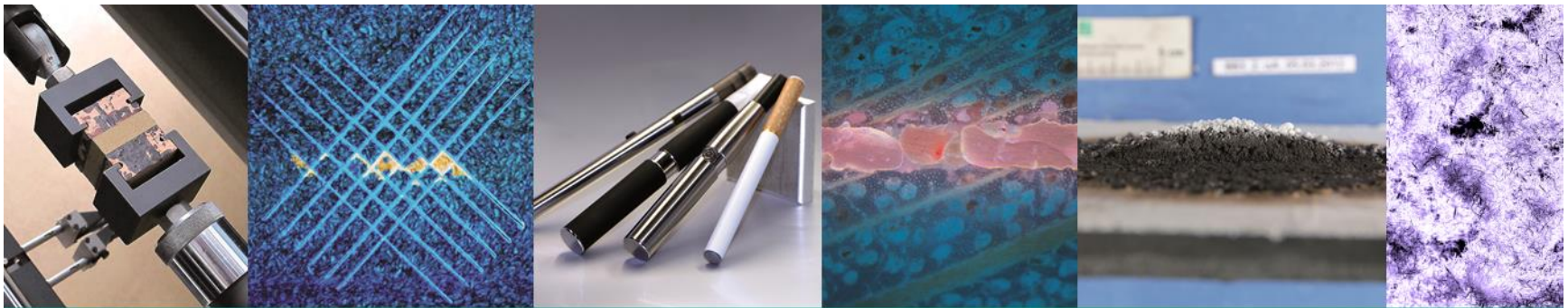




## Smart Cities conference

# Fraunhofer Institute for Wood Research Wilhelm-Klauditz-Institut WKI



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# Address

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**Fraunhofer Institute  
for Wood Research**  
Wilhelm-Klauditz-Institut WKI  
Bienroder Weg 54 E  
D-38108 Braunschweig

Phone +49 531 2155-0  
Fax +49 531 351587

[info@wki.fraunhofer.de](mailto:info@wki.fraunhofer.de)  
[www.wki.fraunhofer.de](http://www.wki.fraunhofer.de)

**Director**  
Prof. Dr.-Ing. Bohumil Kasal

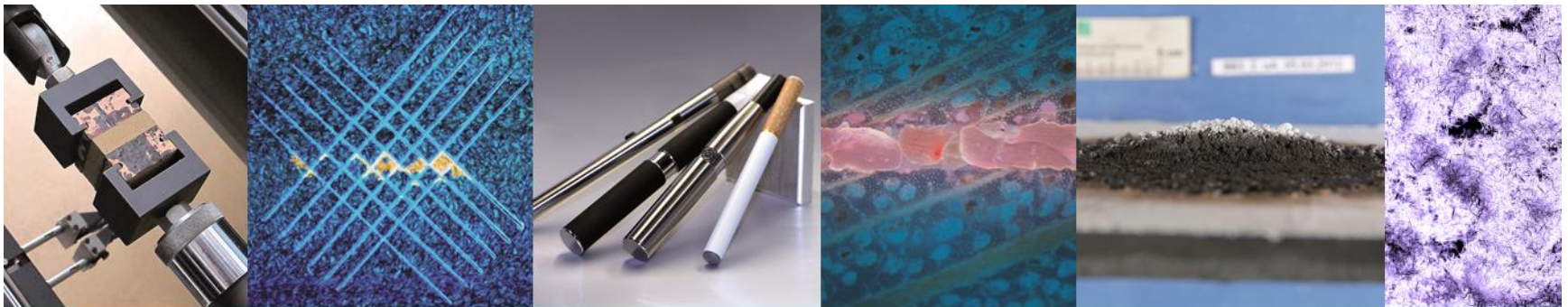


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# Fields of Activity

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- Technology for Wood-based Panels
- Material Analysis and Indoor Chemistry
- Surface Technology
- Structural Engineering and Construction
- Quality Assessment
- Wood Fiber Research



