Fraunhofer WKI

Annual Report 2024 | Jahresbericht 2024

Wood is future – sustainable and digital

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Wood is future – sustainable and digital

Holz ist Zukunft - nachhaltig und digital

Greeting

Dear customers and research partners, dear colleagues,

In October 2024, I had the pleasure of taking over the management of the Fraunhofer WKI from Prof. Bohumil Kasal, who was entering his well-deserved retirement. I would like to take this opportunity to express my heartfelt thanks for the efficient handover and the open and friendly welcome I received from the entire Fraunhofer WKI team and the community. Right from the start, at our European Wood-based Panel Symposium in Hamburg, I was able to experience at first hand the spirit and innovative strength of this sector.

Wood, the material that inspires us, is a key to the so many transformation processes that are enabling the transition from a resource-depleting economy to a renewable bioeconomy. Our common goal is to follow this path, both profitably and sustainably. The demand side – e.g. residential construction – is weak. The supply side, our raw material, is changing. The cost of energy is high. But whining is not our thing. We see the potential and perceive the challenges as opportunities. Research must be a strong and "simple" partner, supplying new ideas and solutions to the companies that use them to create innovations and market success.

In the current year, our continuous strategic development is being focused on two areas of activity. Our new technology center for wood and natural fibre based materials is at the heat of our infrastructural renewal. It should see start of construction in 2025. This will be complemented by the fundamental renovation of the old lecture hall including a new fiber and particle laboratory, the construction of the new wood yard, improved utilization of the test field and laboratories at the ZELUBA®, and substantial investment in a modernized energy supply. Alltogether this has a positive effect on our R&D capabilities, spatial efficiency and cost structure.

In order to solve complex issues more quickly, collaboration is essential. With the TU Braunschweig, we have developed a joint vision of a regional and national innovation stimulus in cost-efficient residential construction – both technically and politically. Timber construction hereby plays a central role.

The network within the Fraunhofer-Gesellschaft is also unique. The Fraunhofer WKI has top-level sister institutes that are receptive and curious about collaborating with us on the transfer of innovations from other sectors into the wood industry. This enables us to generate new solutions and competitive advantages for our customers much more quickly.

Grounded in optimism and confidence, we at the Fraunhofer WKI are eager to courageously push the boundaries with you. Please do not hesitate to contact us!

With best wishes,

Raoul Klingner
Acting Director of the Fraunhofer WKI

Grußwort

**Liebe Kunden und Forschungspartner,
liebe Mitarbeiterinnen und Mitarbeiter,**

im Oktober 2024 durfte ich die Leitung des Fraunhofer WKI von Prof. Bohumil Kasal übernehmen, der in seinen verdienten Ruhestand eintrat. Ich möchte mich an dieser Stelle herzlich für die effiziente Übergabe und die offene und freundliche Aufnahme durch das ganze Fraunhofer WKI-Team ebenso wie in der Community bedanken. Gleich zu Beginn konnte ich mich bei unserem European Wood-based Panel Symposium in Hamburg vom Spirit und der Innovationskraft der Branche überzeugen.

Holz, das Material, das uns begeistert, ist ein Schlüssel der allgegenwärtigen Transformationsprozesse von einer ressourcenerschöpfenden Ökonomie zu einer erneuerbaren Bioökonomie. Diesen Weg profitabel und nachhaltig zu gehen, ist unser gemeinsames Ziel. Die Nachfrageseite, Stichwort Wohnungsbau, ist schwach. Die Angebotsseite, unser Rohstoff, verändert sich. Die Kosten für Energie sind hoch. Aber Jammern ist nicht unsere Sache.

Wir sehen die Potenziale und begreifen die Herausforderungen als Chance. Die Forschung muss mit neuen Ideen und Lösungen als starker und »einfacher« Partner an der Seite der Unternehmen stehen, die daraus Innovationen und Markterfolg machen.

