Continuous improvement: **reliable, durable aseptic process pump makes key contribution to success**

„Pump technology plays a central role in drying oil-in-water emulsions for the food and pharmaceutical industries," explained Natalie Ibald, Plant Manager of Formulations at DSM Nutritional Products AG (Source: DSM Nutritional Products AG)

„The LEWA triplex process diaphragm pump we use is hermetically tight, effectively preventing external contamination of the pumped fluid," said Pietro Pettoruto, Managing Director of LEWA NIKKISO Switzerland AG. (Source: LEWA NIKKISO Switzerland AG)

Spray drying in the food and pharmaceutical industries - LEWA ensures maximum hygienic standards at DSM Nutritional Products AG

The Swiss subsidiary of Dutch company DSM Nutritional Products AG uses the spray drying method when producing vitamin and carotenoid powders for the pharmaceutical and food industries. The procedure uses pump technology to convey various emulsions into a spray tower, where they are dried into powder. But the feed and booster pump that was being used proved to be an uncertainty factor because the diaphragm required for the pumping process tended to tear when the pump was started up. Generally, such production interruptions can be corrected through immediate maintenance and repair work. However, it is very expensive to replace a diaphragm or an entire system. DSM was in search of an alternative and finally made a find when they talked to the pump experts at LEWA NIKKISO Switzerland, who recommended a LEWA triplex process diaphragm pump for the spray tower application. The drive unit features a safe start-up mode that keeps the diaphragm located in the neutral position, and continuous regulation using an integrated monitoring system. Since the hermetically tight pumps are electropolished and CIP-approved, it is easy to fulfill the food industry's stringent hygienic provisions. The new process diaphragm pump was commissioned in April 2019.

„Pump technology plays a central role in drying oil-in-water emulsions for the food and pharmaceutical industries. These emulsions contain substances such as vitamins, carotenoids, or polyunsaturated fatty acids as active ingredients," explained Natalie Ibald, Plant Manager of Formulations at DSM Nutritional Products AG. „As part of the process chain, each pump is 100% integrated into the closed plant system. The pumps are used for conveying the mixtures into the spray tower." With the previous system, the risk of unforeseen interruptions to this process couldn't be ruled out. As a result, the different emulsions could not be processed further. In other words, it was not possible to dry them into powder. The pump diaphragm was the reason: it was often too sensitive to withstand the stress placed on it when starting up the pump and would rupture. Replacing the diaphragm reduced the system's service life and sometimes meant that trouble-free operation could not be guaranteed.

In the course of searching for a reliable alternative, DSM got in touch with the Swiss subsidiary of pump manufacturer LEWA. „We were already familiar with LEWA NIKKISO Switzerland as a supplier of robust systems with long service lives in the SFP sector. To ensure trouble-free spray drying, we thought it would

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be smart to join forces with the experts from LEWA and come up with a design to solve the technical problems," said Ibald. DSM is committed to continually improving its processes and investing in technology. This commitment, along with prior experience with the short service lives of the previous pumps, led DSM to place special focus on reliable function and a robust design during the project planning phase. The list of requirements also included a substantial number of stringent hygienic provisions that had to be fulfilled. „Certain foods have provisions regarding microbiological purity that are many times more stringent than those for producing other food products," explained Ibald. „This meant that the new feed and booster pump had to meet these more challenging conditions and every type of contamination had to be ruled out to produce the widest possible variety of products on the system."

Process diaphragm pump guarantees safe start-up operation

After a visit at the company premises to consider the spatial and technical parameters, LEWA NIKKISO Switzerland recommended a type G3F triplex process diaphragm pump for the spray tower application. This pump features a completely secure start-up operation, since a spring continuously holds the integrated sandwich diaphragm located in a neutral position. „This protects the diaphragm against incorrect positioning and prevents it from being damaged while the pump is starting up, increasing system availability substantially," said Pietro Pettoruto, Managing Director at LEWA NIKKISO Switzerland AG. „And the LEWA triplex is controlled using a pressure relief valve that is installed in the hydraulic part and can be configured for the specific situation." Thus the pump can be adapted to different operational situations in order to prevent any overloads that may arise. This ensures that the unit has a long service life and smooth regular operation for the entire system.

In addition to the pressure relief valve and the spring control, the design of the diaphragm also plays an important role in ensuring reliable pump operation. The patented sandwich diaphragm consists of two separate PTFE diaphragms that are extremely long-lasting. They are connected to each other through positive interlocking during the discharge stroke and mechanical force-fitting during the suction stroke. „This makes the pump hermetically tight and effectively prevents external contamination," explained Pettoruto. As an additional safety feature, the DPS monitoring system from LEWA continuously monitors the condition of the diaphragm. The monitoring unit promptly displays any damage to the device that leads to increased pressure in the diaphragm space. „This makes it possible to carry out preventive maintenance and repair work before the diaphragm even begins to rupture and potentially contaminates the pumped fluid," Pettoruto explained. „Thus it is usually unnecessary to switch the pump off right away, which means that neither the pumping process nor spray drying are negatively impacted to a significant extent." If damage to a diaphragm is detected, production can continue without any problems up to a planned maintenance stop. The components can then be replaced quickly and easily by releasing the cassette for the assembly.

The pump being used features aseptic, FDA-compliant operation

The hermetically tight design of the process diaphragm pump does more than just ensure reliable continuous operation. It is also a central component for fulfilling the stringent hygiene provisions that the spray tower application is subject to. The LEWA triplex maintains a hermetically tight space without dynamic seals, guaranteeing completely clean and aseptic production conditions. All pump heads that come into contact with the product are also electropolished, which makes it possible to ensure FDA-compliant pump operation.

Because the pump can be cleaned in place (CIP) using different alkaline and acidic agents and without prior dismantling, it is possible to meet the special requirements for baby food as well. „The provisions for baby food are 1,000 times more stringent than those for other products in the food sector," explained Pettoruto. „Thanks to the hermetically tight design, electropolishing, and CIP cleaning, we were able to rule out any contamination of the pumped medium and clearly meet the required hygiene standard."

„Quick response times and well-founded expertise"

The first quote was received in June of 2018 and in September of the same year, DSM Nutritional Products AG placed an order for the triplex process diaphragm pump. In operation since April 2019, the pump has become an indispensable part of production at the plant in Sisseln. „In every phase of the project, LEWA NIKKISO Switzerland demonstrated quick response times and well-founded expertise, which made a key contribution to implementing the project successfully," said Ibald. „Our specifications with regard to quality, robustness, and hygiene were followed to the letter in this project. As a result, our production has become noticeably more efficient and reliable."

LEWA GmbH D 71229 Leonberg

The type G3F triplex process diaphragm pump features completely safe start-up and fulfills the stringent hygienic provisions of the food industry. (Source: DSM Nutritional Products GmbH)

The first quote was received in June of 2018 and in September DSM Nutritional Products AG placed an order for the triplex process diaphragm pump. The system has become an indispensable part of production at the plant in Sisseln. (Source: DSM Nutritional Products GmbH)

Pharma´s Journey to Digital Manufacturing:
OWN it – DRIVE it – WIN it!

ISPE D/A/CH Workshop

About this Workshop
The pharma industry is undergoing a significant transformation due to digital technologies. Techniques such as visualization, modeling, automation, machine learning and artificial intelligence are dematerializing traditional processes and facilities, and drive productivity through fewer errors, higher output and improved quality, safety and speed of operations.
Building on the success of the workshop in November 2018, ISPE D/A/CH will organize a second workshop on 4-5March 2020 in Basel, Switzerland.
The event will feature case studies, regulatory aspects, opportunities, successes and pitfalls faced in the digitalization journey, pointing to the urgency to accelerate the digital transformation.
This event is tailored for mid-senior level management, decision makers, and leaders who set strategy and direction for manufacturing, quality and CMC regulatory affairs in their organizations.

Event language:
English.
Chair:
Viktor Mettler, Global Quality Head REFS, NBS & Country Quality, Novartis, ISPE DACH Chapter representative
Co-Chair:
Ursula Busse, Global Head Quality Intelligence & External Affairs, Novartis
When?
4th to 5th of March, 2020
Where?
Novartis Campus, Basel. Switzerland
Hotel recommendation (following soon)
Participation fee
ISPE Members: 450 Euros
Non Members: 750 Euros

ISPE - DACH
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At this point a reference to an event:
LOUNGES 2020
January, 28-30, 2020
Messe Karlsruhe

More:
https://www.x4com.de/expo_lounges

January 2020

Dear subscribers,
somewhat belatedly, but nevertheless from the bottom of my heart, I wish you all the best in the New Year, health and much success. Maybe we can meet and talk at the Lounges 2020 in Karlsruhe. I would be delighted. You will findmeatourboothC2.1.

At the moment the Cleanroom Yearbook 2020 is in production.
It will be sent out in the next few days and I hope you like it as much as I do.

In the current issue of the Cleanroom online newsletter you can read about the following topics:

New date and new product groups for Cleanzone 2020

Viability study of CPS technologies

HMI Assembly Options in Cleanrooms

...

Yours sincerely

Reinhold Schuster

72 ultrasonic systems for pilot electroplating line

Largest Asian bathroom and kitchen furnishings manufacturer employs ultrasound from Weber Ultrasonics

The Chinese company aimed to install a new electroplating line that would set benchmarks in the industry by employing the latest technology. Six cleaning stations are integrated into the system. Each one contains 12 ultrasonic units that ensure clean, grease-free parts, which are essential for achieving high-grade coating quality. When it came to the ultrasonic technology, the company opted for solutions from Weber Ultrasonics.

Chinese firm Changtai Kemei Kitchen & Bathroom Technology Ltd., the largest bathroom furnishings manufacturer in Asia, invested around 3.8 million euros in a new electroplating line at its factory in Zhangzhou. The line is used for finishing bathroom and kitchen fittings made from stainless steel and copper alloys.

Modern technology for first-class surface quality

The key criterion for an optimal plating result is achieving a clean and grease-free surface on the parts. As such, the new system has a cleaning line with six stations. Waxy polishing pastes are removed in four tanks, while the other two are dedicated to degreasing before the subsequent electroplating treatment.

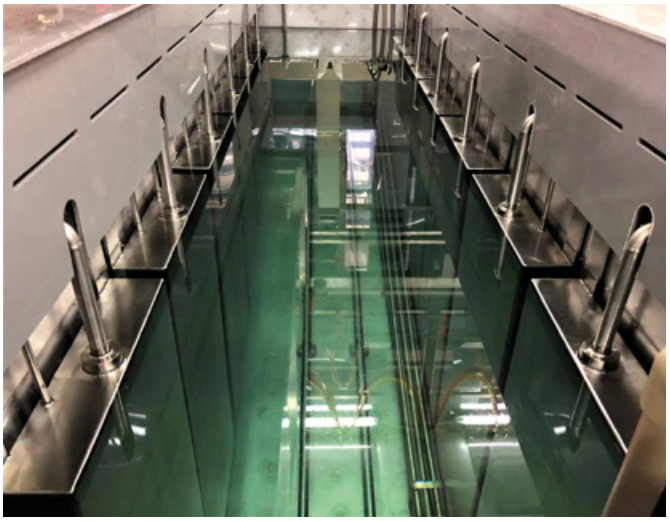
In order to ensure an optimum and stable cleaning result as quickly as possible, the action of the medium is supported by ultrasound with a frequency of 25 kHz in all tanks. Changtai Kemei uses Sonopower 3S generators in the 2,600 watt power class and power-adjusted submersible transducers from Weber Ultrasonics AG for this purpose.

The 72 Sonopower 3S generators are located in an air-conditioned room and are equipped with an optional Profibus interface. This enables the transducers to be controlled remotely. (Image source: Weber Ultrasonics AG)

High process and operational reliability

Due to the large tank volume, each tank is equipped with twelve Sonosub submersible transducers. Their capsule is produced using a special laser welding technique that ensures extreme sealing strength and dimensional accuracy.

Digital frequency generation and control are performed by a Sonopower 3S generator for each transducer. Thanks to combined frequency and amplitude modulation, these single-frequency systems enable very homogeneous sound fields and thus prevent standing waves. This increases the ultrasonic effect so that the cleaning and degreasing processes can take place more quickly and efficiently. The Sonoscan also contributes to consistent ultrasound performance. It determines the operating frequency automatically before ultrasonic output and adjusts the system settings accordingly. During the process, the frequency can be continuously monitored and automatically



Each cleaning tank is equipped with twelve submersible transducers with 25 kHz. (Image source: Weber Ultrasonics AG)

72 ultrasonic systems for pilot electroplating line

adjusted. This means that the most efficient power output is always applied, even in the face of changing operating conditions such as temperature fluctuations. As the adjustments take place during running operation, uninterrupted operation is guaranteed - a criterion that is just as important to Changtai Kemei as high quality and service life, as the system is in use in three-shift operation, seven days a week.

Controlled via Profibus

The 72 generators are located in an air-conditioned room and equipped with an optional Profibus interface. This makes it possible to select the parts-specific cleaning programs remotely, for example tailored to the different materials and parts dimensions. What's more, the power output can be continuously adjusted in the range from 10 to 100 percent.

The electroplating unit is a pilot project for a new industrial park in which up to 20 such electroplating lines are to be used. It is set to go into operation by 2022.

Weber Ultrasonics AG
D 76307 Karlsbad-Ittersbach

New date and new product groups for Cleanzone 2020

Cleanzone 2020 will be held on a new date. The international trade fair for contamination control and cleanroom technology is taking place on 18 and 19 November 2020. Also new: product groups will be presented in accordance with the logic of cleanroom production processes.

18th - 19th Nov. 2020: CLEANZONE 2020, Frankfurt am Main (D)

The dates and days of the week for Cleanzone 2020 have changed. In 2020, the international trade fair for contamination control and cleanroom technology will be taking place on Wednesday and Thursday, 18 and 19 November in Hall 1.2 on the Frankfurt exhibition grounds. Registration is now open at www.cleanzone.messefrankfurt.com/anmeldung for anyone interested in exhibiting at the trade fair – and those who do so by 15 January 2020 can take advantage of our special early-bird rate.

Cleanzone Product (Messe Frankfurt/Petra Welzel)

Also new in 2020: product groups will be presented in accordance with the logic of cleanroom processes. Cleanzone's product groups will be assigned to six primary categories: Architecture/Planning, Building Technology / Construction, Equipment & Fixtures/Furnishings, Measurement Technology, Hygiene/Microbiology and Outward Transfer. These categories are based on the logistics chain in cleanroom production, extending from airlock entry to packing.

Kerstin Horaczek, Group Show Director Technology at Messe Frankfurt, explains the reasons for the event's new structure: "By implementing this new arrangement at Cleanzone, we are able to reflect the full scope of the complex processes involved in contamination control. This makes it even clearer that the international trade fair covers all aspects of cleanroom technology and allows us to support its international growth for exhibitors and visitors alike." The new product group alignment provides exhibitors with an attractive venue in which to present their latest innovations while simultaneously affording visitors a comprehensive overview of the full range of innovative prowess on offer in each category.

The idea for this new structure originated in a meeting of the Cleanzone strategy commission in early 2019. As a member of the commission, Josef Ortner played a significant role in this development, and he explains why he considers these categories to be so important: "Exhibitors and users need a market showcase featuring high-quality providers, as well as the opportunity for knowledge transfer and sharing expertise. Cleanzone and its Frankfurt location are ideal for presenting the full spectrum of what the international cleanroom industry has to offer for users and the supplier sector.

