitrogen oxide, which is damaging to health, and filters fine dust. Furthermore, the plant also has a positive effect on the absorption of the greenhouse gas CO₂.

The evaluations confirmed that ivy and other facade plants have a cooling effect in winter, and a heat-insulating effect in the winter on the facades.

"Facade plants improve the climate in both the city and the room conditions, reduce overheating and smog, produce oxygen and help maintain and increase biodiversity in the city as a living space for fauna and flora," explains Hans Georg Edelmann.

For example the green facades only showed fluctuations of 10



Photo: MYRAL Fassaden GmbH; iStock; Shutterstock



Large enough

With the acquisition of SORMAT and the LIEBIG brand in 2017, the EJOT product portfolio effectively expanded overnight. The variety of products thus reaches new dimensions. The big brother of all fasteners in the EJOT family is the ULTRAPLUS undercut anchor. A powerhouse for extreme loads, whether for a roller coaster in an amusement park or for the construction of a power plant.

>>Text: Geoff Heath

In market terms, Undercut Anchors present the strongest option when fixing into concrete. They take their name from the process of 'undercutting' a special flared cavity within the substrate. After the installation the anchor utilises the full capacity of the concrete to resist the application load. Considering that the LIEBIG ULTRAPLUS design offers the highest tensile and shear strength of any other Undercut Anchor on the market (from 320 KN tensile strength and more), it is understandable why civil engineers around the world value this traditional and stand-alone anchor technology.

ULTRAPLUS can be made of galvanized steel, sherardised steel and stainless steel. In terms of size we usually refer to the diameter first – ranging from 10 mm to 36 mm (M10 to M36). Due to

its unique modular design, the lengths can often be individually designed to suit a specific application – basically there are many M36 variants with a length of up to 1.5 m.

Safety of people and buildings

With an ETA certificate for cracked and non-cracked concrete – including seismic loads and fire loads as well as other industry-specific, independent test certificates – the application is conceivable wherever structural and human safety is paramount, e.g. a roller coaster in an amusement park or the construction of a nuclear power plant.

Some recent projects in the UK that have involved EJOT UK's LIEBIG specialist, Mr Paul Papworth, include a hydroelectric



power plant in Scotland, a nuclear waste facility, a waste treatment plant in the north of England, and the construction of a nuclear submarine test facility. Paul Papworth explained how ULTRAPLUS was utilised in each application.

For the Scottish hydro power plant, M36 diameter stainless steel ULTRAPLUS anchors were used to hold down a tunnel liner in the main water inlet tunnel. Ultra-high performance anchors were needed here due to a significantly high rip force that was created by the water passing through a 90 degree inlet. These massive forces had previously ripped up the 25mm steel liner.

The nuclear waste plant utilised M24 x 1.2 m long ULTRAPLUS anchors. Once again, significantly high load and safety factors, including risk of failure, were the driving factors behind specification. The length of anchor chosen meant that sub-level utilities could be avoided. Anchor performance was also enhanced, providing extra strength.

M36 diameter zinc plated ULTRAPLUS anchors were installed at a chimney stack on the waste treatment plant in the northwest of England. Heavy loads occur in the structure, so that an immediate load bearing is required - one of the outstanding application advantages of the ULTRAPLUS anchor.

A special ULTRAPLUS M20 assembly has been developed for a test facility for nuclear-powered submarines. Again, ultra-high loads and significant failure risks were decisive for the specification. These special anchors have been designed to be permanently installed without having to release the preload when removing the test beds to be fixed by the anchors.

With case studies such as these from all around the globe, putting the strength of LIEBIG anchoring technology back in the spotlight is an exciting prospect. And with the LIEBIG ULTRAPLUS, we certainly have something BIG to talk about! **E**

Intelligent light

Halogen, Xenon, LED and laser. Key words which reflect the development in light engineering for cars. It seems like the rapid progress of the latest lighting systems is far from coming to an end - whether it is communication with the environment or driver assistance. New dimensions of the night-time light revolution are continuously evident. And this is no longer exclusively about the illumination range and luminous power. It is about making headlights "intelligent".

