Baden-Württemberg

Ministry of Economic Affairs

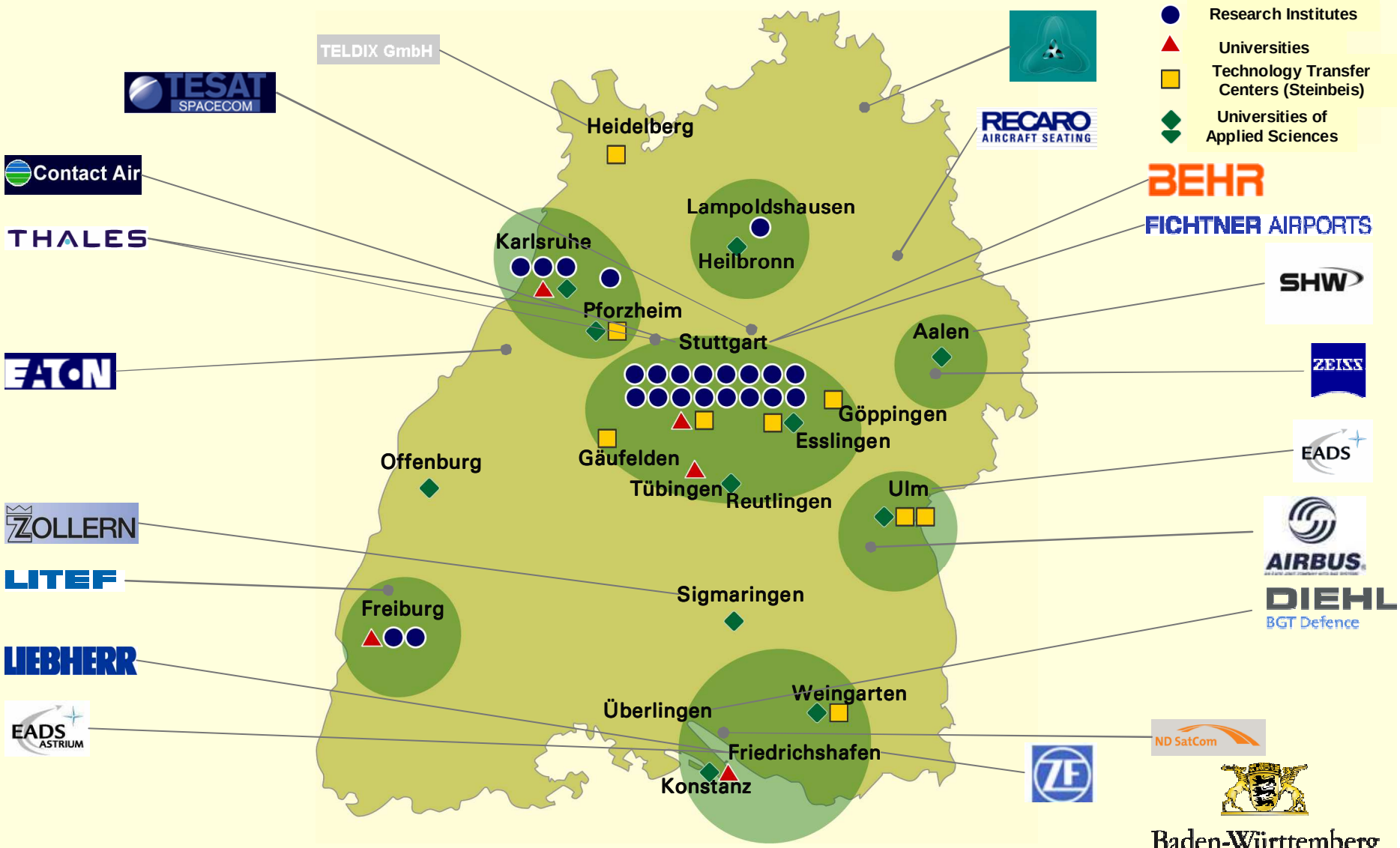
Aerospace

Baden-Württemberg - home to a cluster of major aerospace players

- Revenues in the aerospace industry have increased by about 50 percent in the recent years. The sector employs more than one million people worldwide.
- Furthermore, a global increase in the volume of air traffic and more funding for defense and space technology suggest the industry will continue to develop positively.
- Baden-Württemberg is one of Europe's key centers for the aerospace industry:
  - World leaders, such as EADS, Liebherr Aerospace and Thales, have multiple sites within Baden-Württemberg.
  - And leading suppliers from other relevant sectors have successfully penetrated the aerospace industry - for example, Behr Industrietechnik and ZF Friedrichshafen.
- Baden-Württemberg is an excellent base for aerospace companies. The region boasts a wide range of relevant university institutes, and is home to a large number of players from the sector, institutes of the German Aerospace Center (DLR), and specialist research and technology-transfer centers.