Im laufenden Jahr fokussiert sich unsere kontinuierliche strategische Weiterentwicklung auf zwei Handlungsfelder. Das neue Technikum ist der Kern unserer infrastrukturellen Erneuerung. Hinzu kommt 2025 die grundlegende Renovierung des alten Hörsaals inkl. Faser- und Partikellabor, der Neubau des Holzplatzes, eine bessere Auslastung des Prüffelds und der Labore am ZELUBA® sowie umfassende Investitionen in eine erneuerte Energieversorgung. All dies ist kein Selbstzweck, sondern wirkt positiv auf unsere FuE-Fähigkeiten, Flächeneffizienz und Kostenstruktur.

Um komplexe Fragestellungen schneller zu lösen, sind Kooperationen unerlässlich. Mit der TU Braunschweig haben wir die gemeinsame Vision entwickelt, einen regionalen und nationalen Innovationsimpuls im kosteneffizienten Wohnungsbau voranzutreiben – fachlich und politisch. Der Holzbau spielt dabei eine zentrale Rolle.

Besonders ist auch das Netzwerk innerhalb der Fraunhofer-Gesellschaft. Das Fraunhofer WKI hat Schwesterinstitute auf Top-Niveau, die offen und neugierig sind, gemeinsam mit uns Innovationen aus anderen Sektoren in die Holzbranche zu transferieren. So können wir viel schneller neue Lösungen und Wettbewerbsvorteile für unsere Kunden generieren.

Wir sind als Fraunhofer WKI voller Tatendrang und Zuversicht, mit Ihnen mutig voranzugehen. Kommen Sie auf uns zu!

Mit besten Grüßen,

Ihr Raoul Klingner
Kommissarischer Institutsleiter
des Fraunhofer WKI

Contents

Timber-concrete composite components

...optimally combine the specific material properties of wood and concrete.
» Page 19.

Institute with Profile

Sustainability has formed the focus of the Fraunhofer WKI since its foundation in 1946.

The founder and eponym, Dr. Wilhelm Klauditz, sought solutions for the optimal exploitation of raw wood – a commodity which had become scarce as a result of the second world war – as well as for the technical utilization of waste wood and small-diameter wood. He is regarded as a co-founder of the modern wood-based materials industry.

The topics resulting in our foundation 80 years ago are now more relevant than ever. Climate change is altering and diminishing the availability of raw materials. Reduce, reuse and recycle are today's buzzwords. At the Fraunhofer WKI, we consider renewable raw materials comprehensively - from production through to recycling. One particular focus is thereby directed at sustainable lightweight construction solutions. Our holistic research approach also encompasses the development of material recycling processes, life cycle analyses, indoor air analysis, and other.

Virtually all the procedures and materials resulting from the research activities are applied industrially. Customers of the Fraunhofer WKI include companies from the wood and furniture industries, the construction industry, the chemical industry, the packaging industry and the automotive industry.

With its research and development activities, the Fraunhofer WKI makes an important contribution towards the development of a bio-based recycling economy (bioeconomy).

As an accredited testing body, the Fraunhofer WKI performs material-testing and quality monitoring tasks. It assesses cases of damage and provides advice on questions of damage remediation. The quality assurance of wood products and other materials by means of non-destructive procedures such as thermography, ultrasound or computer tomography enhance the institute's spectrum.

With the HOFZET® Application Center and the integration into the Open Hybrid LabFactory, the important and promising new field of fiber composites is currently being systematically analyzed for future innovation potential and the possible role of Fraunhofer WKI in this value chain. In collaboration with the Technische Universität Braunschweig, the ZELUBA® Center for Light and Environmentally-Friendly Structures is reinforcing the subject areas of building construction and lignocellulose-containing materials.

From October 2010, the Fraunhofer WKI was under the leadership of Professor Dr. Ing. Bohumil Kasal. Since October 2024, Professor Dr. Raoul Klingner has been his provisional successor. Professor Dr. Tunga Salthammer continues to act as his deputy. The institute was incorporated into the Fraunhofer-Gesellschaft in 1972 and, with currently around 165 permanent employees and an operating budget of ca. 19,5 million euros, is one of the largest institutions for applied wood research in Europe. Around 9,000 m^2 of offices, laboratories, technical center and workshops are available.

