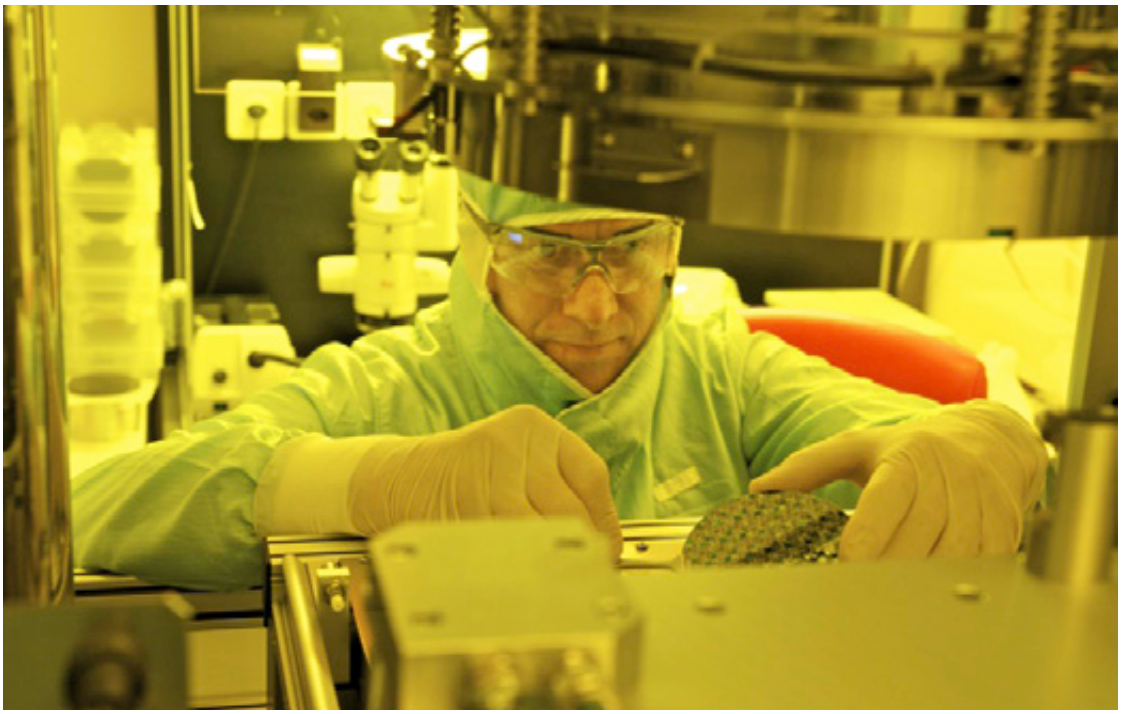
Highly sensitive processes take place in the cleanrooms of the Paul Scherrer Institute (PSI) as a single dust particle in the wrong place could have disastrous consequences. Here is a glimpse behind the scenes in rooms that are so clean even pencils are prohibited.

The cleanest place at the Paul Scherrer Institute

Autor: Alexandra von Ascheraden



Konrad Vogelsang removes a silicon wafer with imprinted nanostructures from the thermal imprint machine. Because the process is highly susceptible to dirt particles, the technicians wear a protective suit and gloves while working in the cleanroom. (Photo: Paul Scherrer Institute/Markus Fischer)

Anyone who attends the cleanroom course conducted by Martin Bednarzik, head of the technology development group at the PSI Laboratory for Micro and Nanotechnology, and his colleague Anja Weber is bound to regard his or her surroundings differently afterwards. The lab operates three cleanrooms: two located in the PSI Ost campus of the institute and a smaller one directly at Swiss Light Source (SLS), one of the PSI's large-scale research facilities on the other side of the River Aare. «Just as the PSI has been operating mechanical workshops to produce the components necessary for the large facilities since the year dot, a state-of-the-art research centre also needs cleanrooms with micro-fabrication processes,» explains Helmut Schift, head of the polymer nanotechnology group.

Before you are allowed to work in a cleanroom at the PSI, however, you attend a two-day training with Martin Bednarzik, where he explains that a person who is not moving gives off 100,000 particles a minute, the majority of which are tiny flakes of skin. When doing sport, however, it can be as many as 10,000,000 particles. These numbers essentially refer to all particles that are so small they are able to float in the air.

Bednarzik does not mention this to create any unease, but rather to highlight why the cleanrooms he is responsible for are so special. A cleanroom is defined by the number of particles floating in the air inside it. In a conventional room, this can be as many as a million particles per cubic foot (one cubic foot is equivalent to around twenty-eight litres; in other words, the amount of air in the cooking chamber of a microwave unit). At certain points in the cleanroom, however, it may even be only ten particles per cubic foot – even if people are moving around inside, continuously giving off particles.

p. 2 : The cleanest place at the Paul Scherrer Institute

On the light microscope, Helmut Schift checks whether the stamp structures have been moulded evenly during the thermal imprint and whether process changes are necessary. (Photo: Paul Scherrer Institute/Markus Fischer)

Fuzz-free overall

Consequently, the cleanroom course also teaches you to don the mandatory special overalls complete with head and foot covers. In the cleanroom, you are not even allowed to write on normal paper: special lint-free cleanroom paper is regulation, and rubbers and pencils are also prohibited. The strict rules are necessary because micro and nanoproduction needs to take place in an extremely clean environment.

Complex structures are carved out there layer by layer from silicon wafers (see box). The wafer is coated with a thin light-sensitive film, a special partially transparent stencil is placed on top and the whole stack is exposed – much like in a classical photo lab, where you expose the negative of a black-and-white photograph over photographic paper to transfer the image. The film is then developed and the wafer etched. In doing so, the patterned film structure is transferred deep into the material. The remaining layer of film is removed and the process repeated with further stencils on the same wafer until the desired structure is finished.

This is how nanostructured «lenses» for x-rays used at the SLS or components for detectors that identify newly created particles at CERN are produced.

Dust like boulders

The highly complex structures such components require are so fine that a single speck of dust falling onto the wafer during the production process would be catastrophic. Thomas Neiger, one of the cleanrooms' «infrastructure technicians», explains why the air in the room has to be so extremely clean: «Every tiny dirt particle would eat into the wafer during processing. A speck of dust is a boulder compared to the component that is being produced. Statistically speaking, however, the risk of a foreign body getting onto the wafer in our cleanrooms is virtually nil.»

In order to provide the almost particle-free environment necessary for production, the technicians go to great lengths to filter and prepare the air. Giant pieces of equipment move throughout the entire building. The purified, temperature-controlled, dehumidified air is conducted into the room over the workstations vertically from above and without any turbulence and back out again via the perforated worktables. As a result, the few remaining floating particles are unable to settle on the work surfaces. The air in the room is replaced completely every two minutes.

Due to the elaborate technology, every cleanroom basically has to be five to six metres high, the majority of which is taken up by the air treatment machinery. The PSI cleanrooms, however, are some way short of this height as they had to be installed in existing buildings with considerably lower ceilings. Consequently, the technicians had a trick up their sleeves: twice a week, a special floor is treated with a sticky substance that prevents the few remaining particles from being stirred up.

All the equipment in the cleanroom runs continuously for twenty-four hours a day – the only way a constant temperature be guaranteed, which is vital for the complicated production processes. The networks are battery-supported as some machines cannot tolerate a power failure. «Sometimes, we even have to provide a separate voltage frequency as the manufacturers of machines we obtain from the USA have little interest in our Swiss frequencies,» reports Neiger.

Like space travel

«Needless to say, we regularly have to explain why what we do is so expensive. Generally speaking, you can say that we have to work just as reliably as in space travel,» says Helmut Schift. The bill is straightforward: operating one square metre of cleanroom costs at least a thousand Swiss francs a year. «This includes everything, from the special gloves to the electricity costs for the air-conditioning unit,» Schift explains. «The maintenance and incidental costs are high. In return, the production results are always flawless and repeatable at any time. And that's ultimately what counts.»

Wafers

The wafers used at the PSI are round disks that are about 0.5 mm thick and made of silicon or another semiconductor material. In the semiconductor industry, they form the basis for integrated circuits such as computer chips. At the PSI, however, the wafers are used as a perfectly pure material for the production of x-ray lenses, detectors or «imprint stamps».

Paul Scherrer Institut
CH 5232 Villigen PSI

Dear readers, dear subscribers,

this is the new English issue of our cleanroom newsletter. More and more people and compagnies realize the chance to communicate in this way with their cliends and to show their products and company to people beeing interested in cleanrooms.

Yours sincerely

Reinhold Schuster

The map shows where the readers of the cleanroom online newsletter are coming from: if you want to get in contact with these readers please contact us.

On 17 September 2013, the big day finally arrived: The groundbreaking ceremony marked the official start of construction for the Arburg Technology Center (ATC) in Warsaw. The new, representative premises for the subsidiary in Poland will have a useable floorspace of 800 m² and will further improve the outstanding customer support for which Arburg is well-known for in the industry. At the heart of the new building will be the 240 square-metre showroom, which will offer space for seven Allrounder injection moulding machines.

