ELECTROMEDICAL DEVICES

MADE IN GERMANY

S T A T E - O F - T H E - A R T   E L E C T R O M E D I C A L   M A N U F A C T U R I N G

Setting a high standard of technical reliability, the country's electromedical manufacturers continue to provide solutions that optimise and accelerate medical care in hospitals and surgeries. The equipment is used in preventive medical care; for precise diagnosis via state-of-the-art imaging systems; to monitor patients and support life-saving organ functions.

In addition, the country's information technology (IT) regulates the entire patient-oriented chain of processes. From initial examination and electronic prescription, to hospital admission-treatment-discharge, and any aftercare and rehabilitation - networked software can ensure a seamless exchange of information to improve workflow, as well as produce a complete electronic patient file, archived centrally. This, combined with the hospital information system (HIS), in the future could enable automated therapy recommendations (e.g. contra-indications), as well as therapy monitoring and control due to an improved identification of false alarms.

In addition, manufacturers' access to hardware, for 'remote device service and diagnosis' means there is not only direct online support for medical technicians, but fewer onsite visits and therefore lower operating costs.

In IT there have also been innovations in patient and user security.

German engineering has a valued history, which continues and ever advances. Today, the importance of the **Made in Germany** stamp on electromedical technology is underlined by the combined annual turnover of €3 billion - two thirds derived from exports - of companies associated with the *German ZVEI Association for Electromedical Technology*

Valued worldwide

SIEMENS

Ever advancing medical technology manufacturing enables doctors to delve deeper into the body's innermost secrets

TOSHIBA

GE

PHILIPS

Improved imaging and therapies

The World Health Organisation (WHO) has reported that quality ensured mammography screening could achieve a reduction in mortality of up to 35%. Consequently, many EU representatives and European doctors have argued the case for quality-ensured mammography screening according to European guidelines. This could be greatly improved by using digital rather than analogue mammography systems.

CT scans enable very precise, diagnostic insights into the morphology of the body. However, if a tumour is detected, generally it is impossible to tell whether the lesion is benign or malignant.

Positron emissions tomography (PET) scanners present that differentiation.

Deposits in arteries can lead to constrictions, or complete blockages. This can be alleviated in a minimally invasive procedure, using a balloon catheter and fitting a stent.

Three-dimensional (3-D) images of coronary vessels, provided by modern angiography equipment, show the position, size and angles of constrictions or calcifications of coronaries with great accuracy.

These are just a few examples of medical developments that can now improve patient care. They enable more effective and efficient healthcare, and are available now. However, only the

healthcare services themselves can decide to take advantage of their development.