The Fraunhofer WKI is a member of, among others, the Fraunhofer Group for Materials and Components – MATERIALS and the Fraunhofer Building Innovation Alliance. Within the Fraunhofer-Gesellschaft, the Fraunhofer WKI occupies a unique position with regard to its holistic research approach to the material utilization of wood and lignocellulosic materials.

Nachhaltigkeit steht seit seiner Gründung im Jahre 1946 im Fokus des Fraunhofer WKI.

Gründer und Namensgeber des Fraunhofer WKI, Dr. Wilhelm Klauditz, suchte nach Lösungen, um das kriegsbedingt knappe Rohholzangebot optimal verwerten zu können sowie Abfall- und Schwachholz technisch nutzbar zu machen. Er gilt als Mitbegründer der modernen Holzwerkstoffindustrie.

Die Gründungsthemen vor 80 Jahren sind aktueller denn je. Der Klimawandel verändert und verknappt das Rohstoffangebot. »Reduce, Reuse and Recycle« sind die heutigen Schlagworte. Am Fraunhofer WKI betrachten wir nachwachsende Rohstoffe umfassend von der Produktion bis zum Recycling. Ein besonderer Schwerpunkt liegt dabei auf nachhaltigen Leichtbaulösungen. Zu unserem ganzheitlichen Forschungsansatz gehören außerdem die Entwicklung von werkstofflichen Recyclingverfahren, Lebenszyklusanalysen und die Innenraumluftanalytik.

Nahezu alle Verfahren und Werkstoffe, die aus der Forschungstätigkeit des Instituts hervorgehen, werden industriell genutzt. Zu den Kunden des Fraunhofer WKI zählen Unternehmen aus der Holz- und Möbelwirtschaft, der Bauwirtschaft, der chemischen Industrie, der Verpackungs- und der Fahrzeugindustrie.

Mit seiner Forschung und Entwicklung leistet das Fraunhofer WKI einen wichtigen Beitrag für den Aufbau einer biobasierten Kreislaufwirtschaft (Bioökonomie).

Als akkreditierte Prüfstelle nimmt das Fraunhofer WKI Aufgaben der Materialprüfung und Qualitätsüberwachung wahr. Es begutachtet Schadensfälle und berät in Fragen der Schadenssanierung. Die Qualitätssicherung von Holzprodukten und anderen Materialien mittels zerstörungsfreier Verfahren, wie Thermographie, Ultraschall oder Computertomographie, erweitern das Spektrum des Instituts.

Mit dem Anwendungszentrum HOFZET® und der Einbindung in die Open Hybrid LabFactory wird aktuell der wichtige und zukunftsträchtige neue Bereich der Faserverbundwerkstoffe systematisch analysiert, um das Innovationspotenzial und die Rolle des Fraunhofer WKI in dieser Wertschöpfungskette noch klarer zu profilieren. Gemeinsam mit der Technischen Universität Braunschweig werden im Zentrum für leichte und umweltgerechte Bauten ZELUBA® die Themenfelder Baukonstruktion und lignocellulosehaltige Werkstoffe gestärkt.

Seit Oktober 2010 stand das Fraunhofer WKI unter der Leitung von Professor Dr.-Ing. Bohumil Kasal. Seit Oktober 2024 ist Professor Dr. Raoul Klingner sein kommissarischer Nachfolger. Als sein Stellvertreter fungiert weiterhin Professor Dr. Tunga Salthammer. Das Institut wurde 1972 in die Fraunhofer-Gesellschaft aufgenommen und gehört mit derzeit rund 165 fest angestellten Mitarbeitenden und einem Betriebshaushalt von gut 19,5 Millionen Euro zu den größten Einrichtungen für angewandte Holzforschung in Europa. Auf rund 9 000 m^2 stehen Büros, Labore, Technikum und Werkstätten zur Bearbeitung der Forschungsaufträge zur Verfügung.