Groundbreaking ceremony for new ATC in Warsaw: The subsidiary's Managing Director Dr. Slawomir Sniady (2nd from left) with the Sales Director Europe Stephan Doehler (2nd from right) and the long-term Polish employees Marek Zembrzuski (left) and Pawel Kucharczyk (right) as well as Wojciech Radom (centre), Vice President of main contractor Dorbud. (Photo: Maja Zembrzuska)

Arburg invests in Polish location

- **Groundbreaking ceremony marks start of construction**
- **Polish subsidiary to receive new, representative premises measuring 800 square metres**
- **Arburg has been partner to the Polish injection moulding industry for more than 20 years**

"The new building represents an important milestone in our company's international presence and above all reflects the importance of the Polish market, on which we have been present for over 20 years," said Stephan Doehler, Sales Director Europe, in his speech as a representative of the German Arburg headquarters. Many important customers from Poland responded to the invitation from Dr. Slawomir Sniady, the subsidiary's Managing Director, to celebrate the start of construction. The entire facility is set to be completed towards the end of 2014.

Ideal conditions for comprehensive service

Dr. Slawomir Sniady believes that the construction of the subsidiary's own premises is an important step in the right direction: "Our new building on one of Warsaw's main thoroughfares will strengthen our image and have a positive influence on the way we manage the market. The new showroom offers ideal conditions for customer support and training. Our Arburg Technology Center (ATC) will thus be an impressive resource for our company in Poland."

The carefully chosen new location offers easy access for customers. In addition, the usable floorspace is set to more than double from its current level of 300 square metres. Covering an area of approximately 800 square metres, the new building will house offices, a canteen, spare parts store, training room and a generously proportioned demonstration room. This area will be almost three times the size of the current facility: The showroom in the new building, which measures around 240 square metres, will have space for seven machines, enabling significantly more Allrounders to be presented and customer moulds to be intensively tested in the future.

New premises combine functionality, design and efficiency

The subsidiary's new building will be innovative not just in terms of space and equipment, but also when it comes to construction and facility management. Architecturally, the new building will echo the style of the Lossburg Customer Center and will follow a modular design. The most obvious mark is the large glass facade.

As with all its new buildings worldwide, Arburg is setting high standards in terms of the environment and the conservation of resources at the new Polish premises. Climate control in the building, for example, is via geothermal energy and heat exchangers. Further features include an outdoor rainwater collection basin and an on-site wastewater treatment plant.

Customers look forward to the new Arburg premises

The groundbreaking ceremony was attended by several important customers from the automotive, packaging, electrical and electronics, and medical technology industries, among others, including representatives from the liquid silicone (LSR) and powder materials (PIM) sectors. They unanimously stated that they were looking forward to the new ATC and the new facilities there, and praised the outstanding support provided by Dr. Slawomir Sniady and his team.

ARBURG GmbH + Co KG
D 72290 Loßburg

Engel Austria is continuing to expand its main base in Schwertberg. Just 18 months on from the southwards expansion, a new assembly hall has been opened at the northern end of the factory site. This will increase the number of spaces for machines to be accepted by clients.

Engel invests again in Schwertberg

"The volume of our orders is going up around the world, so we have to address this expansion by continuing to invest in our sites," emphasises Dr. Peter Neumann, CEO of Engel Holding. In the past two business years, the company has invested some €50 million just to expand and modernise its Austrian plants in Schwertberg, St. Valentin and Dietach.

More spaces for large machines

Every year, the production facility in Schwertberg produces more than 2,000 injection moulding machines – and the number is rising. For some time now, there has been a shortage of machine spaces for client acceptance on the site. In particular, large injection moulding machines have had to be transported to the St. Valentin plant for initial start-up. Thanks to the new building, sufficient spaces are now available at the plant. Designed for machines weighing up to 40 tons, the new assembly hall also addresses the trend towards larger injection moulding machines. The company now produces machines with clamping force of up to 650 tons in Schwertberg. One of the biggest machines manufactured on the site is the new Engel e-speed high performance hybrid machine.

The new structure was completed in a construction period of just seven months. Only companies based in the local region were contracted to carry out planning and construction work.

Engel open day attracts more than 5,000 visitors

To mark the opening of the new assembly hall, ENGEL organised an open day. At the end of September, more than 5,000 guests from across the region took the chance to have a look behind the scenes of the ultra-modern production hall for injection moulding machines in Schwertberg. "Investing in our buildings is not just about expanding capacity but also about modernising and improving working conditions in every instance," says Peter Neumann. Visitors to the plant could see for themselves exactly what he means.

ENGEL AUSTRIA GmbH
AT 4311 Schwertberg

Beijing Higher Court Rules in Favor of Merck Millipore in Patent Infringement Case

Merck Millipore, the Life Science division of Merck KGaA, today announced that the Beijing Higher Court, Beijing, China has affirmed a lower court's decision against RephiLe Bioscience for copying and selling purification cartridges for lab water systems, infringing on patents owned by Merck Millipore. The Court determined that RephiLe's accused products fall into the protection scope of Merck Millipore's patent. The decision upholds the permanent injunction against RephiLe to discontinue making, selling and offering to sell the infringing products. The decision also confirmed the award of damages to Merck Millipore originally set by the lower court.

"We are pleased by the judgment rendered in this case," noted Bernard Arend, VP of Merck Millipore's Lab Water Business. "It is a very positive indicator that Chinese authorities and the Chinese legal system recognize the importance of intellectual property rights for both foreign companies trading in the country and Chinese domestic companies trading globally. We invest tens of millions of dollars in research every year to create a portfolio of products superior to and differentiated from our competitors. In addition we invest a significant amount of money to patent many of the inventions incorporated into those products. We will continue to actively protect our patents."

Merck Millipore reserves the right to take action against any distributors of RephiLe products in any part of the world that continue to supply the infringing products covered by this judgment to the extent allowed by law.

Merck KGaA D 64293 Darmstadt

International heat pump experts meet for the third edition of the European Heat Pump Summit in the Exhibition Centre Nuremberg on 15–16 October. Together they look beyond national boundaries to the future of the multi-talented, energy-efficient heat pump. 37 presentations by top speakers promise interesting insights. The programme covers international heat pump markets and their specific challenges for the industry as well as the current political debate at European level. Examples of topics at the European Heat Pump Summit are the F-Gas Regulation and the Ecodesign Directive. The presentations on the IEA Heat Pump Programme are a highlight, with recognized experts reporting on current research in the multinational working groups. Specialist knowledge on the latest state of research and development and on components and systems complete the agenda of the European Heat Pump Summit.

Experts look into the future of heat pumps

- **Heat pump professionals discuss international markets**
- **Latest findings from research and development**
- **Industry and associations send top-class speakers**
- **Focus on energy efficiency**

The European energy system faces a full-scale and fundamental reorganization. The political requirement is to move away from fossil energy sources and towards more energy efficiency and renewable energy forms for the production of electricity and heat. Here the heat pump plays a key role as a climate-friendly and economic alternative to gas and oil heating.

Overview of international heat pump market

The special role assigned to heat pumps in the individual European countries is described by Thomas Nowak, Secretary General of the European Heat Pump Association (EHPA), on the first day of the European Heat Pump Summit on 15 October 2013. Other presentations examine issues such as the heat pump market in Russia and the contribution of heat pumps to more energy efficiency in the Indian building sector.

Innovations in systems and components

Speakers from well-known companies give participants at the European Heat Pump Summit an extensive overview of current trends in the research and development of components and heat pumps. Based on practical examples and the latest research findings, they show the current state of the art in hybrid heat pump systems (gas heating and heat pump), heat pumps powered by gas engines, and air-air and air-water heat pumps. Another topic block deals with the further development of components for more energy efficiency, cost-effectiveness and noise reduction.

Top themes: F-Gas Regulation and Ecodesign Directive

The pending decision on the possible new F-Gas Regulation at European level is eagerly awaited in the heat pump sector. Andrea Voigt, Director General of EPEE, deals with the possible impacts of the planned F-Gas Regulation and the importance of the Ecodesign Directive for heat pump manufacturers in her presentation on the second day of the summit, 16 October 2013.

There again: IEA Heat Pump Programme

The highlights of the European Heat Pump Summit also include the presentations on several IEA HPP annexes in progress. Here international specialists discuss topics such as the role of heat pumps in smart grids, present the latest research findings on low-temperature heat pumps and report on possible combinations of solar thermal systems and heat pumps. Heat pump concepts for near zero energy houses are also on the agenda. The Energy Performance Building Directive demands that with effect from 2021 the energy consumption of new buildings in the European Union must be reduced to a minimum. The USA, Japan and other countries also demand compliance with stricter standards. This gives heat pump manufacturers opportunities to appreciably expand the heat pump's share of the market for heat producers.

Foyer Expo

Heat pump and component manufacturers invest large amounts in research and development. At the Foyer Expo accompanying the European Heat Pump Summit they show innovative components and heat pump systems that meet the highest demands for energy efficiency and cost-effectiveness.

Presentation programme online

Details of the presentation programme at the European Heat Pump Summit are available online.

