MEDICAL TECHNOLOGY COMPETENCE

in education, research and business

Technical innovations are essential in many ways for improvements in the area of medical care. The combination of experts from various areas of speciality is often the basis for successful innovations. At the Technopol Wiener Neustadt, a high concentration of competence in this field of technology has been created.
The figures speak for themselves:

5 research facilities
14 areas of expertise
95 employees

TECHNOPOL WIENER NEUSTADT

The research institutes at the Technopol Wiener Neustadt have successfully put their expertise to use in the medical technology field in many applications. Some examples are presented on the following pages.

MEDICAL TECHNOLOGY

- **Analysis and development** of materials, products and methods in the sector of pharma, medical devices and hygienics

- **Exploring** innovative measuring methods and development of measuring device prototypes for cardio-vascular system analysis
- **Exploring** physological processes in living organisms by means of imaging techniques and customized biomarkers
- **Designing** overall solutions und developing safety and comfort technologies for a safe life in old age
- **Development and optimization** of biocompatible and biodegradable metals, specific production processes and resulting products

- **Manufacturing** of prototypes, parts and pilot series of highly challenging components using additive manufacturing processes (3D printing)
- **Solving** sophisticated tasks for eletronic, mechanical and mechatronical systems
- **Development** of ready-to-use production processes for challenging plastic/ceramic and metal components by (powder) injection moulding

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- **Design** of integrated system solutions for complex sensor-based applications

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· Forschung
· Ausbildung
· Industrie

- **Development** of medical sensor systems for tissue property investigation and tissue classification
- **Development** of medical robot systems
- **Design** of micro-optical components for medical applications, e.g. multifocal lenses
- **Development** of novel surgical instruments and components for minimally invasive interventions
- **Development** of systems and processes for quantifiable optimization of surgical procedures

Application example
"iSYS1" robotic system

iSYS Medizintechnik GmbH, in collaboration with ACMIT, has developed a robotic system with four degrees of freedom for high-precision x-y positioning for interventional radiology. The system consists of a control unit with safety devices, a hand-held terminal for remote control of the robotic system with a joystick function, as well as a software interface for connection to external planning systems. In addition, work flows and accessories for various clinical applications have been developed:

CBCT-guided, needle-based interventions, such as pain management, biopsies, etc.

CT-guided, needle-based interventions, such as biopsies, tumour ablation, etc.

Frameless stereotactic applications in neurosurgery

Application example
Bandage-integrated sensors for monitoring of wound healing

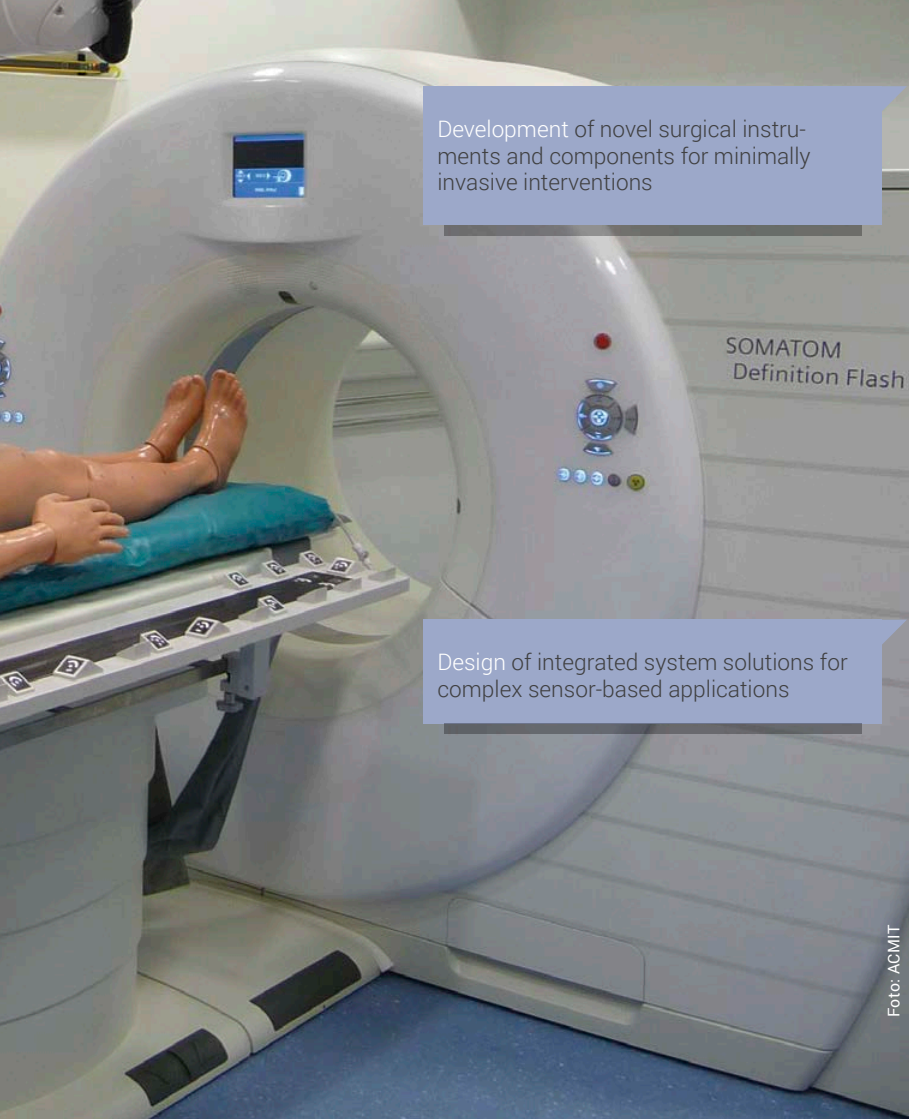
At ACMIT, sensor components have been developed that can be incorporated into wound bandages in order to keep track of the status of the tissue on a continuous basis. For this purpose, microfluidic platforms are used that can check biochemical tissue parameters. Multivariate analysis methods allow the use of multi-parameter concepts to derive information on relevant properties of the tissue. Research at ACMIT focusses on the integration of self-sustaining, mobile and miniaturised sensor systems in biocompatible wound bandages. ■

