Press release – final report and trends

Suppliers presented themselves from their best side again at COMPAMED 2017

The smallest components – medical technology requires smart solutions – are still rapidly advancing

A total of 780 exhibitors from 35 countries, even greater international participation and almost 20,000 trade visitors – COMPAMED, the leading trade fair for suppliers of medical technology products and services that is always staged in parallel to the world's largest medical trade fair, i.e. MEDICA (more than 5,100 exhibitors from 66 countries, which in 2017 ran from 13 to 16 November) maintains its heading towards success. The fact that the supplier sector for the medical technology industry remains optimistic about growth is without a doubt a contributor to its success. Digitisation and miniaturisation are currently the most important drivers that are pushing progress in micro-technology as well as other areas rapidly forwards. “The demand for smart miniaturised components destined for use in medical products and efficient high-precision production processes is still rapidly increasing,” says the IVAM, the Professional Association for Microtechnology. The association, which serves an international product market, attends the fair every year; its motto for COMPAMED 2017 was ‘Hightech for Medical Devices’. The specialists for small parts see micro-technology, nano-technology, photonics, MEMS (microsystem technology) and new materials as key technologies.

These ‘keys’ are also the focus of HNP Mikrosysteme (HNPM), which specialises in so-called micro annular gear pumps for microfluidics that are able to dose small and smallest quantities of liquid with the utmost of precision. The company presented its ‘mzr Touch Control’, which offers a new type of graphic control for pumps, at COMPAMED. The compact units for controlling individual pumps come with a simple and intuitive interface.

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The combination of touch control and pump enables users to set dosages from 0.25 micro litres and pumping quantities that range from between one micro litre and 288 millilitres per minute. Micro annular gear pumps are miniaturised rotary displacement pumps with internal motors that possess external gears and external rotors with internal gears. “These eccentrically-mounted rotors form a system of several conveyor chambers that remain sealed at all points in time during the rotational movement. They are used in medical technology particularly for diagnostics, e.g. for analysing blood samples,” explained Dr Dorothee Runge, who is responsible for Technical Sales at HNPM's Life Sciences Division.

Smart ‘peas’ that can be sterilised

The Fraunhofer Institute for Electronic Nanosystems (ENAS) is also pursuing the trend towards miniaturisation. The institute travelled to COMPAMED 2017 with its ‘Sens-o-Spheres’ project, which has been developed in conjunction with the Bioprocess Engineering Faculty at the Technical University of Dresden and industrial partners. ‘Sens-o-Spheres’ are pea-sized sensors that are around eight millimetres in diameter and that are used to monitor bio-reactor processes in the millilitre to litre range. Using the currently smallest sensors in the world, they move freely within the reaction volume and so supply continuous measurements from all areas of the reactor. “We can also deploy several spheres at the same time and so utilise many wirelessly transmitted measurements,” said Tobias Lüke, a scientist at the ENAS. The clever sterilisable ‘peas’ have been designed to help improve and develop processes in the pharmaceuticals and life-sciences industries. They can be recharged overnight.

Learning to walk again thanks to shoe insoles with pressure sensors

ENAS' colleagues from the Fraunhofer Institute for Silicon Technology (ISIT) are working on entirely different applications for their sensors. Their sensors are used to measure the distribution of pressure in shoe insoles

and so map gait and walking profiles. The data is sent via Bluetooth to a PC or smartphone and then processed there acoustically or visually. “By analysing gaits and using acoustic signals while doing so, it is our aim to help people doing sports during their free time prevent injuries, rehabilitate better and improve their results,” says Lars Blohm, a scientist carrying out research into bio-sensor technology and system integration at ISIT. Developments have been assisted by the Institute for Sports Medicine in Hamburg; other approaches include the measurement of moisture and temperatures.