Das Fraunhofer WKI ist u. a. Mitglied im Verbund Werkstoffe, Bauteile – MATERIALS und in der Allianz Bau. Innerhalb der Fraunhofer-Gesellschaft verfügt das Fraunhofer WKI hinsichtlich des ganzheitlichen Forschungsansatzes zur stofflichen Nutzung von Holz und lignocellulosen Materialien über eine Alleinstellung.

Our DNA

Vision

Our vision is a globally successful research institute which addresses current and future issues concerning renewable raw materials in a customer-oriented manner whilst taking into account the socio-economic and ecological challenges.

Mission

We develop technologies and products and provide services for the responsible use of renewable resources, taking into account environment-related interactions and a sustainable improvement in the quality of life.

Sustainability

Since its foundation in 1946, the Fraunhofer WKI has been conducting applied research, the results of which are then utilized to develop new materials, products, services and technologies in collaboration with industry. These developments are focused on renewable resources and their sustainable use. The aim is an improvement in product quality and safety as well as an increase in the competitiveness of our industrial partners. We strive to establish a long-term cooperation based on partnership.

In addition to the most important renewable raw material wood, the institute investigates numerous other lignocellulosic materials. These are, in all facets, key materials for a sustainable development and the solution of ecological and socio-economic challenges – from chemical applications, through industrial use, and on to recycling.

The effective utilization of complex materials requires highly specialized knowledge, the scope of which encompasses many disciplines of natural and engineering sciences.

The Fraunhofer WKI is the research institution in which the complexity of renewable raw materials is systematically documented and processed in the most diverse facets and interactions. This is the fundament which enables the WKI to occupy a leading position in research and development today and tomorrow.

Unser Selbstverständnis

Vision

Unsere Vision ist ein weltweit erfolgreich agierendes Forschungsinstitut, das aktuelle und zukünftige Fragestellungen zu nachwachsenden Rohstoffen kundenorientiert bearbeitet und sozioökonomische sowie ökologische Herausforderungen berücksichtigt.

Mission

Wir entwickeln Technologien und Produkte und bieten Lösungen für die verantwortungsvolle Nutzung nachwachsender Rohstoffe unter Berücksichtigung umweltbezogener Wechselwirkungen und zur nachhaltigen Verbesserung der Lebensqualität.

Nachhaltigkeit

Das Fraunhofer WKI forscht seit Institutsgründung 1946 anwendungsorientiert und entwickelt aus den gewonnenen Erkenntnissen gemeinsam mit der Industrie neue Materialien, Produkte, Dienstleistungen und Technologien. Diese fokussieren sich auf erneuerbare Ressourcen und deren nachhaltige Nutzung. Das Ziel ist eine Verbesserung von Produktqualität und -sicherheit sowie die Erhöhung der Wettbewerbsfähigkeit der beteiligten Industriepartner. Wir streben dabei eine langfristige partnerschaftliche Zusammenarbeit an.

Das Institut beschäftigt sich neben dem wichtigsten nachwachsenden Rohstoff Holz ebenso mit vielen weiteren lignocellulosehaltigen Materialien. Sie sind in allen Facetten – von der chemischen Anwendung, über die industrielle Nutzung bis zum Recycling – Schlüsselwerkstoffe für eine nachhaltige Entwicklung und die Lösung ökologischer und sozioökonomischer Herausforderungen.

Zur effektiven Nutzung komplexer Materialien auf Basis dieser Rohstoffe sind hochspezialisierte Kenntnisse nötig, deren Spannbreite viele Disziplinen der Natur- und Ingenieurwissenschaften umfasst.

Das Fraunhofer WKI ist die Forschungseinrichtung, in der die Komplexität nachwachsender Rohstoffe systematisch erfasst und in unterschiedlichsten Facetten und Wechselwirkungen bearbeitet wird. Dies ist Grundlage für die heutige und zukünftige Spitzenposition des Fraunhofer WKI in Forschung und Entwicklung.