>>Text: Andreas Wolf



Let there be light, and there was light. For the first cars with combustion engines at the end of the 19th century, light was certainly not so easy. Plain candlelight and later carbide lamps, which not only consumed a lot of gas, but were always a constant fire hazard, were the first modest sources of light.

The so-called "Bosch light", launched by Bosch in 1913, brought the first electrical light to the car. For the first time the headlights were operated by a generator, which later became the alternator. Another important technical development was the "Bilux lamp" developed by Osram in the middle of the 1930s. Here, for the first time, a light bulb with two filaments was inserted into the reflector of the headlight. This technology was the standard until the 1970s.

Finally, the halogen headlight conquered the market, providing a bulb for low beam and full beam headlights, which doubled the range of vision. That was now almost 50 years ago. Many cars still use halogen headlights, a technology from yesteryear. And if you use Xenon bulbs at night, you are also no longer using the latest technology.

The latest generation of multi-LED headlights makes driving at night more comfortable and above all safer. For years, manufacturers have been working on light systems which selectively illuminate their environment. To always provide the maximum amount of light, a glare-free permanent full beam light has been developed, which works automatically. With this technical development, the share of full beam lights driving at night has risen from approx. 10 percent to up to 65 percent.

Headlights which react in the blink of an eye and automatically adapt to the driving situation and specifically block out light from vehicles coming the other direction, but at the same time light up the rest of the roadway. In addition to the automatic on and off of the full beam lights, the light intensity of blinding road signs or wet road surfaces can be specifically dimmed with the help of the camera.

Modern and intelligent light systems provide a significant benefit to safety, particularly at night. This is because, statistically, accidents at night on state roads are of an above-average severity, according to a survey in 2016 by the Federal Highway Research Institute (Bundesanstalt für Straßenwesen). According to authorities, six of ten deaths occur there. At night, the modern vehicle lighting becomes an important assistance system.

Meanwhile, technological progress continues rapidly. New car headlights do not just light up the road, but they also analyse the traffic and weather situation and make adjustments accordingly. This is possible thanks to an LED chip which can, for the first time, control the 1,024 light dots (LED pixels) individually. Furthermore, its size of just a few millimetres means that it fits on just one fingernail. This is important, particularly for car manufacturers. The chip was developed by researchers working on the project "µ-AFS", which is part of the "Photonik Forschung Germany" (Photonik Research Germany) support programme of the Federal Ministry of Education and Research (BMBF). The partners of the joint project were countless companies and institutes.

Photo: Hella AG



The car manufacturer Daimler has developed technology, called "Digital Light", which projects symbols, warnings or navigation arrows onto the road: This could be, for example, zebra stripes, which clearly indicate to pedestrians at night that they can cross the road. "In each headlight there are chips with over one million micro mirrors, so over two million in total per vehicle. On-board camera and sensor systems recognise other road users, powerful computers analyse the data and digital navigation maps in milliseconds and give the headlights the command to best adjust the light to all situations," is what Daimler claim. In this case, light engineering is like a cinema on the road.

Intelligent car light: The use of a light-based driver assistance system for oncoming traffic

EJOT Micro Adjuster

EJOT has accompanied the development of the vehicle light in recent years with innovative fastening elements, as well as fastening and adjustment systems. To make sure that the light modules in modern headlights work precisely, they have to be aligned to each other and to the headlight casing.

For this purpose, the joint venture of EJOT and Asyst Technologies have developed the Micro Adjuster: Unlike traditional assembly solutions, the Micro Adjuster reduces the assembly time thanks to its simple handling and minimises the number of rejects. It is a safe solution which also meets the high requirements on technical cleanliness. While it is applied in vehicle headlights, it can also be used, for example, in radar modules or other automotive and non-automotive applications. A reliable solution which also reduces overall costs.