International network for refrigeration, air conditioning, ventilation and heat pumps

Save the date now! The next stop in NürnbergMesse's international network for refrigeration, air conditioning, ventilation and heat pumps is Chillventa Rossija, which takes place in the Crocus Expo International Exhibition Center in Moscow from 4–6 February 2014. ACREX India opens its doors from 27 February to 1 March 2014 and heat pumps will also be one of the top issues again at Chillventa 2014. The gathering of the international refrigeration, air conditioning, ventilation and heat pump community opens in the exhibition halls from 14–16 October 2014. Chillventa Congressing updates visitors on the sector's current trends as usual the day before, 13 October.

NürnbergMesse GmbH D 90471 Nürnberg

Everyone knows: powders are dusty. Yet, in most cases it is considered no more than annoying; however, it is a real hazard source in the areas of pharmaceutics, chemistry or BSL zones. In order to prevent the spreading of dust, a controlled lock-in and lock-out system is necessary.

Multifunctional and mobile decontamination locks

Autor: Stefanie Rud

Ortner's decontamination lock system is aimed at preventing the spreading of dust. Apart from protecting people, it particularly guarantees control and validation of lock-in and lock-out processes. Equipped with a range of options, decontamination locks can be adjusted according to customer's needs.

Moving personnel and material

So far, decontamination locks have been designed for locking persons in and out. It is new that these systems can now also be used for locking material in and out. To do so, the interior of the lock has been adapted. A sophisticated transport and storage system on the inside of the lock enables the user to move material directly in and out of the interior chamber of the lock with just a few movements.. The user can now choose between processes for persons or material. Of course, the possibility of validating the system remains.

Flexibility in the production process

The newly designed decontamination locks are not only multifunctional, but also mobile, as, according to current studies, more than 35% of pharmaceutical processes change within one year. The percentage is even higher in other life science productions. Ortner's designers took this fact into account and have created a way of applying decontamination locks flexibly within an entire factory. To allow for this, the system has been designed as a high-performce, self-sufficient unit. All components necessary for its operation - such as control cabinet, fan, supply and exhaust air, or filter unit - have been integrated directly into the device, which is thus ready to be plugged in. By means of its four steerable and lockable heavy-duty wheels, the entire unit can be used wherever a special risk is to be prevented, a hazardous incident took place, or a production process requires it according to the requirements. In other words, the equipment follows the process, and not the other way round.

After the new location is chosen and the lock is positioned, the equipment is lowered for the respective operation via an integrated hydraulic unit. The seal of the decontamination lock is applied to the door frame of the respective room door and ensures that the pressure cascade is maintained. This extension makes decontamination locks even more flexible for fast changing production requirements.

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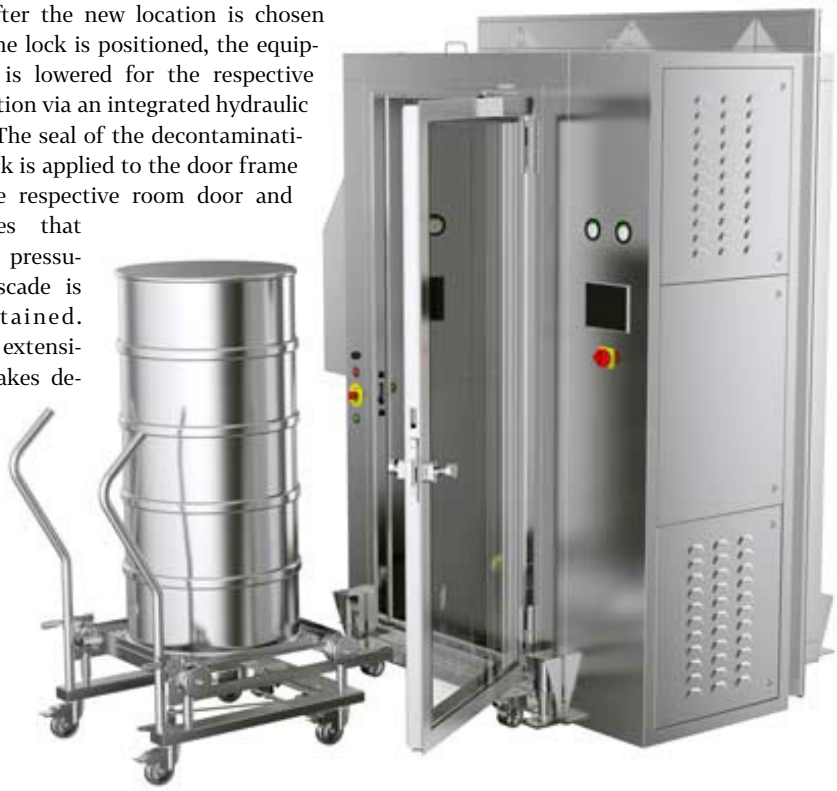

New Center will offer the global semiconductor ecosystem crucial patterning knowledge for sub-10nm technologies

ASML and imec launch Advanced Patterning Center

On October 7, ASML and imec announced the next major step in their extensive collaboration, with the launch of the Advanced Patterning Center. Together they plan to tackle upcoming scaling challenges due to the chip industry's move towards single digit nanometer dimensions. The Center will be located at the imec campus in Leuven and is expected to grow to close to 100 engineers over the next couple of years.

To guarantee critical dimension uniformity and overlay control, soon to be measured in fractions of one nanometer, imec and ASML will collaborate to investigate the practical interaction between all the different steps in the chip patterning process. The Advanced Patterning Center will use actual devices to analyse and optimize process steps as well as materials and device architecture choices, while applying integrated metrology. >>> p. 2

p. 2 : ASML and imec launch Advanced Patterning Center

The Advanced Patterning Center combines imec's and ASML's complementary expertise, engineering capabilities and patterning infrastructure to tackle these challenges, the infrastructure investments and the patterning knowledge requirements.

Imec will bring to the partnership its world leading clean room infrastructure (full 300mm pilot line with extension to 450mm) through which it supports a unique partner network of material and equipment suppliers, IDMs, foundries and fabless companies.

ASML will support the Advanced Patterning Center by making available its most advanced scanners, metrology systems and holistic lithography solutions, and by using the Center's resources to optimize its offerings for the fab environment.

"ASML and imec have been partners for almost as long as both organizations exist, and while we have both benefited from this relationship, I believe the biggest beneficiary has been the chip industry which has gained faster access to breakthrough technology. I'm extremely confident that this continued investment in our joint capabilities will further accelerate technology development and new device introductions," said Martin van den Brink, President and Chief Technology Officer at ASML.

"In order to stay ahead in today's fast-evolving and equipment-intensive semiconductor business, it is critical that the entire semiconductor eco system has insight and access to state-of-the-art technology," said Luc Van den hove, President and CEO at imec. "By bringing our collaboration to the next level, we will be able to expand our knowledge base more quickly and drive lithography advancements. In this way the global partner network of both companies will have access to the most advanced patterning processes for sub-10 nanometer technologies. This is crucial to better address future scaling and infrastructure challenges."

As a result of the intensified collaboration between imec and ASML, the global semiconductor ecosystem will gain access to best-in-class patterning solutions for next-generation chip manufacturing, paving the way to future technology leadership and commercial success.

IMEC Belgium
BE 3001 Leuven

Greater flexibility through exchangeable process section

Newly developed laboratory extruder from Coperion – efficient, versatile and user-friendly

One of the latest developments of Coperion GmbH to make its debut at K 2013 is the ZSK 26 Mc18 twin screw laboratory extruder with 26 mm screw diameter. This new extruder offers all the advantages of the ZSK Mc18 series; it has a simple design, it is operator-friendly and easy to clean. It is suitable for the development of formulations, for conducting sample compound trials and for the production of relatively small batches with up to approximately 180 kg/h. Compared to its predecessor, the ZSK 26 Mc, this newly developed laboratory extruder of the ZSK Mc18 series, which will be shown on the company's booth, is capable of an increase in throughput of up to 100%, as the specific torque has been increased to 15 Nm/cm3, and is more energy efficient thanks to the reduced specific energy input. The increased filling degree and the lower melt temperatures ensure extremely gentle compounding. The new ZSK 26 Mc18 is a mobile unit and requires only a minimum of floor space, as the control cabinet is integrated into the base frame of the machine. Heating and cooling are installed ready for use.

The laboratory extruder offers additional flexibility since it can be easily converted into a ZSK 27 Mv PLUS with a much larger free volume. Configured in this way the extrusion system permits the compounding both of products with high torque requirement and of low bulk density products that require high free volume. Conversion merely entails exchanging the process section (the replacement process section is pre-assembled), which is done with the aid of an assembly trolley. All connections – screw shaft coupling, heating system, cooling system, temperature measurement – are plug-in-coupled for time-saving installation. The ZSK 26 Mc18/ZSK 27 Mv PLUS permits direct and reliable scale-up to larger machines of the ZSK Mc18 and ZSK Mv PLUS series.

Following a complete redesign, the laboratory extruder is now equipped with a central water and power supply system. The cooling water manifold is installed in the totally enclosed base frame; a covered multiple socket strip supplies power to the heater cartridges. The single-piece stainless steel cover of the process section serves ideally as a dust and safety guard and – like the smooth surfaces of the base frame – is easy to clean. Because of the high specific torque, the screw shafts are manufactured from materials developed by the aerospace industry and have already proved themselves in the other sizes of the Mc18 series. The newly improved quick-release screw shaft coupling, which works on the tried and tested plug-push-principle, permits rapid exchange of the screw shafts and considerably reduces cleaning times when changing over from one colour or formulation to another.

