Life Science Nord

Partners of Life Science Nord presenting the region

Medical Technology in North Germany

The Life Science Nord partners are companies and institutions from medical technology, biotechnology and the pharmaceutical industry in Hamburg and Schleswig-Holstein. Thanks to their active support the Life Science region North Germany can be strengthened effectively.

Traditional focus and innovation – medical technology in the North

Hamburg and Schleswig-Holstein can be considered the ideal location for medical technology, due in particular to the size and the dominant market positions the conglomerates headquartered here hold. Hardly any other region has an economic structure that is as distinctive in the area of research and development in medical technology. Around 300 medical technology businesses employ approximately 16,000 people. This strength is not based on sand but on a rock-solid foundation. Hamburg is home to many large and traditional medical technology companies, including Philips Medical Systems and the Olympus Europe Group, which can be considered excellent innovators and constantly provide research with new impetus, due in particular to their competence in imaging methods. In Schleswig-Holstein, internationally active companies such as Dräger Medical, Ethicon, Söring and Eska Implants produce for the global market. Apart from large companies there is also a multitude of medium-sized businesses and small start-ups. In the area around Lübeck alone, approximately 50 traditional and young companies with almost 3,500 staff have settled within the proximity of universities and research institutions that are committed and prepared to cooperate.

In many areas within medical technology, the North holds the lead with innovative products and practice-related research. Apart from competences in implantology, minimally invasive surgery as well as prosthetics and biomechanics, the North holds a clear competence lead in imaging methods, in particular.

Miniaturization and integration

Not only the manufacturing side of medical technology is extremely alive in the North. Research in medical technology also enjoys a broad base and excellent links. Here the close cooperation of universities and research institutions, so typical for the North, contributes significantly to the companies' success. Thus, the close interdisciplinary cooperation of the University and the University of Applied Sciences in Lübeck with the Medical Laser Center and the Institute of Biomedical Optics repeatedly results in various synergies and new questions.

In future, medical technology will be dealing with the integration of different systems, the miniaturization of tools for minimally invasive surgery and the improvement of optical imaging methods. In the North research is at top gear, in all areas.

State-of-the-art technologies for better images

Industry and science are making progress in developing new imaging methods.

Optical and imaging diagnosis have long been an issue in North Germany, at the very latest since the Hamburg-based company C.H.F. Müller constructed the first x-ray machines back in 1896. It is in this tradition that Philips Medical Systems currently operates the world's most state-of-the-art production site for x-ray tubes in Hamburg. But that's not all: the international company Olympus Winter & Ibe produces and develops micro-invasive imaging technologies in Hamburg. Even Siemens Medical Solutions has a commitment to medical technology in North Germany and the Schleswig-Holstein based Möller-Wedel GmbH is known around the globe as a producer of surgical microscopes.

In principle, in imaging methods, a differentiation can be made between optical and non-optical devices. In North Germany, both groups of companies are represented with important global players but also with medium-sized, innovative businesses. Apart from scientific expertise, this opens up the option to link different imaging techniques. Currently, in the area of surgical microscopes, there are attempts to also depict data from the pre-surgical *in vivo* diagnosis in the microscope's field of view, to assist the surgeon.

However, other businesses, active in the innovative field of biotechnology, are also dealing with imaging methods.
Evotec, for example, is one of the leading providers for high-quality confocal analysis tools and ultra-high throughput screening systems worldwide. In the area of high-resolution imaging detection devices for cellular assays, in particular, the company has taken a leading role. Evotec offers pharmaceutical and biotechnology companies its ultra-high throughput screening (uHTS) technology including its confocal fluorescence microscopy technology and other technologies for the fast identification of biologically active substances.

Apart from this research, which is oriented towards molecular biology, there are close links to engineering technology, e.g. with the department of microsystem technology at the Technical University Hamburg-Harburg and Philips or in the development of procedures for the MRT supported positioning of intravascular catheters. These and other technical developments in the area of image registration are completed, e.g. by the expertise of Prof Fischer, Department of Mathematics at Lübeck University. As a result, all components required for modern innovative molecular imaging, an up and coming area in North Germany, are also available at an academic level.

Molecular Imaging North

Hamburg and Schleswig-Holstein have started a unique project to promote molecular imaging in Germany. In this regional project, the University Medical Centers of Schleswig-Holstein (UK S-H) and Hamburg-Eppendorf (UKE) are cooperating with the technology partner Philips to improve diagnosis of serious diseases such as cancer and Alzheimer's. The medical fields of tumor and vascular disease, transplantations, neurodegeneration and the imaging facilities of the two university clinics are combined under MOIN – an acronym for Molecular Imaging North. Methods ranging from the improvement of molecular imaging techniques to the development of new contrast agent and marker compounds are combined for diagnostic purposes. The project aims to develop a technology platform for molecular imaging based on magnetic resonance imaging (MRI), fluorescence imaging and nuclear medical methods (PET and SPECT).