The Micro Adjuster consists of an EJOT ALtracs® Plus ball-head screw and a pre-mounted plastic element, which is based on the snap-in design principle. In the interplay between the ball-head screw and the plastic components, the Micro Adjuster also acts as a multi-axle tolerance compen-



sator. Additionally available for the system and compatible with the Micro Adjuster, is a spherical socket. This provides extra tolerance compensation and also has a simple "snap-in" assembly.

>>Text: Thomas Birkelbach

The history of car lights

1886 The first vehicle with a combustion engine, built by Gottfried Daimler in 1886, still uses candlelight, which does not provide any guidance at night.



1900 Petroleum lamps, acetylene burners and carbide lamps offer a bit more light when driving at night.

However, a carbide lamp consumed around 35 litres of gas per hour.

1913 With the help of a generator, electricity is brought to cars. Bosch introduces the so-called "Bosch light".

1919 The safety requirements when driving at night increase. As a consequence, two headlights are attached on each side of the car.

1930 The lamp manufacturer Osram develops a light bulb with full beam and low beam with its "Bilux lamp". It can be switched on and off at the touch of a button.

1965 The first halogen lights conquer the market. They have higher luminosity and are more durable.

1971 With the "H4" the low and full beam light are combined in a two filament halogen bulb.

1991 The Xenon gas discharge lamp is launched, initially as a low beam light, but later also as a full beam (BiXenon). Xenon headlights offer much more light than halogen lights.

2000 An important innovation in headlight technology follows with LED technology (light-emitting diodes). With the so-called matrix technology, the full beam light is automatically turned off in situations where it does damage.

For this purpose, cameras in the vehicle are networked to the headlights, so that different LEDs in the headlights can be switched on or off.

2014 The laser light comes to the road. Laser headlights provide a light beam with very high intensity, which includes parallel light beams.

2016 Another technical innovation is provided by OLEDs, organic light emitting diodes, which are already used in some smartphone screens and TVs. They are surface light sources, which no longer illuminate dots. The light is more equal and has less glare than dot light sources.

Bending lights on the CITROËN DS

The Citroen DS "Divine" received its legendary halogen bending lights in 1962, and was also the first European car to do so. With the DS, however, it was only the full beam, not the low beam, that was designed as the curving light. The headlights were connected directly with the steering column via a cable.



Photo: Shutterstock, Pixabay

Fasteners for a better climate

Air conditioning units were in high demand this summer. Anyone who waited at a bus stop in bright sunlight when the outside temperature was just under 40 degrees knows the magnificent feeling of entering a nicely air-conditioned bus.

>>Text: Andreas Wolf

Temperature decrease, dehumidification, reliability, the integration of vibration-resistant components, acoustic development, reduction of size and weight, design or the use of climate-friendly CO₂ as coolant. While buses are an environmentally-friendly means of transport, there is still room for improvement for many vehicles. With the prevalence of

modern air conditioning systems, the technical requirements are reaching new dimensions.

For the implementation, EJOT is co-operating with Konvekta AG, located in Schwalmstadt in the state of Hesse, Germany. Konvekta AG is a global operating manufacturer of innovative

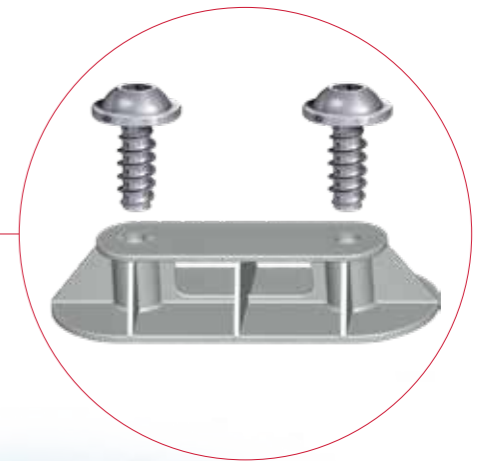
and future-ready climate and cooling systems for buses, construction and agricultural machinery, as well as rail and transport refrigeration vehicles. With the improved bus air conditioning unit system "Ultralight II", Konvekta developed a new model with improved aerodynamics and reduced height – according to them, this is currently the world's lightest air conditioning unit series. In addition, the system can be recycled and are therefore ecologically friendly and very easy to maintain thanks to the innovative plug-in principle lacking unnecessary screwed brackets. With their powerful cooling capacity from 24 to 44 kW, the ultra-light roof top air conditioning units can ensure a pleasant climate in buses even with outside temperatures of up to 50°C.