Beutter, a manufacturer of high-quality precision components, possesses special skills in the manufacture of precision-engineered components with tight tolerances. The company makes individual parts and assemblies for technical medical instruments, prostheses and implants up to the highest Risk Class III category. “We manufacture small batches of sophisticated parts in quantities ranging between 50 and 1,000 units and have all the machining production processes, such as turning, milling, grinding and honing that are required to do so, available to us in-house,” says Dr Wolf-Dieter Kiessling, Managing-Shareholder at Beutter. The company just recently developed a medical port, i.e. a permanent subcutaneous interface to the bloodstream, for one of its customers. It consists of a titanium ring and a silicone membrane that can be punctured up to 1,000 times. Beutter offers special skills in handling and combining materials that are very difficult to work with and that are very demanding in regard to biocompatibility and fatigue-resistance, particularly when in contact with tissue.

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Metals, alloys and particularly plastics are materials that are important to the manufacture of products destined for the medical technology sector. The demands being placed on systems and assemblies made from polymers continue to increase steadily. Riegler, a plastics-processing company, has been meeting these demands for more than 30 years and is currently manufacturing moulded parts that weigh only between 0.007 and 800 grams. It draws on state-of-the-art manufacturing processes to do so:

"We are currently actively pursuing the trend towards 3D printing and have presented our first prototypes to customers. We are not only focusing on printing components, we are also concentrating particularly on the printing of tools," says Dr Thomas Jakob, Head of the Medical Technology Business Unit at Riegler. Our activities have also enabled us to realise prototypes quickly and cost-effectively.

Danish suppliers with own joint stand

Danish suppliers to the medical equipment industry also travelled to COMPAMED to exhibit state-of-the-art manufacturing and component technologies in Düsseldorf at their joint stand. "The industry for medical equipment is currently experiencing fundamental changes across the globe whereby cost reduction and outsourcing are the order of the day and continual innovation is consequently a vital necessity," says Thomas Andersen, Head of the Danish Health Tech Group. Knudsen Plast A/S, for example, has specialised in injection-moulding processes for plastics that are destined for use in the health sector. According to Frederic Bernard, Head of Business Development at Knudsen Plast A/S, medical-equipment companies are increasingly outsourcing their injection-moulding requirements as well as the production of injection-moulding tools along with the associated process development and testing activities and as a consequence are looking to their suppliers to provide the necessary skills and capabilities. Knudsen Plast's testing and product start-up centre in Denmark allows medical-equipment manufacturers to fully test and document their production lines for their products before manufacturing commences in Denmark or Knudsen's plant in Slovakia.

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Glass technology for diagnostic applications

Neither metal nor plastics: The name of Schott is very closely associated with the material of glass. The company has bundled its activities in the medical-technology sector under the heading of diagnostics. The new D

263 glass substrate that Schott supplies, for instance, constitutes a high-quality solution for optical diagnostics and biotechnology. Microfluidic components that are, for example, needed to sequence genomes and carry out pharmaceutical research are very demanding where optical requirements are concerned. Schott's new glass substrate is ideal for meeting these requirements: It offers certified biocompatibility and very low autofluorescence so that there is no interference with fluorescent markers.

A whole lab in your pocket

The Fraunhofer Institute of Applied Optics and Precision Engineering (IOF) has developed a whole pocket-sized lab that may in future be used to quickly and easily locate disease indicators in the bloodstream – and to do so at patients' homes. The lab will do away with the need for specialist physicians, all that it requires is a disposable fluorescence chip and a smartphone. The IOF scientists' vision is for an app to read out the results within just a few minutes of a drop of blood being applied to the chip. The industrially manufactured chips possess small channels that the IOF is populating with the necessary optical systems. “We can print a lamp and photo detector on the component – and can do so using a conventional ink-jet printer that has been only slightly modified,” says Falk Kemper, Scientist with the IOF, explaining the simple manufacturing process. The trick here: The use of special inks that have been populated with fluorescent molecules and nano particles. The method's principles: Special anchor molecules and fluorescent inks are located in the channels. Only the corresponding disease markers and the anchors will fit on a chip that has, for instance, been designed to confirm the presence celiac disease (gluten intolerance) – all other molecules will be washed away. The fluorescent dyes additionally attach themselves to the structure that the anchors and markers create and will only fit on this one combination. The printed lamp will stimulate the dye and cause it to light up. So if the photo detector then ‘sees’ the light, this will indicate the marker's presence thus allowing the conclusion to be drawn that the

person concerned suffers from a gluten intolerance. “This method of ink-jet printing provides us with a process for quickly and cost-effectively manufacturing fluorescence sensors while also helping to reduce the consumption of materials and resources as a result of the fact that the material is only applied specifically to where it is needed,” says Kemper summarising all the benefits. The next step will be to develop applications for other disease markers.