The development of biomechanical optics in North Germany is being driven ahead by institutions such as the Medical Laser Center Lübeck and the Institute of Biomedical Optics. Both carry out basic research and perform clinical trials as well as commissioned developments in the area of laser applications in medicine. A number of research teams are working at optimizing and extending the application areas for laser medicine.

New options for the structure elucidation of biomolecules at a nuclear level have opened up, thanks to the x-ray sources of Deutsche Elektronen-Synchrotron DESY. The x-ray laser XFEL, unique in Europe, will be available from 2012/2013. The European Molecular Biology Laboratory (EMBL) and the Max-Planck working group for structural molecular biology already work at DESY as permanent visiting research groups.


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PHILIPS MEDICAL SYSTEMS

Images provide information

Philips Medical Systems is the oldest manufacturer of x-ray tubes in the world. Philips still produces x-ray tubes in Hamburg and is developing the latest generation of magnetic resonance imaging systems.

In 1896, Carl Heinrich Florenz Müller produced the first x-ray tubes in his glass blowing workshop in Hamburg. In 1927, the Dutch company Philips takes over the specialist manufacturer C.H.F. Müller who has since become world-famous. To this day, Philips has left the production of the x-ray tubes in Hamburg. Even the current-generation tubes are developed and produced there for the global market. The latest generation of x-ray tubes offers a much higher resolution than previous models. At the same time the required dose of radiation is much lower so that the best possible resolution is achieved with the lowest possible dose. Even a longer radiation period, for example to watch the blood stream of a patient or to observe the beating heart, is possible with the low-dose x-ray systems. The latest x-ray systems produced by Philips are frequently used in CT scanners and in the products of other manufacturers.

Philips' magnetic resonance imaging division is also operated from Hamburg. It is in Hamburg that Philips develops and produces all devices based on this state-of-the-art imaging method for the global market. Magnetic resonance imaging is considered the gold standard in medical diagnostics. The images created by this method are generated without the use of x-rays and are solely based on the measurement of magnetic resonance. Philips' most recent innovation are open magnetic resonance imaging systems that no longer require a narrow tunnel system but place two magnetic tubes around the patient, similar to a sandwich, and provide an excellent image quality. The benefit of these systems is that they offer more room to move. That offers the possibility to examine, e.g. children free of fear and without sedation. Additionally, the so-called panorama MRIs enable the examination of lesions in which patients need to move, e.g. injuries of the knee joint.

OLYMPUS WINTER & IBE

Masters of clear vision

The Hamburg-based Olympus Winter & Ibe GmbH has, for many decades, been the innovation leader on the endoscopy market.

Winter & Ibe, founded in Hamburg in 1954 by Rudolf Winter and Wolfgang Ibe, launched its first cold-light resectoscope and cytoscope on the market at the beginning of the 1960s. In parallel, Olympus developed the first flexible endoscope for gastro-enterological examinations in Tokyo in the 1950s. In 1979, the two companies bundled their competences and amalgamated Japanese opto-digital high-tech and German precision mechanics in the new company Olympus Winter & Ibe (OWI). OWI develops and produces surgical and diagnostic tools as well as fiber optic devices for the current business areas Urology, Gynecology, Surgery, ENT and Arthroscopy, with a focus on lenses and video endoscopes. Thanks to the close cooperation between Tokyo and Hamburg, the application areas of the endoscopes are constantly being extended. With the reduction of the chip diameter and the improvement of the image quality of its video endoscopes Olympus has set benchmarks. In video endoscopy the image is transmitted from the tip of the endoscope to the camera unit by means of electrical signals produced by a tiny chip of only few millimeters in diameter. The video-optics were developed by OWI and are now produced in Hamburg for the global market.

With the introduction of HDTV (High Definition Television) in video endoscopy OWI has enabled new quality standards in operating rooms. The benefit of HDTV endoscopy to the surgeon is not only the greater amount of details through the higher resolution but also the natural color reproduction. In addition, even minute capillaries and lesions can be depicted during laparascopic examinations due to the new and patented NBI technology (Narrow Band Imaging). The use of HDTV during minimally invasive surgery can thus contribute to an increase of precision and quality of the operation, while reducing fatigue among surgeons.

With the acquisition of Celon AG Medical Instruments from Teltow near Berlin in the spring of 2004, OWI further extended its product range in the area of minimally invasive surgery. The key business area of Celon AG is radio frequency-induced bipolar hyperthermia. This procedure uses heat to destroy superfluous or pathologically altered tissue rapidly and precisely, so that the pain and trauma to the patient is minimized. In these days OWI additionally was given global responsibility for the ETD System. The automatic endoscope reprocessor ETD3 and the endoscopy management software ENDOBASE provide state-of-the-art solutions for endoscopy departments, which allow the correct reprocessing of each flexible endoscope to be checked before it is used again.

Furthermore, OWI is now responsible for the global Integrated OR business. An integrated endosurgery system balances the needs of doctors, nurses, and administration, providing state-of-the-art performance, streamlined operation workflow and optimal cost-efficiency. It offers a complete endoscopic surgery site that leverages Olympus expertise in areas such as imaging, electrosurgery, ultrasound, networking, robotics.