The newly designed die head features an optimized heating system and can be opened simply by loosening one single screw, for example, to replace the die plate or the breaker plate. A newly designed swivel arm permits direct machine-mounting of the ZS-B twin screw side feeder – for the feeding of fillers and additives – or the ZS-EG twin screw side devolatilization unit.

The new CSpro control system is available in two versions: the basic version covers all standard applications, while the medium version offers additional functions such as order and formulation management. The laboratory extruder can also be equipped with a high-resolution torque measuring instrument, the readings of which permit a considerably more accurate calculation of specific energy input in order to enable even greater precision when scaling-up. The readings also provide information on the dynamic behaviour of the two screw shafts and make optimized configuration of the screws possible.

Coperion GmbH
D 70469 Stuttgart

Bionic bio-fan from Ziehl-Abegg: Better in every way

- **Significant CO2 saving in the manufacture**
- **Low noise development**
- **Reduced electricity consumption during operation**
- **Better load capacity, temperature resistance, long-term stability and mechanical properties**

Vorstandsvorsitzender Peter Fenkl präsentiert den neuen bionischen Bio-Ventilator, mit dem Ziehl-Abegg Trendsetter beim Einsatz von Bio-Polyamiden ist. (Foto: Ziehl-Abegg / Achim Köpf)

"We can save the environment thousands of tonnes of CO2 every year with these fans," says Managing Director Peter Fenkl. His company, Ziehl-Abegg (Kuenzelsau), now presents a bionic bio-fan. The new fan consists of castor oil-based bio-polyamides. In addition to the CO2 saving, there are improvements in the load capacity, temperature resistance and long-term stability as well as the mechanical properties. Since the blade geometry incorporates knowledge from bionics, the fan is also quieter and more efficient – and therefore reduces electricity costs and noise emissions in operation.

This revolutionary design is used, for example, in refrigeration engineering (refrigeration chain for food to the supermarket), in heaters, heating pumps and for electrical cooling (computer centres, control cabinet cooling, inverter cooling). In keeping with its sustainable concept, the fan is 100 percent recyclable. Although the CO2-footprint is considerably minimised, it has benefits for appliance planners: The fan has greater chemical resistance and better low-temperature impact strength and withstands hot water and steam.

20 years ago „fair" coffee was just for bohemian types. Now more and more people are looking beyond the advertising claims at shipping distances and manufacturing processes. The bionic bio fan is similarly a pioneer in this sense even if the price is currently higher than for petroleum-based products. With equivalent performance data and dimensions to conventional fans there are no technical barriers. However the market needs attuning to this product and its positive environmental features.

In technical terms the bionic bio fan offers several benefits in addition to its environmental contribution: Unlike petroleum-based products it has very low water absorption and a considerably longer lifespan as well as better chemical resistance. "Ziehl-Abegg as a trendsetter in fan development therefore also wants to be a pioneer in the use of bio-polymers," says Managing Director Fenkl.

1. Bionics (less noise and less energy use)

The designers of Ziehl-Abegg have been observing many creatures whose bodies are optimised for water or air flow. The engineers were struck by the quietest of the birds of prey - the owl.

Just why is the owl so quiet? The owl hunts at night when visibility is very poor. Owls therefore locate their prey by hearing. And this only works if they can fly extremely quietly. How do they do that? A barn owl for instance weighs around the same as a pigeon. Their wings however are several times larger and more arched. This gives the bird much more uplift at lower speeds. Pigeons on the other hand have to flap their wings hard which makes them audible from afar.

The tips of the owl's wings are also fringed. This causes the air flowing over and underneath the wings to meet at the rear edge of the wings more gently and therefore more quietly. The rear edge of the fan blade is serrated for the same reason.

However the company's designers did not just scrutinise owls. Vultures, eagles and storks raise individual feathers. These create small border-vortices at their tips, further reducing the resistance of the wing. You can also see this in aeroplanes whose wings now have a small nick (or winglet) at their tip. Ziehl-Abegg owlet fan-blades have long had this feature.

The combination of several bionic features in a single fan also reduces the energy consumption in operation.

2. Biomaterial in the fan (CO2-reduction during manufacture)

Sustainable raw materials in place of fossil fuels contribute to a reduction of CO2 emissions. 60% of the fan blade is composed of the sustainable raw material sebacic acid which is obtained from the oil of the castor oil plant.

Castor oil (CAS-no. M8001-79-4) is a plant oil which is obtained from the seeds of the tropical castor oil plant (Ricinus communis), which belongs to the Spurge family. It is a triglyceride with pharmaceutical names Oleum Ricini s. Castoris, Ricini oleum virginale and castor oil (castor oil in English-speaking countries, but also ricinus oil or oil of Palma Christi).

In moderate climates the plant grows as

p. 2 : Bionic bio-fan

an annual but it is a perennial in the tropics. The plant is fast-growing and under ideal conditions it can reach 5 m within three or four months. In tropical climates after several years it can reach heights of up to 30 m and forms a woody stem. In temperate climates the plant dies down each year and then re-shoots when there is sufficient sunlight.

The castor oil plant also grows in a semi-arid climate (from the Latin aridus = dry, arid) and is therefore drought resistant. The most important producing country for castor oil is India. With an annual 750,000 tonnes it represents around 60 percent of the world production. Further important producing countries are the People's Republic of China and Brazil.

Castor oil is obtained from cultivation on low nutrient soils which are too poor for other crops so that it is not in competition with food production. The castor oil plant and/or the castor oil is not a food product.

It is possible to process biopolyamides like conventional plastics on conventional machines simply by adjusting the process parameters.

Since the castor oil tree absorbs CO2 in the growth phase, it reduces the CO2 emissions by two thirds as compared to petroleum-based plastics. It is therefore a drastic CO2 saving. Managing Director Peter Fenkl: „The use of plant-based raw materials which have already extracted CO2 from the environment in the growth phase means that the CO2-balance sheet of the material overall is significantly better as compared to polymers based on fossil fuels." The whole fan blade (including 30 percent fibreglass/GF 30) still represents a CO2 saving of 40 percent.

Since the material contains more than 60 percent sustainable raw material, it meets the current definition of a bio-plastic.

So-called biopolymers are counted into the Lead Market Initiatives of the European commission when the following preconditions are fulfilled: a sufficient level of industrial production and no competition with food production. Both these facts apply to castor oil-based biopolymers.

3. Bio-material reduces the weight of the fan

The bio-fan is 6% lighter in comparison with products made of PA6 GF30 (fossil-based). This results firstly from a 5-percent reduction in density and secondly from a far lower moisture absorption (PA 6 GF 30: density 1.36 and moisture absorption 2.1-2.3 % compared to biomaterial GF30: density 1.31 and moisture absorption 1.2 %.).

4. Bio-material has a number of positive characteristics

For the customer this new material offers many benefits, i.e. even more possibilities for use of this fan.

- Greater chemical resistance (stress fracture-resistant under the influence of aggressive chemicals)
- Hot water- and steam resistant (high hydrolysis resistance)
- Absorbs 50% less moisture
- Dimensionally stable
- Better low-temperature impact strength
- Good abrasion/wear behaviour

5. Wood is not a suitable substitute for fossil fuels

The use of wood as a substitute material is not an option for Ziehl-Abegg since this has a direct financial impact on owners of houses and flats who use wood or pellets for heating. (see table 1)

Lead Market Initiatives of the EU

The European Commission launched the Lead Market Initiatives (LMI) in 2007 and selected bio-based products as one of six target markets. The LMIs employ demand-orientated measures aimed at significantly increasing the potential and competitiveness of bio-based products.

Un-economical: The major obstacle for experts when questioned is the continued higher costs for bio-based products as compared to product alternatives so that the development of bio-technological production processes is generally un-economical.

Background:

Bio-based products have considerable potential for the reduction of production-related environmental impact, for improved health, as a sustainable alternative to fossil fuel-based raw materials and to ensure the international competitiveness of German and European industry through technology leadership. This potential however cannot be fully exploited at this point. Various obstacles stand in the way, e.g. absence of cost competitiveness to some extent, low acceptance in the processing industry, „time to market" dominance, biased regulations, relative favouring of energy- compared to material utilisation of biomasses. Tailoring support is made difficult because of the extreme heterogeneity of the products and the variety of potential application fields (including bio-chemicals, bio-lubricants and bio-plastics for packaging as well as for construction or the automotive industry).

High-tech-strategy of the German Government (2006)

The high-tech-strategy of the German Government is aimed at placing Germany at the forefront of the most important markets of the future. The plant as a supplier of raw material is one of 17 future-fields in which innovation strategies have been defined. In this context, by 2015 Germany aims to achieve pole position in Europe in plant biotechnology and plant engineering and to considerably expand the use of renewable and sustainable raw materials in the chemical industry.