Regional Centers in Cluster Aerospace

(Relevant research institutes, universities and examples of important enterprises)



Baden-Württemberg
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Aerospace – Selected Companies

Zollern Vertriebs-GmbH & Co. KG, Sigmaringen

http://www.zollern.de

Schwäbische Hüttenwerke GmbH, Aalen-Wasseralfingen

http://www.shw.de

EADS Astrium GmbH, Friedrichshafen

http://www.space.eads.net

Aerospace – Selected Companies

Liebherr Aerospace Lindenberg, Friedrichshafen

http://www.liebherr.com/ae

Zeiss Optronik GmbH, Oberkochen

http://www.zeiss.com

EADS Deutschland GmbH, Ulm

http://www.eads.com

ND SatCom AG, Immenstaad

http://www.ntsatcom.com

Aerospace – Selected Companies

Behr Industrietechnik GmbH & Co. KG, Stuttgart

http://www.behr.de

THALES Defence Deutschland GmbH, Pforzheim

http://www.thalesgroup.com

WITTENSTEIN AG, Igersheim

http://www.wittenstein.de

ZF Friedrichshafen AG, Friedrichshafen

http://www.zf.com

Aerospace – Selected Companies

Eaton Fluid Power GmbH, Baden-Baden

http://www.eaton.com

Diehl BGT Defence, Überlingen

http://www.diehl-bgt-defence.de

Airbus Deutschland, Laupheim

http://www.airbus.com

Fichtner Airports GmbH, Stuttgart

http://www.fichtner.de

Aerospace – Selected Companies

Teldix GmbH, Heidelberg

http://www.teldix.com

Contact Air Flugdienst GmbH + Co., Stuttgart

http://www.contactair.de

Thales ATM Navigation GmbH, Korntal – Münchingen

http://www.thalesgroup.com

Aerospace – Selected Companies

RECARO Aircraft Seating GmbH & Co. KG, Schwäbisch Hall

http://www.recaro-as.com

Tesat-Spacecom GmbH & Co. KG, Backnang

http://www.tesat.de

Litef GmbH, Freiburg

http://www.litef.com

Aerospace – Regional Centers - Selected Companies

Teldix GmbH, Heidelberg

THALES Defence Deutschland GmbH, Pforzheim

Eaton Fluid Power, Baden-Baden

Litef GmbH, Freiburg

Konstanz, Lake Constance District:

Diehl VA Systeme Stiftung & Co. KG

LIEBHERR

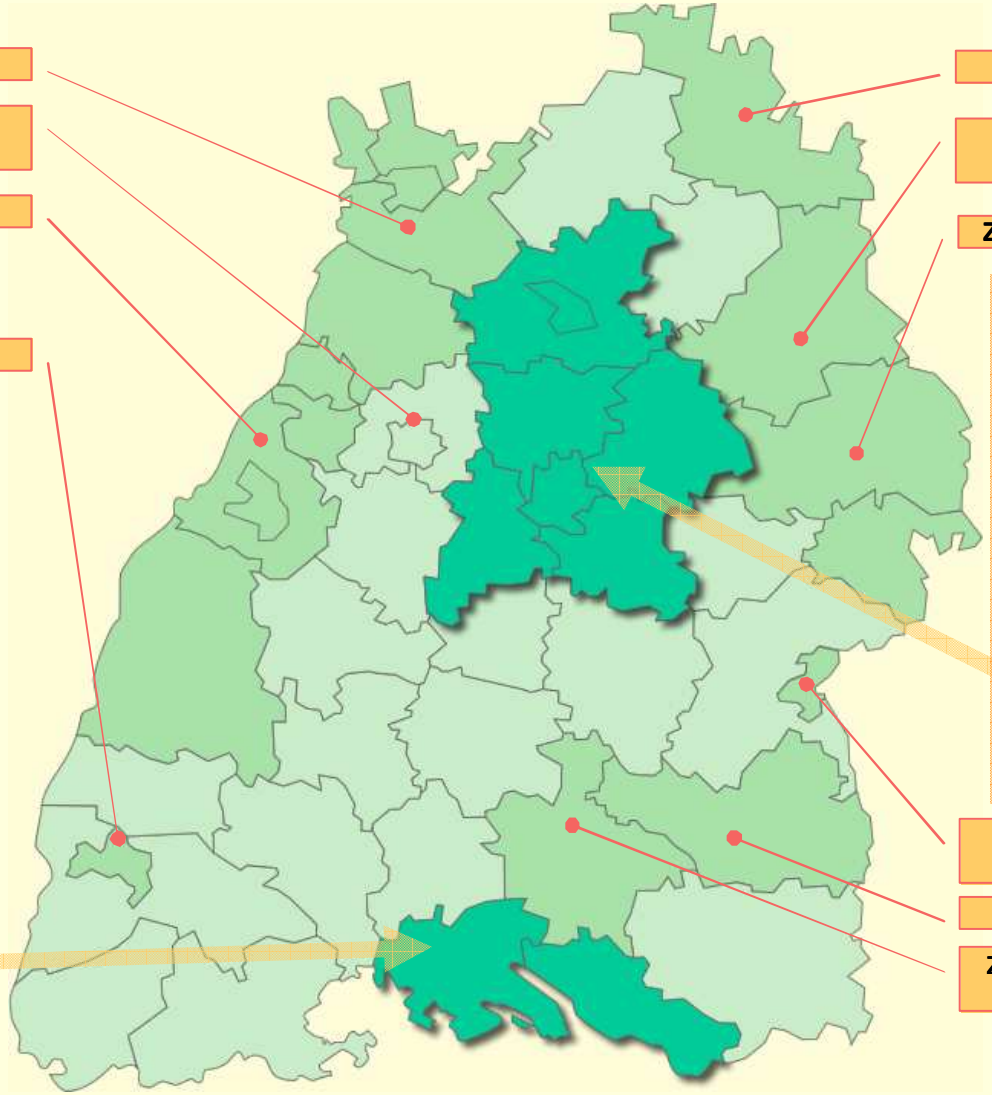
EADS

ZF

DIEHL BGT Defence

ND SatCom

astrium



Wittenstein AG, Igersheim

RECARO Aircraft Seating, Schwäbisch Hall

Zeiss Optronic GmbH, Oberkochen

Stuttgart-Heilbronn Region :