Research building of the accredited departments MAIC and QA of the Fraunhofer WKI.

Forschungsgebäude der akkreditierten Bereiche von MAIC und QA des Fraunhofer WKI.

Organization Chart | Organigramm

Institute Management | Institutsleitung

Acting Director Kommissarischer Institutsleiter	Prof. Dr. Raoul Klingner | Phone +49 531 2155-212 raoul.klingner@wki.fraunhofer.de
Deputy Director Stellvertretender Institutsleiter	Prof. Dr. Tunga Salthammer | Phone +49 531 2155-213 tunga.salthammer@wki.fraunhofer.de
Assistant to the Institute Management Assistenz	Patrizia Molinaro | Phone +49 531 2155-212 patrizia.molinaro@wki.fraunhofer.de
Technology for Wood and Natural Fiber-Based Materials Holzwerkstoff- und Naturfaser-Technologien	Dr. Dirk Berthold | Phone +49 531 2155-452 dirk.berthold@wki.fraunhofer.de
Material Analysis and Indoor Chemistry Materialanalytik und Innenluftchemie	Dr. Alexandra Schieweck | Phone +49 531 2155-924 alexandra.schieweck@wki.fraunhofer.de
Binders and Coatings Bindemittel und Beschichtungen	Dr. Steven Eschig | Phone +49 531 2155-433 steven.eschig@wki.fraunhofer.de
Quality Assessment Qualitätsprüfung und -bewertung	Dipl.-Ing. Harald Schwab | Phone +49 531 2155-370 harald.schwab@wki.fraunhofer.de
Center for Light and Environmentally-Friendly Structures ZELUBA® Zentrum für leichte und umweltgerechte Bauten ZELUBA®	Prof. Libo Yan Ph. D. | Phone +49 531 120496-14 libo.yan@wki.fraunhofer.de
Application Center HOFZET® Anwendungszentrum HOFZET®	Dr. Nina Ritter | Phone +49 (0)531 2155-353 nina.ritter@wki.fraunhofer.de

Infrastructure Services | Infrastrukturdienste

General Administration Allgemeine Verwaltung	Dipl.-Wirt.-Ing. Ulrike Holzhauer
Information Technology Informationstechnologie	Andreas Schlechtweg
Technical Services Technische Dienste	Dipl.-Ing. (FH) Stephan Thiele

Board of Trustees | Kuratorium

The Board of Trustees of the Fraunhofer WKI, which consists of qualified scientists and experts from industry, authorities and institutions, examines the research activities and advises the Institute's Management as well as the Executive Board of the Fraunhofer-Gesellschaft.

Das Kuratorium des Fraunhofer WKI, dem kompetente Wissenschaftlerinnen und Wissenschaftler sowie Expertinnen und Experten aus Industrie, Behörden und Institutionen angehören, begutachtet die Forschungsaktivitäten und berät die Institutsleitung sowie den Vorstand der Fraunhofer-Gesellschaft.

Dr. Markus Boos
Remmers GmbH, Löningen | Germany

Christine Dübler
ZwickRoell GmbH & Co. KG, Ulm | Germany

Dorothee Flötotto
Sauerländer Spanplatten GmbH & Co. KG, Arnsberg | Germany

Prof. Dr. Eva Frühwald Hansson
Lund University, Faculty of Engineering | Sweden

Dipl.-Ing. Kai Greten | Chair
Gronau (Leine) | Germany

Prof. Dr. Joachim Hasch
SWISS KRONO Tec AG, Luzern | Switzerland

Dr. Jörg Hasener
Fagus-GreCon Greten GmbH & Co. KG, Alfeld (Leine) | Germany

Dr. Frank Herrmann
Pfleiderer Deutschland GmbH, Neumarkt i.d.OPf. | Germany

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Technische Universität Braunschweig | Germany

Dr. Helge Kramberger
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Prof. Dr. Andreas Krause
Thünen-Institut für Holzforschung, Hamburg | Germany