SIEMENS MEDICAL SOLUTIONS

SIEMENS

Clear internal views

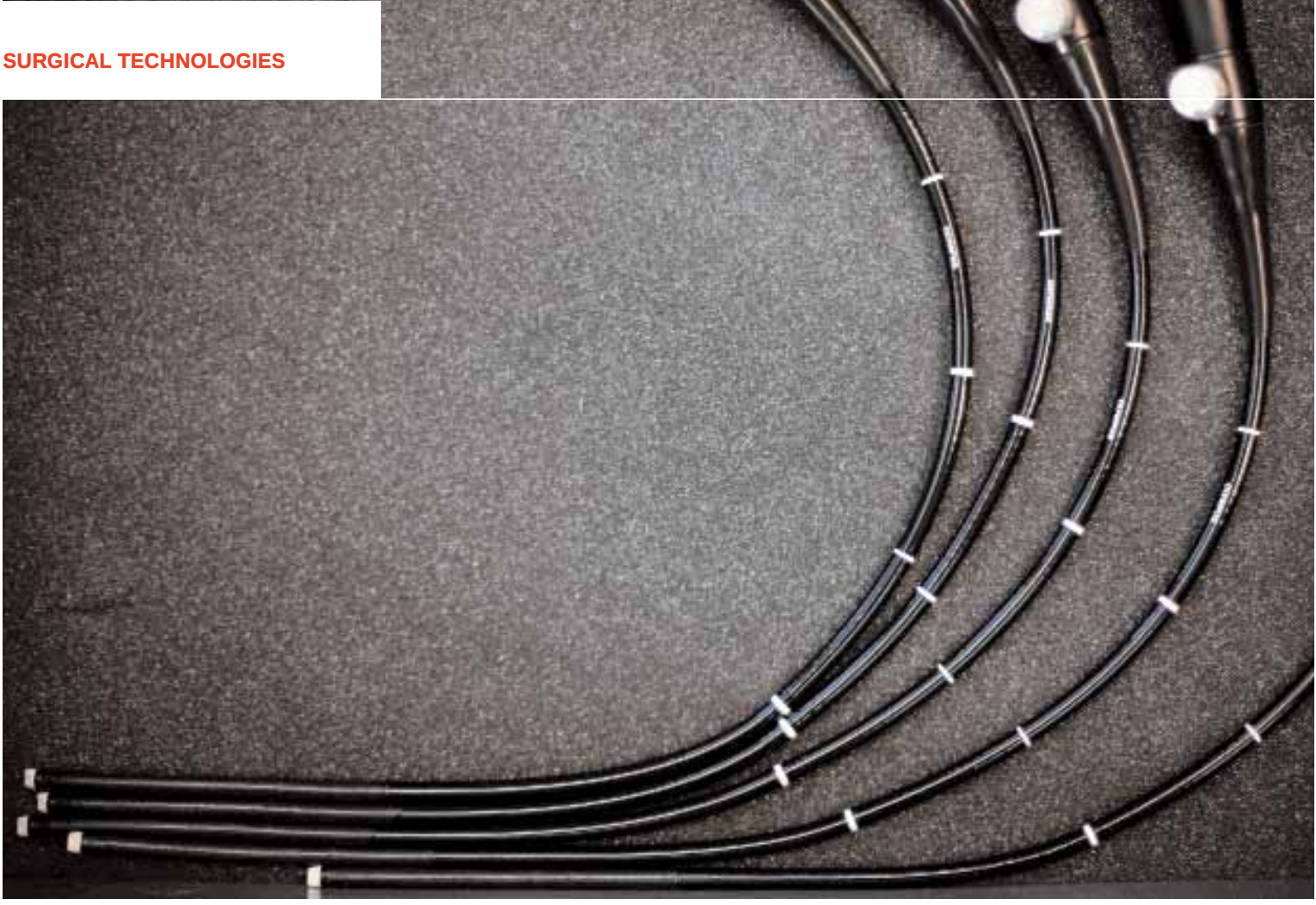
Not only does Siemens Medical Solutions use Hamburg as a base to sell its products from the area of Imaging methods throughout North Germany, it also develops the complex technologies in a targeted manner, for specific applications on site.

Magnetic resonance imaging and computed tomography, x-ray machines and ultrasound: Siemens Medical is the leading provider for all these imaging methods. The new generation of systems contributes to the earlier, safer and gentler detection of diseases, while reducing healthcare costs at the same time. An example of this is the first dual source CT scanner in the world: while previous systems featured an x-ray tube and a detector, which rotated around the patient and generated detailed images, Siemens' new Somatom Definition features two tubes and pairs of detectors. It therefore works faster than the beating heart of a person and can, so to speak, "freeze" the organ, thus enabling pin sharp images. Physicians can in fact even "fly" through the tiniest of vessels. On top of that, the Somatom Definition requires only half the dose of radiation of a tube-based system. The new technology also represents a relief to the patient and healthcare system – thanks to the high quality of the cardiac CT, a large share of the 600,000 catheter examinations annually can be done without.