FICHTNER AIRPORTS

TESAT SPACECOM

BEHR

Contact Air

THALES

EADS Deutschland GmbH, Ulm

Airbus Deutschland, Laupheim

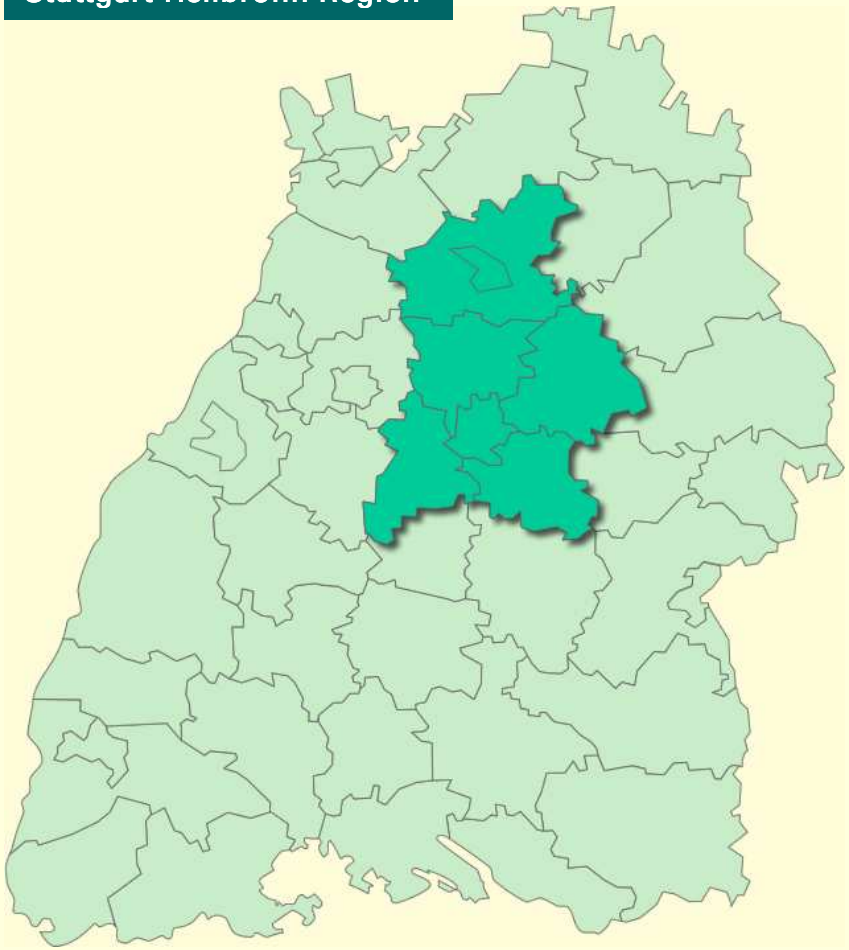
Zollern Vertriebs-GmbH & Co. KG, Sigmaringen

Baden-Württemberg

Ministry of Economic Affairs

Aerospace – Regional Centers

Stuttgart-Heilbronn Region

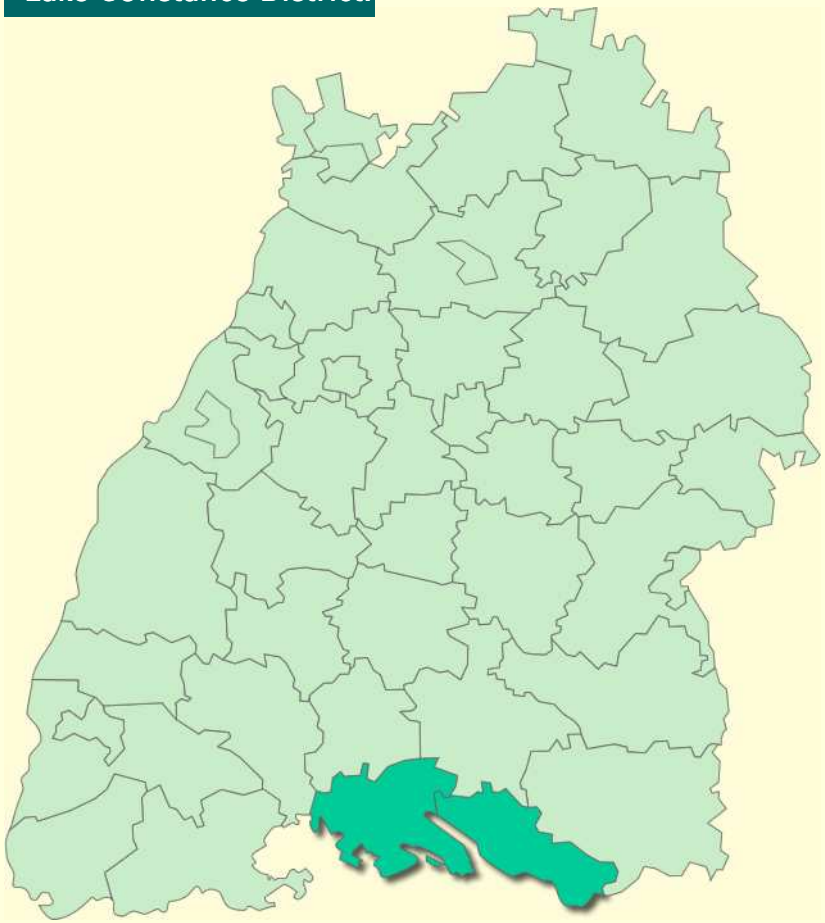


Stuttgart-Heilbronn Region:

- Behr Industrietechnik GmbH & Co. KG (Stuttgart)
- Sika GmbH(Stuttgart)
- Daimler Chrysler AG (Stuttgart)
- MAHLE Filtersysteme GmbH (Stuttgart)
- IBM Deutschland GmbH(Stuttgart)
- Robert Bosch GmbH (Gerlingen)
- Filterwerk Mann + Hummel GmbH (Ludwigsburg)
- Alfred Kärcher GmbH & Co. KG (Winnenden)
- Fichtner Airports GmbH (Stuttgart)
- Ferdinand Gross GmbH & Co. KG (Leinfelden-Echterdingen)
- Moog GmbH (Böblingen)
- ACAL GmbH (Flein)
- AIM Infrarot-Module GmbH (Heilbronn)
- Thales ATM Navigation GmbH (Korntal-Münchingen)
- Tesat-Spacecom GmbH & Co. KG. (Backnang)

Aerospace – Regional Centers

Konstanz / Lake Constance District:

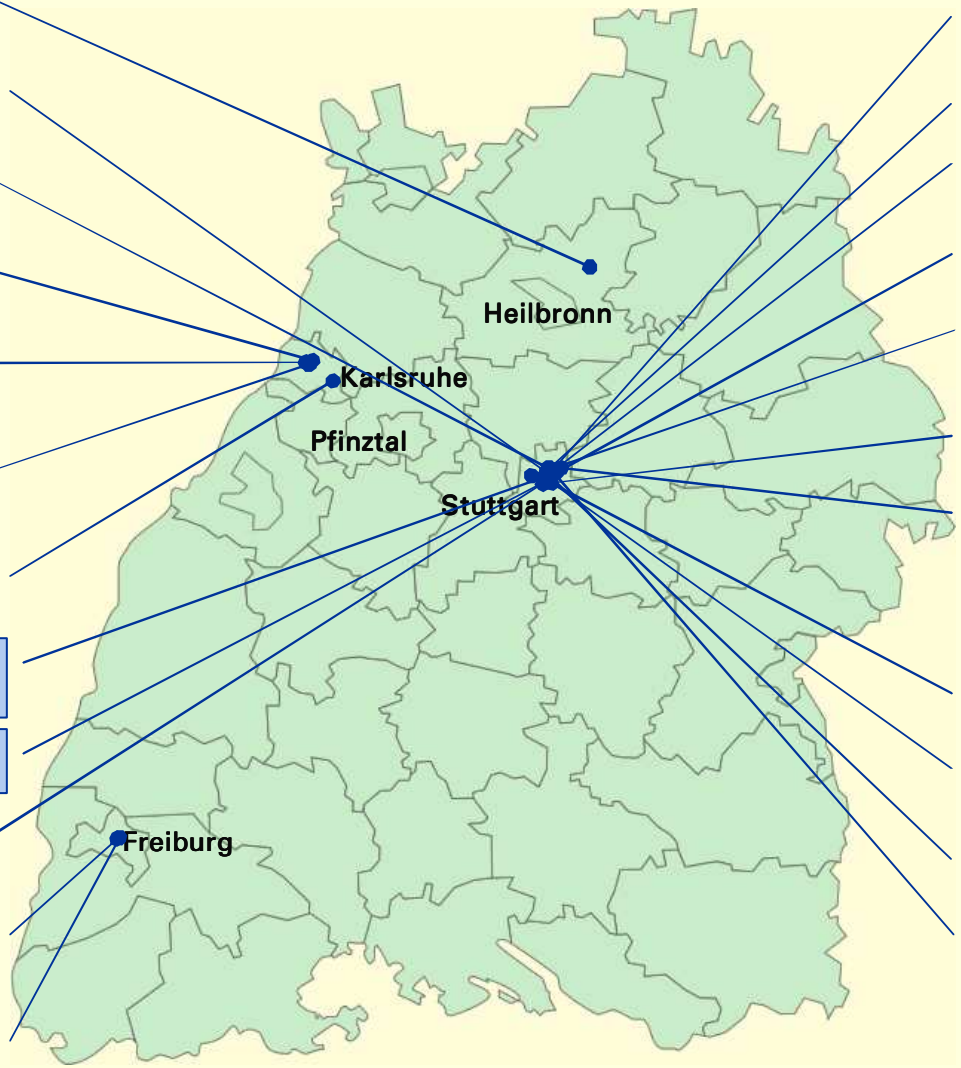


Konstanz, Lake Constance District:

- Diehl VA Systeme Stiftung & Co. KG (Überlingen)
- Astrium (Friedrichshafen)
- ZF Friedrichshafen AG (Friedrichshafen)
- Liebherr-Aerospace Lindenberg GmbH (Friedrichshafen)
- ND SatCom AG (Friedrichshafen)
- Nortel Networks Germany & Co. KG (Friedrichshafen)
- Diehl BGT Defence GmbH & Co. KG (Überlingen)
- Oerlikon Contraves GmbH (Stockach)
- allsafe Jungfalk GmbH & Co. KG (Engen)
- ZLT Zeppelin Luftschifftechnik GmbH & Co KG (Friedrichshafen)
- Air Plus Maintenance GmbH (Friedrichshafen)
- AC & S GmbH Aerospace Consulting & Services (Langenargen)

