



Sector information

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Medical engineering in Munich

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Medical engineering in Munich: High-tech companies strongly positioned in a growing healthcare market

The medical engineering sector researches and manufactures products to facilitate healthcare and boost quality of life. The Munich region is one of Germany's leading competence centers in this discipline. Access to a wide range of fundamental and enabling technologies such as mechatronics, microsystem technology, I&C technology, photonics/optics, material science, pharmaceutical technology and biotechnology – all of which are very strongly represented in Munich – helps companies in this industry develop a broad spectrum of highly innovative products and system solutions. This diverse array of products is also playing an important part as the entire healthcare industry increasingly goes digital.

Driven by technological progress and global demographic and economic developments, medical engineering has become a central pillar of the healthcare industry and a significant growth market in its own right: Annual growth rates of around 5 percent are forecast for the global medical engineering market, whose current volume is around EUR 240 billion.



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Annual revenue of EUR 4.1 billion and 19,000 socially insured employees in 350 medical engineering companies firmly establish Munich as one of Germany's foremost centers for this industry. Businesses based in the Bavarian capital are young, flexible and, with the exception of a few international players, mostly represent the small and medium-sized enterprise (SME) segment. Many are set up as spin-offs from university activities. Whatever their size, Munich-based medical engineering companies have a strong international outlook: About a third of them generate more than 75 percent of their revenue outside Germany.

In its capacity as an outstanding technology, business and healthcare hub, Munich also boasts a high-caliber medical and clinical infrastructure.

Leading research, development and educational organizations

The innovative skills that give Munich's medical engineering companies their vital agility and keen competitive edge are naturally reflected in their research and development (R&D) activities. Throughout Germany, the medical engineering industry invests more than most sectors in research and development, and companies based in and around Munich are likewise deeply committed to intensive R&D programs. Accordingly, the region's R&D quota – R&D spending as a proportion of total revenues – currently stands at around 15 percent in this industry. The fact that the local industry has forged close network links with the substantial research potential made available by Munich's institutions of higher education and non-university organizations further enhances their innovative capabilities.

Munich's wealth of universities and research organizations comprises the following institutions:



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14 respected universities:

- TUM (Technical University of Munich)
- LMU (Ludwig Maximilians University)
- Munich University of Applied Sciences
- University of the Federal Armed Forces
- 10 other institutes of higher education

Non-university research organizations:

- The Fraunhofer Society (with its headquarters and four individual institutes in and around Munich)
- The Max Planck Society (with its headquarters and ten individual institutes in Munich)
- The German Research Center for Environmental Health (Helmholtz Zentrum München; a research organization run jointly by federal government and the Free State of Bavaria and featuring 40 scientific institutes and independent departments). This center focuses on research into health and the environment and is a member of the Helmholtz Association of German Research Centers
- DLR, the German Aerospace Agency (with nine scientific institutes at its Oberpfaffenhofen campus)

As the following detailed outline shows, Munich has a tightly meshed network of university and non-university research organizations that devote themselves to medical engineering research:

LMU (Ludwig Maximilians University)

A total of 50,527 students (winter semester 2014/2015), 746 professors and 3,076 scientific officers make the LMU one of the biggest universities in Germany and – in the unanimous view of all relevant rankings – the country's leading mainstream university. This verdict is impressively underscored by the fact that, in 2014, the LMU was able to attract and spend external funding totaling EUR 148.4 million. This outstanding position is indeed what saw the LMU singled out as one of Germany's first "elite universities".

Institute of Clinical Radiology
<http://www.radiologie-lmu.de/>
Director: Professor M. Reiser



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This institute concentrates its research activities in areas such as radiological physics, one of the most important areas of which is research and development in the field of magnetic resonance imaging (MRI). It is affiliated with the state vocational school for medical/technical radiology assistants.

TUM (Technical University of Munich)

The TUM is another of Germany's designated "elite universities". 39,081 students are enrolled here (winter semester 2015/2016) and 9,846 people work here (including the university hospital). The university's strong focus on research is attested by its large number of doctorates (1,013 in 2014) and its 6,002 scientific publications. Its enviable research capabilities are borne out by the TUM's ability to attract external funding, which totaled EUR 276 million in 2014 (including the university hospital). The TUM teaches a master's degree course in medical engineering whose aim is to communicate a thorough knowledge and grasp of engineering and science as the basis for developing, commissioning and servicing medical technology systems in collaboration with graduates from other disciplines. The curriculum also covers the legal framework for the licensing, operation and maintenance of engineered medical products.