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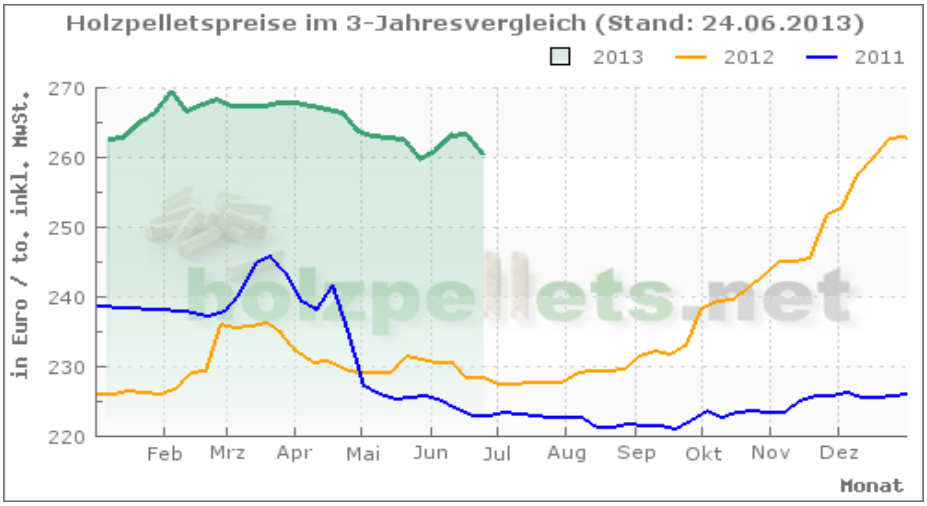

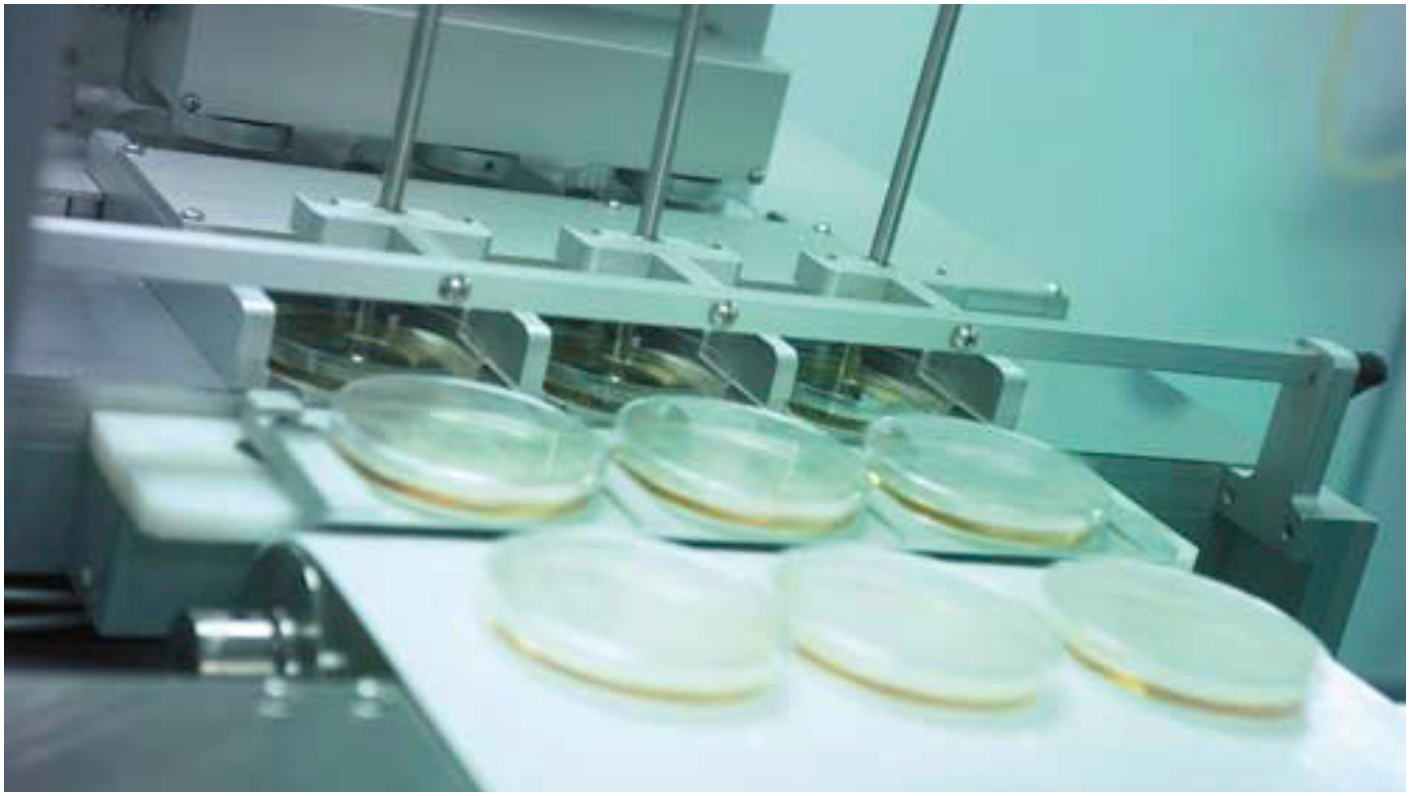

Redipor plate pouring

New Cherwell cleanroom manufacturing facility extended to over 950m2

Redipor Success Drives Cherwell Cleanroom Expansion

Cherwell Laboratories, leading supplier of microbiology media and instruments for pharmaceutical and related industries, is continuing with the investment and expansion programme of its cleanroom production facilities. To increase capacity for future demand from Cherwell's ever growing customer base, Phase II of the expansion programme will boost Redipor® microbiological prepared media plate filling and bottle production capabilities. The new cleanroom facility will be further extended by 230m2 to over 950m2.

Once Phase II is completed in early 2014, Cherwell's facilities will have doubled in size since July 2012. Phase I delivered new inspection and packing facilities to maintain stringent quality requirements in media preparation prior to Phase II's increase in Redipor production facilities. Uniquely, to ensure utmost quality the company does not package Redipor products straight from the filling line but first hold them to condition, additionally all products then undergo 100% inspection before final packing.

Demand for Cherwell's Redipor products continues to rise as new customers experience the benefits of a flexible and reliable supply of these exceptionally high quality prepared media products. The company's ability to deliver high volume efficiency with small volume flexibility has helped to increase its market share and develop more export markets, such as Poland. Careful selection of new partners in mainland Europe, has also contributed to securing new customers keen to benefit from a full adaptable service for their industrial microbiological prepared media.

Andy Whittard, Managing Director, Cherwell Laboratories, provided further insight into the reasons for the company's expanding market. "Despite growing interest in rapid methods, the traditional methods for environmental monitoring are still the most widely used and will continue to be for many years to come. This, coupled with some customers' movement back to UK and European-based manufacturing, is seeing demand for prepared media continue to increase."

As Cherwell's production volumes increase from the current 6.5 million agar plates annually, the company will continue to add to its workforce to maintain its efficiency in supply. It has already recruited 5 new staff members since the completion of Phase I, with 3 additional new starters anticipated before the end of 2013.

"Phase II of our cleanroom extension will provide additional manufacturing space to allow us to invest in further production equipment, such as large scale plate filling systems, media preparators and autoclaves," added Andy Whittard. "By carefully planning and controlling the works around our own production schedules and with our contractor, Envair Projects, we aim to minimise any impact to customers and product lead times."

Cherwell Laboratories Ltd
OX26 4XB BICESTER
Vereinigtes Königreich Großbritannien und Nordirland

Vaisala Radiosonde RS41 Unveiling at Meteorological Technology World Expo (MTWE2013)

The new Vaisala Radiosonde RS41, the heart of Vaisala's 4th Generation Soundings, will be launched today at Meteorological Technology World Expo (MTWE2013) in Brussels.

Setting New Standards in Soundings

The Vaisala Radiosonde RS41 streamlines launch preparations, reduces human errors, and lowers operational costs of upper-air weather observations, while delivering industry-leading data accuracy.The new RS41 features customer-driven design improvements, and enhancements to the humidity and temperature sensors that ensure the data reliability and accuracy customers expect from Vaisala.

Using the RS41 and the Vaisala DigiCORA® Sounding System MW41 the radiosonde launch process has been streamlined in various ways through the use of status lights, wireless connection to the MW41, maintenance-free ground check procedure, as well as advanced pre- and post-flight diagnostics. The new compact design is easier to handle and 61% lighter, allowing 20% more launches using the same amount of gas as needed with the RS92. The radiosonde unwinder has also been redesigned for ease of use.

The Vaisala 4th Generation Soundings comprises the Vaisala Radiosonde RS41, Vaisala DigiCORA Sounding System MW41 and the Vaisala RI41 Ground Check Device. An upgrade path for any Vaisala sounding system is available, allowing customers to upgrade their existing systems to Vaisala DigiCORA Sounding System MW41. The MW41 system can utilize both RS92 and RS41 radiosondes.

Vaisala soundings solution includes the possibility to fully automate sounding operations. As the leader in automatic soundings, Vaisala will make RS41 upgrades for the AUTOSONDE systems available, ensuring a straightforward upgrade path and securing the existing investments of the customers.