From airlock entry to packing, on 19 and 20 November 2019 there were 80 providers from 13 countries on hand to present their pioneering solutions for the full scope of complex material flows in cleanrooms. Frankfurt played host to 1,300 participants from 42 countries.

cleanzone

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Viability study of CPS technologies

Researchers from Fraunhofer IPA and the International Performance Research Institute (IPRI) have compared costs and benefits of cyber-physical systems in a viability study. For the first time, this will enable businesses to predict the costs over an entire life cycle and to identify the most cost effective solution.

One of the advantages of commissioning robots in warehouses and using driverless transport systems to load goods is the increased flexibility such systems give a company. This is because cyber-physical systems (CPS) can be linked to Enterprise Resource Planning (ERP) and can, for example, report back in virtual real time when raw materials are removed. If stock runs short, the ERP system is able to immediately order new supplies. The automated supply of information has other benefits, for example, it can also reduce the error rate. At the same time, CPS technology is able to handle a high number of variants, as it is flexible enough to adapt quickly to short notice changes in the order position.

However, until now, all of this has been difficult to quantify. Martina Schiffer from the Department of Factory Planning and Production Management at Fraunhofer IPA highlights that "it is difficult to assess the costs and benefits of a driverless transport system with any degree of reliability." The reason for this is that all potential CPS users have their own IT infrastructure. Connecting the technologies to the existing ERP or Manufacturing Execution System (MES) can incur high costs. "Even the existing processes would probably have to be adjusted as they are not configured for use with these new technologies", says Martina Schiffer.

© University of Stuttgart IFF/Fraunhofer IPA, photo: Rainer Bez

Mispurchases unlikely

It is almost impossible for anyone to draw on empirical data, firstly because CPS technologies are new and not yet in use across the board and secondly, because every business is structured and organized differently. Philip Autenrieth, researcher at IPRI in Stuttgart, says: "Even small and medium-sized enterprises have huge problems in estimating investment costs in CPS technology." In order to give a rough guideline, Philip Autenrieth and Martina Schiffer together with their colleagues, have developed a method for comparing the costs of investment in CPS technology and the anticipated increase in performance in a viability study.

The basis of this is the generation of the typology of all current CPS technologies associated with specific intralogistic processes. As a result, it is possible to quickly determine which products are needed for each application. Mispurchases become more unlikely. When a choice is made, an Excel application based on Visual Basic for Applications (VBA) produces qualitative statements on its benefits, such as: "A sensor armband for commissioning has a great influence on data quality" or "A driverless transport system has a moderate influence on processing time."

Name:
Industry 4.0 profitable – Life Cycle Costing und Performance-quantification of cyber-physical systems in intra logistics

Project term:
12.1.2016 – 5.31.2019

Partners:
International Performance Research Institute (IPRI), Fraunhofer IPA

Funding:
EUR 396,260 from the Federal Ministry for Economic Affairs and Energy

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Consideration of different methods for HMI integration in cleanrooms for GMP-compliant planning of an optimized production environment

HMI Assembly Options in Cleanrooms

Preamble

Nowadays, it is hard to imagine process management and visualization in modern processing environments within the pharmaceutical and biotech industries without the use of Human Machine Interfaces (HMI). What's more, the additional requirements for a paperless production process and biometric operator authentication increase the demands placed upon HMI systems in production environments.

For that reason, it is absolutely essential that HMI systems are integrated into the production concept and into the planning of process-related operational workflows from the outset. This integration process also involves planning how to position and assemble the systems, to ensure they are ergonomic for the operator to reach and operate.

When systems require integration into existing concepts and plans, the flexibility of the assembly solutions is paramount, as space is precious – especially when the field of application demands a high level of hygiene.

Assembly variants

If you consider the given specific requirements in different production areas within the pharmaceutical and biotech industries, it doesn't take long to notice that almost all HMI systems are mounted to the wall or attached to the ceiling. This makes it easier for data connection and power supply cables to be routed in a hygienic manner and eliminates the need for cable glands in the assembly pipes. You seldom find HMI systems assembled on the floor, as routing cables via external cable glands is not generally accepted. This is because this type of assembly requires not only the cable glands, but also the routed cables or cable duct used to be cleaned.

However, if neither the wall nor the ceiling is able to take the load of the HMI, other solutions are possible. In this case, the heaviest part is designed to be assembled on the floor, but the cables are routed through the ceiling or wall. It may be a less elegant-looking solution, but it is practical and completely suitable for a cleanroom.

Wall assembly

Wherever circumstances allow, wall assembly is the easiest solution. However, due to the own weight of the HMI system, this does require mechanical reinforcement of the cleanroom wall. This is absolutely essential for the generated forces to be absorbed, which in turn ensures that the installation is safe and long lasting.

There are two basic types of wall assemblies: in-wall and on-wall assemblies.

In-wall assembly

This is the traditional assembly variant (see figure 1), used because older generations of HMI systems were designed with a deeper structure. It involves making a cutout in the cleanroom wall and defining a device-specific hole pattern with reinforcement.

Figure 1: Flush in-wall assembly without front panel.

Normally, the device is then embedded with a front panel with welded stud bolts and screwed in from behind. The advantage of this solution is that it is easy to assemble and the device is flush with the wall, although the assembly frame may represent a potential dirt-collecting edge. For simple touch devices, this also continues to be a common assembly method – yet one that harbors several disadvantages.

This type of solution has to take the following points into consideration:

The hole pattern in the wall is specific to the device and model. If the device needs replacing, any modifications the manufacturer makes to the device can have significant invasive consequences in the cleanroom, as the assembly cutout in the cleanroom wall would have to be altered and adjusted to the new dimensions of the device.

If the device is assembled with a front panel and stud bolts, it must be possible to access the rear of the cleanroom wall, to have the option of replacing the device in the event of a repair.

However, this also means that, in the event of a repair, the cleanroom would have to be opened. In turn, this would also require carrying out the additional steps needed to reseal and clean the room. In short, a process that is both administratively complex and has a huge impact on the usage of the room.

There are solutions designed to minimize this sort of complexity: for example, by recessing an assembly frame into the wall and sealing this hermetically. However, this only reduces the outlay in replacing the device; it doesn't address the problem of the dimensions of the cutout in the wall being specific the device.

In conclusion, this solution saves space, but the assembly method involves a huge amount of outlay, and costs the plant operator significant time and money if the device malfunctions.

HMI Assembly Options in Cleanrooms

On-wall assembly

The often-preferred method is assembling the HMI system onto the wall – as it is a more flexible solution (see figure 2). In recent years, this solution has gained in popularity over the in-wall assembly option, as advances in technology have resulted in devices that are smaller, more lightweight, and, in particular, slimmer. This makes the devices easy to clean and they require very little space.

This type of assembly also requires the wall to be structurally reinforced, in order to bear the generated forces. However, unlike with the in-wall assembly method, the positioning of the devices is more flexible: rather than having just one fixed position, it is possible to move the devices around using the various assembly systems. With one or more rotatable couplings, it is possible to rotate a device around its own axis. With the addition of a wall coupling, it is possible to pull the device out into the room or push it back again against the wall. It is also possible to position and move an HMI system as a duplex configuration (dual-screen display). This provides the operator with a huge amount of flexibility when viewing the content.

It should also be noted that these flexible solutions require cables to be routed internally, and for no cables to be visible externally. It is never easy to clean externally routed cables, and, as a result, they pose a contamination risk. When it comes to the couplings, it is essential that they have a rotation stop that limits the rotation to a maximum of 350°. This is needed to prevent the internal data and power supply lines from becoming twisted – and, thus, damaged.

In most cases, the assembly systems are standardized and, as a result, the devices on them can be exchanged. This makes the replacement process easier in the event of device discontinuation. Furthermore, with the on-wall assembly method, device supply lines can be routed into the cleanroom using a cable gland, which ensures the supply lines are hermetically sealed. This means that, in the event of an exchange, the cleanroom is opened and, consequently, cleaning it following the exchange of an HMI is not essential.

Figure 2: On-wall assembly using U-pipe support arm. Several rotatable couplings enable the HMI and support arm to rotate by 350°. The cables are routed internally as per cleanroom requirements.

Mobile HMI

The in-wall and on-wall assembly methods are the traditional solutions and offer an excellent cost-benefit ratio in the case of cleanrooms that are more or less in permanent use. However, in many cases, cleanrooms are actually only used a few days a week, as preparations have to be made for the next production step and the room has to be cleaned for this. Consequently, the HMI systems are not in use for these tasks. These types of situations call for a state-of-the-art solution – mobile HMI systems (see figure 3).

The concept of powering a computer by battery, thus providing a mobile solution that can be used as and when needed, is not new. However, there are several things that need to be taken into account.

The most important requirement for the use of a mobile solution in a cleanroom to be successful is the connection to the network. Ideally, the WIFI should cover the entire production area, to ensure that data integrity is ensured at all times. Accordingly, for areas in which this is not possible or desirable, physical LAN connections should be provided via LAN sockets suitable for cleanrooms.

Figure 4: Mobile HMI with dual-screen display for viewing several applications at once.

Figure 3: Mobile HMI with powerful battery in base.

Given the fact that the mechanics of mobile solutions are more complex than fixed ones, another point to consider is the ability to clean the devices quickly and easily. If these have to be moved from one cleanroom to another, preventing cross-contamination is essential. As a result, a mobile solution should be designed for the cleanroom and comply with at least protection class IP65, to ensure that it meets suitability for cleaning conditions.

When using mobile solutions, taking the device out of the room to recharge the battery while production is in process is not desirable. Consequently, a long battery life is another essential criterion. It should be taken into account that a production shift can last for 8 hours in German-speaking regions, and up to 12 hours non-German-speaking regions. Over the course of its service life, a battery loses capacity, which is why you should never rely on the best-case battery performance. When trying to ensure that a battery will last throughout one or several shifts, you should assume a battery capacity of 75% as a basis, which should still be realistic after several years of use. Ideally, robust battery technologies (e.g. AGM – Absorbent Glass Mat) should be used which are characterized by high power and reliability.

When it comes to mobile solutions, it is also important to consider operator safety. Typical scenarios in production environments include a caster coming off the base of the device, the device hitting an obstacle, and the operator supporting themselves on the device. In each case, it has to be ensured that the device doesn't tilt or topple over. As a general rule, a mobile base with just four casters attached is not suitable for this.

Thanks to modern product designs, mobile solutions are no longer just available with

Figure 5: Inductive charging eliminates the need for cables in a cleanroom. The device can be operated while it is being charged.

HMI Assembly Options in Cleanrooms

one display, but also come as dual-screen display (duplex) solutions (see figure 4). This enables the operator to view several applications on the display at once.

Another development that has helped to make devices highly suitable for cleanroom use is not having to use charging cables, which means sockets in cleanrooms aren't necessary either. This is made possible by charging the batteries inductively. For this, one or several charging points are distributed around the cleanroom and are used to charge the device while it is in use (see figure 5). According to the current state of the art, the solution charges comparatively more quickly than cable-based charging equipment – depending on the version. Another advantage is that it saves space, as there is no longer the need for an allocated place to charge the mobile HMI.

Tablet PC

The tablet PC solution (see figure 6) is considered by many persons responsible to be the most cost-efficient solution for managing and visualizing processes in cleanrooms. A tablet PC is highly mobile, cost efficient and easy to replace.

However, this is a purely CAPEX (capital expenditure) point of view and is very rarely shared by production employees. In view of the differing perspectives, it is especially important to think about the application for which a tablet PC may be better or less well suited. Situations in which this still relatively new technology has been put into practice reveal that it is a particularly useful solution for maintenance, commissioning and when producing standard operating procedures (SOP). The mobility of a tablet is perfect for these applications.

Figure 6: A tablet is particularly suitable for use in maintenance and commissioning, and for producing standard operation procedures (SOP) in cleanrooms.

Other applications, such as operating a manufacturing execution system (MES) or a distributed control system (DCS) require the ability to input data. Inputing data on a tablet PC is done via an on-screen keyboard, which takes up space on the display. Consequently, the operator no longer has a clear overview and the tablet PC becomes a hindrance and a risk factor in the production process.

Permanently installed and mobile HMI solutions can be fixed into one specific position, which enables the operator to use both hands for their usual work tasks. In the case of a tablet PC, either a special shelf has to be created, or the operator has to continue carrying the device. Having to continue holding the device makes scanning processes with a tablet PC cumbersome compared with a hand scanner, due to the lack of ergonomics. On the other hand, a link with a hand scanner makes inputting data on a tablet difficult, as both hands are occupied.

The general usefulness of tablet PCs in cleanrooms also has to be considered. A product for private end users is suitable for use in a cleanroom only with the help of special auxiliary solutions, such as placing it in a stainless steel housing. If a tablet PC isn't protected, then its essential cleaning suitability is either not guaranteed, or is only possible with considerable outlay, as even open ports (Micro USB), for example, have to be cleaned meticulously. The extent to which it is possible to use standard cleaning products from the pharmaceutical and biotech industries then has to be determined for each individual case.

Another point that is often overlooked is the product life cycle of a commercial product. Tablets are subject to shorter life cycles than an industrial product. As a result, it is likely that after the successful testing, certification and procurement processes, the chosen tablet is replaced by the next model.

The final point that needs to be resolved is where and how to recharge the tablet PCs. Depending on the application, the battery life of a tablet PC in normal use probably would not last for an entire shift. If the device is to be charged in the cleanroom, it must be possible to clean the actual docking stations, and a charging place for the tablet PCs has to be provided. If the devices are to the recharged outside of the cleanroom, the tablet itself has to comply with the requirements for GMP-compliant cleaning suitability, so that it is easy to take it in and out of the cleanroom.

LEAN production

Another point that is often given only little thought when selecting and positioning the HMI devices is planning the HMI as an integral part of a LEAN production process. If you compare the spaghetti diagram (see figure 7) for permanently installed HMI systems and mobile HMI systems, inputting data at the location where the data occurs is significantly more effective, and also makes the process leaner. If this procedure is combined with biometric operator authentication, it significantly improves productivity.

Environment health & safety (EHS)

Considering different assembly options from an EHS perspective involves thinking about aspects such as device safety, device suitability for cleaning, environmental friendliness of the materials used and, in particular, ergonomics. It is important that devices go further than meeting the current state of the art; they must also be produced in a safe and sustainable manner. With regard to sustainability, the use of lead-free components and solder has now become state of the art, and manufacturers also have to comply with the REACH regulation (Registration, Evaluation, Authorisation and restriction of CHemicals).

In terms of health, cleaning the device using production-specific cleaning solutions must be easy and pose no problems; it must be facilitated by the design of the device, material characteristics and surface structure. A roughly ground stainless steel surface is not suitable in this case, and care should also be taken in the design, so as not to enable liquid and dust to collect easily on flat surfaces. Only if these measures are taken can it be ensured that operators do not come into contact with contaminated surfaces at a later point and that highly active substances do not accumulate on top of these surfaces.

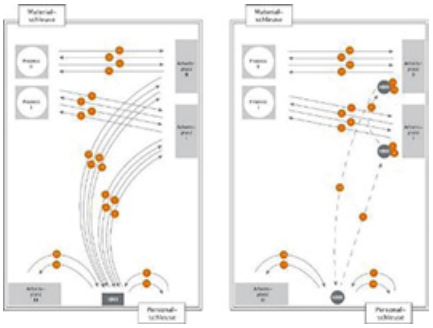

Figure 7: Illustration of workflow optimization and reduction of walking distances covered through use of a mobile HMI.