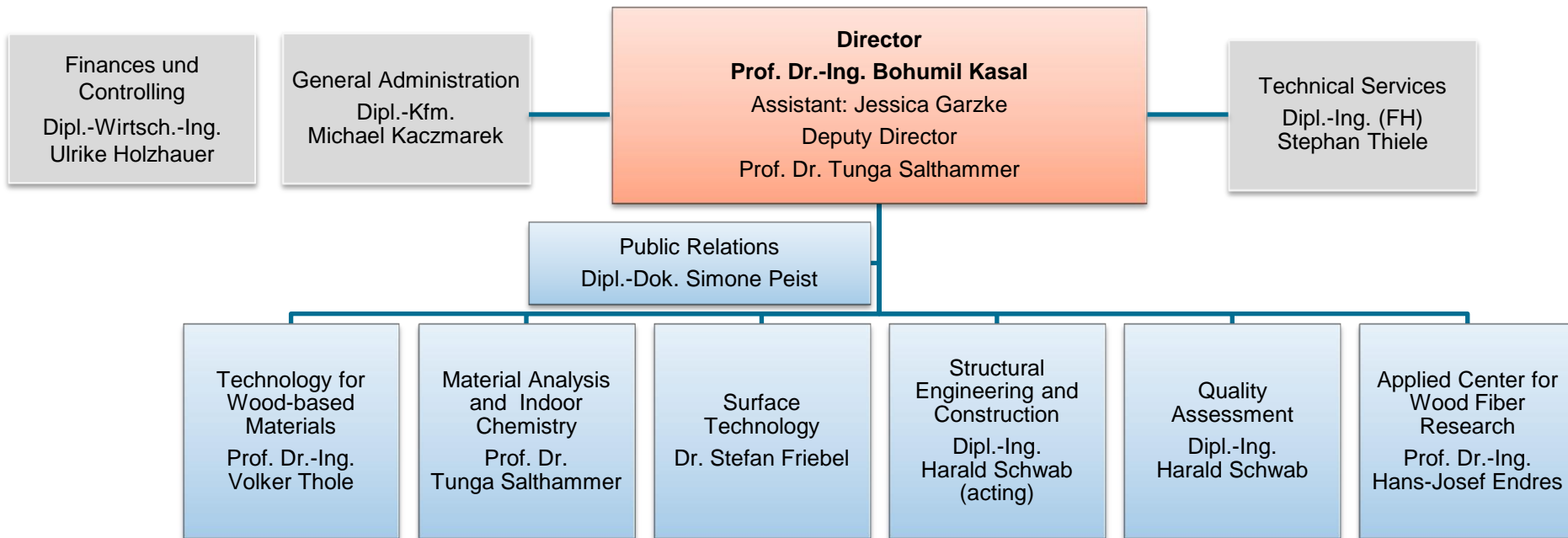
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# General Figures

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■ Affiliation	The Fraunhofer-Gesellschaft
■ Staff	109 (160)
■ Research officers	53
■ Budget	11.4 Mio. € (2014)
■ Investments	780,000 € (2012), 1,1 Mio € (2014)
■ Funded support	International Association for Technical Issues related to Wood (registered association) (iVTH)

# Organization Chart (November 2013)



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# Equipment

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Useful areas	■ Offices, laboratories, infrastructure	ca. 4300 m <sup>2</sup>
	■ Technical fields	2000 m <sup>2</sup>
	■ Test fields for weathering test	400 m <sup>2</sup>
Library (2012)	■ Specialist books	10 800
	■ Trade journals (subscription)	90
	■ Loose-leaf collection	13

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# Special Equipment (1)

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- Process-engineering test fields
- Climatic exposure test cabinets, test facility
- Test chambers for the detection of the emission behaviour under indoor conditions
- Online mass spectroscopy
- Thermal analysis
- Facilities for natural and time-lapse weathering of surfaces
- Test houses for examination of building elements
- Thermographic camera for detection of delaminations
- Indoor/outdoor climate simulator for examination of building elements

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# Special Equipment (2)

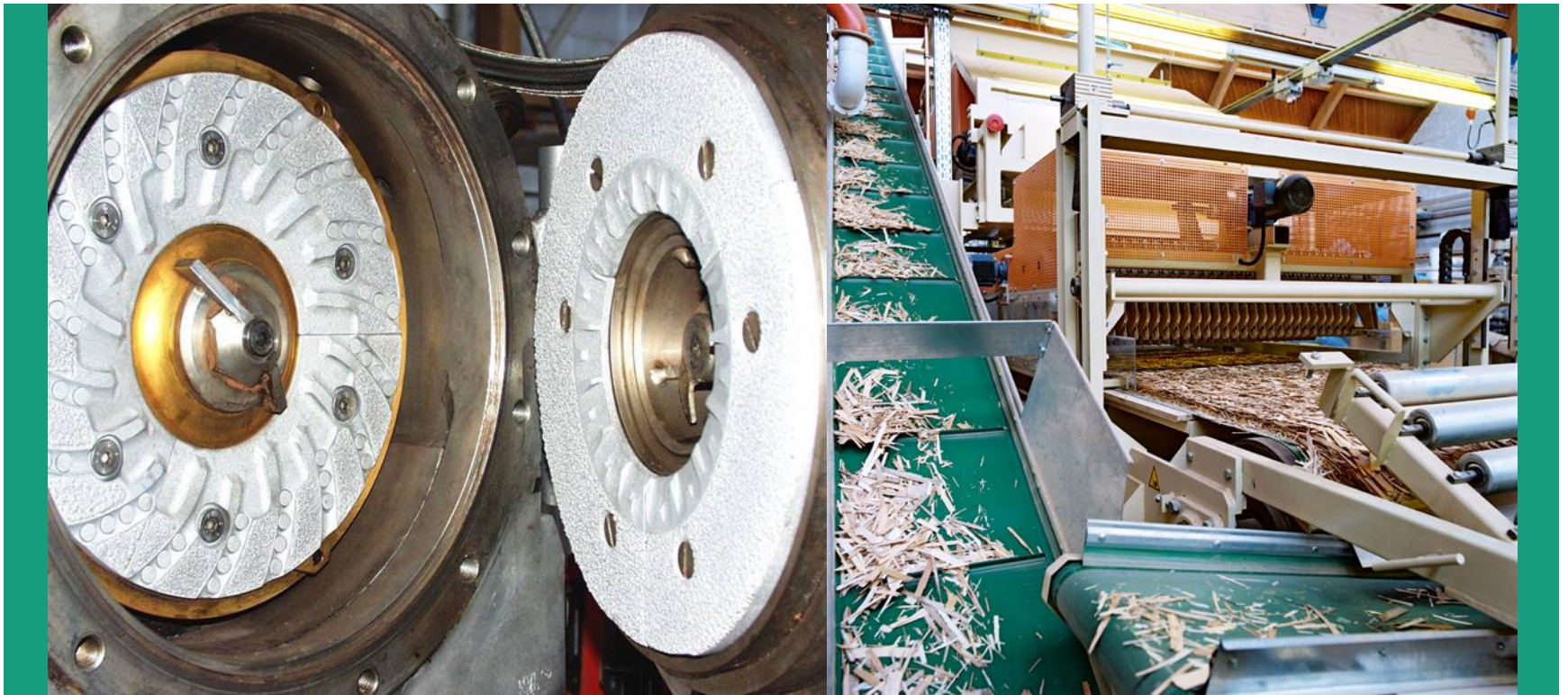
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- Drying systems on a semi-technical scale
- Laboratory-scale plant for manufacture of OSB with roller conveyor to the hot press and programmable press control
- Small-scale plant for production and gluing of fibers
- Devices for non-destructive examination
- Acoustical testing device for laminated floorings
- Extrusion plant for WPC (Wood-Plastic-Composites) manufacture
- Performance test device for floors and roofs