Vaisala at MTWE2013

Vaisala welcomes visitors at MTWE2013 to stop by our stand to see the new radiosonde. Customers are welcome to book a personal demonstration of the 4th Generation Soundings at the Vaisala booth. Visit the Vaisala stand at MTWE2013, booth number 5002.

At MTWE2013, Vaisala will also showcase the new Vaisala Automatic Weather Station AWS310, the Vaisala Global Lightning Dataset GLD360, mid-life upgrade for Vaisala TacMet® Tactical Meteorological Observation System MAWS201M, as well as the Vaisala MARWIN® Sounding System MW32.

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Hospital Pharmacy Europe Live focuses on safety and affordability

Cherwell Supports Hospital Pharmacists' Safety Conference

Cherwell Laboratories, specialists in the microbiological requirements of aseptic manufacturing and compounding in hospital and contract pharmacies, will be supporting "Hospital Pharmacy Europe Live" on 29th October 2013. The inaugural event, being held at the Hilton Birmingham Metropole Hotel, will see hospital pharmacists come together to learn about the latest developments in clinical practice. The CPD-accredited event will focus on two key topics: 'Safety' and 'Affordability' and is free to attend for hospital pharmacists.

The company has over 40 years' experience and has developed a unique range of industry standard and bespoke solutions for microbiological applications. It manufactures Redipor agar and liquid media for environmental monitoring and validation of aseptic transfer and sterilisation processes. Other products in the Cherwell range include; portable and installed microbiological air samplers; biological indicators for validation of steam, vapour, gas or dry heat sterilisation; and cleanroom accessories, such as settle plate stands, plate carriers, irradiated consumables and sampling tools.

The Cherwell SAS microbiological air sampler has minimal long-term running costs.

"Our range of products offers the highest quality environmental monitoring and process validation solutions," commented Andrew Barrow, Sales Manager, Cherwell Laboratories. "Our microbial air samplers use readily available contact plates or petri dishes, therefore minimising long-term running costs. The cost-efficient manufacturing process for Redipor prepared media also ensures we can offer bespoke products and flexible quantities to meet specific customer requirements."

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European Heat Pump Summit 2013: meeting-place for international heat pump experts

- **Talks between specialists from 26 countries**
- **Focus on expertise**

The European Heat Pump Summit 2013 – powered by Chillventa turned Nürnberg into Heat Pump City on 15–16 October 2013. More than 250 international congress participants sourced information on current questions concerning the status quo and the future of heat pumps at presentations given by well-known speakers from Germany and abroad.

The key themes of the summit were innovative approaches to technical solutions, possible applications, market analyses and the challenges and opportunities resulting from the political framework like the F-Gas Regulation and the EU Ecodesign Directive. The summit also focused on the components, which played a special role this year. The highlights included the presentations on the IEA Heat Pump Programme, which examined trends and possible future uses of heat pumps in applications such as smart grids. The current figures and information on market development in many European countries, India and Russia rounded off the spectrum of presentation topics.

Many international players

"I am pleased that the event was a success, which once again shows that the heart of the heat pump beats in Nürnberg. Top-class presentations and a highly international audience prove that the orientation of the European Heat Pump Summit attracts a very good response from the experts," sums up Richard Krowoza, Member of the Management Board of NürnbergMesse. The participants came from 26 countries, including many EU Member States as well as countries like the USA, South Korea, Lithuania and Russia. "Six out of ten participants travelled from abroad," says Krowoza.

From experts for experts

Dr. Rainer Jakobs, Informationszentrum Wärmepumpen + Kältetechnik IZW (Heat Pump and Refrigeration Information Centre) and coordinator of the European Heat Pump Summit, also sums up favourably: "The European Heat Pump Summit has become an established international platform for information exchange between heat pump professionals. The specialists gained a comprehensive overview of markets, technologies and components. At the European Heat Pump Summit they were able to discuss the key questions on the future of heat pumps on equal terms – the motto 'from experts for experts' was again practised in an impressive way." At the accompanying Foyer Expo, heat pump and component manufacturers presented their current products and new products for interested summit participants.

Efficiency label for heat generating appliances celebrated

To mark the recently effective European Union Directive on the introduction of an energy efficiency label for heat generating appliances, EHPA initiated the symbolic cutting of the "Energy Label Cake" at the evening get-together." Thomas Nowak, Secretary General of the European Heat Pump Association, commented as follows on the start of the compulsory label to be attached to all heat generating appliances: "The standard marking of energy efficiency is the right step towards more transparency in the market for heat generating appliances. It enables specialists and consumers to easily compare the performance figures of different heating appliances. We hope that the energy label will stimulate growth in the heat pump market."

Ochsner and Nowak cut the Energylabel Cake

Heat pump know-how in Nürnberg and worldwide

The heat pump also plays a special role at Chillventa Rossija, which takes place in the Crocus Expo International Exhibition Center in Moscow from 4–6 February 2014. Heat pumps are covered at ACREX India in the Pragati Maidan Exhibition Centre in New Delhi from 27 February to 1 March 2014. The heat pump specialists meet again in Nürnberg at Chillventa 2014, where heat pumps are one of the top themes again. This gathering of the international refrigeration, air conditioning, ventilation and heat pump community opens in the exhibition halls from 14–16 October 2014 and Chillventa Congressing starts on 13 October 2014. The next European Heat Pump Summit takes place in October 2015.

NürnbergMesse GmbH
D 90471 Nürnberg

Fast, precise, reliable, user-friendly and efficient in operation – the all-electric ELION

Netstal demonstrates maximum efficiency and clean room compatibility in the production of infusion devices

- **High standard of system expertise for clean room applications at partner company HRSflow's stand at K 2013**
- **Top precision and energy savings guaranteed**

Netstal will be presenting an all-electric ELION 1750 for medical applications at the stand of partner company HRSflow at K 2013 (Hall 1, Stand B08). Thanks to its excellent engineering and the highly cost-effective solution that it proposes, the machine is brilliantly suited to the production of parts for clean rooms in accordance with international guidelines.

ELION: Maximum precision and energy savings with the ELION 1750

The requirements placed on manufacturers in the medical sector in terms of cleanliness, precision, short cycle times and low material costs are very high. „The all-electric ELION is ideal for use in clean rooms. It guarantees the high-precision manufacture of sterile parts in a very clean environment while achieving very short cycle times in compliance with all applicable legal regulations. The customer benefits from excellent mechanical engineering and a highly cost-effective solution thanks to our system and application expertise," explained Dr. Patrick Blessing, Head of Business Unit MED. At K 2013, Netstal will be producing PC infusion devices on a ELION 1750-530 with a cycle time of approximately 16 seconds. The PC material is being provided by Sabic Europ and the 16-cavity mold is coming courtesy of Italian moldmaker RB / HRS. Meanwhile, Italian-based company Piovan is taking care of raw material supply and cooling equipment. „The ELION features encapsulated joint, closed drag chains, water-cooled electric motors and clean room cleading so that virtually emission-free operation is guaranteed. Moreover, the processor benefits from the machine's extremely low energy consumption." Thanks to the principle of energy recovery, braking energy is fed back into the internal electrical circuit to supply additional consumers. When used efficiently, it is possible to save up to 70 percent of energy consumption compared to conventional drive systems. „As a result of this saving, our customers can verifiable manufacture their products more cost-effectively in the long term," added Blessing.

Distributor for infusions – production in a clean room is essential for this application

Netstal and KrausMaffei offer comprehensive product portfolio for applications in the medical sector

Boasting a strong product portfolio, Netstal and KraussMaffei offer customers in the medical sector outstanding production and technological expertise across the entire process chain – from simple applications through to applications in clean rooms. As well as benefiting from Netstal's ELION series, customers in the medical sector can also take advantage of the CX and AX series from KrausMaffei, which are rounded off with a wide selection of robots designed to improve process and production efficiency.

Netstal-Maschinen AG
CH 8752 Näfels

Compact production cell with a Systec 210 combining IML and IMD technology. A multi-touch-capable display is produced here in one shot.

Sumitomo (SHI) Demag at K 2013: function integration and precision injection moulding – focus on high added value

With an IML/IMD combination for a multi-touch display – without a compression zone with an SL plasticising assembly for higher precision

With innovative technologies and production processes implemented in complex and fully automated injection moulding cells, as well as highly precise, dynamic and energy-efficient injection moulding machines, Sumitomo offers system solutions with high added value for various industry applications.

For the first time, a fully automated IML/IMD production cell, producing a 5“ multi-touch display in one single step, has been presented at the K trade fair in Düsseldorf. For the first time also, the SL plasticising assembly that operates without a traditional compression zone and thus offers advantages compared to conventional plasticising assemblies has been presented in Europe. In addition, the company has demonstrated the performance spectrum of an all-electric IntElect by running various applications.