Nano coating reduces friction in seals

Trelleborg Sealing Solutions is one of the world's leading suppliers of precision seals. Among other things, the company presented its new method of coating for elastomers in Düsseldorf. The layers that this method creates are just a few hundred nanometres thin. This significantly reduces the otherwise high friction coefficients for elastomers while considerably improving the underlying material's gliding properties. The new coatings therefore help simplify the installation of sealing systems while improving the quality and extending the service lives of technical medical devices. Trelleborg has used the process it has developed to apply nanoscale coatings to further reduce the thickness of layers that have been possible to date by a factor of between 10 and 50 over conventional coating systems. And, because the new application is very stable, it can also withstand sterilisation by gamma rays, ethylene oxide and superheated steam. “Our coating process enables us to apply a wafer-thin coating to classic O-rings and complex moulded components that moves within the nanoscale range. The elastomers' original properties are only changed to a negligible extent and the lifespans of the sealing systems are increased as a result of friction reduction during dynamic processes,” says Andreas Schmiedel, Technical Manager Healthcare and Medical Europe at Trelleborg Sealing Solutions

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Packaging as high-tech solutions for medical technology

Packaging remains a permanent fixture at COMPAMED because it is an area that is of particular significance to the medical sector. The Multivac company, for instance, presented its solutions for, among other things, the automatic feeding of prefilled glass and plastic syringes, handling modules and carrier systems. The automation components are able to fill up to 3,000 syringes a minute into the packaging wells – and do so in a reliable and controlled fashion. All modules are synchronised with the thermoforming packaging machines and can be comfortably controlled via the operating terminal. Multivac's broad range includes a variety of straps, carrier and feed systems that may be individually customised on the basis of the product to be packaged. Needles and plungers that are supplied in bulk can, for example, be separated by vibration containers and centrifuges and fed to the packaging machine or machines. Robots are then able to finally insert the syringes, bags, ampoules and vials into their intended packaging wells.

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Other companies such as Xenon have dedicated themselves to the topic of automation. The company specialises in the development and manufacturing of special machines for, among other things, technical medical products. These machines are usually designed to handle up to 500,000 units and more in mass production. The Dresden-based business attended COMPAMED 2017 to present a new dosing module that is able to apply a broad range of materials to different components. “We are concerned here with bubble-free gluing and casting – processes that are also playing an increasingly important role in medical technology,” says Peter Hammer, Head of Medical Sales and Business Development. Xenon has developed a patented procedure in which a dosing needle that may be used with adhesive, for example, that can travel along any desired route within a vacuum chamber. “The special aspect here is that we are able to build very small chambers. As a consequence, it is possible to create vacuums very quickly … within just 0.8 seconds, for instance … and keep cycle times short,” Hammer explains.

Drives that are able to control positions within the nanometre range

The Faulhaber company's motor that is fitted in the bebionic hand prosthesis by ottobock to move a finger weighs just 11 grams. A total of five motors with gears make it possible to execute 14 different gripping patterns. Drive technologies are also a firm part of COMPAMED's programme – as is the company of Dr. Fritz Faulhaber. The company is now able to offer a broad range of solutions for analysis as well as automatic equipment for technical laboratory systems. Ultra-high-precision motors are also available for adjusting optical equipment, mirrors and lasers: “They allow us to position components in the nanometre range," says Frank Maier, Applications Consultant at Faulhaber. But suitable measuring systems are needed before machines can be positioned this precisely. “That's why we also supply integrated systems, i.e. comprehensive solutions,” says Maier. Faulhaber may consequently be regarded as an example of the trends that have been apparent at COMPAMED for many years: Ever smaller, increasingly compact, increasingly functional. And this is precisely the direction that COMPAMED 2018 in Düsseldorf (12 to 15 November) will probably be taking.

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More information available online at:
http://www.compamed-tradefair.com and http://www.medica-tradefair.com

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