Aerospace – Research Institutes

- DLR Institute of Space Propulsion, Lampoldshausen
- Institute for Physics and Meteorology, University of Hohenheim, Stuttgart
- Materials Testing Institute, University of Stuttgart
- Institute for Fluid Mechanics, University of Karlsruhe
- Institute of Thermal Turbomachines, University of Karlsruhe
- Fraunhofer Institute for Information and Data Processng (IITB), Karlsruhe
- Fraunhofer Institute of Chemical Technology (ICT), Pfinztal
- Institute of Aerospace Thermodynamics, University of Stuttgart
- Institute of Flight Mechanics and Flight Control, University of Stuttgart
- Institute of Aerodynamics and Gas Dynamics, University of Stuttgart
- Fraunhofer Institute for Physical Measurement Techniques (IPM), Freiburg
- Fraunhofer Institute for High-Speed Dynamics – Ernst Mach Institute (EMI), Freiburg



- Institute of Propulsion Systems, University of Stuttgart
- Institute of Navigation, University of Stuttgart
- Institute of Aircraft Design, University of Stuttgart
- Institute of Space Systems, University of Stuttgart
- Institute for Statics and Dynamics of Aerospace Engineering and Geodesy (ISD), University of Stuttgart
- Institute for Combustion Technology, University of Stuttgart
- Institute for Nuclear Energetics and Energy Systems, University of Stuttgart
- DLR Institute of Technical Physics, Stuttgart
- DLR Institute of Structures and Design, Stuttgart
- DLR Institute of Technical Thermodynamics, Stuttgart
- DLR Institute of Combustion Technology, Stuttgart

Baden-Württemberg
Ministry of Economic Affairs

Aerospace – Relevant Study Courses (Universities)

University of Karlsruhe (TH):
- Business Engineering
- Mechanical Engineering
- Mechatronics
- Electrical Engineering
- Mathematics
- Physics

University of Freiburg:
- Mathematics
- Physics
- Microsytems Technology

University of Stuttgart:
- Aerospace Engineering
- Electrical Engineering
- Materials Science
- Automotive and Engine Technology

University of Tübingen:
- Physics
- Mathematics

University of Konstanz:
- Physics
- Mathematics

Baden-Württemberg
Ministry of Economic Affairs

Aerospace – Relevant Study Courses (Universities of Applied Sciences/Fachhochschulen)

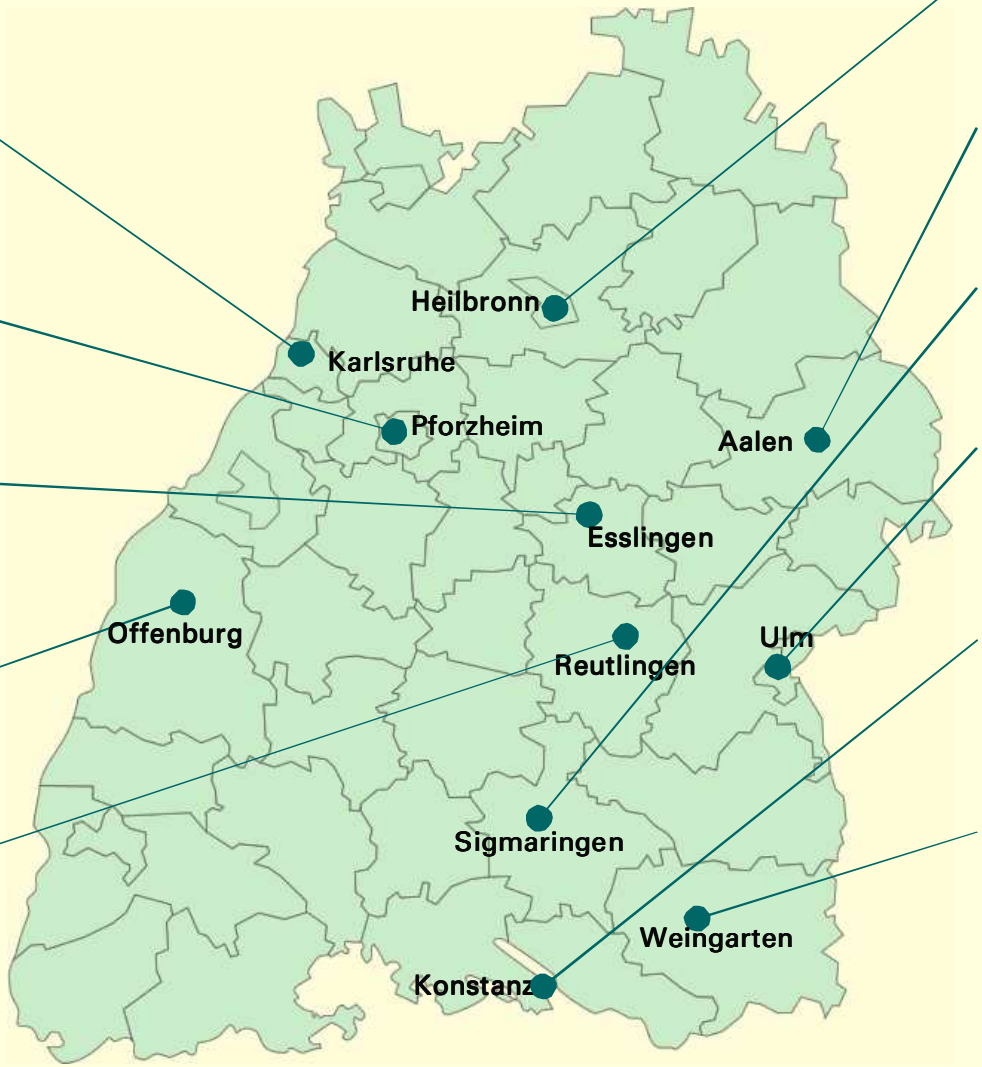
Fachhochschule Karlsruhe:
- Business Engineering
- Mechatronics
- Mechanical Engineering
- Electrical Engineering