Siemens is also moving ahead with innovations in magnetic resonance imaging. The Tim technology (total imaging matrix), introduced in 2003, enables the scanning of a patient from top to toe in one go, while achieving an excellent image quality. This reduces the examination time to only a quarter of an hour. In addition, the system reduces the stress to patients as they can be scanned starting with the feet. The head need only be inserted into the tube if necessary.

In recent years the importance of imaging when dealing with processes at a molecular (metabolic) level has grown significantly. This development has also been pushed ahead by a new technology developed by Siemens. In its PET/CT system, Siemens combines Positron Emission Tomography (PET) with computed tomography. While the PET detects tumors and metastases through their increased consumption of (previously radioactively marked) sugar, the CT depicts anatomical details. Together, the PET/CT system supplies clear indications of the location, size and activity of the primary tumor. The combination of the different imaging methods is considered an issue researchers hope to derive great progress from in future with regard to the quality of the examination and early recognition.

Siemens in Hamburg is, however, more than "merely" a sales department for the medical technology products of the Siemens parent company in North Germany. In Hamburg, Siemens' products undergo a targeted further development and are adapted to meet special requirements in the region. Siemens and Asklepios Klinik Hamburg-St. Georg, for example, cooperate within the context of a magnetically controlled cardiac catheter procedure. In so doing, the catheter is inserted into the human body and navigated with the aid of specially adapted imaging methods of Siemens.



Innovative medical engineering “made in North Germany” for the operating room

High-precision medical instruments are designed for optimal and gentle treatment of patients. North Germany has excellent know-how in implantology and minimally invasive surgical techniques. Like a puzzle, individual technologies are combined to form an integrated therapy for the future.

Minimally invasive surgery – so-called "key-hole technology" – is considered a guarantee for pain-free incisions and a speedy recovery. North Germany is playing a leading role when it comes to innovative high-tech solutions for the operating room. From three-dimensional imaging methods to centralized control of surgical systems and adaptable implants, pioneering products and instruments are being developed in medical engineering companies in North Germany.

The Norderstedt-based Ethicon has been successfully developing products for minimally invasive surgery for some time. Originally a specialist for suture material, Ethicon Endosurgery was formed in 1992 as an independent unit of the Johnson & Johnson Group. The product portfolio covers, among other things, trocars, clamping and cutting instruments as well as suture material and ligature clips.

For the Hamburg company Olympus Winter & Ibe, integrated operating room concepts are nothing new. The Endo Alpha system represents a user interface for the centralized control of all instruments used in an operation. It includes not only the firm's own endoscopic systems, but also all peripheral equipment. For example, the surgeon can access and inspect x-ray or CT images. Via a conferencing function, doctors from all over the world can be consulted on specific questions and linked directly to the operating room.

However, specialists in surgical microscopy can also find a suitable niche when it comes to providing integrated patient care in the operating theater. For example, Möller-Wedel GmbH offers a high-tech microscope for brain surgery. In connection with a stand, it can be moved by servo control – similar to the "fly-by-wire" principle in modern aircraft – almost freely in any direction while still remaining perfectly balanced. The Wedel firm was founded 142 years ago as an optical business and shows how products can be further developed and thus remain up-to-date and in line with market requirements.

In the field of bone surgery, medical engineering companies from North Germany are also trailblazers. Implants of the Lübeck firm ESKA Implants such as the high-quality, cement-free joint replacement, have firmly established in operating rooms. The surface of the ESKA endoprostheses is a three-dimensional lattice structure which is adapted to the structure of osseous tissue and bone and so permits bone vascularization within the structure.

The Kiel-based Stryker Osteosynthesis, which has specialized in the intramedullary treatment of fractures of long tubular bones, can boast a record result worldwide. The German subsidiary of the global Stryker Group produces medical nail implants, screws and instruments, mainly for the treatment of bone fractures, in Kiel. In 2005, the North German facility produced 280,000 nails and every 2.4 minutes a product from Kiel is implanted into a patient.

Centrally controlled instruments

However, the North is well positioned not only in industry, but also in research. For example, a landmark project with international recognition is currently being established. The core of the nationwide research project, which was initiated at the University Medical Center Schleswig-Holstein (Lübeck Campus), is the development of a new, comprehensive concept for gentle liver surgery. To provide integrated patient treatment, this involves, among other things, aligning and overlapping pre-operating images (MRI/CT) with images during the operation (ultrasound).

To this end, the Institute for Biomedical Optics (formerly Medical Laser Center at the University of Lübeck) is developing a new-style laser which automatically recognizes blood vessels and either coagulates vessels, i.e. seals them, or automatically switches off in order to avoid the opening of larger vessels. The laser fiber is integrated into a navigable hand-held instrument supplied by Bauer and Häselbarth, a company based in Ellerau, Schleswig-Holstein.