Injection moulding cell for multi-touch display – IML for function, IMD for decoration

The production of a multi-touch display, for the first time in a 5“ size – equivalent to a modern smartphone – by injection moulding with a Systec 210 (clamping force 2,100 kN) is evidence of Sumitomo’s competence in complex, fully automated injection moulding cells for efficient and reliable mass production of innovative products. An example of a mass produced part that has been presented at the K trade fair stand is functional films overmoulded with PMMA as part of an in-mould labelling (IML) process developed by PolyIC GmbH & Co. KG, a Kurz Group company. The narrow frame produced by the same procedure is additionally decorated using in-mould decoration (IMD) with a sleek black finish. All operations, from insertion of IML film into the mould cavity through the final multi-step post-processing process for displaying the assembly, take place in the production cell in a cleanroom atmosphere (class ISO 7).

Conductive IML films optimised by PolyIC for injection moulding (so-called PolyTC films) are PET-based films covered with thin metallic conductor structures. They can replace many films currently used for touch screens, for the most part consisting of indium tin oxide (so-called ITO films). ITO alternatives are interesting not only from a technical viewpoint, but also from an economical one, since indium is a rare heavy metal, the price of which continually increases with a growing demand. In addition, the costly lamination of the carrier with film can be omitted. It is already apparent that touch screen technology will be increasingly utilised in the future, and not just in communications technology. Versatile fields of application range, in particular, from the automotive industry and consumer electronics down to white goods for the diverse operating functions required for each specific task.

Even with their individually customisable layout, PolyTC films from PolyIC can be manufactured cost-efficiently as a mass produced product. At the same time, these functional films can be used as individual labels applied during the IML process. Thus, the injection moulding process can be used to efficiently and directly apply touch sensor functionality to large-scale production components.

p. 2 : With an IML/IMD combination for a multi-touch display...

Products manufactured with all-electric IntElect precision: Smart key shell (on the left) with components made of PC/ABS blend, produced in a 6-cavity family mould on an IntElect 100

The IML/IMD production cell with a Systec 210 at a glance: For the IML/IMD combination presented at K 2013, Sumitomo and several specialists designed a modular system centred on the hydraulic all-rounder machine, the Systec. Besides PolyIC (for functional film) and Leonhard Kurz Stiftung GmbH & Co. KG for IMD decoration film and IMD film handling, partners include HBW-Gubesch Kunststoff-Engineering GmbH as developer of the mould, SAR Electronic GmbH as system integrator for the robot-supported automation; Max Petek for the cleanroom solution; and Kist Maschinenbau GmbH as supplier of the modules for the UV film hardening and cleaning of finished parts.

The central switch point in the injection moulding cell with the Systec 210 is a suspended industrial robot (TX90 from Stäubli), equipped with a three-sided gripper system. It extracts one conductive in-mould label (PolyTC-Label) per cycle from a stack and positions it exactly onto the fixed half of the single-cavity mould. Simultaneously, the IMD feeder, installed on the clamping side above the mould mounting area, brings a carrier film with individual pictures to the decorative coating of the moulded part and positions it exactly inside the cavity. Once the mould has been closed, the PMMA display is injected through an auxiliary gate; the shot weight is 20 g. This process uses the variotherm mould temperature control developed by gwk Gesellschaft Wärme Kältetechnik mbH.

On the clamping side of the mould the frame of the 5" display is decorated using the IMD unit directly during injection.

The variotherm mould temperature control is extremely important for the reproducibility of consistently high product quality, in particular for long and narrow flow paths inside the mould, e.g. for an injection-moulded multi-touch display. During this process the mould wall is temporarily heated to a temperature between glass transition temperature and melting temperature of the utilised plastic. This increased mould wall temperature delays or prevents melt solidification as early as during injection, preserves its flowability through constant low viscosity until the mould is completely filled, and thus reduces the required injection pressure and consequently the clamping force. Mould cooling does not start until the cavity has been completely filled and lasts until the part has reached demoulding temperature. While cooling down, the even mould fill extends hold pressure due to an improved pressure distribution in the areas located far from the gate. As a result, all mould areas require the same cooling time. This reduces the risk of deformation as a result of contraction, and at the same time, improves part size accuracy and consistency. In addition, this process is especially well suited for the production of particularly smooth finishes and high-quality glossy finishes. All these advantages of variothermal injection moulding will also be observed in the Systec cell during the combined IML/IMD injection moulding of the touch screen display and frame with its glossy finish.

Even though injection moulding itself forms the basis of the process, the subsequent steps that take place outside the mould within the cycle time of 40 s contribute considerably to the component quality and its cost effectiveness. Once the six-axis robot has removed the display frame from the mould and inserted a new label, it places the component onto a work carrier. The component is then transported into an enclosed laser separation station, where a CO2 laser with air extraction accurately removes the film sprue without breakage. The robot then brings the display into a UV curing unit to cure the finish coat of the decoration film. From there the component is transferred to the cleaning station located below the UV station for the final processing step. Here, brushes perform the meticulous and gentle removal of any remaining fragments of IMD film; any particles loosened from the edges are extracted, leaving no residue.

Production in a cleanroom is absolutely essential for the reliable operation of the multi-touch display. This is ensured by a laminar flow module that cleans the incoming outside air and prevents penetration of particles through a FFU (Filter Fan Unit). Thus, an air purity of ISO class 7 is reached. However, the overall concept of the cell clearly exceeds basic requirements – with the cleanroom module above the injection unit and with protective enclosure profiles and surfaces that can easily be cleaned. All subsequent post-processing steps, such as degating, UV curing and cleaning, take place in sealed system modules closed off from the mould mounting area of the injection moulding machine by partitions.

The entire production cell is constructed modularly. This allows modules to be added or removed depending on the desired degree of automation. In addition, a standardised interface between the moulding machine and automation equipment ensures short commissioning times and a high level of flexibility. Faster commissioning and a reduction in equipment complexity are also helped by the fact that a single industrial robot performs all the handling tasks of the entire production cell. Due to the suspended mounting of the six-axis unit and the compact automation enclosure, the footprint of the entire cell is very small.

The new SL plasticising assembly – compression-free plasticising brings advantages for process stability and product quality

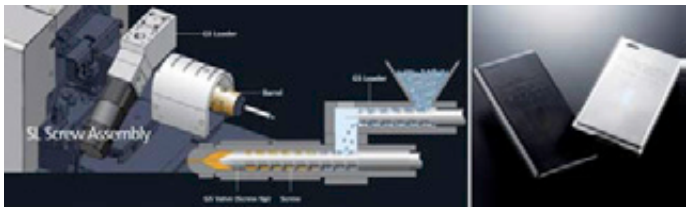
The important feature of the new SL (Spiral Logic) plasticising assembly, presented by Sumitomo at K 2013, that sets it apart from conventional plasticising assemblies of an injection moulding machine is a cushioned plasticising screw operating without a compression zone. The material is fed by an upstream dosing screw in a controlled manner. The optimum filling ratio is defined based on the material

p. 3 : With an IML/IMD combination for a multi-touch display...

properties and process parameters. The added granulated plastic is melted almost exclusively by the easily adjustable heat supply from the plasticising unit barrel heater.

Compared to conventional plasticising assemblies, the SL assembly offers clear advantages. The crucial feature here is that the regulated operation generates a very homogenous melt without viscosity variations. This results in an obvious reduction in process variations and thus variations in product quality. Due to controlled feeding and operation without a compression zone, high pressure peaks and blockages from nonmelts in the feed zone are avoided, in contrast to cases where such problems occur in the compression zone when conventional screws are used, in particular, when semi-crystalline plastics such as polyamides and PBT (polybutylene terephthalate) are processed. At the same time, due to the lower friction of the SL assembly, wear in the feed zone of the plasticising unit is clearly reduced. Additional advantages of gentle material handling are a low degradation level, a lower reduction in fibre length, longer mould cleaning intervals and energy-related benefits.

In combination with a switchable non-return valve, the compression-free screw has a particularly positive affect on the production of technical precision parts. The SL plasticising assembly is also beneficial if product cleanliness requirements are high, e.g. for moulding of optical parts. Due to the removal of the compression zone, the deposits on the screw that are usually unavoidable can be drastically reduced. These deposits flake off and appear as black spots on the parts. Longer cleaning intervals not only reduce the amount of the reject rate, but also increase the machine availability for applications, even if part cleanliness requirements are high.



Parts of a smartphone housing made of an ABC/PC blend using an all-electric SE 180 EV which is equipped with the modern SL plasticising assembly. The assembly operates with a completely heated screw without a compression zone (screw); the material is fed by an upstream dosing screw (GS Loader).

The SL plasticising assembly is currently only available as an option for all-electric SE-EV series machines produced by Sumitomo with a clamping force range of 500 to 1,800 kN. The new assembly will be presented at the K trade fair on an SE 180 EV (clamping force 1,800 kN). The machine will produce cases for a smartphone made of a ABS/PC blend using a 2-cavity mould; the shot weight is 45 g, the cycle time 25 s.

Precision injection moulding – a domain of the all-electric IntElect

Safety, process consistency and precision for demanding applications with the narrowest tolerances are the main characteristics of the all-electric IntElect series. Similar to the SE series, the IntElect also uses electric direct drives developed and optimised for the injection moulding process and produced by Sumitomo. In contrast to the belt-driven electric drives, these direct drives offer a high level of energy efficiency and ensure higher precision with their faster response times, higher reproducibility and even a cycle time advantage. Thus, the company's electric machines particularly meet the requirements for injection moulding of high volume precision parts.