And with the lightest version weighing only 127 kilogrammes, Ultralight II certainly lives up to its name. This is also ensured by the construction made of EPP, a material with the highest requirements when it comes to fastening technology. Expanded polypropylene (EPP) is a thermoplastic granulated foam plastic based on polypropylene. Mostly the so-called autoclave technique is used for processing.

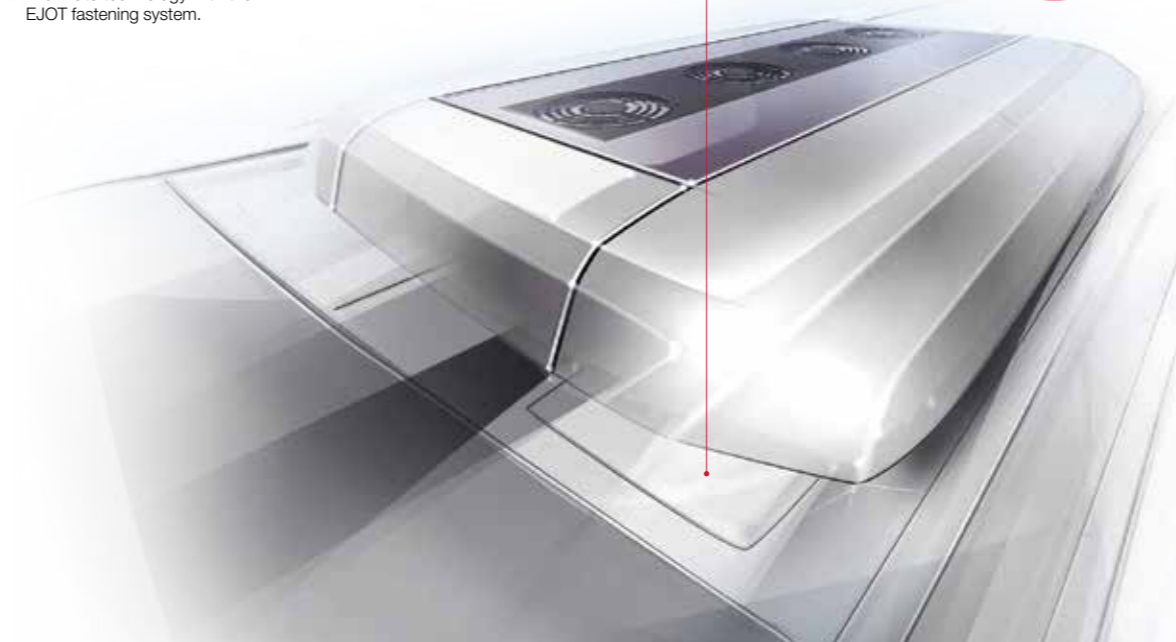
In the actual processing, granulated foam pearls are blown under pressure into the closed tool form and then 150-degree water vapour passes through them. For this group of materials, EJOT developed the EJOT® EPPsys product family – suitable solutions to join parts made of particle foam with other components.

Through its membership in the EEP forum and the existing network connection, EJOT set up contact with the company Konvekta. As the challenges of dynamic security and pull-out loads were very demanding in this project, it was not possible to use a standard connection element of the EJOT® EPPsys product family. Based on the excellent collaboration and coordination among the customer, application engineers, product management and R&D, Konvekta was finally presented with a synchronised connector system consisting of a double Delta boss + DELTA PT® 60. This EJOT solution is applied in the serial production of joints, mould clamping mechanisms and fastenings of the roof girder. The manufacturer of the EPP components inserts the DELTA boss twice into the tool before the foaming process.