All the instruments involved in a surgical procedure are to be centrally controlled via a kind of cockpit. The Lübeck-based company Dräger Medical is lead manager for this part of the project.

Many large and small medical engineering companies are already profiting from the growing healthcare market. However, the potential is far from exhausted and there are sufficient opportunities for new developments and technological solutions – both stand-alone and combined into intelligent, complete systems.

MÖLLER-WEDEL

Pioneer in Life Sciences

An internationally renowned company from the Hamburg region, which has supplied quality for 140 years: Möller-Wedel GmbH produces high-class optical medical devices.

Möller-Wedel was already active in high-tech medical technology long before the term Life Sciences was coined. Founded as an optical company, it has existed in Wedel near Hamburg since 1864. In the course of the last 50 years, Möller-Wedel concentrated on development and production of medical systems, in particular on operating microscopes which combine high-class optics with progressive electronics for intelligent solutions. Especially for neurosurgical procedures, the latest microscopes are equipped with a system similar to the "fly by wire" technology in aeroplanes providing continuous equilibrium as well as free-floating, exact movements. Various accessories are available for image guided surgery (IGS) and for connection to navigation systems and to the hospital archives via DICom. A family of six surgical microscopes for ophthalmology covers all needs for cataract and retinal surgery in small surgery centers up to large hospitals and university clinics. Various options of slit lamp modules provide dedicated illumination formerly found only in diagnostic instruments.

Whereever very small tissue, vessels, or nerves have to be repaired, whether in neurosurery, ophthalmology, ENT, reconstructive surgery, or dentistry, the appropriate operating microscope system can be offered by Möller-Wedel.

BODE CHEMIE

When seconds count

For 110 years, disinfection times between three and five minutes have been observed prior to operations. Last year BODE Chemie proved that a 1.5 minute surgical disinfection of hands with Sterillium is as effective as the usual three minute application.

While so-called cases of malpractice generally create a tremendous uproar in the media, a common threat present during surgery often does not make its way into the public: wound infections that can result from surgery – one of the most common hospital-acquired infections worldwide. The rate of infection of almost 1.4% in Germany, determined through tests, may be low; however, it does represent considerable stress for the patient affected and the healthcare system. With average additional costs of approximately EUR 2,500 per post-operative wound infection it quickly becomes clear – even under economic aspects – that all measures must be taken to reduce the risk.

In 2005, BODE Chemie proved that its hand disinfectant Sterillium was as effective within only 1.5 minutes as with an action time of 3 minutes. For more than 110 years hospitals have worked with disinfection times between three and five minutes. The use of Sterillium for surgical hand disinfection with a shorter action time has been approved in Germany and in a further eleven EU member states, Switzerland and Ukraine. The two BODE products Sterillium and Sterillium classic pure are the only products currently approved for a shorter action time. The economic benefits of halving the action time are tremendous for the hospital. The greatest benefit, however, is the time saved; time that physicians and surgery staff can now use better, for other tasks, e.g. patient care. In view of the increasing involvement of physicians in administrative work, even a few minutes extra per day have a positive effect.

Surgical hand disinfection of physicians and surgical staff prior to surgical interventions is one of the most important measures for the prevention of infection. The focus here is in particular on the skin-borne bacteria of the surgical team. While harmless on intact skin, the skin-borne microorganisms can trigger infections in the surgical wounds of patients. The obligatory surgical gloves alone do not offer sufficient protection. Tests show that almost one fifth of all gloves are no longer intact following an operation. The fact that there is a connection between damaged gloves and a higher rate of wound infection has been proven scientifically. The use of alcohol-based hand disinfectants reduces the rate of bacteria on the hands of the surgical staff and thus the risk that germs are emitted into the wound if the surgical gloves are damaged.

ETHICON

A revolutionary in surgery

The Johnson & Johnson subsidiary from Norderstedt is attracting attention with constant innovations in surgical technologies.

Ethicon CEO Anton J. Schmidt comments on the strengths of the medical engineering specialist and the significance of Norderstedt as a location.

Ethicon supplies a wide range of highly specialized medical instruments. What do you focus on and where are your products used?
Our products are used by all surgical disciplines. We focus on the production of surgical suture materials: we produce 150 million needles and more than 100 million production units of suture materials annually, as well as a great volume of absorbable implants. On top of that, the Ethicon subsidiary Endo Surgery is the global market leader in consumable instruments for endoscopic surgery.

Which innovations has Ethicon recently launched on the market? Which innovations have you scheduled for the near future?
Our product Vicryl Plus has revolutionized the market for suture materials. It is the first and only antibacterial suture material in the world. The antibacterial coating prevents the colonization of the material with bacteria, thus preventing infections. With the development of Vicryl Plus we have made a big step toward preventing infections. Physicians refer to it as a "surgical revolution". A further milestone in medical technology was the introduction of lightweight and partially absorbable mesh for the repair of hernias and incisional hernias by Ethicon. And finally: with the opening of the European Surgical Institute (ESI) in Norderstedt in 1993, the most up-to-date training center for minimally invasive surgery in Europe was inaugurated. Since then, more than 100,000 physicians from around the globe have received training there.