Developing medical robotic systems

Development of medical sensor systems for tissue property investigation and tissue classification

"We see ourselves as R&D service providers, who support the entire development process for medical technology systems".

DI Nikolaus Dellantoni
CEO of ACMIT



Development of novel surgical instruments and components for minimally invasive interventions

Design of integrated system solutions for complex sensor-based applications

Foto: ACMIT

Application example

Multi-functional tools for minimally invasive surgery

In minimally invasive surgery, operations are performed through very small openings to keep injuries to skin and soft tissues as low as possible. **ACMIT** is developing new treatment methods and the multi-functional surgical tools needed for this. Examples:

- Instruments with integrated safety functions
- Anatomically shaped instrument handles for optimised and individual ergonomics
- Surgical shaving instruments with integrated cooling

Application example

Cochlear implants with an implantable middle ear microphone

Cochlear implants make an important contribution to the treatment of hearing loss. They replace the function of the inner ear by sending impulses to the auditory nerve by means of an implanted electrode. A novel implantable middle ear microphone, developed at ZISS, now allows the reception of acoustic signals in the functioning middle ear. In order to work with the conditions in the middle ear and those of the implant, the specially developed capacitative micro mechanical sensor must be produced in an extremely compact form, with specific evaluation electronics and work extremely energy efficiently, in order to be mounted directly to the auditory bones. ■

Application example

Circadian Central Hemodynamics

Studies have shown that damaged and sclerotic vessels often contribute to the development of heart attacks. As a means to identify them and thus for the early detection of high-risk patients, the pulse wave analysis for determination of the central hemodynamics is applied. This method was previously only available in clinical medicine as a singular one-point measurement. AIT has now been able to develop, for the first time worldwide, a solution that allows 24-hour monitoring of the central hemodynamics and that permits a standard extramural application. For this purpose, the shape of the pulse wave on the upper arm is recorded by means of a cuff. Special algorithms (ARCSolver) developed by AIT provide information about the cardiovascular condition (vascular condition, terminal organ damage, etc.) of patients. ■