# Technology for Wood-based Materials

Prof. Dr.-Ing. Volker Thole



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# Technology of Wood-based Materials

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## Fields of activity

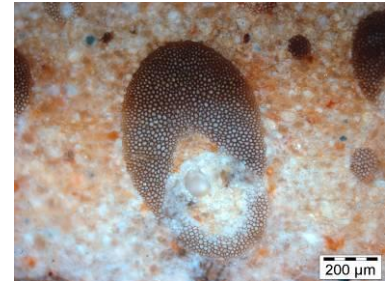
- Material research and development
- Optimization of the properties of materials made from wood and other regenerative raw materials, and of organic and inorganic binders
- Raw material and materials testing
- Utilization of secondary raw materials and of residues
- Preparation of fibres for composites and paper
- Structure orientated wood-based materials, splinter and fibre materials, plywood
- Questions of ecology



# Technology of Wood-based Materials

## Selected projects

- Structured materials made from wood particles
- Dry gluing as alternative to the blow-line gluing in MDF manufacture
- Low emission drying of wood particles in a closed-loop dryer
- Binder systems made from vegetable oil derivatives for application in wood-based materials and fibre moulds
- Utilization of residues from palm oil cultivation to produce fibre boards in Malaysia

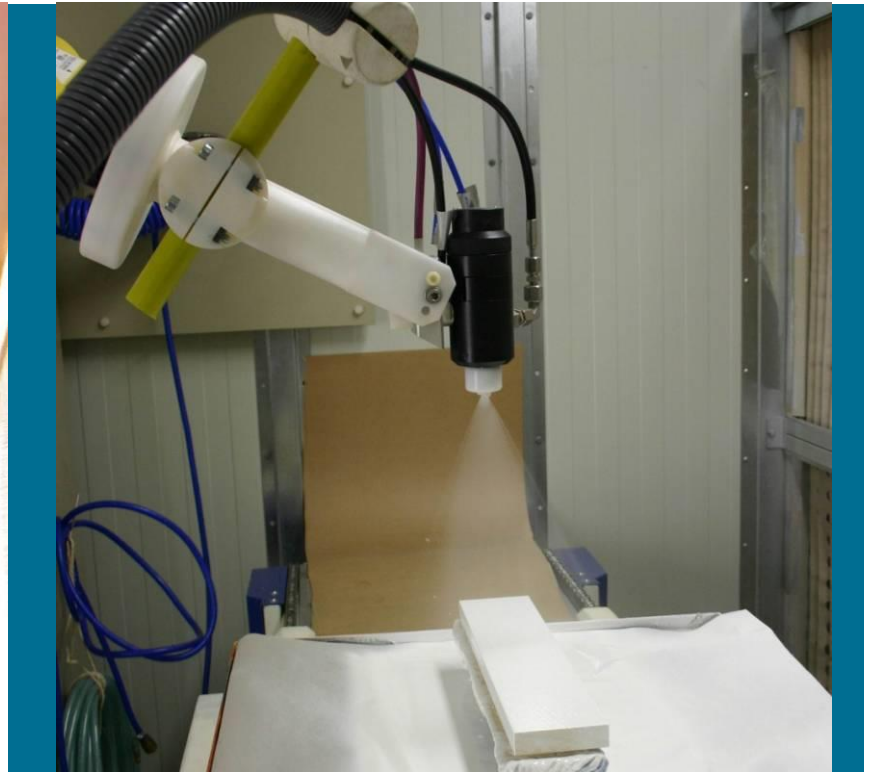


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# Surface Technology

Dr. Stefan Friebe

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# Surface Technology

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## Fields of activity

- Acrylate dispersions
- Adhesives
- Application processes
- Certification products
- Coating recycling
- Coating testing
- Damage analysis
- Exterior testing
- Oleo chemistry
- Polyesters
- Polymer analytics
- PU-dispersions
- Radiation curing lacquers
- Saccharide chemistry
- Wood protection