For EJOT, successful implementation of the project served as a "door opener" for additional projects. Not only for EPPsys products, but also for the use of EJOT products in metal fastenings.



The UltraLight II – Innovation in climate technology with the EJOT fastening system.



Q&A

Dipl.-Ing. Jürgen Behle,
authorised signatory, Head of Sales
Division V

- 36 years at EJOT Industrial Fasteners Division, now Industrial Division, in Sales.
- Main customers: The world's largest automotive supplier and the market leader in forestry equipment.



Mr Behle, in this issue of Moment, we are looking at all kinds of different “dimensions”. In physics, the measurement of a body is called a dimension. Now let's transfer this to our customers. In your view, how has the size structure of the most important customers changed in recent years?

The big customers have become even bigger. Both with regards to the actual size of the companies, but also the importance of their turnover for EJOT. Nevertheless, due to the large number of current customers we have, our dependence on individual customers is very low. The EJOT Group, for example, has over 26,000 active customers in its current customer portfolio. Furthermore, the scope of individual projects has evidently increased due to the concentration on the automobile supplier sector, and also due to the platform strategies of OEMs.

You can now look back on 36 years in EJOT Sales. You can rightly be called a EJOT veteran. What did typical customer support and order processing look like 30 years ago?

30 years ago the world was analogue. This was evident, for example, in the office equipment we had in inside sales. Two inside sales employees shared an input station of the IBM mainframe computer AS 400. The clientele was also very thankful for the technical support, with the key word here being “application technology”, which back then not a single screw supplier offered in this manner. When visiting customers, there was not such a focus on the “price” dimension as there is today.

What are the fundamental differences compared to today? In your opinion, how have the customer demands on EJOT changed over the last years?

Today, at least with large customers, price is of great, if not crucial, importance. The workplace equipment in inside sales now comprises two screens as standard. A fast response time is also demanded, waiting 24 hours is not acceptable for many customers. This goes not just for relatively simple matters, but even complex tasks such as changing the scheduled shipping date.

Have these changing demands by the customer also led to specific different requirements in sales?

If anyone thinks that you can build trusting customer relationships today via teleconferences or WEBEX, they will be bitterly disappointed sooner or later. For us, the completion of one single order does not mean a long-term satisfied customer relationship has been established. This can only be done by personal contact, regardless of the decision-making channels of the customer, which have changed significantly over recent years. Previously, it was primarily the design engineer in the development department who decide about the awarding of the project, and thereby he or she was the most important contact partner for EJOT Sales. Here the dimensions have also changed, as today at large customers it is primarily the purchaser who makes the decision to award projects. This is often regardless of the extent to which free technical services, such as the APPLITEC screw laboratory or the prognosis programs DELTA CALC® or ALtra CALC® are used during the project.

Mr Behle, at EJOT we took these changed structures into account by creating a modified sales organisation in the form of the Key Account Management. Could you briefly explain the benefit of this divisional split?

The increasing size of our customers' companies normally means considerable extra work for us and therefore more personnel in Sales. This is primarily due to extra administrative work, which comprises a relocation of tasks and different types of costs to the supplier. We see Key Account Management as a win-win solution for both our A customers – and EJOT. The customer receives intense support, and in return we have better opportunities to generate higher sales. Furthermore, the fact that we have invested considerably in our foreign locations in recent years has played into our hands, which means that we are able to produce directly on site for our customers in the key sales markets, and also offer technical support there.

“The scope of individual projects has clearly increased due to the concentration on the automobile supplier sector”.

Dipl.-Ing. Jürgen Behle

To overcome these challenges, a large amount of travelling has been necessary, during which you have got to know a wide range of companies and people. Can you remember a particular highlight or a special anecdote, which you can tell us here?

There's just one thing I'd like to say here: I have many, many anecdotes, and I would be happy to share the best of them in a smaller, more intimate group. But it is difficult for me to provide an anecdote here without stepping on somebody's toes. In closing I would like to share the wisdom I have often heard in business: “You only get what you pay for!”