Industry and users work together

The medical technology industry and its end users have taken steps to optimise processes through the European umbrella organisation COCIR - and, in Germany, via the ZVEI Association. Doctors and medical companies have also united in the *Integrating the Healthcare Enterprise* (IHE) to solve the problems of interoperability of primary systems. Clinical processes, such as a request for diagnosis and transmission of the
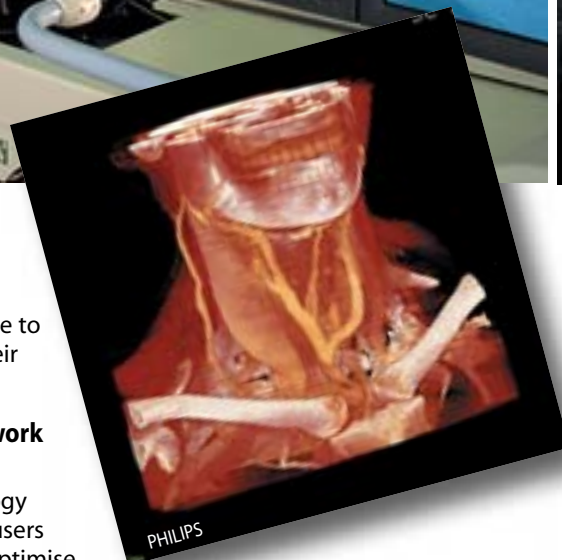
results, are defined by the user and put into practice by the industry, an initiative that has produced such success that it has been copied across Europe. Clinical departments, e.g. cardiology and the laboratory, are already integrated and, in the future, this will extend, for example, to pathology and surgery.
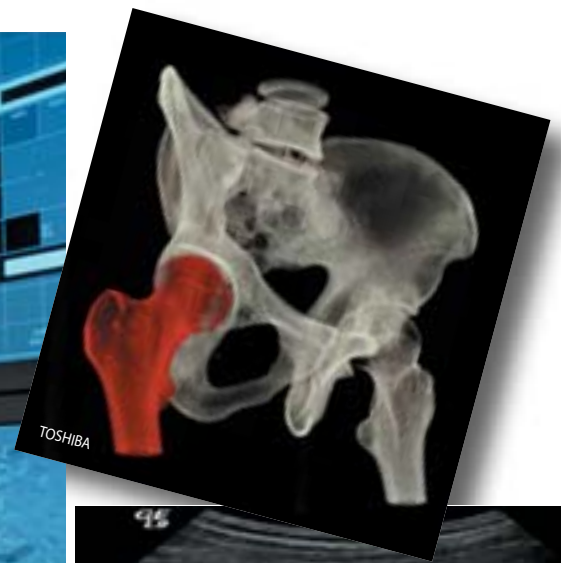
** The **German ZVEI Association for Electromedical Technology** represents about 100 companies that produce 90% of the country's imaging and other electromedical equipment.*

Apart from political lobbying in the interest of this high-tech field, the Association also co-ordinates the exchange of information and experience in all relevant business areas. Information regarding market developments during the last few years can be accessed at: www.zvei.org/medtech (Branchen-information).

*The association also represents members at a European and international level through active involvement in the European umbrella organisation **COCIR** (www.cocir.org), which, among other activities, focuses on European legislation originating in Brussels. COCIR also tackles topics such as the EU-recognised licensing procedure for medical technology products in relation to partner associations in North America and Asia.*

The world's medical electronics market is worth around Euros 40 billion (2004)

MARKET LEADERS

1 USA	2 JAPAN	3 GERMANY

GERMANY

Imports	€2.45 billion	Export markets		Share of export turnover	
		Europe	43%	1980	47%
Exports	€5.22 billion	USA/America	34%	2004	62%
		Asia	20%		
		Africa	2%		
		Australia	1%		

In 2003, German public healthcare expenditure was euros 136.2 billion. The country has 82 million inhabitants and 37 million employees. Of these, four million work in healthcare (11 %).

MEDICAL ELECTRONICS TURNOVER

Total: Euros 1.2 billon (1,121) - two-thirds for diagnostic imaging equipment

In euros	2004	1999*	changes
Imaging equipment	438	521	- 16 %
Medical electronics	294	338	- 13 %
Ultrasound	263	244	+ 8 %
Nuclear	17	22	- 23 %
Miscellaneous	109	103	+ 6 %
Total	**1121**	**1228**	**- 8.7 %**

Turnover share for imaging systems (2004)

Ultrasound	42%
MRT	20%
CT	16%
Angiography	9%
X-Ray	7%
Nuclear	4%
Fluoroscopy	2%

Total MRT systems worldwide (2002) 25,210
Installations per million population

Japan	42
USA/Canada	39
Germany	19 (plus 42 % since 2000)
UK	8

Total CT systems worldwide (2002) 41,000
Installations per 1 million inhabitants

Japan	87
USA/Canada	32
Germany	30 (plus 15 % since 2000)
UK	8

Ultrasound (sonography) systems used in Germany: about 40,000
Average age of the country's medical electronic systems

	2001	1998
Over 10 years	34 %	51 %
6-10 years	43 %	21 %
Up to 5 years	23 %	28 %

Data source: ZVEI, 6/2005

CONTRAST AGENT INJECTORS

NEW Save time! Don't change media containers

In 1982, **ulrich medical** - a 3rd generation family concern based in Ulm - presented the first contrast agent injector for CT examinations. Twenty years on, ulrich not only offers a high-end portfolio of contrast agent injectors - many installed on the fastest MSCTs - but it also has a highly active international distribution network.