HMI Assembly Options in Cleanrooms

When it comes to safety, particular attention must be paid to avoid 90° angles in the design of the device wherever possible, to reduce the risk of the operator injuring themselves on the housing. For optimum device use, keyboards have to stick out from the front of the device, but in many instances this increases the risk of collision with the operator. If keyboards can be swung away out of the pathway of the operator, this is the preferred solution. A mobile solution has to have at least 5 casters, to ensure it doesn't tip over in the event that a caster comes off, and device top-heaviness is also a significant problem if a device is wheeled over ramps or bumps into obstacles.

Special solutions

Height-adjustable HMI

In many instances, a height-adjustable HMI assembly solution is considered to be an ergonomically suitable design. This is a useful solution for older HMI display devices, as their angle of view means operators can only view the device directly from the front. More recent display technologies, such as in-plane switching (IPS) allow you to view the display from a 178° angle. Furthermore, when combined with optical bonding (the gapless connection between display, touch and front glass) – as found on smartphones and tablet PCs – the display is significantly brighter, clearer and has better contrast. These technologies make it possible to forgo a height-adjustable assembly. They also considerably improve suitability for use in a cleanroom, due to the fact that mechanically height-adjustable solutions always have moving parts that interlink with each other. The cleaning suitability of this type of solution must always be assessed very critically, as normally it doesn't concern a closed system in accordance with the IP65 protection type.

Building management systems

Building automation doesn't just concern the decentralized management of an air-conditioning system; it also concerns designing a comprehensive solution to ensure that energy use, access control and set-up of control capabilities for monitoring ambient conditions are as efficient as possible. Due to the paperless documentation and network requirements from Pharma 4.0, the pharmaceutical and biotech industries are faced with additional requirements in terms of building management. In this case, the user interface is an HMI, normally with a small display and limited computing power, and which is connected to a central server via the network. From here, it makes requests for the information to be displayed and, if necessary, passes on the details entered by the operator. For these simple display tasks, it is sufficient to use a display that can be operated when in cleanroom protective clothing and has a network connection, plus, ideally, an integrated power supply via Power over Ethernet (PoE). This enables assembly and cabling work to be kept to the bare minimum. As it is the server that supplies the computing power, it is possible to forgo the use of powerful hardware and it is advisable to use a thin client. Ideally, it should be possible to assemble these displays to the cleanroom wall without using reinforcement, such that they are flush with the surface of the wall, thus guaranteeing IP65 protection. In the event of device malfunction, it must be possible for the operator to remove the device by lifting it towards themselves.

Figure 8: An HMI with a usually small display and limited computing power is used for the user interface of building automation systems.

Afterword

The requirements placed upon HMI systems in production environments within the pharmaceutical and biotech industries are diverse and challenging. As a result, the solutions have to be flexible and meet the complex requirements of good manufacturing practice (GMP) and its associated qualification. The needs of the operator should be just as much a priority as the actual suitability of the device for the production environment and easy cleaning of the devices. Depending on the scope of requirements, an HMI is no small investment, and is something that, with advanced planning and incorporation of the manufacturer in this process, ensures the best possible return on investment (RoI).

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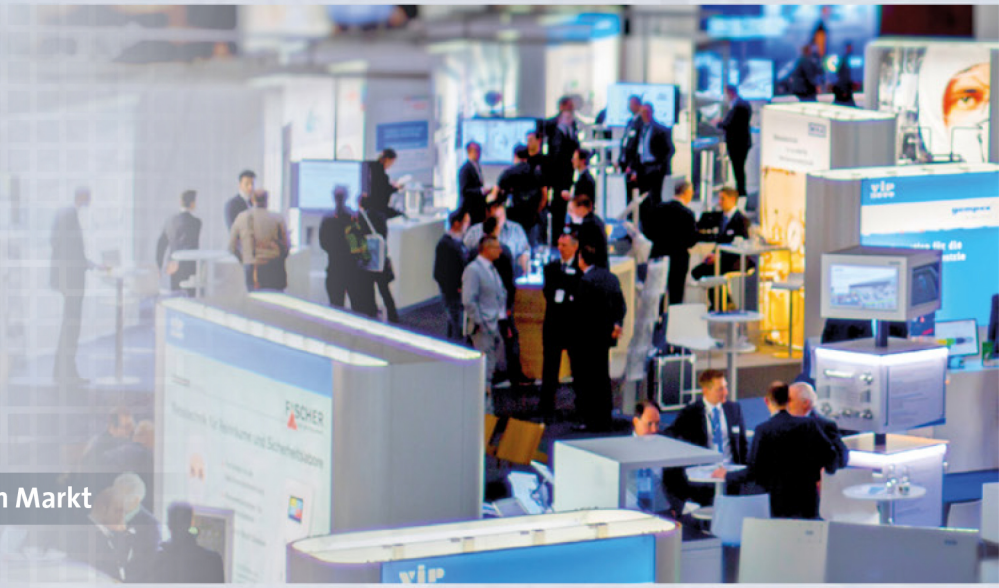
LOUNGES CLEANROOM PROCESSES

28.- 30. Januar 2020 · Messe Karlsruhe



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Imec shows excellent performance in ultra-scaled FETs with 2D-material channel

2D materials paving the way to extreme scaling for logic and memory transistors

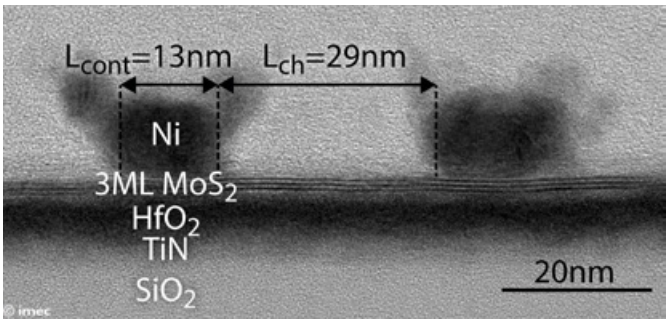
At this year's IEEE International Electron Devices Meeting (Dec 7-11 2019), imec, a world-leading research and innovation hub in nanoelectronics and digital technologies, reports an in-depth study of scaled transistors with MoS2 and demonstrates best device performance to date for such materials.

MoS2 is a 2D material, meaning that it can be grown in stable form with nearly atomic thickness and atomic precision. Imec synthesized the material down to monolayer (0.6nm thickness) and fabricated devices with scaled contact and channel length, as small as 13nm and 30nm respectively. These very scaled dimensions, combined with scaled gate oxide thickness and high K dielectric, have enabled the demonstration of some of the best device performances so far. Most importantly, these transistors enable a comprehensive study of fundamental device properties and calibration of TCAD models. The calibrated TCAD model is used to propose a realistic path for performance improvement. The results presented here confirm the potential of 2D-materials for extreme transistor scaling – benefiting both high-performance logic and memory applications.

Theoretical studies recommend 2D materials as the perfect channel material for extreme transistor scaling as only little short channel effects are expected compared to the current Si-based devices. Hints of this potential have already been published with one-of-a-kind transistors built on natural flakes of 2D materials.

For the first time, imec has tested these theoretical findings through a comprehensive set of 2D-materials-based transistor data. The devices with the smallest footprint have a channel length of 30nm and <50nm contact pitch. ON current as high as 250µA/µm has been demonstrated with 50nm SiO_2 gate dielectric. On current of ~ 100 µA/µm and an excellent SSmin of 80mV/dec (for VD =50mV) have been demonstrated with 4nm HfO_2 in a backgated configuration. The device performance is not impacted by contact length scaling, confirming that carriers are injected from the edge of the contact metal directly into the channel, in line with TCAD simulations. The work confirms that TCAD models capture large parts of device physics and guide experimental validation and mapping the application space. Part of the paper that is presented at IEDM, is dedicated to setting the path for device optimization for reaching Si-like performance targets.

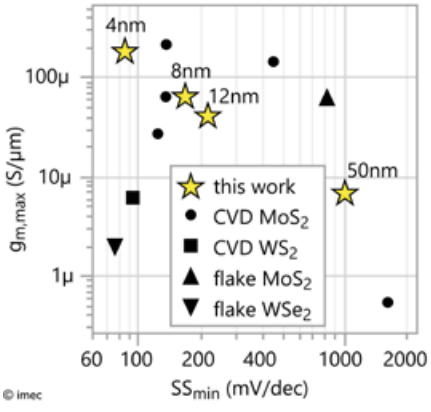
"Although still an order of magnitude away from Si transistors, we have brought our MOSFET devices into a realm where they show promising performance for future logic and memory applications", says Iuliana Radu, director of Exploratory and Quantum Computing imec. "To bridge this order of magnitude, we have identified a path of systematic improvements such as a further reduction of the gate oxide thickness, the implementation of a double-gated architecture, and further reduction of channel and interface defects. We are transferring this insight to our 300mm-wafer platform for transistors with 2D materials, which was announced at last year's IEDM."



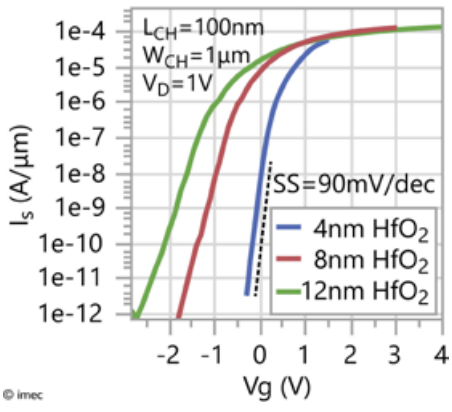
TEM pictures showing (a) 3 monolayers MoS2 channel, with contact length 13nm and channel length 29nm Transfer characteristics have improved sub-threshold swing (SS) with thinner HfO2.

"As a world-leading research and innovation hub, it is imec's role to push device scaling towards the ultimate limit. We are tackling this challenge by investigating different scaling options, providing optimal projections, and guiding the industry to adopt the proposed solutions, stated Luc Van den hove, imec CEO. "Our partners expect us to lead the way and to support them in realizing their roadmaps by demonstrating the potential of innovative concepts and novel materials. This is why I am so thrilled we have demonstrated excellent performance in ultra-scaled devices with 2D materials, and a credible path to further improvements aiming at mass production in industrial 300mm fabs."

IMEC Belgium BE 3001 Leuven



Benchmark study: imec's devices with 4nm, 8nm, 12nm HfO2 and 50nm SiO2 have excellent combination of gmmax and SSmin compared to literature.



Transfer characteristics have improved sub-threshold swing (SS) with thinner HfO2.

Milestones in Battery and Energy Research

Climate change and rising CO_2 levels on the one hand and a growing world population with increasingly scarce resources on the other are fueling the discussion about the phasing out of coal-fired power and replacement of fossil fuels. The energy revolution called for by all stakeholders is raising great expectations and posing even greater challenges. Climate pro-tection packages and a wide variety of programs to reduce CO_2 emissions are being de-manded and developed by science, industry, and politics alike. Future-oriented technologies such as alternative energy extraction and novel energy storage concepts, as well as the new materials required for these, are essential prerequisites for successful implementation of the "Energie¬wende" – the energy revolution begun in Germany. In this context, great expecta-tions are placed on battery research, and electromobility is even considered the white hope. The race for time and the best concepts has begun.

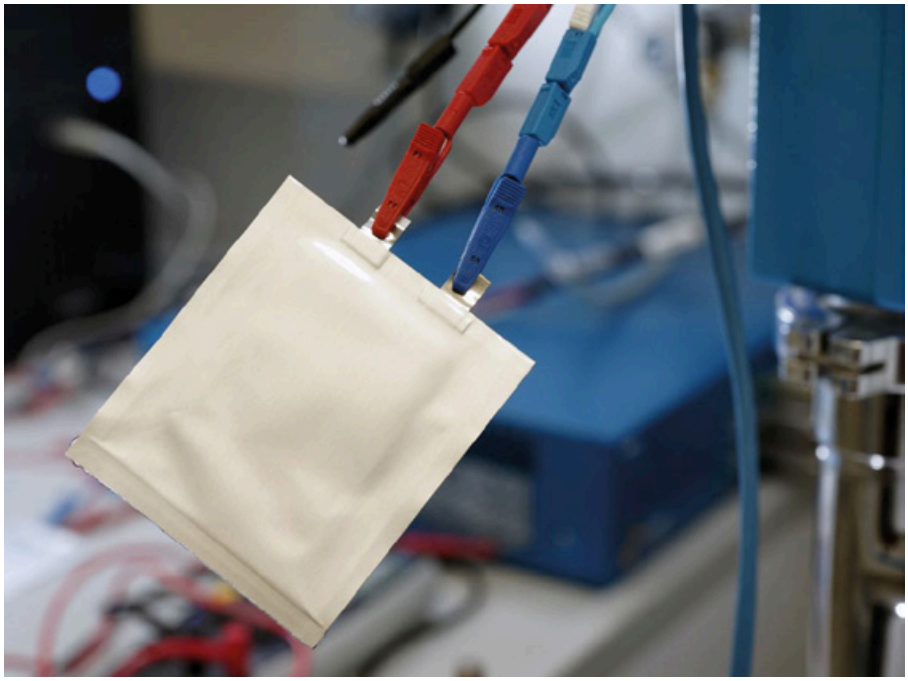
31st March - 03th April 2020: analytica 2020, Munich (D)

Future Technologies

At present and in the near future, lithium batteries are still the ultimate high performers in mobile and stationary power supply. It was only through them that electromobility became feasible and marketable. In view of the scarcity of resources, however, alternatives are urgently needed. Since development of high-performance battery systems is an extremely complex issue, it requires interdisciplinary research strategies and networks in science and industry.

Next-Generation Batteries

Development of sustainable and environmentally sound energy storage systems is one of the major challenges of the energy revolution. Due to their outstanding energy and power densi-ties, the compact lithium ion batteries that have been used very successfully so far have a high market potential, but have become extremely cost-intensive and questionable in terms of energy required for production and the increased demand for valuable and scarce raw mate-rials such as lithium and cobalt. This is why demands for more energy-efficient, more effi-cient, more cost-effective, and more environmentally friendly alternatives are increasingly being voiced. Sodium ion batteries may offer adequate solutions in the future.



Battery research – a topic for the future

The need for research is high. "This field of research is currently experiencing a tremendous boom. In Germany, in April the German Research Foundation (DFG) established a priority program (€ 12.6 million, duration 6 years), and the EU a training network (ITN, € 4 million, duration 4 years) – I have the honor of coordinating both programs," says Professor Dr. S. Ulrich Schubert of the Center for Energy and Environmental Chemistry Jena (CEEC Jena) at Friedrich Schiller University Jena. "The interest and investment of Evonik Industries AG likewise indicates the economic potential clearly. And there continues to be extremely strong interest from China and Japan."

The Federal Ministry of Education and Research (BMBF) is also funding the "Transition" joint research project for more sustainable energy storage with € 1.15 million. The project involves the Helmholtz Institute Ulm (HIU) founded by the Karlsruhe Institute of

Milestones in Battery and Energy Research

Technology (KIT), the Centre for Solar Energy and Hydrogen Research Baden Württemberg (ZSW), and the Frie-drich Schiller University Jena (FSU). The aim is to develop an alternative to conventional lith-ium ion batteries. In this project, too, scientists are investigating suitable active materials and electrolytes for next-generation sodium ion batteries.

"Polymer-based batteries, i.e. batteries that use polymers as active materials for storing elec-trical energy, have been under intensive investigation in my research group since 2011," notes Professor Schubert. "For the first time, we were now able to present a thin-film battery generated by ink-jet printing. We were also able to file patents and publish papers concerning a number of new active materials. Evonik Industries AG is currently about to commercialize these new polymers as printable inks (under the brand name of 'TAeTTOOz')."