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# Surface Technology

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## Selected projects

- Extended concepts of coating recycling using online measurement and preparation methods
- Development of a simplified method for the testing of the suitability of MDF for exterior door applications
- High quality products for the paint and plastics industry from by-products of the biodiesel production through biotechnological processes
- Robot-assisted coating of windows and wooden building elements for resource saving and optimised surfaces
- Saccharide containing, water-based binders for wood coatings as a substitute for methyl methacrylates containing dispersions
- Virtual product qualification for the sustainability

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# Material Analysis and Indoor Chemistry

Prof. Dr. Tunga Salthammer

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# Material Analysis and Indoor Chemistry

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## Fields of activity

- Indoor air quality measurements
- Chamber emission tests
- Material analysis
- Standard test procedures
- Characterization of nano-particles
- Biocide analytics





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# Material Analysis and Indoor Chemistry

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## Selected projects

- VOC and particle emissions from electronic devices
- Release of formaldehyde from insulation material
- Photo-catalytic systems for the reduction of VOC in rooms
- Pollutants in museums and archives
- Indoor air quality in residential and office buildings made of wood or wood-based material
- Gas-phase/particle partitioning of SVOC in the indoor environment
- New methods for the analysis of volatile aldehydes
- Breath gas analysis

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# Material Analysis and Indoor Chemistry

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## Special equipment

- Gas chromatography / mass spectrometry (GC/MS)
- Proton transfer reaction mass spectrometry (PTR-MS)
- Elemental analysis by ICP-OES and XRF
- HPLC
- Online formaldehyde analysis
- Photo-acoustic detection
- Analysis of trace gases



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# Structural Engineering and Construction

Dipl.-Ing. Harald Schwab (acting)

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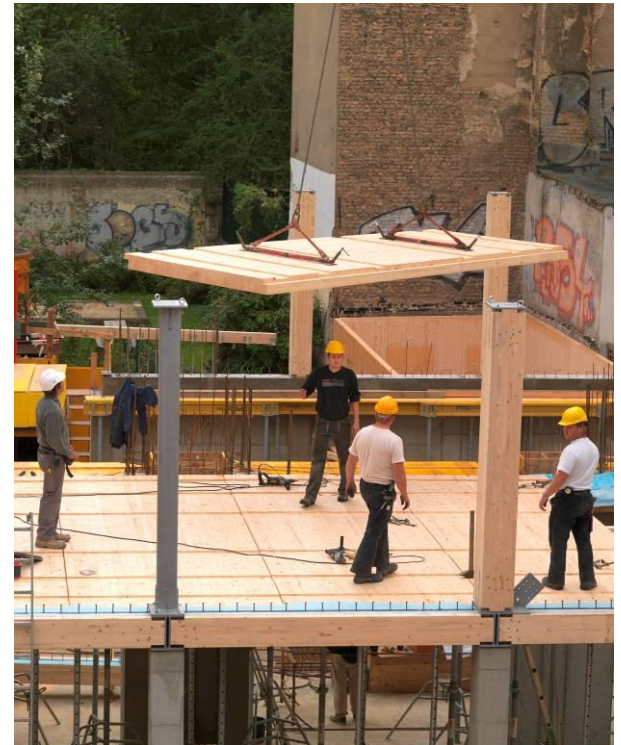
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# Structural Engineering and Construction

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## Fields of activity

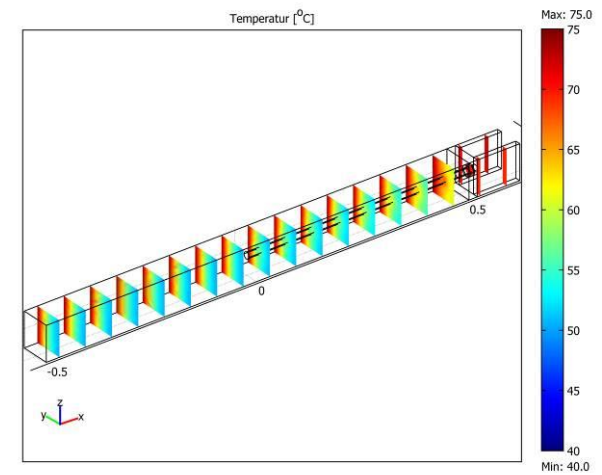
- Building-physical investigations
- Mechanical investigations
- Fire research
- Expert surveys
- External supervision
- Approvals



# Structural Engineering and Construction

## Selected projects (1)

- Weathering simulation
- Numerical simulation
- Climate analysis
- Load-carrying capacity of wooden building components, p. ex. timber frame walls
- Corrosion Impact on junction elements (joints)
- Development of reactive coating systems
- Development of new products with enhanced fire performance properties



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# Structural Engineering and Construction