'Unlike common syringe injectors,' ulrich explains, 'all our injectors are based on the special roll pump system. Pre-loading syringes is not necessary because injection is made directly from the media container, a feature that allows big storage bottles to be mounted. So several injections can be made consecutively without loading or decanting media. This comfortable handling contributes to a high patient turnover, as well as the saving of time and costs for disposables. In addition to the economic performance and consumption, the construction principle of a roll pump system reliably ensures the hygienic safety for multi-dosing.'

In addition to its CT injector **ohio tandem**, the company has now developed the **ohio M**, to also provide the tandem function for MRI examinations. This means two different contrast agents can be chosen without a time-consuming change of media containers. 'Because two of the three media accesses can be equipped with different contrast agents, the optimal contrast medium, plus NaCl for each patient or examination, can be chosen without re-organising the daily workflow,' ulrich points out.

CANopen technology

Medtron AG, which designs and markets high-performance contrast agent injectors for use in CT, MRI and angiography, constantly aims to meet the demands of the latest scanner generations and advancing medical requirements, along with patient comfort and cost effectiveness. 'Injection systems for simultaneous or sequential injection of contrast agent and saline solution, meets those demands,' Medtron points out. 'We recognised at an early stage the chances of CANopen technology and were the first to support an interface based on this standard.'

Based in Saarbrücken, Medtron has qualified partners in many countries who distribute and maintain the firm's devices and corresponding disposables - e.g. syringes, automatic filling kits or specially designed customer solutions.
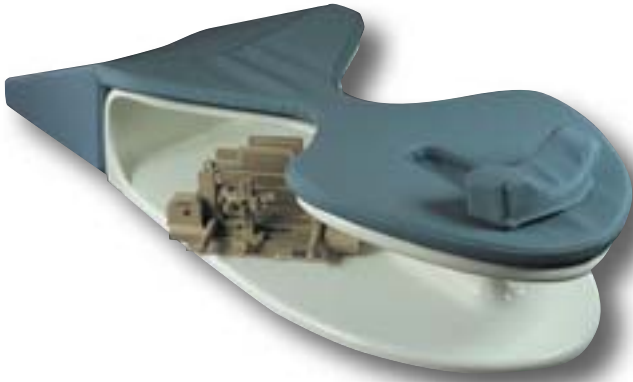
CONTRAST at the right time – at the right place

INJEKTRON CT 2

Mammography

Greater control plus comfort

Immobilisation of the female breast for diagnostic examination and biopsy is one of the prime foci of the Noras Company. In 1996 the predecessor of the firm's well-known MR-BI 160 Biopsy Unit was submitted for a patent; today over 500 of these are at work worldwide.

Based on resulting clinical experience, this unit and other products have been further developed: the MR-BI 160 PA Unit consists of a padded patient support table and a variation of the **MR-BI 160 Unit**. Using this version, imaging can be carried out with the spine coil and/or other coils of an existing system, for example.

The device immobilises the breast under examination and provides needle guidance during a biopsy. Immobilisation is realised by the compression

unit, which can be rotated by 360º parallel to the frontal plane for optimum accessibility to the lesion. Noras also points out that a further development of the well-known **PE 162 Positioning Unit** is used for needle guidance and offers access to areas close to the axillary region (chest wall).

System independence, simple assembly and disassembly and easy cleaning (the system is 100% plastic), plus comfortable patient bedding, are among the unit's many other advantages. Additionally, the components of the biopsy unit are made of Peek and can be reused after disinfection/sterilisation.

* A special Noras adapter permits use with the Vacora Vacuum Biopsy System of the C R Bard Company.