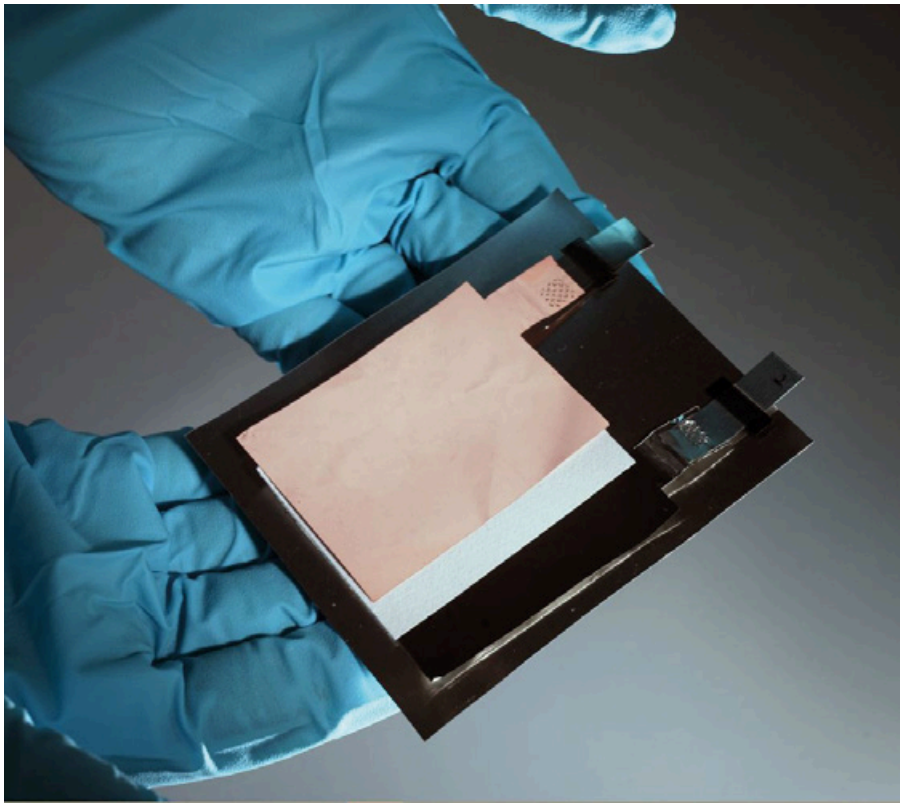
The innovative batteries are required to be sustainable, environmentally friendly, and cost-effective, and to provide high performance as well. The development of novel metal-free and printable energy storage systems based on polymers opens up promising application areas in the health care sector, in sensor technology and for the Internet of Things. "This applies above all to the area of printable thin-film batteries. From active RFIT tags through 'patches' for transmitting health functions to intelligent clothing," adds Professor Dr. Ulrich Schubert.

Energy Efficiency and High Performance

Batteries need to prove their reliability and performance even under the most adverse condi-tions. At the same time, potential hazards and risks in the event of faulty operation and de-struction must be eliminated throughout the entire life cycle. In addition, especially in the dis-cussion about e-mobility, the long-term operability of battery cells is in the focus of atten-tion.

Compared to the established lithium ion batteries, new types of plastic-based batteries have numerous advantages. The production of such batteries is already much more energy-ef-ficient due to the organic and polymer materials used. Polymers as active materials require a much smaller CO_2 footprint during production. Furthermore, they are generally less toxic and flammable. Moreover, these batteries can be processed using printing techniques (screen-print-ing, inkjet printing, roll-to-roll printing).

The same holds true for their application. Eventually, disposal and recycling are also more environmentally sound and much more cost-effective. Batteries with polymers as active elec-trode material are also more sustainable, as the use of heavy metals can be dispensed with. The prototype of a sodium ion battery, as being researched in the Transition joint project, consists on the anode side of biomass-based hard carbon in combination with aqueous binders and aluminum as current collector, and on the cathode side of transition metal oxides. In addition, improved structure-pro-perty relationships are the prerequisite for controlled electro-chemical reactions.



Electromobility

In the short and medium term, lithium ion batteries are at the heart of all electromo-bility, due to their performance and energy densities. They ensure operating time and range, depending on external conditions such as areas of application, temperatures and driving behavior. In the foreseeable fu-ture, sodium ion batteries will not be able to replace, but according to experts only to supplement lithium ion batteries. In the field of electromobility, water technology is also considered to have potential if various safety aspects are met.

Analysis and Characterization

Every research and development result is only as good as its process-accompanying analytics. Therefore, modern analytical met-hods for determination of electrolytes and identification of trace substances, raw mate-rials, and material components are indispen-sable in today's battery research. The latest instrument technologies for such measure-ments and material tests will be presented comprehensively over their entire spectrum at analytica in Munich. Experts are going to present the latest technologies and methods from chromatography, spectrometry, micro-scopy, surface and ion analysis at the world's leading trade fair analytica. Moreover, live ex-periments will be carried out in the Live Lab Plastics Analysis/Polymers. Interested parties will have the opportunity to experience inno-vations from the fields of plas-tics and mate-rials analysis live in a real laboratory.

At analytica in Munich from March 30 to April 03,experts will learn about the most important innovations in the industry. Expert knowledge and innovative analysis technolo-gies represent enormous added value for re-search into new battery systems. In Munich, relevant key tech-nologies allow a look into the future.

Messe München GmbH
D 81823 München

Pinpoint secures new investment to develop ImpactAir® Range

UK manufacturer attracts investment to grow business

Pinpoint Scientific, specialist product designers and manufacturers of environmental monitoring solutions for the pharmaceutical and related industries, is pleased to announce it has secured further investment into the business, to aid the development of its ImpactAir® range of environmental monitoring solutions.

Cherwell Laboratories and Development Bank of Wales (DBW) have both invested into Pinpoint and taken a minority share in the business. The investment not only secures jobs in South Wales, a key objective of DBW, but also allows the business to bring to the market some exciting new products within the ImpactAir range. Cherwell are an existing distributor of ImpactAir products within the UK and Andy Whittard, Cherwell's Managing Director, has also taken a seat on the Pinpoint board to help with business strategy and planning.

Gethin Jones, Managing Director of Pinpoint and the designer of the ImpactAir product says: "This is an exciting time for Pinpoint. We have been working on very innovative ideas to develop a new generation of microbial air monitors to meet the new Pharmaceutical regulations. This investment is perfect timing for Pinpoint and allows us to create a range of ground-breaking products for this market."

ImpactAir® microbial air samplers developed by Pinpoint Scientific.

Andy Whittard added: "I am really excited to join up with Gethin and the team at Pinpoint and help create an exciting range of products for pharma EM. The Annex 1 revision is potentially going to shift the dynamics for EM within grade A spaces and I think Pinpoint are well placed to service that need with innovative and highly effective monitoring devices."

Sarah Smith, Investment Executive with the Technology Venture Investment team at the Development Bank of Wales said: "Our Wales Technology Seed Fund provides businesses like Pinpoint with the funding that they need to further develop their products. Together with Cherwell Laboratories, we will work with the team to support their growth in this niche sector as providers of continuous air quality for life science cleanrooms. This is an exciting time for the team as they look to capitalise on their existing customer base and scale the business. We wish them every success."

The ImpactAir range of microbial air samplers is shortly to be expanded with the introduction of the new ImpactAir® ISO-90 Monitoring Platform. ImpactAir is designed for continuous monitoring in high-grade areas, where in-process sampling of viable particles is often critical. The ImpactAir ISO is a modular system designed to integrate into isolators or RABS, using an external controller and local or remotely located air mover. It can be designed in almost any orientation using standard or custom-made connections. The ISO-90-Monitoring Head features a chamber for 90mm agar plates and a highly efficient slit to agar sampling method. The low D50 value and ability to sample for long periods makes the ISO-90 ideal for continuous monitoring as demanded by the Annex 1 revision.

Cherwell Laboratories Ltd
OX26 4XB BICESTER
Vereinigtes Königreich

Gerresheimer opens a new plant for the production of pharmaceutical primary plastic packaging in China

A new plant for producing plastic pharmaceutical packaging has been set up in the Chinese city of Changzhou to help satisfy the high demand for Gerresheimer's primary packaging in China in the future. Today the new facility will be officially opened.

„"From now on, we will also have production facilities in China to meet the needs of our customers and partners," says Niels Düring, Global Executive Vice President Plastic Packaging, at the opening ceremony for the Changzhou plant on December 11, 2019. His welcoming speech follows a presentation of the plant by Jari Tevajarvi, Vice President Plastic Packaging Asia, and Plant Manager Paul Chen.

The ceremony attracts numerous guests from both China and abroad, including official representatives from the local development authority (Development Zone) Zhou Yongqiang and Feng Xujiang.

The new plant will be operating in clean rooms class 9 and 7. The Food and Drug Administration (FDA) has just registered the US type containers for the US market. This is combined with a Drug Master File (DMF) number for the Triveni site in India, which means that the Gerresheimer customers can now use containers produced in Changzhou for their export products to the USA. The Changzhou plant is also in process of getting approval from Center for Drug Evaluation, CDE for the locally manufactured containers to also supply the local Chinese marker with high quality plastic primary packaging.

Gerresheimer AG D 40468 Düsseldorf

Le nouveau salon de l'industrie à Berne s'appelle Innoteq

Le nouveau salon phare pour l'industrie des machines-outils, les négociants de machines et d'outils ainsi que pour les fournisseurs de l'industrie MEM a été baptisé : il s'appelle Innoteq. Ses organisateurs sont les associations tecnoswiss, Swissmechanic et Swissmem, ainsi que le groupe BERNEXPO.

02.03. - 05.03.2021: Innoteq 2021, Bern (CH)

Du 2 au 5 mars 2021, puis tous les deux ans, se tiendra le nouveau salon phare de l'industrie des machines-outils, des négociants de machines et d'outils ainsi que des fournisseurs de l'industrie MEM. Ce nouveau salon s'appelle Innoteq.

Des partenaires forts

Le nouveau salon phare pour l'industrie des machines-outils et les fournisseurs est organisé par les associations tecnoswiss, Swissmechanic et Swissmem, ainsi que le groupe BERNEXPO. « Des partenaires forts sont indispensables pour le lancement d'une nouvelle manifestation de cette envergure. Le contact direct avec l'industrie et son soutien sont fondamentaux et sont assurés avec ces trois partenaires », relève Pascal Blanc, directeur du secteur Industrie et technique du groupe BERNEXPO. Innoteq remplace les précédentes foires suisses de Berne et de Bâle.

Ensemble, les trois associations responsables visent à mettre sur pied un salon réunissant les derniers développements, les nouveautés dans le domaine des produits ainsi que des informations d'actualité. Par ailleurs, Innoteq doit renforcer la visibilité du secteur au sein de l'industrie MEM et en dehors de celle-ci. Ce salon prévoit d'accueillir quelque 550 exposants et 25'000 visiteurs professionnels, qui y trouveront une vitrine très complète du secteur et une plate-forme de réseautage.

Manifestation de lancement en mars

L'Innoteq se tiendra sur le site du groupe BERNEXPO à Berne. « Notre site offre les conditions idéales pour l'Innoteq », se réjouit Pascal Blanc. « L'espace disponible permet de nouvelles variantes conceptuelles offrant une valeur ajoutée pour les exposants, les visiteurs et les partenaires. Afin d'augmenter l'attrait pour les visiteurs, nous misons sur une concentration élevée d'exposants et de compétences en matière de processus. »

Innoteq innove également pour l'acquisition des exposants : le 26 mars 2020, une manifestation de lancement pour le secteur sera organisée à Berne. Le nouveau salon et son identité visuelle y seront bien sûr présentés, mais l'événement offrira également des possibilités de réseautage et mettra en oeuvre un concept novateur de répartition de la halle, basé sur l'esprit d'initiative. Des informations complémentaires seront publiées début 2020.

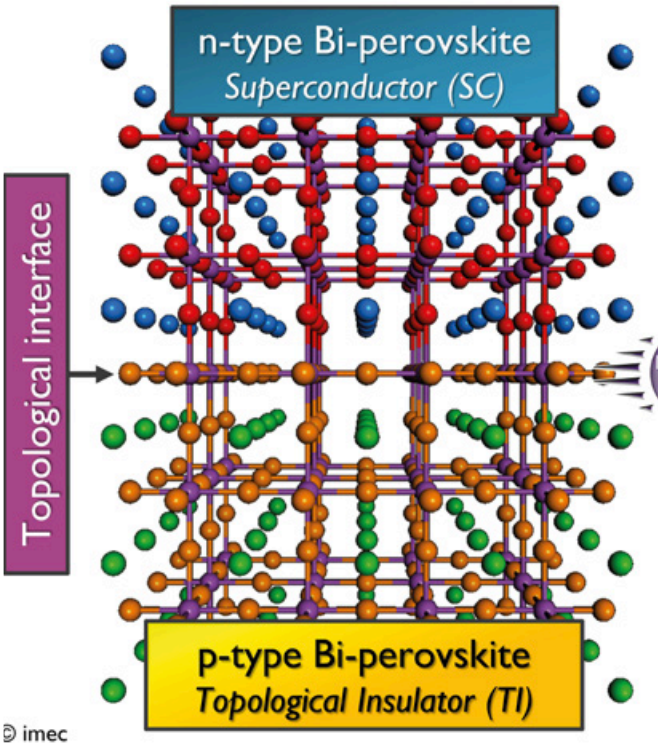
BERNEXPO AG
CH 3000 Bern 22

Prestigious European ERC Consolidator Grant awarded to imec's Clement Merckling for developing fault-tolerant Qubits

Imec, a world-leading research and innovation hub in nanoelectronics and digital technologies, today announces that the European Research Council has awarded Clement Merckling, principal member of technical staff at imec, a Consolidator Grant for working out his project NOTICE. Groundbreaking idea of this project is the research of novel oxides and experimental realization of topological interfaces to generate Majorana fermions that will lead to fault-tolerant qubits devices – building blocks of the next-generation quantum computers. These "Majorana qubits" are expected to be immune to decoherence – a phenomenon that induce the loss of quantum information. Clement Merckling receives 2.3 million euro for this ambitious 5-year project that might open the path to 'stable' quantum devices.

Quantum computing is expected to enable a gigantic improvement in computation capabilities as compared to classical computing. The fundamental building block of a quantum computer is the qubit, a two-level system that obeys the laws of quantum mechanics. Present developments mainly focus on semiconducting quantum dots and superconducting qubits, that hold promising properties for quantum computing and manufacturing. However, these qubits suffer from decoherence. Today, this challenge is being addressed by upscaling the density of qubits (target above 106 per chip) and making use of quantum error correction algorithms.

"The ERC Consolidator Grant allows me to explore the next-generation of qubits – the Majorana qubits," explains Clement Merckling.



Groundbreaking idea of the NOTICE project is to use a novel stable oxide material as the basis for both the superconductor and topological insulator material. At the epitaxial interface, Majorana fermions – building blocks for fault-tolerant qubits – will be generated.

"The main challenge in Majorana qubits is to generate Majorana fermions that can hold and preserve a quantum state. The way to do that is to stack a superconductor on top of a material with strong spin-orbit coupling (SOC), such as a topological insulator." Majorana fermions have been predicted theoretically, and recently, first signatures of their existence have been demonstrated by using different material combinations and device architectures.