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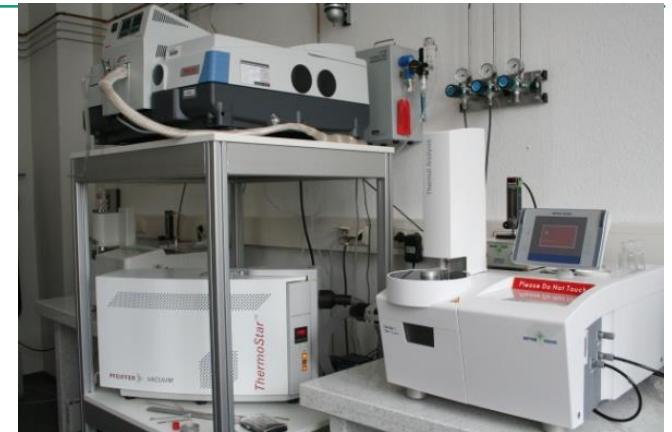
## Selected projects (2)

- External supervision
- Quality and performance supervision for various build-legal and private quality communities
- Approval tests, p. ex. for heat insulating materials and external thermal insulation composite systems in timber constructions
- Book: Research on framework – Contributions for its conservation

# Structural Engineering and Construction

## Equipment

- Thermogravimetric analysis coupled with Fourier-transform-Infrared Spectroscopy / Mass Spectrometry (TGA-FTIR / MS)
- Thermomechanical Analysis (TMA)
- Differential Scanning Calorimetry (DSC)
- High-Pressure DSC-Microscopy System
- Dynamic Stress Rheometer (DSR)
- Texture Analyser

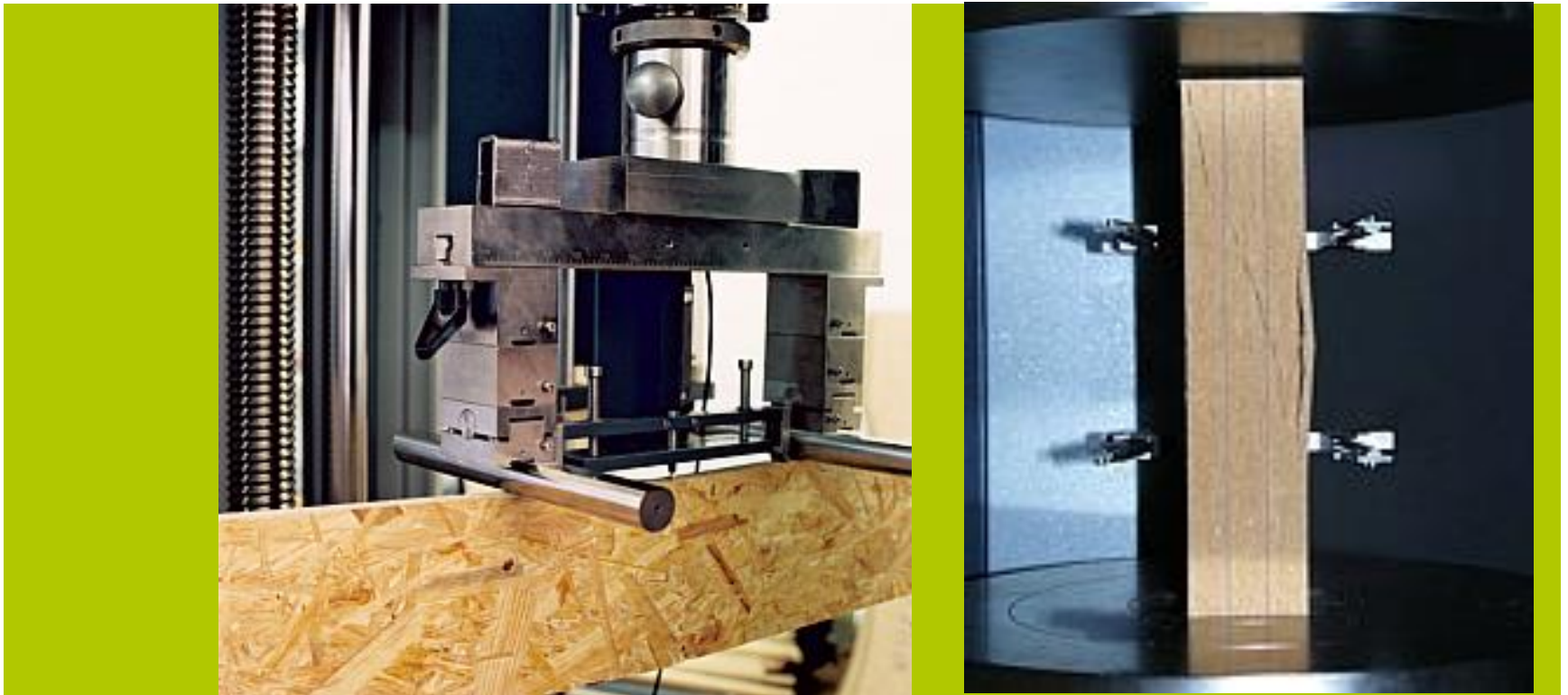


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# Quality Assessment

Dipl.-Ing. Harald Schwab

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# Quality Assessment

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## Fields of activity

- Testing laboratory for wood and wood based panels
- Inspection body for quality assurance systems in the wood based panels industry
- Certification body for quality assurance systems in the wood based panels industry
- Development of new test methods for wood based panels
- Research and development in the area of adhesives for the building industry
- Contribution in committees for the development of engineering standards in the area of wood based panels