The tabletop film processor   NEW

Ecomax - a brand new plug and play system for analogue X-ray film processing - is being launched at the RSNA by the Oberstenfeld-based company **Protec Medizintechnik GmbH & Co. KG**. The firm reports that this concept of mounting all components that substantially influence image quality (e.g. pumps, heaters, guide bars, rollers etc.) has resulted in:

- optimised image quality due to a brand new tank design
- reduction of wasted chemicals due to oxidation, because of smaller tank sizes (environment-friendly and money-saving for consumables)
- less required space, due to the more compact overall processor design
- easier access to components that require regular maintenance saves time and reduces maintenance costs
- preset, optimal parameters ensure consistent good results.

To be marketed early next year, Protec adds: 'Ecomax convinces with its simplicity, its design and the image quality it produces.'

Protec entered the X-ray film processing market in 1984, then, in 2001, in order to play a major role in digital growth, the firm set up **Protec medical information systems**. Today the company has a worldwide dealer network of dealers that sell its products in almost 100 countries, accounting for an export share of over 90%.

Mobile patient positioning table with quick-change battery

The bucky table is an inexpensive tool for X-Ray departments. However, due to the increasing use of movable stands, especially combined with digital imaging receptors, further requirements for a patient positioning table arise. Along with tabletop movements in XYZ directions, to optimise the advantages of movable stands, table movement is desirable with a patient in the room. To this end, **Provotec GmbH & Co. KG**, based in Espelkamp, has developed the **Prognost XPE** - a mobile patient positioning table with motorised elevating and floating tabletop that allows variable

patient positioning as well as the optimal use of modern X-ray tube/image receptor combinations.

Not having a line cable makes the **Prognost XPE - Akku** particularly comfortable, Provotec also points out. 'A rechargeable battery (accu) supplies sufficient energy for moving approximately 120 patients up to desired working heights. While one accu supplies energy to the table, another is loaded in the loading station. This is very user-friendly, because the accus can be changed simply, quickly and without a tool. Even if charge signals are overlooked and the accu is "suddenly" empty, changing it takes only seconds. The loaded accu can be removed with one hand from the loading station and replaced in the Prognost XPE - Akku against the empty one.'

New diagnostic software

Making a second appearance at the RSNA, **Medos AG**, of Langenselboldis, is demonstrating MD-Jade 2, its radiology diagnostic workstation, and the new Software MD-Jade 2. Developed by MeVis Diagnostics GmbH & Co KG, as a joint venture, the system's core - a '**Task-focused Diagnostic System - ADS**' - has been put onto a completely new technological foundation, Medos reports. 'By means of the incremental pre-processing of the new ADS, the advantages of pre-processing are used to full capacity, leading to a significant acceleration of data transfer and interaction, particularly with large data sets, while remaining flexible in dealing with newly incoming series.'

Established in 1978, to design and develop medical information systems, by 1984 around 200 of this firm's systems were installed in university hospitals, general hospitals and large radiological practices. In 1998, the firm introduced its multi-media electronic patient documentation, which enables data supply from external IT-Systems via secure web technology. Following the first installation of its PACS, in 1999/2000, this system also became widely used in large university and general hospitals, as well as large radiological practices.

With several regional centres in Germany, as well as a subsidiary in Denmark, in May this year Medos, as part of Sweden's Ortivus Group, was listed on the Stockholm stock exchange.

## Integrating imaging and management systems

Enjoying its specialist role in the integration and tailoring of imaging and management systems specifically for hospitals, private clinics and practices, **Vedisys Medical Solutions** explains: 'We provide much better communication - internally and externally - in other words **Direct image access at any place, any time, instead of manual transport**, snail mail or even Taxi. A substantial part of our solution is a high performance, reliable and modern image management system that significantly reduces costs for X-ray films, chemical processes as well as all the archiving and distribution costs of films and patient records.'