Fachhochschule Pforzheim:
- Business Engineering
- Electrical Engineering
- Mechanical Engineering

Fachhochschule Esslingen:
- Business Engineering
- Automotive Engineering
- Mechanical Engineering
- Electrical Engineering

Fachhochschule Offenburg:
- Business Engineering
- Systems Technology
- Mechanical Engineering

Fachhochschule Reutlingen:
- Mechatronics
- Mechanical Engineering



Fachhochschule Heilbronn:
- Mechatronics
- Mechanical Engineering
- Electrical Engineering

Fachhochschule Aalen:
- Business Engineering
- Mechatronics
- Mechanical Engineering

Fachhochschule Albstadt-Sigmaringen:
- Business Engineering
- Mechanical Engineering

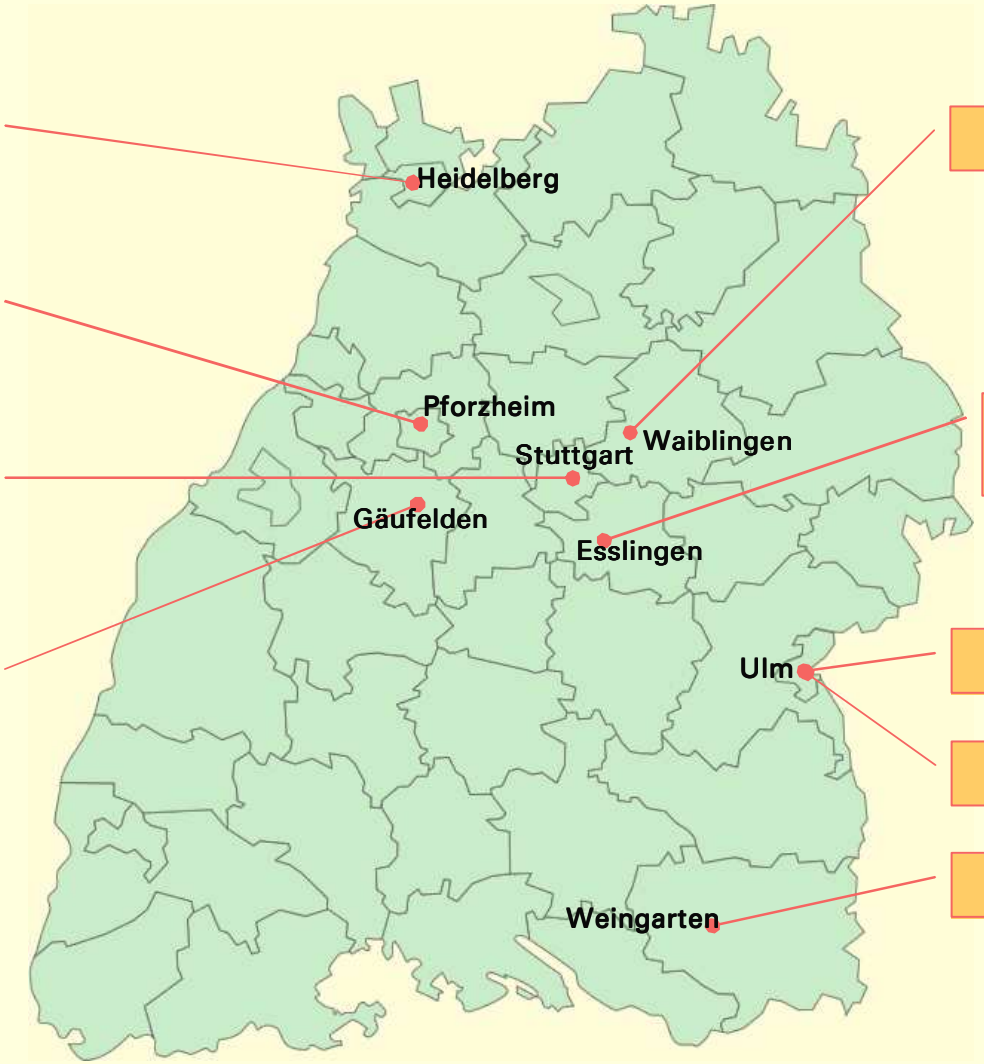
Fachhochschule Ulm:
- Business Engineering
- Electrical Engineering
- Mechanical Engineering
- Automotive Engineering

Fachhochschule Konstanz:
- Business Engineering
- Mechatronics
- Mechanical Engineering
- Electrical Engineering

Fachhochschule Ravensburg-Weingarten:
- Mechatronics
- Mechanical Engineering
- Physical Engineering

Baden-Württemberg
Ministry of Economic Affairs

Aerospace – Steinbeis Technology Transfercenters (STZ)



- STZ Simulation of Reactive Flows, Heidelberg
- STZ Signal Processing Systems, Pforzheim
- STZ Aerodynamics, Flight and Light Weight Construction, Stuttgart
- STZ Space, Gäufelden
- STZ Automotive Engineering, Waiblingen
- STZ Thermal and Fluid Mechanics, Göppingen
- STZ Computer-based Drive and Control Systems, Ulm
- STZ Technical Consulting at FH Ulm
- STZ Materials Engineering, Weingarten

Aerospace - Research

Fraunhofer Institute for Physical Measurement Techniques (IPM), Freiburg

http://www.ipm.fraunhofer.de

As R&D partner to the industry, Fraunhofer IPM develops optical sensor and imaging systems as well as systems based on thin film technology. For industrial applications we offer customized components, prototypes or systems ready for use. IPM scientists develop novel technical solutions for bioanalytical applications, process measurement or railroad measurement. Further research focuses are the measurement of geometrical parameters as well as laser imaging.