Balanced multi-cavity moulds: At the stand at the K trade fair an IntElect 100-340 (clamping force 1,000 kN) produced the complete set of parts for a key housing (smart key) made of a PC/ABS blend; the cycle time is 30 s, the shot weight is 33 g. The special requirement for this family mould with large differences in cavity volume is that it should be reliably filled shot by shot. This is why the additional technology module activeFlowBalance is used. The machine at the trade fair stand vividly demonstrated how deactivation and activation of activeFlowBalance affects the demoulding of parts in individual mould cavities. The 6-cavity mould is designed for two upper and lower parts of the housing, as well as for the clearly smaller button switch.

activeFlowBalance can be used to successfully balance out the uneven and fluctuating balancing of multi-cavity moulds which usually leads to negative effects, such as burr formation, underfilling and mould damage. When changing from injection pressure to hold pressure, this machine function uses the expansion of the compressed melt, whereby the partially-filled cavities are filled better due to their low counter pressure. The fill levels balance out in a natural way without extending the cycle time.

Suitable for the cleanroom: The IntElect 50-45 (clamping force 500 kN) will be used to produce MABS components for a peripheral intravenous catheter with a cycle time of 9 s. This application demonstrates precision injection moulding with a hot-runner connection and multi-cavity mould, as well as the cleanroom suitability of the IntElect. The requirements of ISO class 7, which often apply to the production of medical products, can be easily and reliably be met. The only requirements are the mounting of a laminar flow box above the clamping unit and the installation of the machine in a clean environment (cleanroom).

The IntElect 50-45, in conjunction with three other machines at the trade fair stand, was equipped with MAS software developed by T.I.G. Technische Informationssysteme GmbH to record, visualise, analyse and monitor operation, production and process data in real time, even for a large number of machines. Sumitomo contributed as a partner to this new development that has been presented at the K trade fair. The traceability functions of the software allow the user to trace back the product-relevant information down to each individually manufactured product. This requirement continues to grow, particularly in the medical and automotive industries.

The company was also represented with two other all-electric machines at partner stands. An IntElect 100-340 (clamping force 1,000 kN) produced PP blister packages at the trade fair stand of Yushin Precision Equipment Co. Ltd. At the stand of Stieler Kunststoff Service GmbH an IntElect 50-110 (clamping force 500 kN) produced a radio cover for an automobile interior. The focus here was on the finish quality of this demanding visible part. A special combination of different injection moulding techniques (temperature control, external gas pressure process and CO2 cooling), which have been developed by Stieler, has been used. This process can be used to produce high-quality, reliable finishes

Sumitomo (SHI) Demag D 90571 Schwaig

GMP Compliance Certification by TÜV SÜD gives certainty

Autor: Dipl. Ing. Walter Ritz

Tüv Süd's GMP Compliance Certification is an important service for manufacturers and equipment suppliers that must follow GMP regulations directly or indirectly. The internationally operating TÜV SÜD Group has 19.000-plus staff at over 800 locations.

The EU GMP guidelines governing medicinal products for human and veterinary use specify the principles of good manufacturing practice (GMP) in respect of medicinal products for human use and some medical devices laid down in Commission Directive 2003/94/EC. Manufacturing in accordance with GMP principles imposes very strict demands on manufacturers and equipment suppliers that operate in the pharmaceutical, medical device and cosmetic industries.

Tüv Süd's GMP Compliance Certification gives manufacturers additional certainty that their required comprehensive documentation, production equipment and the actual production process meet the strict requirements of the EU GMP regulations. The certificate supports but does not replace the companies' duty of qualification and validation which includes the requirement of authority inspection to obtain a manufacturing licence.

Within the framework of its GMP Compliance Certification, Tüv Süd carries out a comprehensive assessment programme on site at the manufacturing companies that includes the following issues and subjects:

- Document review (quality management manual, SOPs/work instructions, training programmes, QV documentation, manufacturing documentation, non-conformity reports, monitoring and measuring equipment, etc.);
- Inspection of the premises (production, storage and shipping areas, common rooms, quality control laboratories, service rooms, etc.);
- Production equipment;
- Production processes;
- Personnel hygiene;
- Ancillary equipment (water treatment, air filtration and distribution, production and distribution of compressed air etc.).

Equipment suppliers also benefit from Tüv Süd's GMP Compliance Certification as it assures them that the design, selected materials and documentation of their products and equipment meet the GMP requirements and that their equipment is ready for approval and suitable for use in cleanrooms. To the owners of such a system, machine or component the certificate offers the advantage that the supplier's documentation can be used as a basis on which to build full GMP certification.

Equipment suppliers must also pass a comprehensive assessment programme before they obtain the GMP Compliance certificate. The assessment includes the following elements of the GMP system:

- Document review (quality management manual, CE risk analysis, P&IDs, equipment parts list, design drawings, operating/service manuals, approval/qualification documentation, etc.);
- Technical testing of the component/system (product design, functionality, system safety, cleanability, maintainability);
- Inspection of the premises (production areas and storage and shipping areas).

Tüv Süd's GMP Compliance Certificate was developed and presented in 2011. Today, manufacturers in the pharmaceutical and cosmetic industries, but also suppliers of cleanroom equipment and providers of software services, have come to realise the benefits offered by certification – assurance of legal compliance, ideal integration of components, equipment and machinery, and comprehensive documentation that can be presented to potential customers.

In view of these advantages, Tüv Süd's GMP Compliance Certificate is in rising demand, not only in Germany and Austria, but recently increasingly in the Russian Federation too. The Russian companies aim not only to establish a quality management system in accordance with the ISO 9001 standard, but also to implement the international GMP standard. This combination offers ideal conditions for manufacturing at the highest level and for permanently proving the achieved level of quality in third-party GMP audits.

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Vaisala's Traffic Weather Solution Captures Five-year Deal with Ireland's National Roads Authority

Vaisala has signed a EUR 3.65 million deal with the National Roads Authority (NRA) of Ireland. Under the new five-year contract, Vaisala continues to deliver the most comprehensive winter maintenance decision making tools, solutions and services to NRA to help them provide the best possible winter service to the road users in Ireland.

„This large service contract is a testament to the success of our goal to develop a state of the art road weather information management system in collaboration with our customers. National Roads Authority is a progressive agency who, by selecting the Vaisala's road weather services and tools, will guarantee the most effective winter road maintenance for the tax payers in Ireland." States Antero Jarvinen, Director of Vaisala Roads.

The turn-key contract includes maintenance of over 80 weather stations across Ireland as well as a provision for expanding the network with new weather stations and thermal mapping. A key element in the contract is the Vaisala RoadDSS(TM) Manager software which will help the authorities make accurate and on-time maintenance decisions by combining all relevant weather data into one interface.

Safety through Partnership

The new contract is a continuation to a long-standing partnership. Since 1991, Vaisala has supplied road weather stations, thermal mapping, weather station maintenance, and technical support services to NRA. National Roads Authority is responsible for improving quality of life and national economic competitiveness by developing, maintaining and operating the national road network in a safe, cost effective and sustainable manner.

„We are excited to continue our successful relationship with Vaisala for the provision of road weather information services and strategic winter service decision support. This contract allows us to further develop the partnership and to continue providing the best possible solutions to the national road maintenance organisations and local authorities in Ireland. We are able to deliver on our mission statement when operating national roads throughout the winter period, and minimising the impact of adverse winter weather on the national road user." Comments Stephen Smyth, Engineering Inspector, NRA Network Management.

Vaisala is the leading provider of road weather information products and services with over 30 years' global experience. The company provides customers with the most comprehensive weather management portfolio including observation systems and sensors; visualization and decision support tools; and traffic weather consulting services.

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Vaisala Corporation: Sampsa Lahtinen Appointed Executive Vice President for Controlled Environment Business Area

Sampsa Lahtinen, M.Sc. (El. Eng.), has been appointed Executive Vice President of Vaisala's Controlled Environment business area and a member of Vaisala Management Group as of October 22, 2013. Sampsa Lahtinen will report to Kjell Forsén, President and CEO.

Sampsa Lahtinen has worked in several managerial positions in Nokia Siemens Networks (NSN), Nokia Networks and Nokia for over 20 years, and has a broad experience of leading global businesses and customer relationships. During his NSN years Lahtinen, stationed in London, was in charge of Vodafone Group business globally in 2009-2012, and headed West Europe business in 2006-2009. He has also worked in Latin America as Regional Manager for Nokia Networks and as CEO of Nokia Mexico subsidiary. Lately Sampsa Lahtinen has been an independent advisor and investor to startup companies.

„Controlled Environment business area is strongly driving Life Science growth strategy and accelerating the growth and renewal of Targeted Industrial Applications. Sampsa has strong experience from growing business and responding to demanding customer requirements. His international background fits well with Vaisala's global presence," states Vaisala's President and CEO Kjell Forsén.

Kenneth Forss will leave his current position as Executive Vice President of Controlled Environment business area and member of Vaisala Management Group on October 21, 2013.

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