Within the project called NOTICE (for Novel Oxides and Topological Interfaces for quantum Computing Electronics), the experienced researcher will follow an innovative route for generating Majorana fermions. This route will answer today's major blocking points, being the stability and oxidation of the SOC materials, and the defectivity of the interface between the SOC and superconducting materials. Groundbreaking idea is to use novel and stable oxide materials – i.e., a bismuth-based 'perovskite' oxide – as the basis for both the superconductor (by p-type doping) and topological insulator (by n-type doping). This material system combination is expected to create a perfect epitaxial interface, at which the Majorana fermions will be generated." In a final stage, the team will focus including its integration into Si as to enable reliable and scalable Majorana-based quantum devices, paving the way to large scale manufacturability.

"We are very proud that an experienced researcher such as Clement Merckling is awarded an ERC Consolidator Grant and as such gets a unique opportunity to establish a team and carry out a frontier research project," said Luc Van den hove, president and CEO of imec. "Quantum computing is a very promising area of innovation for Europe, holding a huge industrialization potential. The ability to develop the technology and put it into industrial use across a wide spectrum of applications is one of Europe's major challenges. This project in particular is expected to revolutionize quantum computing on the longer term. But it will also open new horizons for materials science and epitaxy – two fields that support major breakthroughs in many other domains."

IMEC Belgium
BE 3001 Leuven

Clement Merckling

Imec presents forksheet device as the ultimate solution to push scaling towards the 2nm technology node

TCAD simulations of a new forksheet device show 10 percent performance boost and 20 percent cell area reduction compared to gate-all-around nanosheet devices.

This week, at the 2019 IEEE International Electron Devices Meeting, imec, a world-leading research and innovation hub in nanoelectronics and digital technologies, presents first standard cell simulation results of its forksheet device designed for sub-3nm logic technology nodes. Compared to nanosheet devices, the reduced n-to-p spacing results in a 10 percent performance increase. When combined with scaling boosters, the new device architecture will bring logic standard cell height down to 4.3 tracks, which combined with cell template optimization can result in more than 20 percent area reduction. The results value the forksheet architecture as a potential solution to extend the scalability of nanosheet structures beyond the 3nm logic technology node.

The forksheet device has recently been proposed by imec as a natural extension of vertically stacked lateral gate-all-around nanosheet devices. Contrary to the gate-all-around nanosheet device, in the forksheet, the nanosheets are now controlled by a tri-gate forked structure, realized by introducing a dielectric wall in between the P- and NMOS devices before gate patterning. This wall physically isolates the p-gate trench from the n-gate trench, allowing a much tighter n-to-p spacing – a challenge that could not be answered with FinFET or nanosheet structures. Because of this reduced n-to-p separation, the forksheet is expected to have superior area and performance scalability.

For the first time, standard cell simulations confirm this excellent power-performance-area (PPA) potential of the forksheet device architecture. The device under study targets imec's 2nm technology node, using a contacted gate pitch of 42nm and a 5T standard cell library with a metal pitch of 16nm. The proposed design includes scaling boosters such as buried power rails and wrap around contacts. Compared to a nanosheet device, a 10 percent speed gain (at constant power) and a 24 percent power reduction (at constant speed) is reported. The performance boost can be partly explained by a reduced miller capacitance, resulting from a smaller gate-drain overlap. Finally, the n-to-p separation reduction can be used to reduce the track height from 5T to 4.3T. Further layout optimization exploiting the structure of the device enables more than 20 percent cell area reduction. When implemented in an SRAM design, the simulations reveal a combined cell area scaling and performance increase of 30 percent for 8nm p-n spacing.

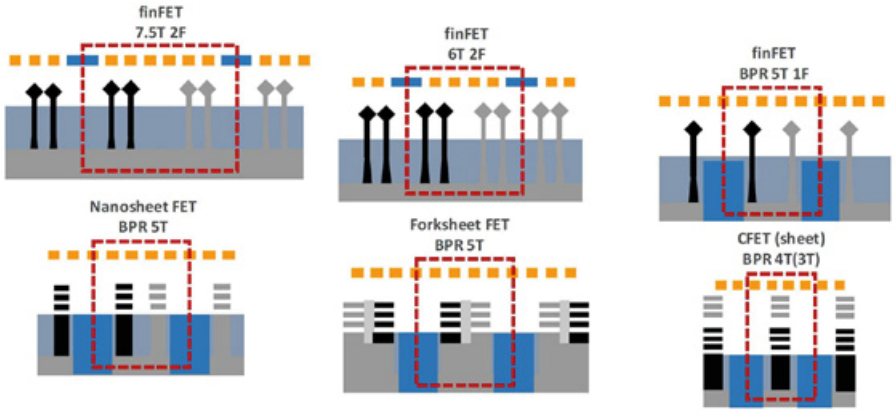


Figure 1 – From FinFET to nanosheet (with buried power rails (BPRs)), forksheet and CFET.

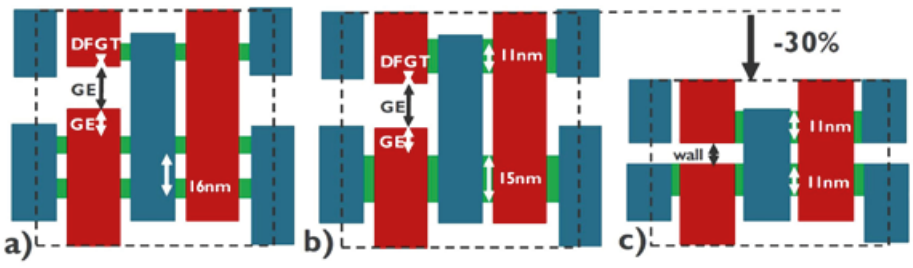


Figure 2 – Layout of SRAM half cells for a) FinFET, b) gate-all-around nanosheet and c) forksheet. The forksheet can provide up to 30% scaling of the bit cell height as the p-n space is not governed by gate extension (GE), gate cut (GE) or dummy fin gate tuck (DFGT).

"As industry scales from planar to FinFET to vertically stacked nanosheets, the forksheet concept is considered non-disruptive extension", says Julien Ryckaert, Program director 3D hybrid scaling at imec. "The nanosheet device has mainly been introduced to improve electrostatic control and drive strength. But both for FinFET and nanosheet architectures feature a large n-to-p device separation distance hindering further scalability. The forksheet architecture is one way to address this challenge and can be considered the ultimate logic 'universal' CMOS device beyond 2nm. Continuing scaling beyond the forksheet device, we propose the complementary FET (or CFET) as a device cadidate." The process flow for the forksheet is similar to the one of a nanosheet device, with only limited additional process steps.

This work is part of imec's logic INSITE R&D program targeting design-technology co-optimization (DTCO) for beyond 3nm technology nodes. The results will be presented at IEDM2019 on Wednesday Dec 11, session 36.5 (3:15 p.m.). Also, Julien Ryckaert, program director will discuss imec's roadmap towards sub-2nm technology nodes, from vertically stacked nanosheets, forksheets, and finally CFET, in conjunction with scaling boosters, in an invited talk on Wednesday 11th at 10:20AM.

IMEC Belgium
BE 3001 Leuven

Injection Molds: Easier Decisions in Mold Design Using Virtual Molding

Upfront simulation of the core pins' deformation helps choose the mold materials

SIGMASOFT® provides a variety of methods to forecast the shrinkage and warpage of plastic parts. Along with this, one can also simulate the deformation of inserts or core pins during filling. SIGMA simulates and compares the deformation of core pins made of two different mold materials under equal process conditions. The calculations are based on the imbalanced melt flow inside the cavity and the mechanical properties of the two materials.

There are many questions that injection mold manufacturers confront daily regarding the variety of mold materials which are available in the market. What type of steel should be used for which part of the mold? Whether it is the thermal conductivity of the steel used for the cavity insert, the diameter of a suitable ejector pin or even the mechanical stability of the core pins, SIGMASOFT® Virtual Molding leads to the correct decision.

In SIGMASOFT® every mold material, e.g. steel, isolation, etc., is taken into account with its thermal and mechanical properties. As an example, one can simulate the heating up phase or the developement of hotspots during several injection cycles having the thermal conductivity and specific heat capacity of all the mold materials. Besides the prediction of shrinkage and warpage of plastic parts, SIGMASOFT® also simulates the deformation of inserts and core pins during filling. These calculations are based on possible imbalances in the filling of the cavity and of course the mechanical properties of the steel.

SIGMA Plastic Services, Inc. (IL), the American subsidiary of SIGMA Engineering GmbH, simulated an interesting project in cooperation with two companies, CAVAFORM (FL) and Crafts Technology (IL). In the project the deformation of core pins made of different materials during filling of the cavity was evaluated. The investigation was done for an injection mold with 16 cavities, which is used to produce centrifuge tubes. In 8 of these cavities, core pins made of tungsten carbide are integrated to form the inside of the tubes. 420 stainless steel is used for the other 8 core pins. Simulative analysis of the filling phase shows an imbalance, which comes to existence after about 85% of filling has passed and becomes more obvious near the end of filling (Figure 2). This imbalance is caused by the asymmetrical geometry of the screw in the cap area of the tube and leads to a force, which tends to deform the core pins during the filling of the cavity. Due to the lower module of elasticity of 420 stainless steel, pins made of this steel are deformed about 3 times more compared to the pins made of tungsten carbide (Figure 1).

The described case is just an example of the many details of an injection mold, which can get misplanned during the mold design phase. SIGMASOFT® Virtual Molding provides even the most experienced mold manufacturers with a detailed insight of the injection molding process. With a very low effort and based only on the thermophysical and mechanical phenomena, even before ordering the mold units, they can examine and evaluate the effect of changes in the mold. Thus, simulation provides a sound basis for decisions and supports the mold design from the beginning.

SIGMA Engineering GmbH
D 52072 Aachen

Figure 1 – Simulative comparison of the deformation of core pins made of tungsten carbide (left) and 420 stainless steel (right) at the end of the filling of the cavity – the material with the lower modulus of elasticity deforms three times more under constant process conditions.

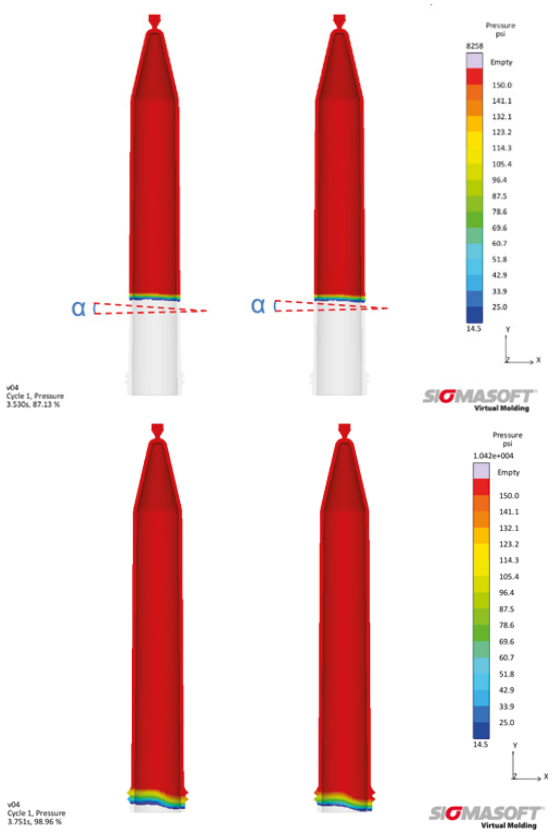


Figure 2 – Demonstration of the melt pressure in two cavities with core pins made of tungsten carbide (left) and 420 stainless steel (right) – The upper section shows the point in filling where the imbalance is visible for the first time. At the end of filling (lower section) this phenomena can be seen clearly.

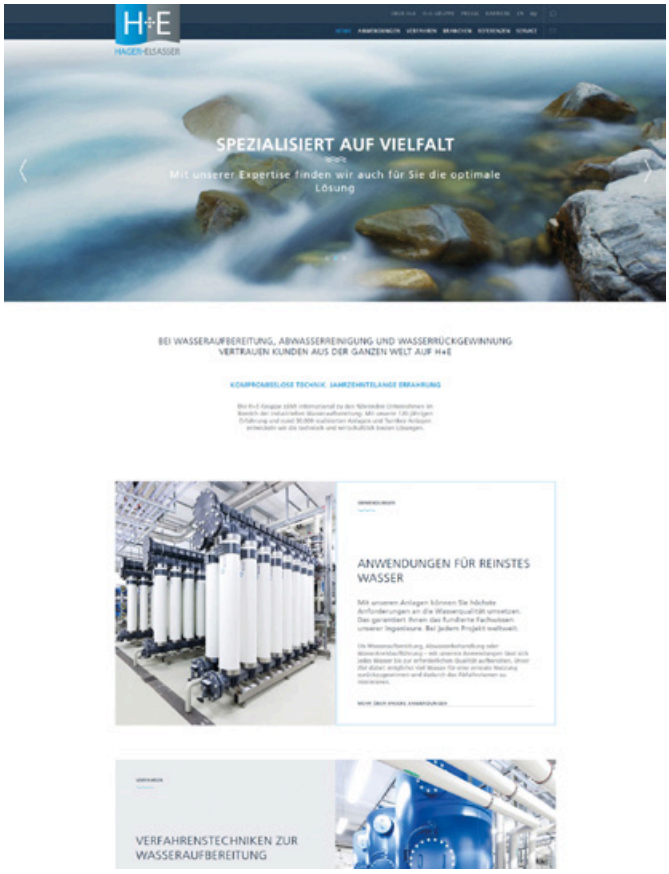
One digital brand identity for the entire Group

On the new H+E website, all companies are brought together for the first time

Information that was previously located on many different websites is now united under the www.he-water.group web address. The new corporate website for the H+E Group has been online since 2 December, and it reflects the success and values of the entire group. The digital business card in its German, English and Russian versions is designed to be user-friendly with an updated, modern and streamlined corporate design. It is geared strictly to the requirements of international users. It offers information on the group's very broad technology portfolio, 120 years of history and current references. Further languages will follow.

H+E's customers have long benefitted from the expertise of the entire group of companies. However, information on the individual companies was still available on various separate websites. This has now changed with the launch of the new website, where everything worth knowing is bundled and clearly arranged in German, English and Russian. Thanks to clear menu navigation, interested users can quickly move to innovative applications, successful technologies and current reference projects from all over the world.

Water, as our planet's most precious resource and number one focus at H+E, is the overarching element on the site. With their in-depth and comprehensive knowledge of the industry, the engineers develop an optimal and reliable solution to meet any requirement. "At H+E, we are all highly motivated to achieve a common goal: the protection of water as an invaluable resource. This standard, which we have set for ourselves, also had to be clearly conveyed through our new website. It has to show users which solutions are possible, sustainable and economical," says Thomas Will, COO of the Aquarion AG.