Hand on your heart – A short statement after over 36 years in sales: Was everything really better before? Or was it just different?

It was just different. Here is one example: Today it is hard to imagine informing a customer that you will be late for the start of a visit by first finding a petrol station and then paying the petrol station attendant 50 Pfennigs so you can use the phone.

The perfect wave

The architecture is spectacular. An impressive wave. On the front and back side of the building, glass surfaces dominate, the roof and facade consists of white tiles. The location of the residential development Bølgen on the bay of Skyttehusbugten, directly on the Vejle Fjord in Denmark, is unique.

>>Text: Andreas Wolf

In 2004, the city Vejle started an ambitious project with the development of the shoreline of the fjord. The Danish architect Henning Larsen won the competition he was inspired by the Sydney Opera House and the natural environment of the fjord. The building blends into the surroundings and yet also changes its surroundings. It catches the eye like a wave stranded ashore – during the day the building is reflected in the water, at night it appears like a hilly, luminous landscape.

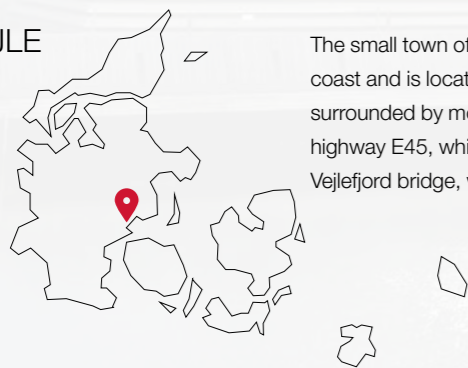
The striking and exclusive housing project consists of five wave-shaped parts. Each wave comprises nine floors and 20 different residential units. The largest apartments are located at the top and have a living space of 240 square meters. Wave one and nine were completed in 2009. The construction of wave 3, 4 and 5 started

in 2015 and is expected to be completed this year. Even before its completion, the wave-shaped complex with its sculptural form was awarded numerous prizes.

The structure of the building is made of steel. Prefabricated wooden elements surround this steel structure and form the substructure for the roof and facade tiles, which can only be seen individually from close up. Viewed from a distance, the white surface appears like a continuous white wave. The very complex substructure also contains around 200,000 EJOT® SUPER SAPHIR self-tapping screws JT3 and JT4.

E

VEJLE



The small town of Vejle is one of the oldest maritime trading towns on the Danish Baltic Sea coast and is located directly on a fjord with the same name. The town of 51,000 inhabitants is surrounded by mostly wooded hills, which is unusual for Denmark. Vejle is located on the main highway E45, which runs in a north-south direction. The highway leads in the east over the Vejlefjord bridge, which is one of the longest and highest bridges in Denmark.

Growing (together) in the future camp

At the EJOT Future Camp, values are probably the most analogue topics. For a whole week, the life of 130 EJOT trainees and dual students evolved around digitization. Whether autonomous transport systems, artificial intelligence or 3-D printing. Do values even fit into this rapidly changing world? Or are values rather stale, boring and uncool, not worth young people's time?

>>Text: Andreas Wolf



Quite the contrary actually. For the trainees and students, values are of central importance and clearly defined. This is one of the fascinating outcomes of the EJOT Future Camp.

For the first time, trainees and dual students of all age groups from the German EJOT locations in Wittgenstein and Thuringia in Germany as well as Switzerland met for a week to focus on the topic of digitization. The camp location was Villa Wewersbusch near Wuppertal, one of the most modern boarding schools in Germany. The key tool for teachers and students is the iPad. In addition to classical school and general knowledge, the school's agenda includes media skills, communications, collaboration, creativity and critical thinking. It is, therefore, a place that also allowed the trainees and dual students to sharpen their digital profiles supported by experienced teachers from the boarding school.

The objective is clearly defined

What is the EJOT Future Camp? "We all got together to strengthen the sense of togetherness, to grow together, to form networks and to establish friendships," explains Managing Director Colette Rückert-Hennen. At the end of the day, regardless of age, location or profession everyone felt: "We are EJOT". Our mission has therefore been impressively successful.