Application example

SIMTARA

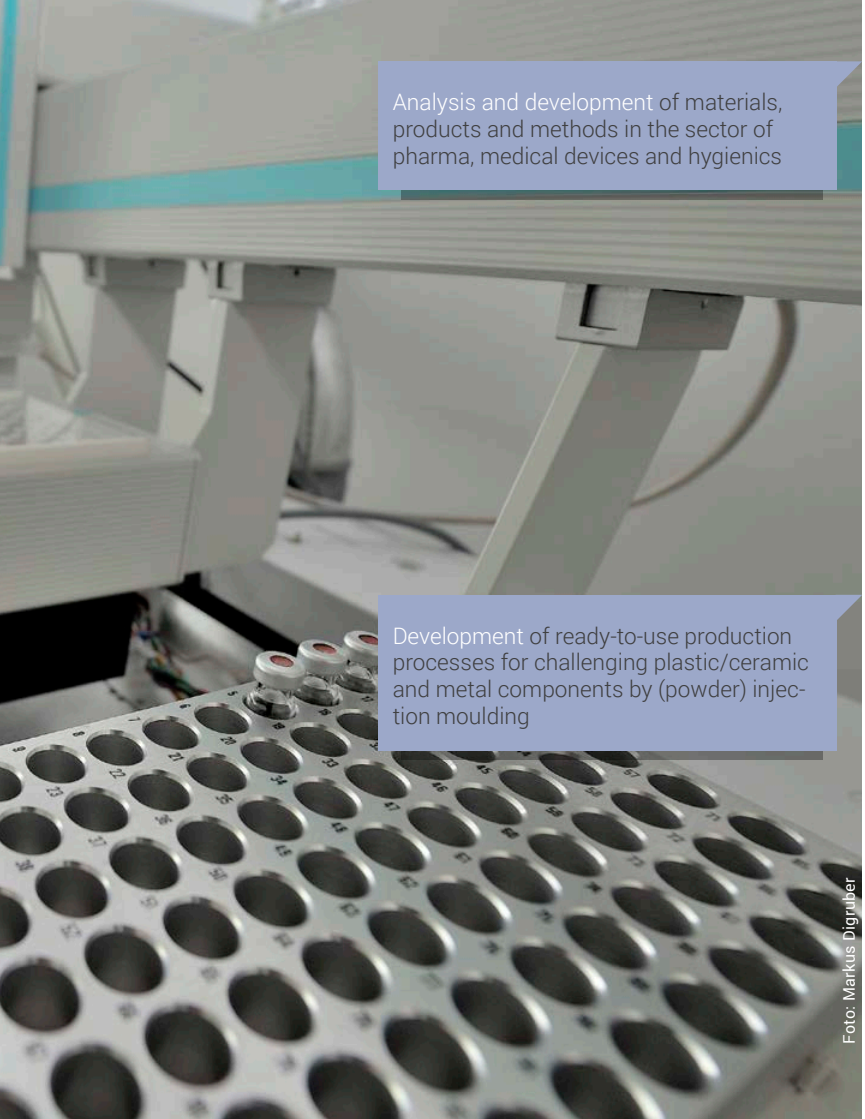
In targeted radionuclide therapy, an open radioactive material is administered, consisting of a carrier molecule and a radionuclide, to selectively destroy a tumour. For this purpose, in the "SIMTARA" project, AIT has developed computer models for individual treatment planning. A reference hybrid phantom of the human body is created, based on which individual data from positron emission tomography and computed tomography can be implemented through rapid and non-linear reshaping. This way, the patient-specific information for visual treatment planning can be used by medical physicists and oncologists. ■

Exploring innovative measuring methods and development of measuring device prototypes for cardio-vascular system analysis

Exploring physiological processes in living organisms by means of imaging techniques and customized biomarkers

"The AIT business unit Biomedical Systems creates biomedical-technical innovations for business and health care".

DI Manfred Bammer, MAS
Head of the Biomedical Systems, AIT



Analysis and development of materials, products and methods in the sector of pharma, medical devices and hygienics

Development of ready-to-use production processes for challenging plastic/ceramic and metal components by (powder) injection moulding

Foto: Markus Digruber

Application example

Development of new hygiene concepts/technologies for health care facilities

In order to comply with hygiene regulations, medical equipment must be treated and disinfected accordingly. **OFI** produces hygiene concepts that prevent and reduce material damage during the treatment of medical devices and that target the proper use of disinfectants. In this regard, the focus is on substrate-specific applications of disinfection measure and effects of repeated use of disinfectants on organic material surfaces. ■

Application example

Injection moulded metal parts for medical technology

Magnetic components with one or more fields are produced at **FOTEC** by means of metal injection moulding (injection moulding of metallic powder) using magnetic materials (MnZn, FeCoV, AlNiCo 8, hard ferrite). They are used in medical and industrial pumps. ■

TECHNOPOL WIENER NEUSTADT

Europäische Union Investitionen in Wachstum & Beschäftigung. Österreich.

Technopol Wiener Neustadt is characterised by the five fields of technology, shown below, in medical and material technologies. The focus here is on the integration of research, education and business:

■ Material ■ tribology (friction, wear, lubrication)
■ Medical engineering ■ sensor-actuator ■ surfaces

The Technopol figures speak for themselves: e.g. 500 researchers, 3500 students, 17,500 m² of office and laboratory space, 4 COMET competence centres for tribology, electro chemistry, medical engineering and bio-resorbable implant materials, Fotec GmbH as a research company in the nearby University of Applied Sciences, the Centre for Integrated Sensor Systems of the Danube University at Krems, the business unit "Biomedical Systems" of the AIT - Austrian Institute of Technology, the Department of "Surface Engineering" of the OFI, as well as MedAustron, the cancer research and treatment centre, which is still under construction, AAC, Happy Plating, Attophotonics, FIANOSTICS and many others.NOSTICS und viele andere mehr.

■ Concentrated competence ■ Successful collaborations
■ Excellent education

The Technopol manager, active on-site, supports the development of the site as part of the Technopol programme.

This brochure is also available as an e-paper. Simply scan the QR code or download it at:

www.tfz-wienerneustadt.at

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In this brochure, all person-related statements apply equally to women and men. It is merely for the sake of simplicity that the masculine form was selected in the text.

Die Wirtschaftsagentur des Landes Niederösterreich