How long has your business already been operating in Norderstedt and are you satisfied with your choice of location?
Ethicon has been headquartered in Norderstedt since 1962. Meanwhile, we employ approximately 2,400 staff at three locations within the region. In Norderstedt we operate the world's largest and state-of-the-art production site for surgical suture materials.
We are extremely pleased with our choice of location. The Schleswig-Holstein state government and the city of Norderstedt provide great support with regard to all our projects. Another point in favor of this region is the fact that we can find highly qualified staff and an excellent infrastructure here. This is why Schleswig-Holstein is of strategic importance to Ethicon as a production and science site – particularly in the area of medical technology.

Innovations come from North Germany

The North sets the standards in a number of medical technologies of the future.

Medical engineering has a long tradition in Germany. It is one of the sectors of the future which is characterized by innovative technologies, high growth rates and improved medical care. Hamburg and Schleswig-Holstein are also helping to ensure that Germany remains a leading international location for medical engineering in the future – in functional imaging, minimally invasive technology, computer-aided diagnosis, therapy support or implantable microsystems technology. In key technologies of pioneering medical engineering, the North sets standards. In related areas of drug delivery and the huge field of consumables, there are a number of the companies in the North that are competing successfully in the market by developing new technologies. Besides the major international innovators, there are in particular small and mid-sized businesses that attract attention with their outstanding product developments.

COLOPLAST

Trailblazer in medical consumables

The Danish specialist for medical products controls its marketing, logistics and research for the German market from Hamburg.

Coloplast focuses on products and services in the areas of wound, stoma, incontinence and breast care as well as skincare and skin protection. The company is, for example, a world market leader in stoma care and, as a trailblazer in this industry, developed and supplied the first modern stoma bag. Currently, the company's range includes a number of complete stoma care systems. Coloplast has also proven to be an innovator in the area of incontinence care: with Speedi-Cath Compact the company has developed a single-use catheter for women that not only works easily and securely, but can be discreetly used in everyday life.

The Danish company has been active on the market for medical consumables since 1957. In 1983 the German subsidiary, Coloplast GmbH, commenced business in Hamburg. At the German headquarters some 200 employees control the sales and marketing of the products for the German market. Additionally, Coloplast executes extensive trials with clinics and medical care staff to gain new insights with regard to product development and to improving existing products. Furthermore, in Hamburg Coloplast trains clinic and care staff in the use of its products and offers targeted patient care.

In addition, Coloplast Deutschland is initiator of a WoundNet: the objective of the project is the creation of a broad basis of data and experience to gain new insights on existing and innovative structures, processes and results in the care of patients with chronic wounds. It is being established as a sector and special needs group spanning network of experts and services providers in healthcare. WoundNet's core is an image-supported, electronic documentation system for the description of the patient's situation and for the clinical and economic evaluation of wound care techniques.

WEINMANN DIAGNOSTICS

Fast waves save lives

A new diagnostic procedure for the determination of carbon monoxide concentrations improves work at the point-of-care.

Hamburg – On the basis of the pulse spectroscopy procedure developed by Weinmann Diagnostics it will soon be possible to non-invasively determine carbon monoxide intoxication directly on site. In addition to the already known parameters of pulse frequency and oxygen saturation in human blood, as used in pulse oximetry, the mobile "Hemily system" can also measure carbon monoxide saturation and on top of that it will soon be possible to determine the concentration of haemoglobin in human blood. In emergencies physicians and paramedics can determine whether they are dealing with carbon monoxide intoxication – much more rapidly than before and without taking blood.

The measuring principle is based on the extended, popular pulse oxymetry test, which – for the purpose of analyzing blood gases – utilizes different wavelengths, generated by light sources. The level of absorption of these wavelengths in tissue allows for the determination of the degree of O_2 and CO saturation.

With this new procedure, Weinmann Diagnostics meets an important medical requirement. With "Hemily", it has for the first time become possible to measure the actual oxygen supply in human circulation. Weinmann Diagnostics is a newly founded business area of the traditional Hamburg-based company Weinmann, which has been active in the medical technology industry for many decades. The group focuses on sleep, oxygen and emergency medicine.