Digitization is about new forms of learning, moving away from frontal teaching with books and paper towards the tablet, in order to be able to learn with electronic support independently of time and place. The instructors are present, but increasingly act as coaches. "Trainees and dual students are our digital ambassadors who convey the topic of digitization into the company and beyond," stresses Colette Rückert-Hennen.

Just a moment ago on the computer display and now already in print, that's the promise of 3D printing processes. One of eight workshop topics in which a particularly rapid technical development could be observed. What about 3D metal printing? Has EJOT already gained some experiences in this area? This topic was presented by tool mechanic Ludwig Völlmer, one of 20 instructors who involved the trainees and students in plenty of learning, discussing and work activities. Each workshop featured a theme related to EJOT. An important aspect on the agenda of the Future Camp.

Driverless transport systems, state-of-the-art logistics concepts - in this workshop, too, the trainees and dual students learned →

Teamwork amongst the apprentices was also in demand in the climbing park.

many new things. But they were also able to find out that EJOT already has a very modern system with its logistics centre in Bad Berleburg. "Over here, the goods already reach people." People are therefore not superfluous. They must intensively focus on handling the data to keep the system in check.

Moving empty crates back and forth, a driverless pallet truck that provides a tool in production, the networking of warehouse and production so that "human beings" always have enough material at their workplaces. In this area, the use of driverless transport systems at EJOT can still benefit vastly automation. Taking over legwork that allows employees to attend to other, more demanding tasks. Here also, the prerequisite is a precise programme for the use of a robot who will only do as asked. This is rather easy to implement with the small table robots by Lego Mindstorm, which the trainees and dual students could program and control via an app on their tablets.

Technical progress that is rapidly picking up speed. If today in China an engine block or even an entire house is reproduced by a 3D printer then this technology has already reached almost inconceivable dimensions, stated Andreas Fey, head of digitization at EJOT, in his keynote speech. "The first humanoid robots who will handle our household chores will be available as Christmas presents in 2022." A bold hypothesis that many cannot really

imagine today. The message conveyed by Andreas Fey to the young people is simple and clear: "Be courageous, curious and willing to tackle these issues."

Is man superfluous?

While it seems promising to have a robot handle household chores, there is also a reverse side: what if the robot takes over not only the household chores but one day also my job? A very central question that worries generations of employees. In reply, the EJOT general management has conceived a mission statement for the topic of digitization: "We will approach digitization responsibly, align it with people and identify potential for change. We will qualify and promote our employees according to their individual needs, create modern workplaces and establish a leadership culture that supports the necessary changes."

What should, therefore, be done to make sure that people do not become superfluous? "People will not become superfluous," emphasised Lisa Wagener from EJOT Personnel Development. Empathy is not available in the app store, personal communication is indispensable. This is also what the trainees would like to see when they deal with the question of how their profession will change in the course of digitization. Core issues are continuous flexibilisation of working hours, more effective operations with the application of digital accessories such as robots, drones or



Health is one of the most important values for trainees and students.

Workshops at the EJOT Future Camp

- Unconditional customer orientation**
 What EJOT can learn from the U.S. service providers Uber and Airbnb and how EJOT can guarantee optimal customer satisfaction in the future.
- Logistics of the future – driverless transport systems and more**
 During the manufacturing process, our products undergo a large number of production processes and travel extensive distances. If an error occurs during this, the production stops. There are intelligent systems to resolve such problems.
- (In)visible Learning – create your own educational video and make it visible to EJOT**
 From the initial idea to the completed video – what is an explanatory video? How are they made and what purpose do they serve?
- Artificial intelligence – this is how smart Siri and Alexa are already today**
 Artificial intelligence as a future scenario – how dependent are we on artificial intelligence already today? How does artificial intelligence spread matter-of-factly in our daily lives? What does that have to do with EJOT?
- Manufacturing in the future – How 3D printing is revolutionising production**
 Just a moment ago on the computer display and now already in print, that's the promise of 3D printing processes. A look at the development of 3D printing and the opportunities for EJOT arising from this.
- Better together – How collaboration improves our co-operation**
 How can we collaborate better, solve problems together and develop joint ideas? Examples of successful collaboration and modern work modes.
- Escape Room - Ready to face the challenge?**
 The EJOT history hidden in riddles. Getting out of the Escape Room requires good teamwork.
- Showtime for the film crew at the EJOT Future Camp**
 The EJOT Future Camp is recorded on film. Comprehensive information about professional video recording, from interviews via sound quality up to skilful cutting.