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# Quality Assessment

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## Selected projects (1)

- Inline measurement methods for the determination of formaldehyde emissions in the production of wood based panels
- The production process of wood based panels and the formaldehyde emission of the produces panels
- Certification systems and eco labels in the area of emission of wood based panels in Europe

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# Quality Assessment

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## Selected projects (2)

- High-speed methods for the determination of the moisture content in wood and wood based panels
- Modern adhesives for timber constructions and the bonding of wood and other materials

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# The »Internationaler Verein für Technische Holzfragen e. V.«

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**Internationaler Verein für  
Technische Holzfragen**

iVTH supports WKI

- Enhances wood research
- Establishes contacts between science and practice
- Links economy and ecology
- Reports on the state of the art
- Is a member in the »Arbeitsgemeinschaft industrieller Forschungsvereinigungen« (AiF) (Working pool of industrial research groups)
- Answers your questions

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# The Fraunhofer-Gesellschaft

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## ■ Research and development

- Application-oriented research of direct use to businesses and for the benefit to society
- Application-oriented basic research
- Departmental research for the German Federal Ministry of Defense

## ■ Business community

- Institutes work as profit centers
- One-third of the budget consists of income from industrial projects
- Spinoffs by Fraunhofer researchers are encouraged

## ■ Contracting partners/clients

- Industrial and service companies
- Public sector



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# Fraunhofer is the largest organization for applied research in Europe

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- 66 Fraunhofer institutes and independent research units
- More than 22,000 employees, the majority educated in the natural sciences or engineering
- An annual research volume of 1.9 billion euros, of which 1.66 billion euros is generated through contract research.
  - 2/3 of this research revenue derives from contracts with industry and from publicly financed research projects.
  - 1/3 is contributed by the German federal government and the *Länder* governments in the form of institutional financing.
- International collaboration through representative offices in Europe, the US, Asia and the Middle East