Fraunhofer Institute for High-Speed Dynamics – Ernst Mach Institute (EMI), Freiburg

http://www.emi.fhg.de

The Fraunhofer Institute for High-Speed Dynamics, also known as the Ernst-Mach-Institut (EMI), focuses on the physical and technical aspects of high-speed mechanical and fluid dynamic processes. This includes the experimental and numerical analysis of shock waves in solids, liquids, and gases; fluid-flow and combustion processes; impact and penetration processes over a wide range of velocities from 10 m/s to 10 km/s; the behaviour of structures under shock and impact; the behaviour of elastic media at high strain or high strain rates of dilatation.

Fraunhofer Institute of Chemical Technology (ICT), Pfinztal

http://www.ict.fhg.de

Fraunhofer ICT in Germany is a unique research and development facility on energetic materials, energetic systems, polymer technology, applied electrochemistry and environmental engineering comprising the entire span from basic research tasks to application investigations and product introduction on behalf of customers' needs.

Aerospace - Research

Fraunhofer Institute for Information and Data Processing (IITB), Karlsruhe

http://www.iitb.fhg.de

Fraunhofer IITB is the prime institute for automatic and interactive imagery analysis, for the application of information technology to the optimization of industrial processes and also for computer networks and information services. The IITB develops ready-to-implement solutions and offer a broad spectrum of feasibility studies, process analyses and optimization. The institute also offers process and system development including the provision and installation of problem solutions based on information technology. Quality management and maintenance of the implemented systems complete the palette of services.

DLR Institute of Space Propulsion, Lampoldshausen

http://www.la.dlr.de/ra

The Institute of Space Propulsion is separated into three departments: technology, engineering and testing. Research is conducted into structural and fluid mechanics, rocket boosters, ramjets, testing equipment, control and instrumentation. The institute also provides research and technology support.

DLR Institute of Technical Thermodynamics, Stuttgart

http://www.dlr.de/tt

The Institute of Technical Thermodynamics at the German Aerospace Centre in Stuttgart has additional sites in Köln-Porz and Almeria/Spanien. The institute works on the exploitation of highly efficient energy conversion technologies and on the accelerated introduction of renewable energy sources. The work ranges from theoretical studies and basic laboratory work to the operation of pilot plants.

Aerospace - Research

DLR Institute of Structures and Design, Stuttgart

http://www.st.dlr.de/BK

The main research activities are concerned with studying the crashworthiness and impact behaviour of composite structures through structural impact tests and crash simulation studies. The long term research projects are concerned with aircraft structures, particularly helicopter and aircraft fuselage subfloor structures. Further work is done on the fields of fibre reinforced polymers and ceramics, hot and lightweight structures.

DLR Institute of Combustion Technology, Stuttgart

http://www.dlr.de/vt

The Institute of Combustion Technology develops design principles for industrial combustion processes. Particular emphasis is placed on reducing harmful substances such as soot, nitrogen oxides and unburned hydrocarbons. The institute also conducts research into unsteady combustion, increasing the reliability of the combustion process, and fuels. Its main areas of expertise are: (1) combustion test facilities, (2) laser measurement technology and analytics, (3) modeling and simulation.

DLR Institute of Technical Physics, Stuttgart

http://www.dlr.de/tp/institut

The Institute of Technical Physics addresses advanced laser source technologies and their applications. There is a particular interest in COIL (chemical oxygen iodine) lasers because of their scalability characteristics and high efficiency. The institute is currently operating the most powerful laser of this type in Europe. Work in the field of diode pumped solid-state lasers is concentrated on fixed frequency and tuneable lasers. With ultra-short pulse lasers, the institute is moving into the completely new field of laser interaction and propagation.

Aerospace - Research

Institute for Fluid Mechanics, University of Karlsruhe

http://www-isl.mach.uni-karlsruhe.de

The Institute teaches and researches fluid mechanics for aerospace technologies, motor vehicles, fluid machines, and for biotechnology and medical technology. Its main areas of research are aeroacoustics, including the numerical and experimental localization of sound sources, further development of the theory of local disturbances in boundary layers for airfoil and motor vehicle flows, and within the scope of bio-fluid mechanics, flow in the human heart and bioanalytics.

Institute of Thermal Turbomachines, University of Karlsruhe

http://www.its.uni-karlsruhe.de

The Institute of Thermal Turbomachines deals with the variety of issues arising from the thermodynamic process of gas turbines with its high pressures and temperatures. The key aspects of research activities are strongly associated with gas turbine components such as combustion chamber, turbine, rotor and bearing chamber. Thus, in a broader sense, they are concerned with flows in complex geometries taking especially into account the phenomena of two phase flow, chemical reaction, turbulent mixing, wall cooling methods and heat transfer as well as the interaction of flow and structure. In this regard new numerical and theoretical approaches are developed and sophisticated experimental investigations are carried out. The results obtained enter directly into new designs.

Institute of Flight Mechanics and Flight Control (IFR), University of Stuttgart

http://www.ifr.uni-stuttgart.de

The IFR's research activities concentrate on three main areas: flight control design, autonomous guidance and control of aircraft, and the development of software to solve trajectory optimization problems. As well as specializing in the practical application of aerospace technologies, the institute also conducts fundamental theoretical research.