STECO SYSTEM-TECHNIK

A family business treading new paths

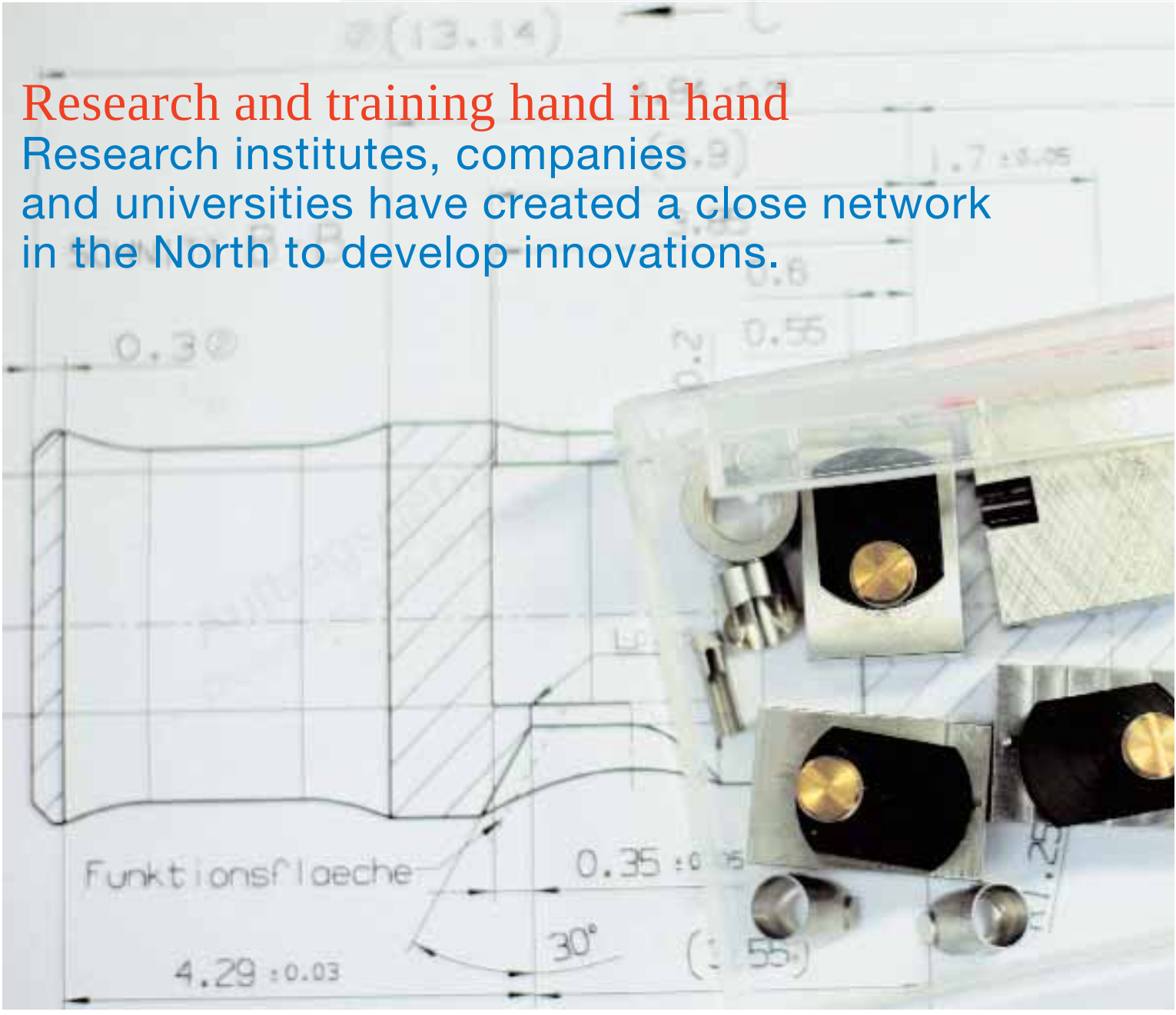
The generation-spanning family business, which has so far been known as a specialist in the field of dental technology, is entering into a new business area: port systems for the infusion of highly effective drugs in chemotherapy.

The Hamburg-based company is a family business that is managed in a way that is only rarely found these days: at Steco, father and son jointly manage the company. While both have a background as dental technicians, the junior, Hjalmar Stemmann deals mainly with the marketing and sales side of the business whereas the senior, Hartmut Stemmann, is responsible for research and development and, as such, has been awarded several prizes for his work in the field of dental technology. The company is also known for its special dental technology products such as magnetic retention systems for dental implants or a comprehensive tool system for the treatment of all ceramic superstructures.

Now Steco has proven itself as an innovator in a new field: the implantable port system (imPort®) presented by Steco is a subcutaneous venous access that is used for highly toxic drugs. Such port systems are predominantly used in the battle against cancer. The venous access that can be implanted for up to 90 days can easily be felt and holds the benefit that vessels need not be repeatedly punctured. In contrast to the port systems commonly used, the imPort's direction of puncture is sidewards – it is therefore similar to the conventional single puncture of vessels. In addition, the imPort has a streamlined cylindrical-conical infusion chamber with a corresponding port casing, with a drop-shaped external geometry. Due to this specification, the imPort can also be used with straight cannulas. Appliance tests for the imPort are to commence this year. Initial interest in the new system has already been communicated to Steco.

Research and training hand in hand

Research institutes, companies and universities have created a close network in the North to develop innovations.