**Joseph von Fraunhofer**



**The Fraunhofer-Gesellschaft**

Discovery of the “Fraunhofer lines” in the solar spectrum

New methods for processing lenses

Director and partner in a glassworks

**Researcher**

**Inventor**

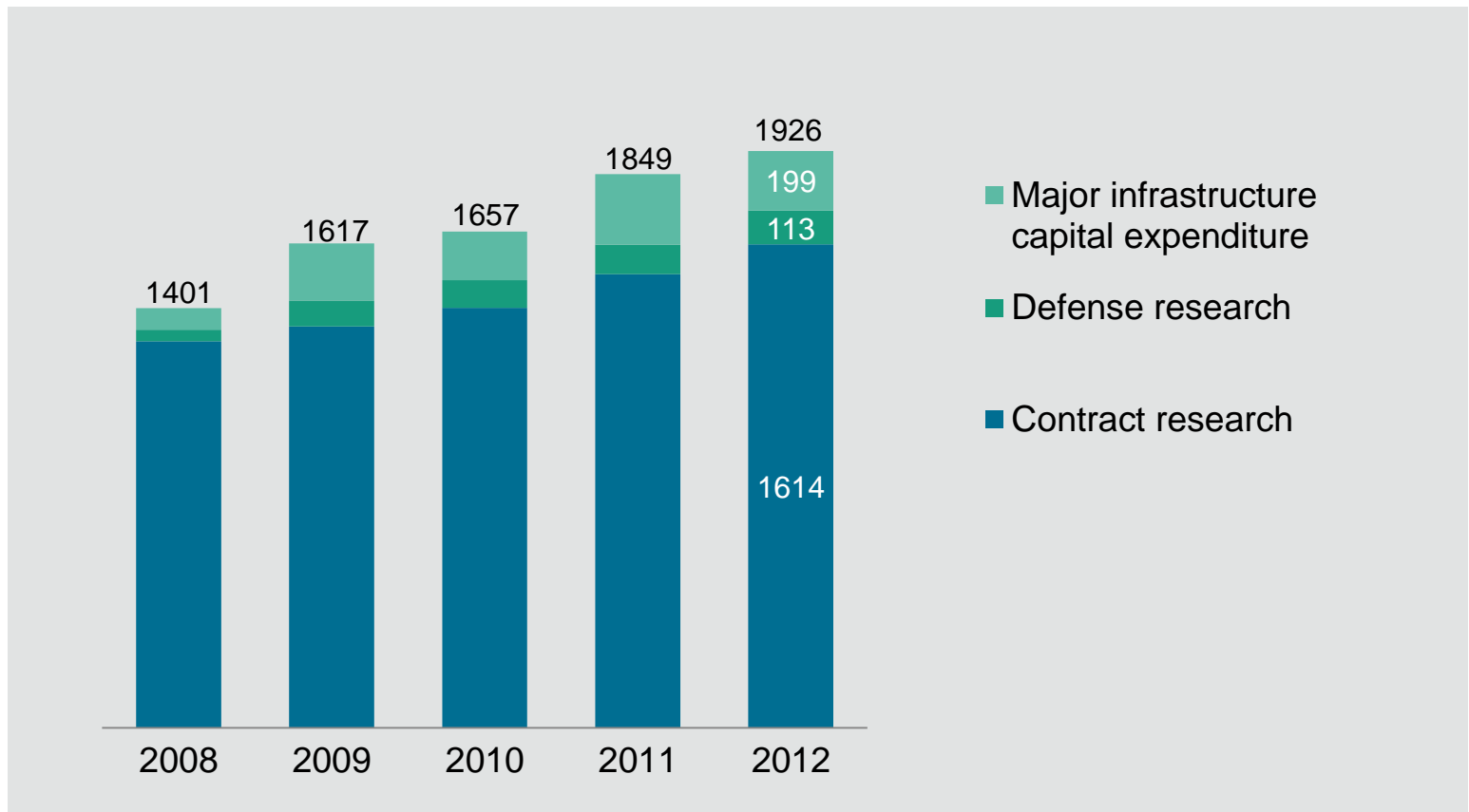
**Entrepreneur**

Research and development on behalf of industry and state

mp3 music format, white LED, high-resolution thermal camera

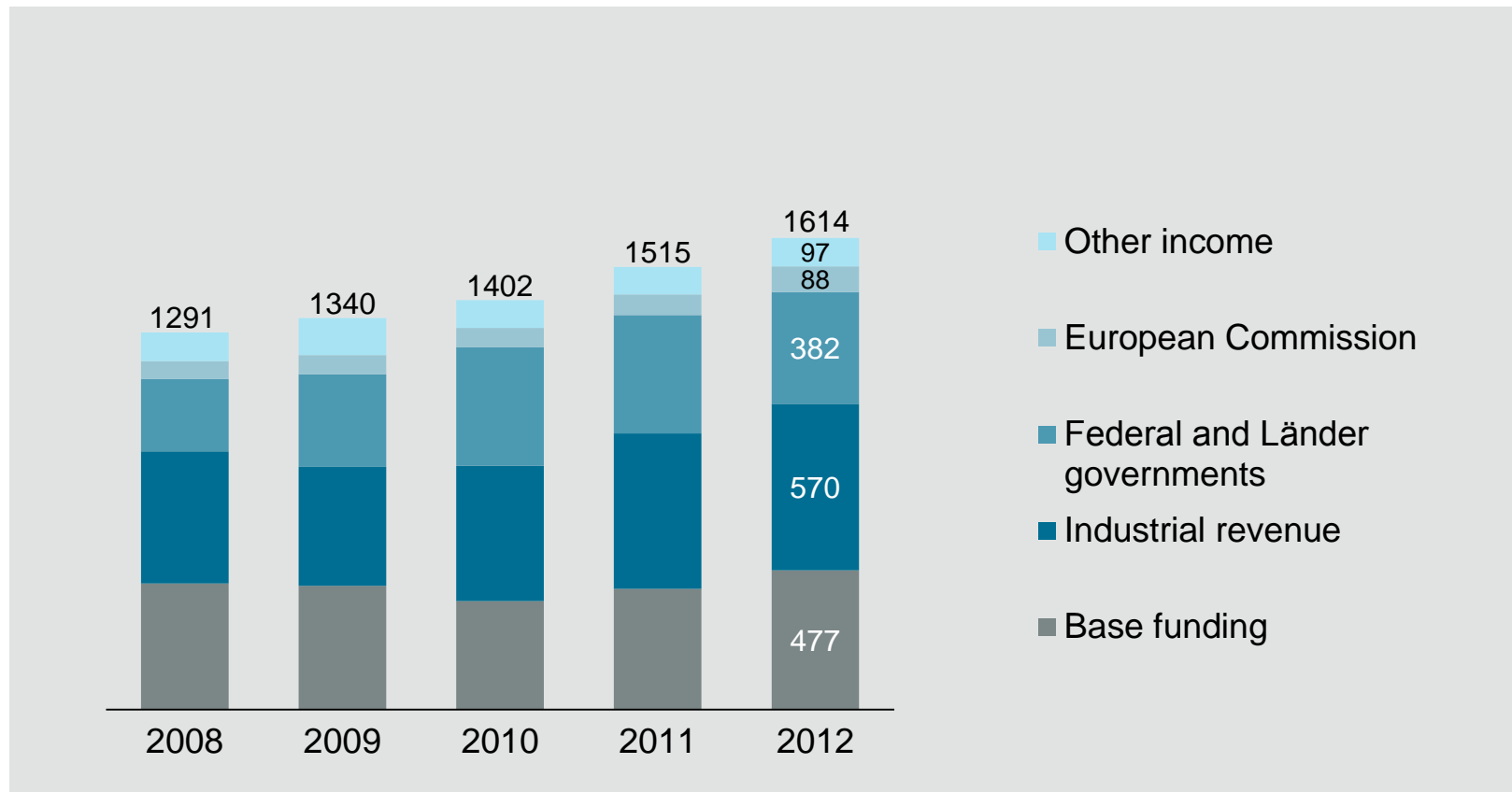
Research volume: approx. 1.66 billion euros annually

# Financial Structure of the Fraunhofer-Gesellschaft (million euros)





# Contract research revenue (million euros)



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# The Fraunhofer-Gesellschaft in a multi-dimensional field of tension