Aerospace - Research

Materials Testing Institute (MPS), University of Stuttgart

http://www.mps.uni-stuttgart.de

The Materials Testing Institute University of Stuttgart carries out the following tasks: research and development work in the areas of materials and component testing, materials development and optimisation, safety of components and design, cooperation with industries (particularly in the area KMU in the fields of technology transfer, such as damage prevention, modern computational methods, adequate materials selection, adequate materials production methods), conformity tests of existing codes and regulations, certification of products.

Institute of Aircraft Design, University of Stuttgart

http://www.ifb.uni-stuttgart.de

The Institute's areas of research are: (1) aircraft and lightweight construction, (2) conceptional aircraft design, (3) composites, and (4) wind energy.

Institute of Aerodynamics and Gas Dynamics, University of Stuttgart

http://www.iag.uni-stuttgart.de

The Institute carries out extensive theoretical and experimental research. Its theoretical research includes studies of laminar-turbulent transition and separation. Within the scope of its experimental studies, wind tunnel tests are conducted on building aerodynamics and other industrial aerodynamics, in particular with regard to the dispersion of pollutants.

Aerospace - Research

Institute for Nuclear Energetics and Energy Systems (IKE), University of Stuttgart

http://www.ike.uni-stuttgart.de

The Institute for Nuclear Energetics and Energy Systems (IKE), one of Stuttgart University‘s largest institutes, is integrated into the department of energy technology. Over the years, IKE‘s research activities have evolved beyond the sphere of nuclear technology and today focus on system and plant technology and thermofluid dynamics, reactor physics and applied radiation physics, nuclear installations and environmental protection technology, heating and air conditioning technology, solar thermal installations and hydrogen technology. The institute carries out both basic research and application research.

Institute of Propulsion Systems, University of Stuttgart

http://www.ila.uni-stuttgart.de

As well as purely technical questions, the institute also handles key cross-industry challenges in the aircraft engine and turbomachines industry (for example, technical and commercial aspects of development, production and operation). Drawing on these comprehensive skills, the institute develops customer-oriented solutions.

Institute of Space Systems (IRS), University of Stuttgart

http://www.irs.uni-stuttgart.de

The IRS conducts research into space systems, space propulsion, and space applications. Particular attention is given to the development of small satellites and electric space propulsion systems, instrument payloads, and space-station design. What's more, the institute examines the behavior of spaceships entering the earth's atmosphere (or the atmosphere of other planets) through theoretical/numerical simulations and by performing experiments. The IRS also specializes in the development of re-entry sensors, the optimization of space missions and flight paths, multispectral remote sensing of the atmosphere and of the earth's surface, as well as infrared astronomy.

Aerospace - Research

Institute for Statics and Dynamics of Aerospace Engineering and Geodesy, University of Stuttgart

http://www.isd.uni-stuttgart.de

Key research activities are: (1) finite elements, (2) material mechanics, (3) data processing, (4) experimental technology and electronics, (5) pneumatic design and adaptive lightweight construction, (6) high-altitude platforms. Its employees are actively involved in German and international standardization bodies.

Institute of Aerospace Thermodynamics, University of Stuttgart

http://www.uni-stuttgart.de/itlr

Research topics of the institute are: heat transfer, aerothermodynamics, droplet dynamics, hypersonic combustion and shock tube research. The institute is equipped with different air supply systems, where one is a high temperature facility. The institute is well equipped with optical measurement systems (PIV, LDA, LIF, Thermochromic Liquid Crystals, Infrared-Thermography) and with measurement systems for determining droplet sizes (Aerosizer, Malvern and 3-wave extinction).

Institute of Physics and Meteorology, University of Hohenheim

http://www.uni-hohenheim.de/www120

The main objective of our research is the development and application of unique remote sensing systems and in-situ sensors for advancing our understanding of Earth's weather and climate.

Aerospace - Research

Institute of Navigation, University of Stuttgart (INS)

http://www.nav.uni-stuttgart.de

Established in 1953, this institute originally specialized in aviation navigation, and is now part of the University of Stuttgart's Faculty of Aerospace Engineering and Geodesy. INS conducts interdisciplinary research into navigation, remote sensing, and sensor development. Particular emphasis is placed on the practical deployment of methodologies and measurement techniques resulting from the institute's research. This focus on real-world applications is reflected in INS's many partnerships with institutions and enterprises.

Institute for Combustion Technology (ITV), University of Stuttgart

http://www.uni-stuttgart.de/itv

The ITV's research aims to achieve a detailed understanding of the fundamentals of combustion technology, in particular the efficient, environment-friendly operation of combustion systems, such as engines, gas turbines and firing systems. The Institute's three departments focus on the theoretical principles of physics and chemistry, experimental methods and the simulation of industrial combustion systems.

Aerospace – Technology parks

TECHNOLOGIE-TRANSFER-ZENTRUM LAMPOLDSHAUSEN

Technology Transfer Centre Lampoldshausen, Hardthausen

The DLR (German Aerospace Centre) as offerer and the economic development corporation Heilbronn, the Chamber of Commerce and industry Heilbronn-Franconia, the Chamber of trade Heilbronn-Franconia and the Municipality Hardthausen as mediators are in working group carriers of the TTZ Lampoldshausen.

www.ttz-lampoldshausen.de

Focal themes of technology transfer are diagnostics of flow and combustion processes using pressure, sampling and temperature probes, optimizing combustion processes in home heating systems and industrial combustion plants in order to develop environmentally friendly combustion systems, advanced laser technology for flow fields and chemical reactions inside combustion chambers, spray production and combustion, determination of drip rate, flame zones and instant species concentrations, heat transfer, cooling and product life of heavy-duty components used in combustion chambers and fire protection in industrial plants, research facilities, buildings and underground traffic facilities.