By working on full integration within existing infrastructure (hard/software) Vedisys points out that customers can reduce their hardware investment to a minimum as well as '.... upgrade existing HIS or RIS systems with the features of a perfectly integrated image management system that works directly in the desired electronic patient record'. Optimal image and patient record distribution throughout a hospital, innovative web-technologies, and most secure archive solutions are framed with digital radiography and mammography systems, information and digital voice recording/recognition systems, as well as economic, high quality paper print solutions, the firm points out, adding: 'Vedisys stands for the best of breed products and solutions from one strong partner!'

New in the firm's product line is a pre-operative planning system named **modiCAS** (modular interactive computer assisted surgery) for implant planning. Unlike many systems on the market, this is not only 2-D, but also utilises 3-D CAD implant data from various vendors which, the firm explains, enables far more precise planning and documentation of implant surgery.

Based in Griesheim, near Frankfurt, the firm provides a team of software developers, service engineers and a sales force for direct consultation, integration and maintenance.
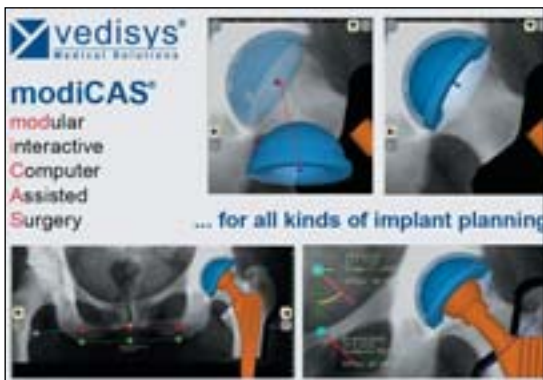
Full automation accelerates uptake of virtual colonoscopy

Although 3-D rendering of the colon eliminates invasive endoscopic probing and thus potential perforation, the adoption of virtual colonoscopy by physicians has been slow - mainly because using the software proved too time-consuming. A fully automated system promises to remove that problem.

Developed by a team of computer scientists in co-operation with radiologists at the Clinical Radiology Institute of LMU (Klinikum Grosshadern), *Rendoscopy Gentle Colon* is intuitive software that accelerates visualisation of the whole colonic mucosa. 'The entire 3-D-Post-Processing is fully automated, without any need for interaction by a doctor or assistant,' the Rendoscopy team explains. 'This applies to the Multi-pathfinding as well as to endoscopic image generation and the view behind-the-folds-images'.

The colon mucosa is examined using an ultra low dose technique, so the mucosa assessment is in no way restricted. In addition to a virtual intra-luminal view, this provides a view behind the folds. (Splitting the colon provides it without distortion, whereas flattening the colon leads to artefacts.) Consequently 'blind areas' can now be assessed.

The Multipath Tracking System finds each path in the 3-D dataset without manual interaction. If the gas-filled colon is blocked by fluid or a collapsed colon part, the part of the colon before and behind the collapsed part can still be examined. After scanning, axial slices are automatically transferred to the Rendoscopy workstation and surface calculation of the colonic mucosa and splitting of the colon along the track also occur automatically. Full cross-sectional imaging data (MPR and oblique use) is updated as tracking continues.

Rendoscopy 3-D imaging algorithms create surfaces with practically no partial volume effect, so images have a far higher technical contrast resolution than 2-D axial cuts. The 1 Voxel spatial resolution (0.3 mm) on 3-D surfaces provides the physician with a very powerful zoom view on the colon mucosa.

A physician can choose to make an interactive examination, or to assess images in paper or electronic form (e.g. PACS assessment console, intranet or CD-Rom).

The software utilises DICOM data from advanced multislice CT scanners, such as those made by GE, Toshiba, Siemens, Philips and Hitachi. Rendoscopy's documentation operates smoothly with all common PACS systems, such as Agfa Impax, GE Centricity, Siemens Magic View, systems produced by Sectra, Philips, Kodak, Cedara, etc.

Added to these benefits, virtual colonoscopy means no sedation for patients. Obviously, all things considered, many gastroenterologists are calling for virtual colonoscopy to be recommended as a front line screening examination.