For the first time, the H+E Group is presenting itself with a joint website – currently in German, English and Russian. Further languages will follow. (Source: H+E GmbH)

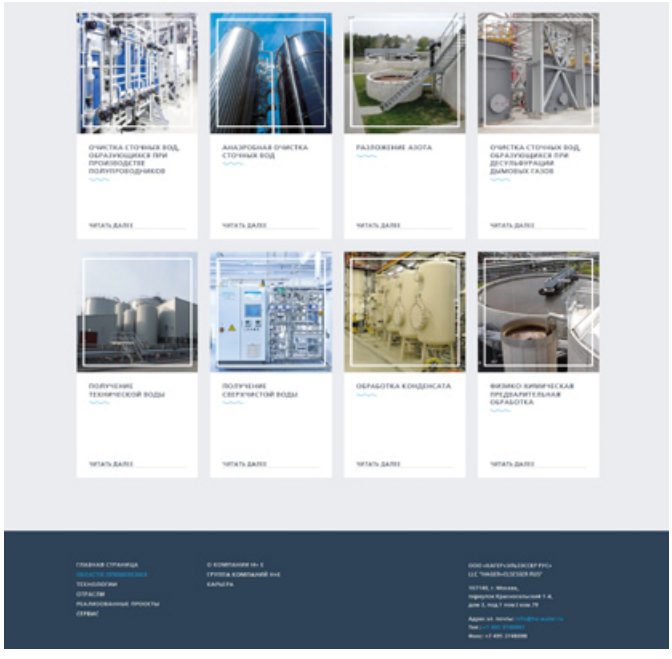
Service is a top priority everywhere

Direct contact with the experts is also possible through many different channels – as an integral part of the customer service provided by the Stuttgart-based company. H+E is well known for its 24-hour hotline, spare parts inventory and much more. This service concept is also reflected in the new website.

Numerous companies for industrial water treatment, wastewater treatment and water recovery, which develop the technically and economically best solutions for their customers, all come together under the umbrella of H+E GmbH, based in Stuttgart. With over 30,000 completed projects in more than 130 countries, the globally active group of companies is one of the leading plant manufacturers – a benchmark that the new website also lives up too.

Since H+E has been on a strong and sustainable course of success for several months now and continues to take in new orders, the Group is increasingly on the lookout for qualified employees in all relevant specialist areas. All interested applicants will find current vacancies, which are constantly updated, in the new website's career section.

H+E GmbH D 70565 Stuttgart



The website provides visitors with information on the Group's very broad technology portfolio, 120 years of company history, current references and much more. (Source: H+E GmbH)

MEDICA and COMPAMED
hold their own in a challenging and demanding market environment

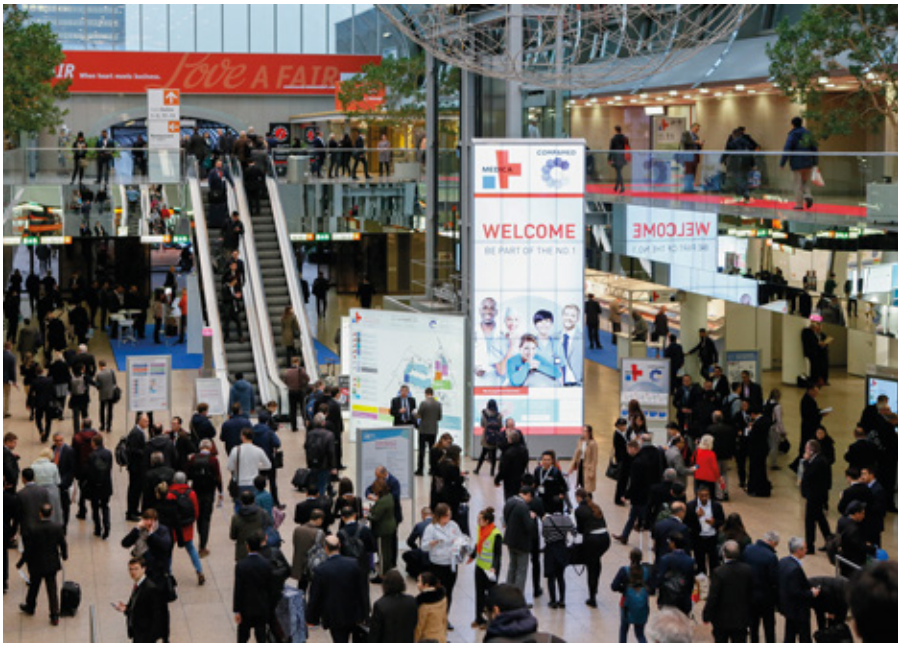
International decision-making elite of the healthcare industry demonstrates presence – New thematic hall structure well received

16th - 19th November 2020: COMPAMED + MEDICA 2020, Duesseldorf (D)

The demand market for medical technology and medical products is becoming increasingly challenging and discriminating worldwide. Providers are adapting to this on a flexible basis and furnishing appropriate answers that include innovations for modern and cost-efficient medical care. Visitors were able to see this for themselves at MEDICA, the world's largest medical trade fair, and COMPAMED, the leading trade fair for the medical technology manufacturing supplier market, both of which took place in Düsseldorf. The slogan "Be Part of the No. 1" was embraced by experts from all areas of the health industry, who provided for a slight increase in the number of visitors to the fully utilised exhibition halls over the four days of the fair (18–21 November 2019).

"MEDICA and COMPAMED are the no. 1 market platforms for international business. Through their exhibitor and visitor numbers, they have confirmed their role as growth drivers for exports. This is in the interests of suppliers, of whom a great deal is currently being demanded in this market environment. Increasing trade restrictions, uncertainty in regard to Brexit, growing pressure on margins and other challenges, including ever more complex approval procedures for medical products, should be mentioned in this context," says Wolfram Diener, Managing Director of Messe Düsseldorf, summing up the trade fair environment. Some 5500 exhibitors at MEDICA and nearly 800 at COMPAMED ensured a new record in participation. Something that was seen as positive particularly from the point of view of the many international exhibitors was the fact that more than 90 per cent of the 121,000 trade visitors have decision-making authority. Two-thirds of the visitors came from abroad, representing some 170 countries.

Numerous delegations with senior decision-makers from regions including Asia (such as Thailand's Deputy Prime Minister and Trade Minister Jurin Laksanawisit), North Africa and South America contributed to this high degree of internationality, which very much accommodates the export interests of many suppliers.



"MEDICA is not only the most important event of the year for many of our members from the medical technology sector. With its many visitors and exhibitors, it is also the world's leading trade fair for the industry", says Jörg Mayer, Executive Director of the German industry association SPECTARIS. Together with Germany's Association for Electromedical Technology (ZVEI), SPECTARIS organised the MEDICA TECH FORUM in Hall 12, which dealt with questions including international market access and regulatory requirements for medical technology and was well received by visitors. In this regard, there was a particular focus on the national markets of China and Russia.

Bringing together what belongs together

There was a great deal of positive feedback regarding the new allocation to the exhibition halls according to topic. The large national and international joint exhibition areas were given more space in Halls 15 to 17. The manufacturers of surgical instruments were moved from Hall 13 to Halls 10 and 11 so that they could be closer to the suppliers of complete OR solutions and imaging processes, given the common ground they share thematically. The MEDICA segment relating to information and communication technology for the first time was presented with its exhibitors and specialist forums in Hall 13 (previously in Hall 15), linking it directly with the halls dedicated to medical technology and electro-medicine.

"The new concept is confirmed by the consistently high number of visitors in the halls. The MEDICA HEALTH IT FORUM and the MEDICA CONNECTED HEALTHCARE FORUM were real hotspots, with high attendance on all days and a total of more than 10,000 visi-

MEDICA and COMPAMED hold their own

tors", says Horst Giesen, Global Portfolio Director for Health & Medical Technologies at Messe Düsseldorf, who was pleased with how well the new organisation of the exhibitors and forums was received. The thematic reorganisation was inspired by the fact that health IT is being regarded less and less as an isolated discipline. Particularly in the areas of electro-medicine and medical technology, many innovations are software-driven (increasingly with the use of artificial intelligence) and equipped with the necessary interfaces for secure integration into network structures.

Focus on robotics and how this technology will be used in future

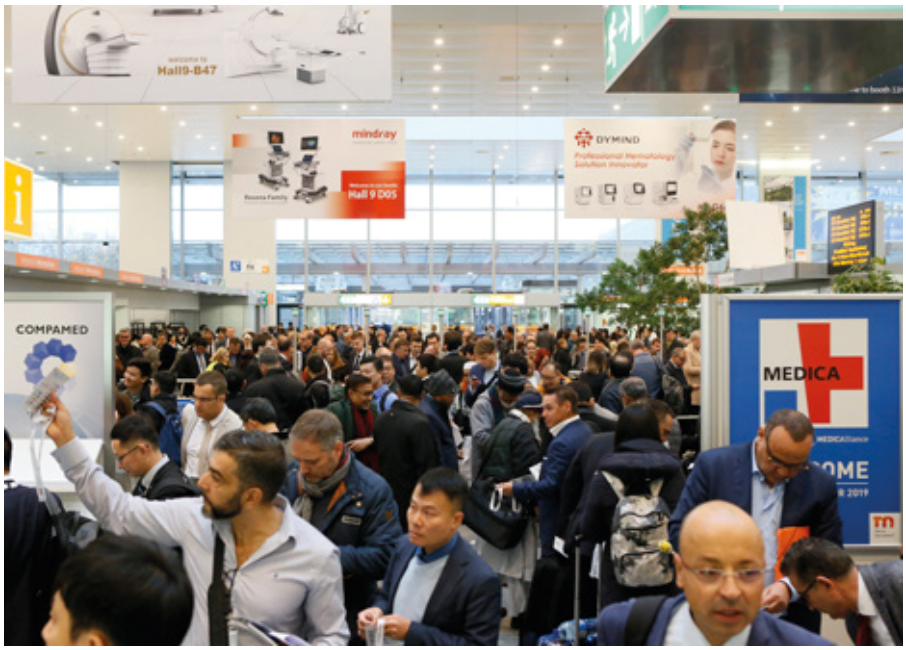
An example of this development is medical robotics applications, which represented a content focal point at MEDICA 2019 and will become even more important in future. KUKA, one of the leading providers of robotics and automation solutions, used the MEDICA platform to demonstrate a variety of possible applications for its lightweight medical robot "LBR Med" in the final round of its "Innovation Award". The spectrum of award topics ranged from a robot platform with magnetic capsules for early detection of colon cancer to an application that provides robot-supported laser treatment for varicose veins and robot-assisted, personalised back massages. "temi" was another innovation at MEDICA. This home-care robot is manufactured by Medisana and is a digital everyday aid that aims to help people remain in their own homes far into old age.

Robert Geiger, Managing Director of Aktormed, explains that use of robots is not intended to replace doctors but to provide optimal support for the "human factor": "Our robot-assisted assistance systems allow the surgeon to perform minimally invasive, highly precise operations while reducing the strain on medical personnel to the greatest extent possible." The company sees itself as market leader in the area of robotic camera control, has been a MEDICA exhibitor since 2013 and this year was located in the middle of the electro-medicine area in Hall 10 for the first time. "We are interested in B2B relationships. The success of our MEDICA contacts can therefore only be assessed in an interval of one to two years. Looking back on our initial years at the fair, we are very satisfied," says Robert Geiger.

The groundbreaking topic of medical robotics is now included in the exhibitor product categories of MEDICA. In this way, companies with expertise in "Medical Robotics", such as KUKA, Aktormed, intelligent motion and Stryker, can now be quickly identified by visitors.

Compact, interconnected and artificially intelligent

Compact solutions for better networking of the participants in the healthcare sector, such as for data transfer between doctors and for communication between doctor and patient, are also on the advance. Many MEDICA exhibitors demonstrated what these 'mHealth'



(mobile health) applications, which are very much in line with current trends, are already accomplishing today in order to accelerate care and make it less complicated. Some examples to be mentioned here in particular would be the young companies participating in the MEDICA START-UP PARK, the "Disrupt" sessions at the MEDICA CONNECTED HEALTHCARE FORUM and the MEDICA App COMPETITION. Their creative ideas are likely to have attracted the attention of potential investors and business partners. The range of topics included medically certified wearables for monitoring various body parameters as well as virtual reality applications for use in rehabilitation.

In the final pitches of the 8th MEDICA App COMPETITION, the "SynPhNe" team (Singapore) won the contest for the world's best health app solution. They developed the first networked, portable solution that trains both the brain and the muscles in mobilisation therapy. This will help increase the functional independence of people with disabilities, such as those who have suffered a stroke or multiple injuries.

Whether robotics or mobile health, these areas of technological application will not be able to move forward without improvements in artificial intelligence (AI) and machine learning. That's why AI, deep learning and big data were also important topics at the expert forums, such as at the MEDICA LABMED FORUM. The practical use of AI in digital pathology, which promises particular benefits in the diagnosis of cancer, was highlighted here.

Conference highlights: Getting to the heart of the foremost topics

The dominant topics of the healthcare industry and individual medical specialist interest areas were also reflected in lectures and discussions at the accompanying congresses and conferences. A few examples of these would be the 42nd German Hospital Day with more than 2000 decision-makers from clinic management (e.g. on structural and financing issues as well as presentations on digitalisation projects in clinics), the MEDICA PHYSIO CONFERENCE and the MEDICA MEDICINE & SPORTS CONFERENCE. Sebastian Kienle, one of the world's best triathletes, was among the celebrity guests. He provided insights regarding the extent to which 'performance medicine' drives elite performances and successes such as the bronze medal he recently won at the Ironman competition in

MEDICA and COMPAMED hold their own

Hawaii. Kienle relies on the latest technologies for his training. He reported on the data, generated in real time, which he uses to guide his preparation, competitive strategy and recovery after an event.

No digitalisation in medical technology without suppliers

The basis for such outstanding athletic performances using cutting-edge technologies is also laid by numerous companies, which presented their innovations at the parallel fair COMPAMED in Halls 8a and 8b. Nearly 800 exhibitors from 41 nations set a new record for the leading international industry platform for suppliers to the medical technology industry. This area is currently benefiting above all from the demand for increasingly powerful components and digitalised solutions for mobile devices for diagnostics, therapy and laboratory equipment.

"Microtechnologies are key to the digitalisation of medical technology. Without miniaturised components and processes that enable ultra-precise manufacturing, portable and networked devices that transmit and evaluate vital parameters or medication would not be possible," explains Dr. Thomas Dietrich, Executive Director of the IVAM Professional Association for Microtechnology.

The strong demand for miniaturised components, such as tiny components for so-called lab-on-a-chip applications, was also highlighted by the range of innovations of the 55 exhibitors participating in IVAM's joint exhibition stand. Current trends on the supplier market were also addressed in the two specialist forums integrated into COMPAMED, which offered a comprehensive overview of all aspects of the development, manufacture and approval of medical products – from electronics manufacturing to machining of plastics and metal all the way through to regulations.

Messe Düsseldorf GmbH
D 40001 Düsseldorf

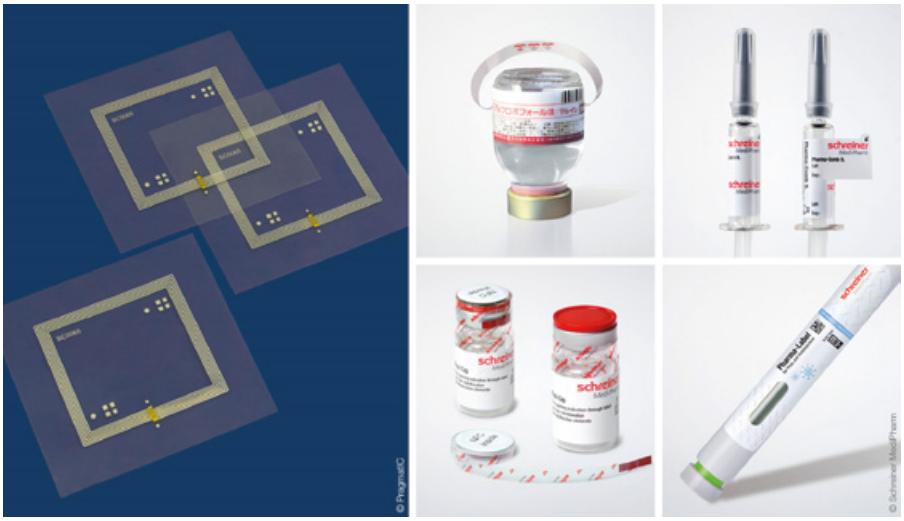
Schreiner MediPharm and PragmatIC Announce Strategic Partnership for Smart Pharma Labels

New RFID Labels for Pharmaceutical Products and Medical Devices

Schreiner MediPharm, a specialist in innovative functional labels for the pharmaceutical industry, and PragmatIC, a world leader in low cost flexible electronics, have entered into a strategic partnership. The purpose of the cooperation is to offer manufacturers of pharmaceutical products and medical devices a more extensive portfolio of cost-efficient smart labels.