Karl-Robert Kuntz
elka-Holzwerke GmbH, Morbach | Germany

Larissa Kuntz, M. Sc.
elka-Holzwerke GmbH, Morbach | Germany

Dr. Klaus Merker
Niedersächsische Landesforsten, Braunschweig | Germany

Prof. Dr. Holger Militz
Georg-August-Universität Göttingen, Wood Biology and Wood Products, Forest Sciences and Forest Ecology | Germany

Prof. em. Dr. Klaus Richter
Chair of Wood Science – Holzforschung München
Technical University of Munich | Germany

Anemon Strohmeyer
Verband der Deutschen Holzwerkstoffindustrie e. V., Berlin | Germany

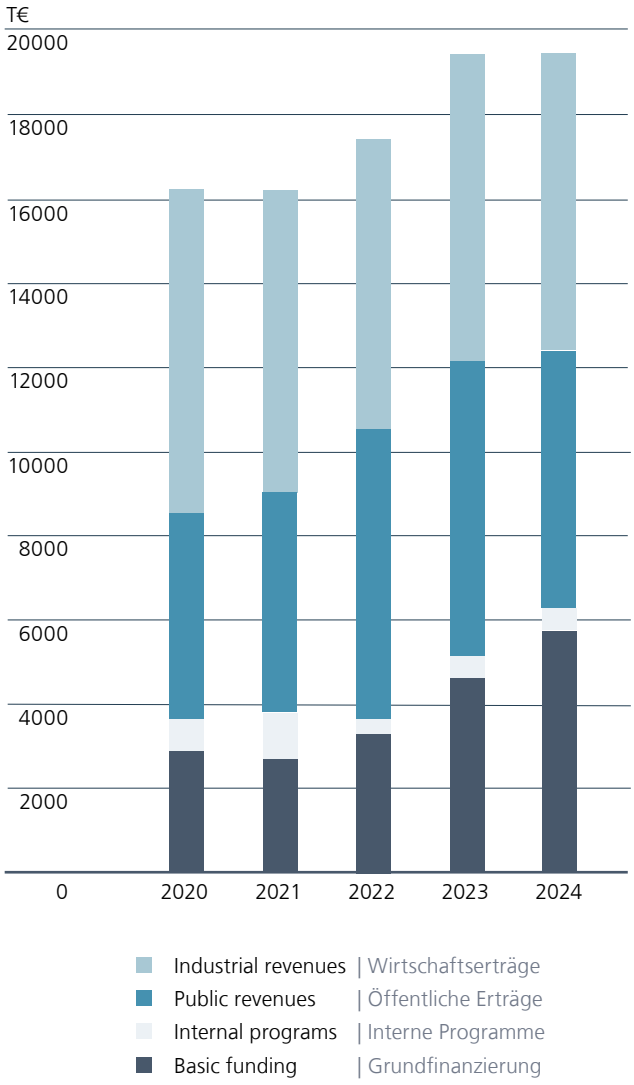
Dr. Stephan Weinkoetz
BASF SE, Ludwigshafen | Germany