The following TUM chairs and institutes are of special relevance to medical engineering:

Chair of Medical Engineering

<http://www.medtech.mw.tum.de/>

Director: Professor Erich Wintermantel

This chair focuses its attention on developing biocompatible materials such as plastic and ceramic implants, tissue substitutes and degradable materials. At the same time, it collaborates closely with the Faculty of Mechanical Engineering and the Faculty of Electrical/Electronic Engineering to research and develop instruments and equipment in areas such as surface engineering, mechatronics and robotics. Both focal areas constitute aspects of therapeutic medical engineering.

Heinz Nixdorf Chair of Medical Electronics

<http://www.lme.ei.tum.de>

Director: Professor Bernhard Wolf

One key theme of the interdisciplinary research work done by this chair is the development of biohybrid, microsensor-assisted lab-on-chip systems designed to facilitate the systematic search for active substances and the diagnosis and



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treatment of tumors. Other areas of research include telemedicine and the development of intelligent microphysiological implants. The chair has already spun off several companies which, in collaboration with Steinbeis-Transfer Centers TIB, have concentrated cell chip technologies both geographically and organizationally at the IME (Innovation Center for Medical Electronics). The IME places its expertise at the disposal of industrial project partners.

Institute of Diagnostic and Interventional Radiology

<http://www.rad.mri.tum.de/>

Director: Professor Ernst J. Rummeny

This institute is an integral component of the university hospital Klinikum rechts der Isar and ranks as one of the most modern radiological institutes in Europe. Modern imaging diagnostics and image-guided methods are used here to diagnose rheumatic and cardiological conditions, for example. New developments in magnetic resonance imaging (MRI) too are creating innovative ways to detect and diagnose the spread of diseases (such as inflammation and tumors). Initial experience shows that these methods can also improve prophylactic medical care.

Central Institute of Medical Engineering (IMETUM)

<http://www.imetum.tum.de>

Professor Axel Haase

Founded in 2000, IMETUM hosts a number of interdisciplinary workgroups. Much of the research that takes place at the institute is currently devoted to biomedical imaging and image processing. Among the other biomedical issues tackled are audiological research and medical measuring equipment. The Graduate School of Information Science in Health (GSISH) is also attached to IMETUM.

Munich University of Applied Sciences (MUAS)

<http://www.hm.edu>

President: Professor Michael Kortstock

Around 17,500 students are enrolled at the Munich University of Applied Sciences (MUAS), making it one of the largest institutions of its kind in Germany. MUAS currently runs more than 80 bachelor's and master's courses at its 14 faculties. Students are served by a total of 475 professors, more than 745 staff and about 750 lecturers. This university too conducts research into medical engineering:

Department of Electrical/Electronic Engineering and Information Technology

<http://www.ee.hm.edu/fk04/profs/hessel.de.html>



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Professor Stefan Hessel

General electrical engineering, measurement systems and electronic components are the focal disciplines of this department, which also engages in intensive research into laser applications in medical engineering – an area in which it has published a wealth of material to date.

Department of Computer Science and Mathematics

<http://www.cs.hm.edu/>

Dean: Professor Jochen Hertle

This department provides a comprehensive and thoroughly modern array of courses relating to computer sciences. Its master's courses focus on computer graphics and image processing – two disciplines that are vital competencies in areas of medical engineering such as computer tomography and remote diagnostics.

University of the Federal Armed Forces

<http://www.unibw.de>

President: Professor Merith Niehuss

The University of the Federal Armed Forces splits into seven regular university departments and three applied sciences departments. Its focus is on engineering in general and electrical engineering in particular. The university's 2,800 students (2014) are served by 163 professors and 1,108 staff. The degree courses on sensor systems and measurement systems in particular include basic lectures on medical engineering.

German Aerospace Agency (DLR) – Robotics and Mechatronics Center, Oberpfaffenhofen

<http://www.dlr.de/rm>

The discipline of mechatronics seeks to maximize the integration of mechanical engineering, electrical engineering and computer engineering with the aim of developing intelligent mechanisms and robots that can interact with their environment. In medical engineering, the center focuses its research in particular on medical robotic technology for use in surgical applications.



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Trade shows and events

Congress: Medizin Innovativ – MedTech Summit 2016

June 15-16, 2016

Nuremberg

Innovative solutions and examples of good practice in the medical engineering and healthcare sectors will be showcased and discussed at this international congress.