The special feature of the new RFID-Labels is a flexible electronics chip embedded in Schreiner MediPharm's functional labels. Unlike conventional silicon chips, the chips from PragmatIC's ConnectIC® family are extremely thin and flexible and can be embedded into a variety of substrates. This makes the solution particularly suitable for small containers with very small radius of curvatures such as vials and small syringes.

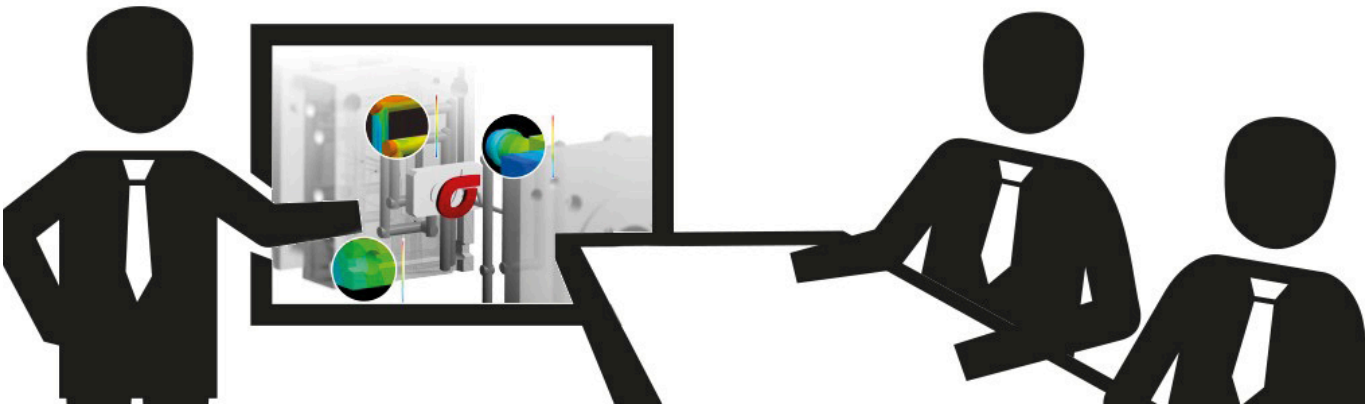
The use of label-integrated RFID technology enables secure identification, traceability and authentication of devices or pharmaceuticals according to the key-lock principle. "To date conventional RFID/NFC solutions have mainly been adopted in high-value use cases. Due to the cooperation with PragmatIC, we are now able to offer attractively priced, smart pharma labels for high-volume requirements and low-cost medicines," said Dr. Thomas Schweizer, President of Schreiner MediPharm. Like all of Schreiner MediPharm's solutions, the labels are customized for application to the respective primary containers, packaging or devices to enhance ease of use and safety.



The new smart pharma labels from Schreiner MediPharm and PragmatIC are suitable for e.g. primary packaging and devices.

„Schreiner MediPharm's label and industry expertise combined with our products is set to accelerate the deployment of RFID-based digital solutions in the healthcare sector," commented Scott White, CEO of PragmatIC. "We are really pleased to see adoption of our technology by leading global suppliers like Schreiner MediPharm and look forward to working closely with them to develop new use cases for their products."

Schreiner MediPharm
D 85764 Oberschleissheim



SIGMA hosts seminars on "Optimization strategies in the injection molding process" all over Germany in cooperation with VDI.

Advanced Training: SIGMA Teaches Injection Molding Know-How for Process Optimization

Together with its partners SIGMA makes injection molding processes understandable in seminars

The focus of a successful injection molding process is the understanding of the decisive influencing parameters. SIGMA Engineering aims to encourage this understanding during seminars in cooperation with DUFNER.MDT and GÜNTHER Heisskanaltechnik. The seminar participants will deal with the basic question of how the injection molding process can be made predictable in order to avoid modification loops and trial-and-error on the machine.

Injection molding tools and processes are often designed to the best of knowledge, but the produced parts do not meet the expectations and experience of previous projects. The reasons for such unforeseen behavior often lie in the specific material characteristics of plastics.

It is the goal of SIGMA Engineering GmbH to train the understanding of the background behind the injection molding process. The seminar series „Optimization strategies in the injection molding process", organized in cooperation with the VDI, exactly conveys this understanding. Its aim is to jointly develop recommendations for action in order to optimize the part, mold and process. The holistic approach of SIGMASOFT® Virtual Molding provides the basis for this goal. The seminar is divided into three sections:

– Deepening of material understanding, DUFNER.MDT GmbH,
– Interpretation of simulation results, SIGMA Engineering GmbH,
– Implementation of the simulation results into practice, GÜNTHER Heisskanaltechnik GmbH.

During the seminar, participants gain a comprehensive insight into the optimization of their processes. Special emphasis is put on topics such as the determination and evaluation of process-relevant properties of thermoplastics, the use of simulation methods to correct warpage and the thermal and rheological design of molds and hot runner systems.

SIGMA CTO Dipl.-Ing. T. Gebauer is particularly pleased about the combination of three fields of specialist knowledge from the areas of material behavior (DUFNER.MDT), virtual injection molding (SIGMA) and practical application implementation with a focus on hot runner production (Günther Heisskanaltechnik). „We are very pleased to have set up this seminar series with our long-standing partners in order to be able to give interested injection molders a detailed look into the background of the injection molding process! Due to the positive feedback we hope to find further partners soon and to be able to offer international training courses promptly as we now do in cooperation with VDI", states Mr. Gebauer.

The next dates and locations for the seminars in German language are:

– 03. - 04.12.19, Bonn
– 20. - 21.04.20, Mannheim
– 28. - 29.07.20, Hamburg

They can be booked via the website of VDI-Wissensforum.

SIGMA Engineering GmbH D 52072 Aachen

Digitalisation increases production efficiency

Arburg at the Swiss Plastics Expo 2020

- arburgXworld: comprehensive range of digital products and services
- Customer portal: new apps offering significant added value
- IT-networked turnkey system: multi-variant injection moulding on demand

Arburg is an industry pioneer in the fields of production efficiency, digitalisation and sustainability. The company will be in attendance at the Swiss Plastics Expo from 21 to 23 January 2020 in Lucerne, Switzerland at stand C1061 in hall 1. They will be showcasing "arburgXworld" as well as an IT-networked turnkey system enabling flexible and efficient injection moulding production. "arburgXworld" incorporates the customer portal of the same name as well as all digital products and services.

21st - 23rd January2020: Swiss Plastics Expo, Luzern (CH)

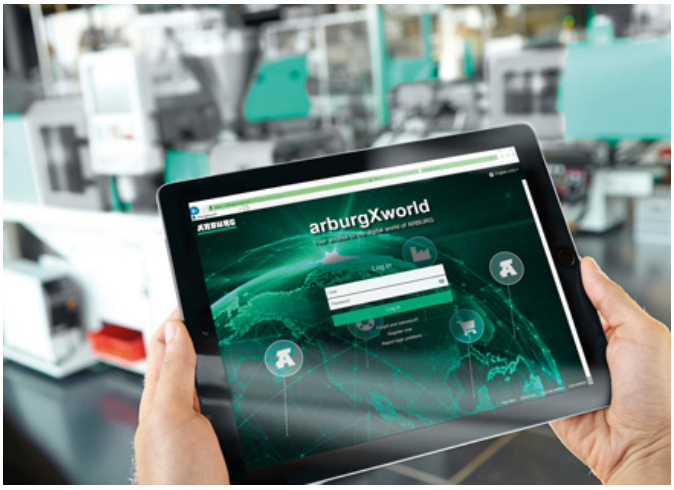
"For our customers, digitalisation and automation are essential when it comes to maintaining and enhancing their production efficiency, innovative strength and competitive edge," states Marcel Spadini, Managing Director of Arburg AG in Switzerland. "Through our 'arburgXworld' range and the customer portal of the same name, we offer significant added value – from support with machine design and provision of digital services, right the way through to online ordering of our new Allrounder 270 S compact. With a tension strap application, we also clearly demonstrate how demands for increased customisation and flexibility in high-volume production can be met in a commercially viable way."

Customer portal contains a multitude of valuable apps

The basic version of the Arburg customer portal includes four free apps – "Machine Center", "Service Center2, "Shop" and "Calendar". As of the K trade fair 2019, "arburgXworld" has been available internationally in 18 languages and offers further new functionalities and paid apps which provide users with significant added value and which will be presented live at the trade fair. These include:

– "Self Service": this interactive app helps users analyse machine malfunctions and downtimes themselves. The paid expansion stage provides self-help with guided problem analysis.
– "Virtual Control": this enables the machine controller to be simulated to create data sets, optimise sequences and train employees.
– "Configuration": this tool enables products such as the new Allrounder 270 S compact to be customised to include defined options and ordered online on the basis of agreed conditions – a simple, secure and menu-driven solution.
– "Machine Finder": this machine design app is used to find the best Allrounder for the application in question. For example, the optimum cylinder is calculated based on process and material-related data.
– "Data Decoder": here, important parameters for a machine data set can be displayed in readable format and saved either as a csv or xlsx file.

Further options include the "Process Dashboard" and the "Machine Dashboard" which are used to document production processes and display status information and indicators for individual machines.



The "arburgXworld" customer portal is available internationally in 18 languages and features new apps and functions. (Photo: ARBURG)

Flexible high-volume production on demand: a turnkey system built around a vertical Allrounder 375 V and a six-axis robot in a space-saving configuration will produce different variants of elastic tension straps according to customer requirements at the Swiss Plastics Expo 2020. (Photo: ARBURG)

Digitalisation increases production efficiency

Flexible turnkey system: injection moulded parts on demand

As a "smart" exhibit, a compact turnkey system built around a vertical Allrounder 375 V produces various types of elastic tension straps on demand from shot to shot – without any need for conversion, thanks to a clever product and mould design and Industry 4.0 components. The customer requirements are integrated into the running injection moulding process online. Visitors will be able to choose between elastic tension straps of three different lengths in three colours and with three different end piece combinations, entering their variant of choice directly at a terminal. After the order has been transferred to the central Selogica control system, the tension strap is cut to the selected length and handled by a space-saving six-axis robot located within the machine installation area. It places the ends of the strap in the cavities of the 4-cavity mould, where hook/hook, hook/eyelet or eyelet/eyelet combinations are moulded in a cycle time of about 40 seconds. In industrial practice, such a system would be ideal for cable assembly in the automotive industry, for example.

Four Arburg presentations to form part of the innovation symposium

At the Swiss Plastics Expo 2020, Arburg will also be well represented at the "Innovation Symposium" by four experts: Lukas Pawelczyk, Head of Freeformer Sales, and Bertram Stern, Packaging and Circular Economy Manager, will be presenting showcases on additive manufacturing and circular economy. Manuel Wöhrle, Senior Sales Manager Lightweight, and Andreas Reich, Head of the Turnkey department, will also be delivering keynote presentations on the topics of lightweight construction and Industry 4.0.

ARBURG GmbH + Co KG
D 72290 Loßburg

Marcel Spadini, Managing Director of Arburg AG, Switzerland: "At the Swiss Plastics Expo 2020, we will be showcasing what Arburg has to offer as the industry pioneer in terms of production efficiency, digitalisation and sustainability." (Photo: ARBURG)

Pfeiffer Vacuum welcomes this year's Röntgen Prize winner Dr. Adriana Pálffy-Buß

- Outstanding contributions in the field of theoretical atomic and nuclear physics
- Development of a new control mechanism for X-ray quanta
- Pfeiffer Vacuum and Schunk Group have been promoting young scientists for many years

Justus Liebig University Giessen (JLU) is awarding the Röntgen Prize this year to Dr. Adriana Pálffy-Buß. Since completing her doctorate, the prizewinner has been conducting research in the theory division at the Max Planck Institute for Nuclear Physics in Heidelberg. She is receiving the award for her outstanding contributions in the field of theoretical atomic and nuclear physics, in particular, for the development of a new control mechanism for X-ray quanta.

Pfeiffer Vacuum receives this year's Röntgen Prize winner Dr. Adriana Pálffy-Buß.

Dr. Adriana Pálffy-Buß was one of the first in the relatively new research field of Xray quantum optics to demonstrate in groundbreaking theoretical work, how to control single X-ray photons by means of suitable nuclear transitions. This innovative technology opens up opportunities for the development of new ultracompact information storage.

The predictions of the physicist were recently confirmed experimentally at DESY in Hamburg. The theoretical and experimental work with the participation of Dr. Adriana Pálffy-Buß has been published in numerous prestigious journals. She has also published significant works on the interaction of X-ray lasers with atomic nuclei, which promises an interesting application for storing energy.

"Basic research and progress, as well as theory and practice, are closely linked. This is the reason why Pfeiffer Vacuum has been partnering with various research institutions for decades, including the Max Planck Institute for Nuclear Physics in Heidelberg, where our vacuum solutions are regularly used. We're particularly pleased therefore that Dr. Adriana Pálffy-Buß is this year's Röntgen prize winner," said Daniel Sälzer, Managing Director of Pfeiffer Vacuum, on the occasion of the award.

The Röntgen Prize is awarded annually at an academic award ceremony of the Justus Liebig University for outstanding work on basic research into radiation physics and radiation biology. The award is named in memory of Wilhelm Conrad Röntgen, who was a professor in Giessen from 1879 to 1888. The award primarily recognizes the work of young scientists. The € 15,000 prize is donated by Pfeiffer Vacuum and the Ludwig Schunk Foundation. On November 28, one day before the award ceremony at JLU, Dr. Adriana Pálffy-Buß visited Pfeiffer Vacuum in Asslar and reported on her research findings.

Pfeiffer Vacuum GmbH D 35614 Asslar

IPB 2019 a big hit with exhibitors and visitors

Highly satisfied exhibitors and visitors at the International Powder & Bulk Solids Processing Conference & Exhibition (IPB) in Shanghai: The three-day exhibition closed on 18 October 2019 with visitor numbers up 30 percent on the previous year and an increase in display area of 19 percent. Apart from the comprehensive range of innovative technology for particle, powder and bulk solids processing, the event also offered an impressive, high-calibre supporting programme with renowned speakers from all around the world. In 2020 the IPB will be rescheduled and will take place in July for the first time.