The development of medical equipment, products and technical methods is marked by a high level of research effort in a large number of medical fields in human medicine. In Schleswig-Holstein and Hamburg, there is a well developed research sector which has close ties to companies in the region. Both states have the required specialization to ensure long-term success in research and development. The foundations for methods of treatment and innovative technologies of the future are being laid at the Laser Center in Lübeck, the Borstel Research Center and the Fraunhofer Institute in Itzehoe. In both states, there are medical engineering courses with differing and complementary areas of focus. Partners collaborate in this area too. For example, in Lübeck the university researches and teaches together with the technical college in a joint biomedical engineering course. The main emphasis is on achieving a balance between basic teaching and practice. The fruitful link between research and application is also a particular feature of universities and specialist clinics of the two states. The exploitation and combination of the methodological breadth of many clinics to form effective focal points of research leads quite frequently to spin-offs of small highly specialized businesses.

SURGERY

New procedures for gentle liver surgery

The FUSION project aims to improve surgical precision and provide individualized methods to treat liver tumors.

Liver carcinoma is one of the world's most frequent malignant tumor diseases. In Germany, some 5,700 people die each year from malignant tumors of the liver and the cystic ducts located there. The liver is also a preferred site for metastases. They appear in about 60 percent of all cancers during the course of the disease.

So far, surgical resection is the only recognized form of therapy. In the last few years, interventional tumor ablation has developed as a further possibility. Optimizing this form of therapy is the goal of a major research project which was started at the University Medical Center Schleswig-Holstein in Lübeck and which receives funds totalling 15 million Euros from the German Federal Ministry of Education and Research. The project known as "Fusion" – Future Environment for Gentle Liver Surgery Using Image-Guided Planning and Intra-Operative Navigation – involves a new and comprehensive approach to gentle liver surgery. Prof. Dr. Hans-Peter Bruch, Director of the Clinic for Surgery at the Lübeck Campus, is the initiator and head of the project. Throughout Germany, 23 participants from medicine, science and industry are coordinated through CEMET – Center of Excellence in Medical Technology in Schleswig-Holstein – headed by Dr. Raimund Mildner.

The project pursues the goal of individual and very precise surgery for soft tissue. The key element of the approach is the optimal transmission of pre-operative three-dimensional imaging data into the surgical situs to enable the operation to be planned much more precisely than with the means previously available.

The project is supported not only by renowned research institutes, but also by medical engineering companies such as Dräger Medical, Siemens Medical Solutions and Karl Storz GmbH. Clinic cooperation is carried out with seven of the leading clinics in the field of liver surgery, transplantation and tumor ablation (Berlin, Düsseldorf, Essen, Krefeld, Hamburg, Kiel and Lübeck).

LASER

High-performance bundle of energy for diagnosis and therapy

The Lübeck Laser Center develops state-of-the-art technologies which support the eyes of the operating surgeon.

Operations with large incisions are increasingly becoming a thing of the past. Besides precise instruments for minimally invasive surgery, a gentle operation that subjects patients to less stress also involves a differentiated look into the human body. Without optical technologies that support doctors' own eyes, modern surgery is hardly feasible. These technologies are developed at the Medical Laser Center (MLL) in Lübeck. Only the use of targeted energy beams permits deep, highly detailed insights into the human organism – whether to prepare biological samples by means of focused femtosecond pulses, for intracellular nanosurgery or to study protein functions by means of optical marking methods with gold particles hit by laser beams. The MLL develops basic therapeutic and diagnostic methods for new medical laser applications which are tested in close collaboration with doctors. Ideas developed for equipment are also quickly passed on to industry under cooperation agreements and jointly developed further.

BIOMECHANICS

Quality of life from the test tube

With studies on the locomotor system and artificial production of human tissue, biomechanic researchers in North Germany are proving to be an innovative force.

In the biomechanics unit at the Technical University of Hamburg-Harburg, Prof. Michael Morlock oversees various research projects on implantology and endoprosthetics. The stability of artificial joints, the use of new materials and dynamic loads on the locomotor system are all research fields in biomechanics, whose aim is to reduce wear and offer enhanced comfort. Besides research projects that consider for example burdens placed on the human locomotor system in everyday life, the scientific community in North Germany also focuses on the highly innovative field of tissue engineering. Tissue engineering is an interdisciplinary field that connects biology, material sciences and medicine with the aim of repairing damaged tissue or improving its function. There is for example a huge need for replacements for skin (after burns), cartilage (rheumatism, arthritis and arthrosis) and bone material (in dentistry, plastic surgery and for anchoring implantations). Tissue defects in cartilage normally arise as a result of excessive stress, wear or inflammation processes. As cartilage in the body does not regenerate, the cartilage cells and material have to be reproduced outside the body to repair the damaged cartilage. In Schleswig-Holstein, research groups also offer their know-how in this young field of regenerative medicine to the scientific community and industry. The Lübeck Tissue Engineering Center of Competence (KTE) offers support in quality control as well as in research and development. In cell culture research, KTE takes on R&D contract work. As a service company, KTE prepares comprehensive analyses and quality controls of collagen and bioartificial matrices. Applications are in medicine, pharmacy, tissue engineering and in the cosmetics and food industries.

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