<http://www.medtech-pharma.de/deutsch/kongress-2016/uebersicht.aspx>

ANALYTICA

May 10-13, 2016

New Munich Exhibition Center

Premier International Trade Fair for Laboratory Technology, Analysis, Biotechnology and the analytica Conference

<http://www.analytica.de>

AUTOMATICA

June 21-24, 2016

New Munich Exhibition Center

International Trade Fair for Automation and Mechatronics

Material assembly and handling systems, robots, industrial image processing, positioning systems and propulsion systems for the automotive, medical, electronics, service robotics and other sectors

<http://www.automatica-muenchen.de>

ID INFO TAGE DENTAL

October 8, 2016

New Munich Exhibition Center

Regional forum for the dental industry

http://www.infotage-dental.de/id_m_home_de

OPTI

January 28-30, 2017

New Munich Exhibition Center

International trade show for optics and design covering the entire spectrum of the ophthalmic industry. The show serves as a platform for the product launches of international market leaders and start-ups alike.

<http://www.opti.de>



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Networks and organizations

Bayern Innovativ

Managing Director: Dr. Markus Eder
Gesellschaft für Innovation und Wissenstransfer mbH
Gewerbemuseumsplatz 2
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<http://www.bayern-innovativ.de>

The idea behind Bayern Innovativ ("Innovative Bavaria") is to bring different capabilities together in a way that expedites innovation by opening the door to fast and efficient cooperation between industry and science.

Bayerische Patentallianz GmbH

Managing Director: Peer Biskup
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mailto:pbiskup@baypat.de
<http://www.baypat.de/>

The "Bavarian Patent Alliance", established in January 2007, acts as a patent licensing agency, valuing and marketing the inventions of over 17,000 university-based scientists and engineers in Bavaria. Acting as the link between the scientific and business communities, it strives to protect the excellent patent-protected inventions of Bavaria's various universities and to enable industry to make sound economic use of them.

Invest in Bavaria

Director: Dr. Wolfgang Hübschle
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<http://www.invest-in-bavaria.de>

Invest in Bavaria is a business promotion agency operated by the Bavarian Ministry of the Economy and Bayern International GmbH. The team assists investors who are looking to move to or expand their activities in Bavaria. It supplies inform-



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ation, assists with the search for suitable sites/premises and puts companies in touch with the relevant local authorities, partners and networks.

**City of Munich
Department of Labor and Economic Development**

Economic Development

Director: Kurt Kapp

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80331 München

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mailto:business@muenchen.de

<http://www.muenchen.de/rathaus/Stadtverwaltung/Referat-fuer-Arbeit-und-Wirtschaft/Wirtschaftsfoerderung.html>

The Department of Labor and Economic Development provides an array of professional services to companies that are based in or considering moving to Munich. A point of single contact is available to help such companies find their way around the relevant aspects of local government administration. Advice on where and how to move is another focal area, as is support for business start-ups, information on the availability of suitable premises and putting firms in touch with the right authorities, chambers, networks and associations. The department also supplies a wealth of information about the rich diversity of Munich as a place to do business.

**Chamber of Industry and Commerce for Munich and Upper Bavaria
Industry, Innovation, Environment**

Director: Helmut Vogel

Balanstr. 55-59

81541 München

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mailto:vogel@muenchen.ihk.de

<http://www.muenchen.ihk.de>

Representing industrial, trading and service companies in the region, the Chamber of Industry and Commerce is committed to improving conditions for the business community. It sees itself as a kind of parliament for the business community, whose interests it represents in respect of the government, administrative authorities and the general public. It also provides services (such as advice and consulting) to companies, handles public-sector commissions (such as inspecting vocational training standards) and takes steps to ensure fair and sustainable business practices.



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Munich Network – Netzwerk München e.V.

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mailto:info@munichnetwork.com
<http://www.munichnetwork.com>

The Munich Network actively helps technology firms to get started, grow and remain successful in the long run. It brings them into contact with regional drivers of innovation and forges ties with the world's leading high-tech regions.

Key companies

ARRI Medical

<http://www.arrimedical.com>

ARRI Medical was established in 2013 as a subsidiary of the ARRI film technology group. Its aim is to apply ARRI's core technology and expertise in the field of medical engineering. ARRI Medical produces the fully digital 3D surgical microscope ARRISCOPE.

Baxter Deutschland

<http://www.baxter.de>

Based in Unterschleissheim near Munich, Baxter is a global leading provider of medical technology, pharmaceutical products and innovative therapies that save and sustain lives.

BrainLAB AG

<http://www.brainlab.com>

Founded in 1989, BrainLAB develops, manufactures and markets software-driven medical technology to enable more efficient, less invasive patient treatments. Its core products include image-guided navigation systems that provide extremely precise real-time information during surgical interventions. An installed base of more than 5,000 systems in over 80 countries singles BrainLAB out as one of the market leaders in image-guided technology.