Apprentices and trainers working together to find a solution (left).

The small table robots were also filmed in action (right).

Working with the 3D printer was new for the apprentices and students (bottom right).



VR goggles. “The robot is not an enemy, but a helper that can be easily integrated into work processes,” emphasised the mechatronics engineers in their presentation. Of course, the young people are also apprehensive of what will possibly come. The loss of workplaces, loss of communications among colleagues, or dependency on technology.

Back to the here and now. The young participants had to experience real stress: “Take a seat in the CEO’s chair and manage

your own company.” While this sounded comfortable at first, it turned out to be anything but. Envelopes had to be manufactured within a specific time period. Planning of the “envelope factory”, purchasing, production, quality. Reorders double the price of materials. Everything was registered online and projected onto a screen in each group: The order, the production, the result. This considerably increased the production pressure. The quality of production is tested and defective items removed – more or less. At the end, on the bottom right the turnover and



Q&A



At EJOT also, the industry division has had first experiences with 3D metal printing. To find out more about the topic, we spoke to Ludwig Völlmer who works as a tool mechanic at the Herrenwiese site in Bad Berleburg, Germany. Ludwig Völlmer also informed the participants of the EJOT future camp of the team’s experiences with 3D metal printing.

What was manufactured with this modern process?

We had complex components manufactured for an experimental die. This will be used for manufacturing initial prototypes of a so-called inner conductor. The aim was to provide the customer as quickly as possible with parts of a near-series manufacturing process.

Can you tell us about the preparations?

The 3D models were created on the PC. Using this data, we placed an inquiry at a company specialised in 3D metal printing. We quickly received an offer and ordered the components.

What was the outcome?

The process cannot comply with the required surfaces and tolerances yet. Yet manufacturing with 3D metal printing is substantially faster.

How does it differ from the conventional process?

There is almost no material loss with printing. The process can be used to create shapes that are not possible with conventional methods. However, the process as such is still very expensive.

What are your conclusions regarding the project and what is your assessment of the future use of 3D metal printing?

With 3D metal printing single parts and models can be created in a very short time. However, these parts still need to be finished mechanically.

In the future I can envision 3D metal printing contributing to significantly reducing the development time of pre-series and development parts.



Get-together at EJOT Future Camp -after a long work day.

profit could be seen, with occasional positive and negative surprises. “That was absolutely realistic, a real challenge for the team and very well organised in its execution,” summarised the prospective tool mechanic Falko Ludwig. The three dual students, who prepared the team challenge on their own for three months, will be delighted. Mission accomplished.

Which values are important?

Managing Director Dr. Frank Dratschmidt picked up on an important finding from this team challenge: “Self-monitoring as an important component in production also worked well for this team challenge.” While the young people diligently produced their envelopes, quietly or noisily, hectically or calmly, the EJOT managing director observed highly motivated young people: “I am impressed by the dynamic that is sparked off here by the 130 trainees and students.”

Finally, after just under a week spent at the Future Camp, came the important question: “Which values do you want to adopt?” Honesty, amiability, flexibility, freedom, fairness, justice, patience, health, diligence, supportiveness. These were the top ten values selected by the trainees and dual students. In separate groups

these values were further specified and elaborated. The visualist Bibi Rosa attended the workshop as a guest. She drew everything that was said in a flash. This created lasting value. Recorded on three 3 x 2-metre canvases and visible to all – at the EJOT locations in Bad Berleburg, Tambach-Dietharz and Dozwil. ■

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