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## On the one hand

66 Institutes with different  
“Institute cultures”

Applied research as a  
profession

Excellent research

Institutional and project funding

Management/rules of a public  
institution



## On the other hand

A single organization with a mission

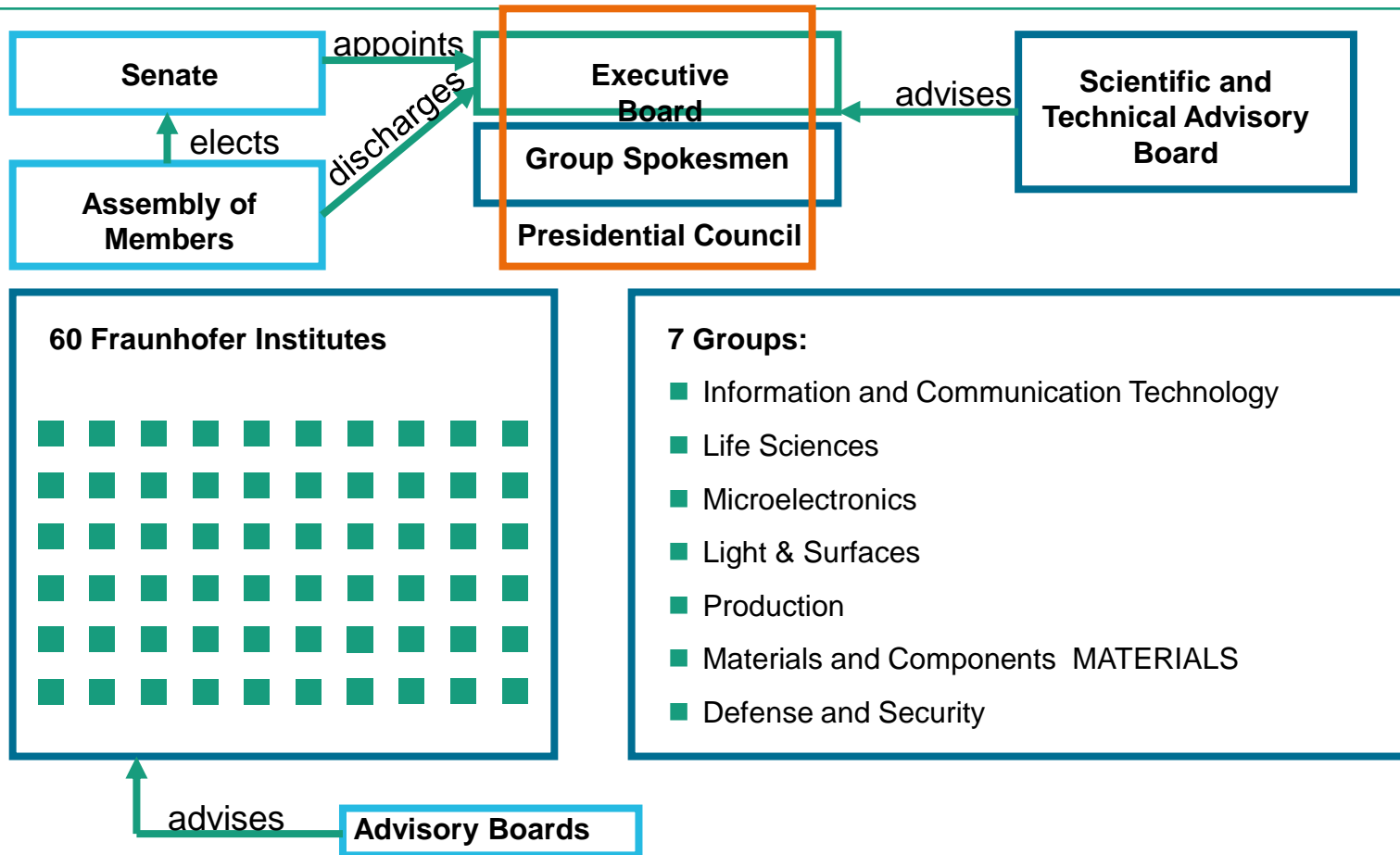
More than 250 business fields and  
core competencies

Strong applications orientation

Revenues from contract research























Entrepreneurial action

# Structure of the Fraunhofer-Gesellschaft



# Fraunhofer Alliances

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 Adaptronics	 Energy
 Additive Manufacturing	 Food Chain Management
 Advancer	 Lightweight Structures
 Ambient Assisted Living AAL	 Nanotechnology
 Automobile Production	 Optic Surfaces
 Building Innovation	 Photocatalysis
 Cleaning Technology	 Polymer Surfaces POLO
 Cloud Computing	 Simulation
 Digital Cinema	 Traffic and Transportation
 E-Government	 Vision
 Embedded Systems	 Water Systems (SysWasser)

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# The Executive Board

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**Prof. Dr.-Ing. Reimund  
Neugebauer**

President of the  
Fraunhofer-Gesellschaft



**Dr. Alexander Kurz**

Senior Vice President  
Personnel and Legal Affairs



**Prof. (Univ. Stellenbosch)  
Dr. Alfred Gossner**

Senior Vice President  
Finance, Controlling (incl.  
Business Administration,  
Purchasing and Real Estate),  
Information Technology

# Fraunhofer-Gesellschaft Human Resources

2008 - 2012