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ConvaTeC

<http://www.convatec.de>

This US company is a global market leader in the development and marketing of innovative wound treatments and ostomy products. Operating in four main business lines – ostomy care, modern wound therapeutics, continence/critical care and infusion devices – the company supports medical professionals in hospitals and care providers.

Definiens AG

<http://www.definiens.com/>

Definiens helps life science and healthcare companies to analyze and interpret digital imaging data. Its automated, accurate and consistent image analysis software simplifies the evaluation of cell and tissue samples and the interpretation of non-invasive images. Definiens also supports image analysis in high-content screening, digital pathology and translational medicine.

General Electric

<http://www.ge.com/de/>

GE, one of the world's largest technology corporations, operates its Global Research Center Europe in Garching. One focus of this center's research is on medical engineering, key aspects of which include advanced imaging diagnostic systems such as ultrasound, high-field magnetic resonance tomography and molecular imaging. GE is the only medical engineering company that brings diagnostic imaging systems, pharmaceutical R&D and research into contrast agents together under one roof. GE Health Care, GE's German medical engineering subsidiary, is likewise based in Munich. <http://www.gehealthcare.com>.

LivaNova

<http://www.livanova.com>

The former Sorin Group merged with Cyberonics in 2015 to become the LivaNova Group. In Munich, the group develops and manufactures medical equipment (cardiopulmonary machines, autotransfusion systems and hypothermia devices). LivaNova moved into its current Munich premises on November 24, 2000, and expanded the plant to a total of 11,000 m² in 2014.



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Meierhofer AG

<http://www.meierhofer.de/>

Meierhofer AG has developed an innovative hospital information system that covers the entire patient journey from admission through treatment to discharge, helping healthcare establishments to plan every step of the way, optimize costs, maintain seamless documentation and thus achieve full transparency.

Mavig GmbH

<http://www.mavig.de>

Mavig leads the market for X-ray protection and confocal laser scanning microscopy. On its premises in the Munich-Moosfeld industrial estate, the company laid the cornerstone of its future back in 1983. Its modern production and administrative facilities cover a good 5,000 m², providing ample room for continuing development and innovation. Around 100 employees at the company's Munich site develop and produce nearly all Mavig products in-house.

MAG & More GmbH

<http://www.magandmore.com>

This TUM spin-off develops biomagnetic and neuroelectronic diagnostic and therapeutic equipment. The company concentrates on the practical development of high-end magnetic neurostimulation equipment, the aim being to provide an alternative therapy with a high clinical value for patients who suffer from various neurological and psychiatric illnesses by improving their quality of life at a low cost. Magnetic neurostimulation is used to treat depression, among other conditions.

Münchener Medizin Mechanik GmbH

<http://www.mmmgroup.com/>

MMM specializes in industrial and medical electronics. Its portfolio comprises a range of products and services for sterilization and disinfection systems for use in hospitals, scientific institutes, laboratories and the pharmaceutical industry. MMM manufactures steam generators, software, sealing equipment, functional furniture and heat technology.

NRI Medizintechnik GmbH

<http://www.nri-med.de/>

This company's products focus on sleep diagnostics and sleep therapy, home respiration, breathing and oxygen therapy, pain therapy and liquid infusions, patient monitoring, baby monitoring and emergency medical treatment.



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PENTA GmbH

<http://www.penta.de>

PENTA GmbH is headquartered in Puchheim near Munich and operates a network of offices both in Germany and abroad. It is a leading manufacturer of fanless, fully sealed, robust medical PC technology that is ideal for deployment in medical contexts such as operating theaters, intensive care units and sterile supplies units.

Pharm-Olam International Deutschland GmbH

<http://www.pharm-olam.com>

Pharm-Olam International is a multinational contract research organization that offers a broad spectrum of end-to-end clinical research services for the pharmaceutical, biotechnology and medical products industries.

VDW GmbH

<http://www.vdw-dental.com>

Founded in 1869, VDW can boast over a century's experience as one of the world's leading manufacturers of endodontic products. The venerable company nevertheless remains committed to the innovative development of high-quality products that make the discipline of endodontics simpler, safer, more successful and more time-saving.

ViewPoint

<http://www.gehealthcare.com>

ViewPoint, a subsidiary of GE Healthcare, has its headquarters in Wessling near Munich. The company specializes in developing imaging and diagnostic documentation systems for use in gynecology and inner medicine.

This sector information has been carefully researched and diligently compiled.
Nevertheless, the City of Munich does not accept any liability for incorrect or incomplete information.
Please address any questions, comments or suggestions to:
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