The same intuitive solution from Rendoscopy exists for virtual bronchoscopy and traumatology
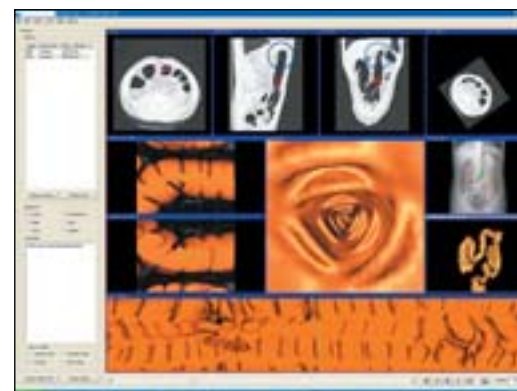
PACS plus selenium technology

The medical information technology (IT) firm **medigration company** specialises in PACS picture archiving and communication systems (PACS) and provides, for example, customised and vendor independent small to mid-size solutions. Established in Erlangen six years ago, medigration's products include:

F: Radiography
- 1710 Radiographic units, digital

L: Film and Image Management
- 3380 PACS
- 3385 PACS components
- 3387 Paper print equipment
- 3395 Teleradiology

R: DICOM-Compliant Systems
- Data storage
- PACS

ImageBroker, medigration's main product is a complete system for digital short and long-term storage of all DICOM image objects with integrated image distribution via intranet. 'We also offer a DICOM review workstation (**ImageVision**) including 3-D as well as DICOM PaperPrint Server and CD-Imager,' the firm adds. 'Our newest innovation is a Direct Digital Radiography system that features **Selenium** technology - a fast, intuitive system ideal for all general radiographic examinations.'

Seamless enterprise-wide IT

Based in Karlsruhe, **medavis GmbH** has been developing system solutions for radiology since 1994. 'As a well-reputed and experienced supplier for radiology IT solutions, especially RIS and PACS, we cover the entire workflow of findings and of all related processes. Therefore we combine ease of use and efficiency with a seamless integration into enterprise wide IT structures - all over the world,' the firm says.

The **medavis RIS** - designed to manage all radiology data - exchanges information with systems from various manufacturers. To that end the firm uses HL7 and DICOM standards and provides modules that harmonise with and complement each other, and they also can be integrated independently of one another in existing structures. 'We support our participation in the IHE Initiative not only with our compatible products but we are also a driving force in its design. We also regularly demonstrate our performance capability at every IHE Connectathon.'

The **medavis PACS** is known for its excellent integration into medavis RIS and its high speed, the firm points out. 'Due to its flexible interfaces it can be easily integrated into an existing system infrastructure. The modular structure and modern distributed system architecture enable free scaling and configuration according to individual requirements.'

MADE IN GERMANY
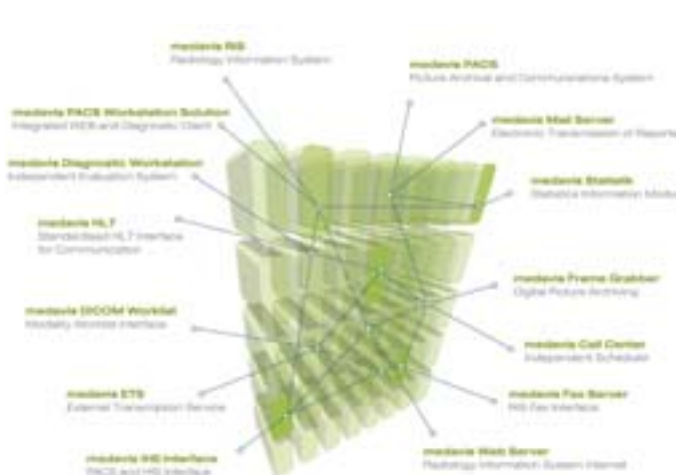
VISIT US
at **RSNA** Chicago, USA
27 November - 2 December
Halls 4372 (A-F)
and 4572 (A-G)