29th - 31st July 2020: IPB 2020, Shanghai (China)

At the 17th round of the IPB, 177 companies showcased innovations from mechanical process engineering and auxiliary technologies. The range on display featured machinery and equipment for pulverising, mixing, separating and agglomerating powders and bulk solids of all kinds as well as solutions for measuring, characterising and transporting granules. On an exhibition area measuring more than 3,000 square meters, the IPB therefore brought together the entire spectrum of modern process engineering solutions for industries like food, pharmaceuticals, chemicals, pit and quarry, recycling and other sectors that process bulk solids. Around 30 percent of exhibitors are internationally renowned companies including leading innovators like Rembe, Netzsch, Malvern-Panalytics, Wam, Hoerbiger, Aviteq, Sympatec, Kawata, Schenck, and many more.

The comprehensive product range attracted 11,366 visitors to hall 4 of the Shanghai World Expo Exhibition and Conference Center (SWEECC) – a new record for the IPB and proof of the unabated growth potential of process engineering industries in China.

Supporting programme with top speakers

The IPB conference programme offered visitors added value. The organisers – the Chinese Society of Particuology and NürnbergMesse China – were once again able to get high-calibre speakers from China and all over the world on board. The highlights included the IND EX Safety Symposium, which covered the latest Chinese safety standards adopted in 2019 and presented customised solutions. The speakers in-

IPB 2019 a big hit with exhibitors and visitors

cluded the authors of the new guidelines as well as explosion protection experts from around the world. "The new safety standards call for products and solutions that effectively minimise the risks in powder and bulk solid production," explains Stefan Penno, Managing Director of Rembe Safety + Control and co-founder of IND EX e.V. "As part of our trade fair appearance we highlighted these solutions in the Safety Symposium. The IPB is the ideal place to address the Chinese market and help shape the economic development in the country along with local customers and partners."

Other areas of focus in the programme included pharmaceutical production and solutions for the general processing and handling of bulk solids. Some presentations also provided tips on successful intercultural business initiation.

New schedule offers best future prospects

With the forthcoming IPB the organisers are heralding a new chapter in the success story of the exhibition. In 2020 the event will relocate for the first time to the even more attractive upper floor of the Shanghai World Expo Exhibition & Convention Center. This means that IPB 2020 will run from 29 to 31 July, parallel to the chemical industry fair Utech Asia. "We are looking forward to offering our exhibitors and visitors an even more attractive and highly professional environment in 2020 as a result of the hall upgrade," says Kate Yuan, Manager IPB at NürnbergMesse China. "The parallel Utech exhibition will also significantly increase our potential to attract visitors from the chemical industry. So IPB 2020 is already promising to be a resounding success!"

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interplastica 2020 in Moscow with Favourable Prospects

Trade fair expects 680 exhibitors from approx. 30 countries – powerful kick-off for "Recycling Solutions" – special 3D fab+print for the 4th time already – lecture forum Polymer Plaza presents sustainability concepts

28th - 31st January 2020: interplastica 2020, Moskau (R)

In Moscow interplastica, the 23rd International Trade Fair for Plastics and Rubber, held at the AO Expocenter in Krasnaja Presnja from 28 to 31 January 2020 continues its positive development. Demand for exhibition space in the machinery and equipment segments as well as in the raw materials division remains high. Messe Düsseldorf expects to the tune of 680 exhibitors from 30 countries to occupy 13,000 square metres of net exhibition space in three halls at Russia's most important trade fair for the plastics and rubber industries. With these figures interplastica 2020 seamlessly follows on from the success of the previous event in January 2019.

Germany's Federal Ministry of Economics and Energy (BMWi) – supported by VDMA's Plastics and Rubber Machinery Association – will once again be taking part in interplastics with an official joint German participation. Other national pavilions will come from Italy, Austria and China. Numerous companies from Turkey will also be participating.

Russia plans to fundamentally modernise its infrastructure in the field of waste management over the coming years and is therefore currently developing into a highly promising market for recycling solutions providers. interplastica is accompanying this development with a new "Recycling Solutions" segment in exhibition hall 8.1. An integrated forum with panel discussions on waste management in Russia and exhibitors' lectures round off the overall concept. Taken together over 50 exhibitors at interplastica 2020 will explicitly present solutions for reclamation and recycling.

Featured for the fourth time now as part of interplastica will be 'fab+print Russia' in Hall 2.3, the Special Show all about Additive Manufacturing and 3D printing. International experts will discuss the developments, opportunities and challenges of this technology while exhibitors will showcase their innovative products and solutions.

The Polymer Plaza in Hall 1 invites visitors to talks and discussions about raw material production, application and utilisation. Focal themes at this Forum include novel materials and applications as well as sustainability and resource savings across the value chain, to name but a few.

Held concurrently with interplastica will be upakovka 2020 – processing and packaging. At upakovka more than 250 exhibitors will be showcasing innovative packaging machines as well as technologies and materials for producing packaging materials and media. This event thereby generates synergies galore for interplastica visitors.

interplastica occupies Halls 1, 2, and 8 at Moscow Exhibition Centre, while upakovka is located in the Forum Hall. To the tune of 25,000 trade visitors are expected at the two events. Admission tickets to interplastica authorise their holders to visit upakovka and vice versa.

Messe Düsseldorf GmbH D 40001 Düsseldorf

Efficient and cost-effective for small batch numbers

ENGEL at Interplastica 2020

At Interplastica 2020, from January 28th to 31st in Moscow, Russia, ENGEL AUSTRIA is showing how the smallest batch sizes can be efficiently and cost-effectively realised in injection moulding. The injection moulding machine manufacturer and system expert, headquartered in Austria, is presenting a highly integrated, assistance-supported production cell, a fully automated solution for the very fast switch of mould inserts. ENGEL guides its customers towards networked, self-optimising injection moulding production with inject 4.0.

28th - 31st January 2020: interplastica 2020, Moskau (R)

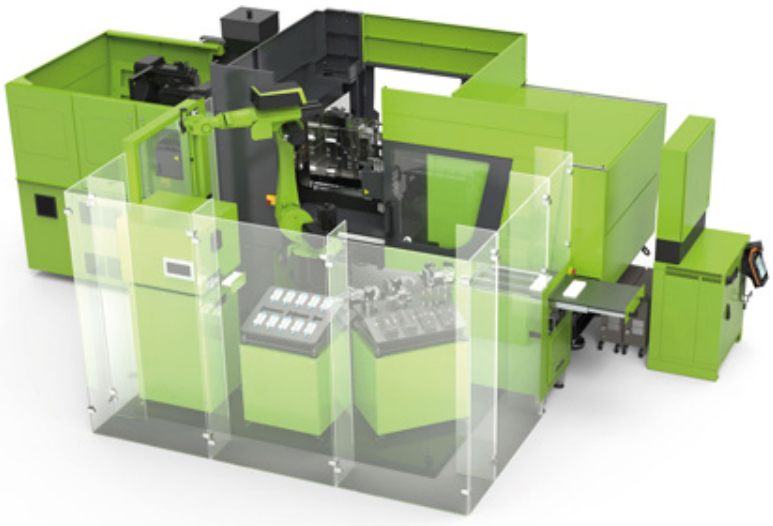
Variant production with fully automated switch-over

With its focus on small batch sizes, ENGEL is picking up on the trend towards product individualisation and more variant diversity at Interplastica 2020. Examples include consumer goods such as writing instruments, technical parts in the automotive and electrical sectors, but also a range of medical technology products. Moulds with interchangeable inserts are often used in injection moulding in order to be able to cover high variant diversity in a cost-effective way. With this trade fair exhibit, ENGEL is taking this principle a step even further in collaboration with Braunform (Bahlingen, Germany) and other system partners. The system solution presented here supports the fully automated exchange of mould inserts in just one minute. The all-electric ENGEL e-motion 170/120 TL injection moulding machine is equipped with a mould featuring the fast-switch mechanism patented by Braunform.

During the fair, the machine is producing two geometrically different components of a calliper in rapid succession with a quick change. After just ten cycles, the injection moulding machine reports to the integrated ENGEL easix articulated robot that the batch is complete and unlocks the mould inserts. The robot first removes the last component that was produced, then changes the gripper and replaces the mould inserts. A complete changeover process from good part to good part production takes just one minute.

One of the challenges of this application is that the two components have different shot weights. However, in order to produce a good part with the first shot after the change, the injection moulding machine continuously self-optimises with the aid of three intelligent assistance systems from ENGEL's inject 4.0 programme. While iQ weight control readjusts the melt volume for each individual shot, iQ clamp control determines the optimum clamping force and adjusts to it automatically. Based on the measured values determined by e-flomo, iQ flow control automatically adjusts temperature differences in the cooling water manifold circuit and adjusts the pump capacity at the e-temp temperature control units to match the current process conditions.

The extremely compact design of the production cell is particularly eye-catching. The easix robot at the centre is responsible for the complete handling of the mould inserts and component parts, marking and assembling the injection moulded parts, and ejecting the callipers. The injection moulding machine, the station for the grippers and mould inserts, the laser printer, the assembly device and the conveyor unit are arranged in a star shape around the robot. The tie-bar-less clamping unit of the e-motion TL injection moulding machine contributes to the space-saving arrangement of the individual components. Barrier-free access to the mould area makes it possible for the robot to move in very close to the clamping unit without restricting its motion.



ENGEL is integrating all the process units for fully-automated variant manufacturing on a very compact footprint. (Picture: ENGEL)

Two-part callipers are being produced during the show. (Picture: ENGEL)

Efficient and cost-effective for small batch numbers

Customer portal integrates smart service products

The modular approach of ENGEL's inject 4.0 range makes it easy for processors to leverage the efficiency and quality potentials that digitalisation and networking offer in production. Even individual solutions such as smart assistance systems offer considerable benefits.

On top of this, ENGEL has brought its smart service solutions along to Interplastica. At any time and anywhere, the e-connect customer portal offers an overview of the machine status, the condition of the monitored machine components, the processing status of service and support orders and the prices and availability of spare parts. e-connect.monitor for condition-based, predictive maintenance and e-connect.24 for 24/7 online support are integrated into the customer portal.

Tutorials on the machine display

A further ENGEL focus at the stand is the machine control unit. The CC300 control unit is being showcased in Moscow along with an upgraded control concept and new features. From the outset, smartphones have served as models for the development of the user interface. This is clear to see once again from the latest improvements. For instance, favourites can be created and edited incredibly easily and quickly in the new release. The new navigation offers even better orientation and, because tasks and components are now organised on the same page, machine operators can switch back and forth between tasks and components even faster.

ENGEL is taking another significant step forwards in development by providing tutorials on the CC300 control unit, and therefore directly at the workplace. The aim of these quick lessons is to support the system operator with unlocking the full potential of the injection moulding machines and systems solutions, without them needing to spend a great deal of time in training sessions or doing online research. The tutorials ensure that all employees in the factory are always brought up to the same level of knowledge.

The tutorials cover a wide range of topics. From guides on new features through to frequently asked trend topics, such as quality and throughput times. Visitors to the trade fair can click through the tutorials live and learn even more about the CC300 control unit's new features.

ENGEL AUSTRIA GmbH
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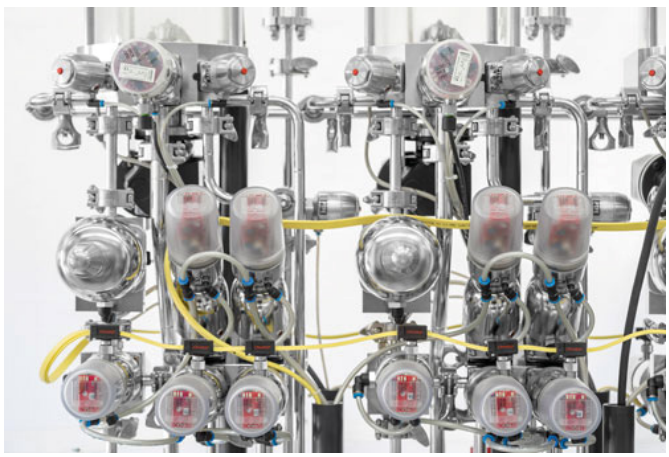
GEMÜ 4242 combi switchbox for explosive range

The GEMÜ 4242 combi switchbox is awarded ATEX approval for use in AS-Interface and DeviceNet fieldbus systems.

The GEMÜ 4242 combi switchbox is designed for the most varied industrial working environments and all common process landscapes. These also include special requirements for areas of application in explosion protection such as ATEX, IECEx and NEC, for which the GEMÜ 4242 combi switchbox has the corresponding approvals.



In addition, the GEMÜ 4242 combi switchbox covers the most varied electrical connection scenarios. This includes communication via IO-Link as well as integration in modern fieldbus systems such as AS-Interface or DeviceNet. Backward compatibility is guaranteed; and the integration option with various AS-Interface profiles also enables retrofitting of older plants.

The GEMÜ 4242 combi switchbox is systematically designed for user friendliness. Microprocessor controlled functions and intelligent and user-friendly programme routines facilitate easy commissioning and service of the valves.

With the ATEX approval of the GEMÜ 4242 combi switchbox, GEMÜ is expanding its offer for use in explosive areas in a wide range of industrial operating environments and process landscapes.

GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG
D 74653 Ingelfingen

High-performance for the packaging industry

- Packaging version of the hybrid Allrounder 570 H produces thin-walled IML containers
- High-performance machines for high-speed packaging items
- Packaging and medical industries in demand in Russia

From 28 to 31 January 2020, Arburg will be in attendance at Interplastica in Moscow, Russia at stand 1B25 in hall 2. A Packaging version of the hybrid Allrounder 570 H will be demonstrating live how thin-walled IML containers are produced for the packaging industry. What's more, visitors will be able to speak to Arburg's experts and find out all about the company's comprehensive product portfolio, which includes automation, turnkey systems and digitalisation.

28th - 31st January 2020: interplastica 2020, Moskau (R)

„Despite the current economic situation and international trade conflicts, we have been able to maintain a strong position in Russia as well as in Eastern and Central Europe in 2019, and we have even managed to gain ground in some business fields, as has been the case with our solutions for the packaging and medical industries," explains Stephan Doehler, Sales Director Europe at Arburg. „At Interplastica 2020, we are using a hybrid high-performance machine to showcase a production-efficient and automated injection moulding solution for the packaging industry."

Production-efficient IML application

The highest priorities for fast, high-quality mass production in the packaging industry are precision and short cycle times. This is exactly what you can expect from the Packaging version of the efficient, high-performance, hybrid Hidrive machine series with clamping forces of up to 6,000 kN.

At Interplastica 2020, a Packaging version of the high-speed, hybrid Allrounder 570 H with clamping forces of 1,800 kN and an injection unit in size 800 will be producing thin-walled IML containers made from PP and featuring tamper-evident closures. A 4-cavity mould from Otto Hofstetter and an IML automation solution from Machines Pagès are used in the machine. The cycle time for four 155-millilitre capacity round tubs weighing 6.3 grams is only around three seconds.

The Packaging version of the high-performance Hidrive series machines has been designed to meet the requirements of the packaging industry. A Packaging version of the hybrid Allrounder 570 H produces thin-walled IML containers at Interplastica 2020. (Photo: Arburg)

Success for Arburg in the Russian market

Arburg has been represented on the Russian market for many years and offers its customers a comprehensive package of reliable application technology consulting and production-efficient, German-engineered machine technology for the high-quality mass production of plastic items.

Solutions such as the new "arburgXworld" customer portal and the Arburg ALS host computer system are on hand to provide assistance with digitalisation and networked injection moulding production. All new Allrounders from Arburg also feature „basic connectivity", i.e. they are equipped with an IIoT gateway and can be easily networked via standard interfaces with higher-level systems. Visitors to Interplastica 2020 can also arrange personal consultations with the experts from Arburg Russia who will be able answer any questions they may have relating to Industry 4.0.

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