MR'in a. D. Dr. jur. Birgit Wolz
Bonn | Germany

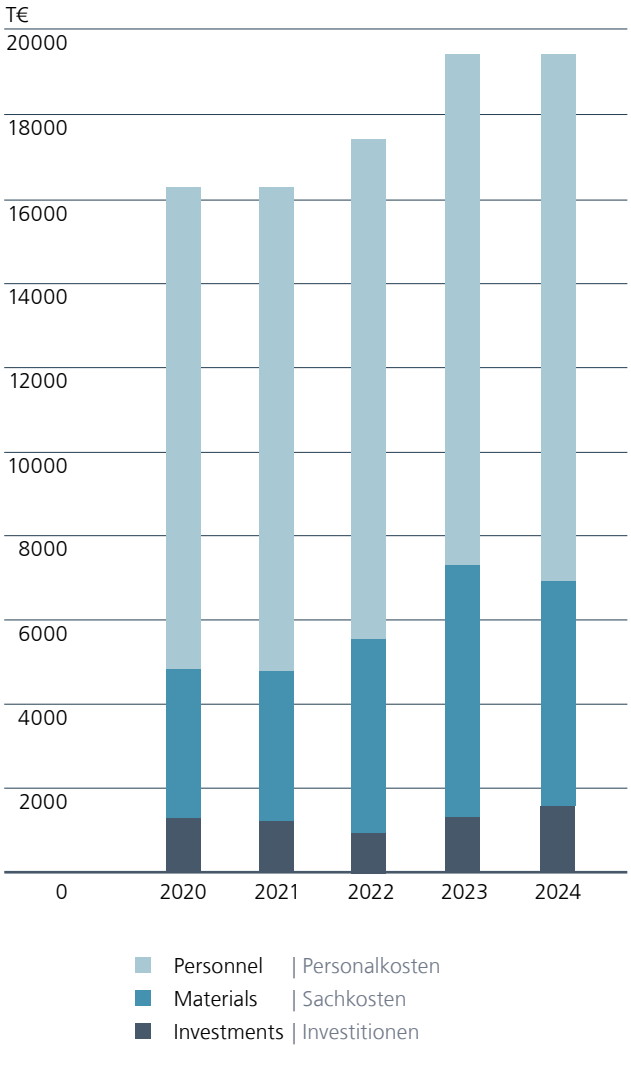
Status: April 2025

Figures / Data / Facts | Zahlen / Daten / Fakten

Revenue Structure | Ertragsstruktur



Budget and Investments | Betriebshaushalt & Invest



In 2024, the scientific departments at the Fraunhofer WKI generated revenues amounting to €13.2 million. The ratio of commercial to public revenue was almost 50/50. In the reporting year, the total budget of the institute amounted to €19.5 million, which is virtually the same as in the previous year. In detail, this total budget is comprised of an investment budget of €1.7 million and an operating budget of €17.8 million. Personnel expenses amounted to €12.6 million and material costs stood at €5.2 million.

2024 wurden durch die wissenschaftlichen Fachbereiche am Fraunhofer WKI 13,2 Mio. € Erträge erwirtschaftet. Das Verhältnis der wirtschaftlichen zu den öffentlichen Erträgen lag dabei fast bei 50/50. Das Institut hatte im Berichtsjahr einen Gesamthaushalt von 19,5 Mio. €, der nahezu dem des Vorjahres entspricht. Im Einzelnen setzt sich dieser Gesamthaushalt aus einem Investitionshaushalt von 1,7 Mio € und einem Betriebshaushalt von 17,8 Mio. € zusammen. Personalaufwendungen lagen bei 12,6 Mio. € und Sachkosten bei 5,2 Mio. €.

Locations | Standorte

Fraunhofer Institute for Wood Research Wilhelm-Klauditz-Institut WKI
Riedenkamp 3 | 38108 Braunschweig
Phone +49 531 2155-0
info@wki.fraunhofer.de

1

Fraunhofer WKI | Center for Light and Environmentally-Friendly Structures ZELUBA®
Beethovenstraße 51 F | 38106 Braunschweig

2

Fraunhofer WKI | Application Center HOFZET®
Heisterbergallee 10A | 30453 Hannover

3

Fraunhofer Project Center Wolfsburg
c/o Open Hybrid LabFactory e. V.
Hermann-Münch-Str. 2 | 38440 Wolfsburg

4

Staff

In the reporting period, the Fraunhofer WKI employed around 165 staff, 30 percent of whom were scientists, engineers and doctoral students.

70 % of the employees come from the professional fields of technology, laboratory, administration and information technology. In addition, bachelor and master students and student assistants are employed to support the research work carried out at the institute.

The Fraunhofer WKI offers apprenticeships in the fields of IT specialist, office communication, and industrial and wood mechanics, as well as in the area of media and information services.

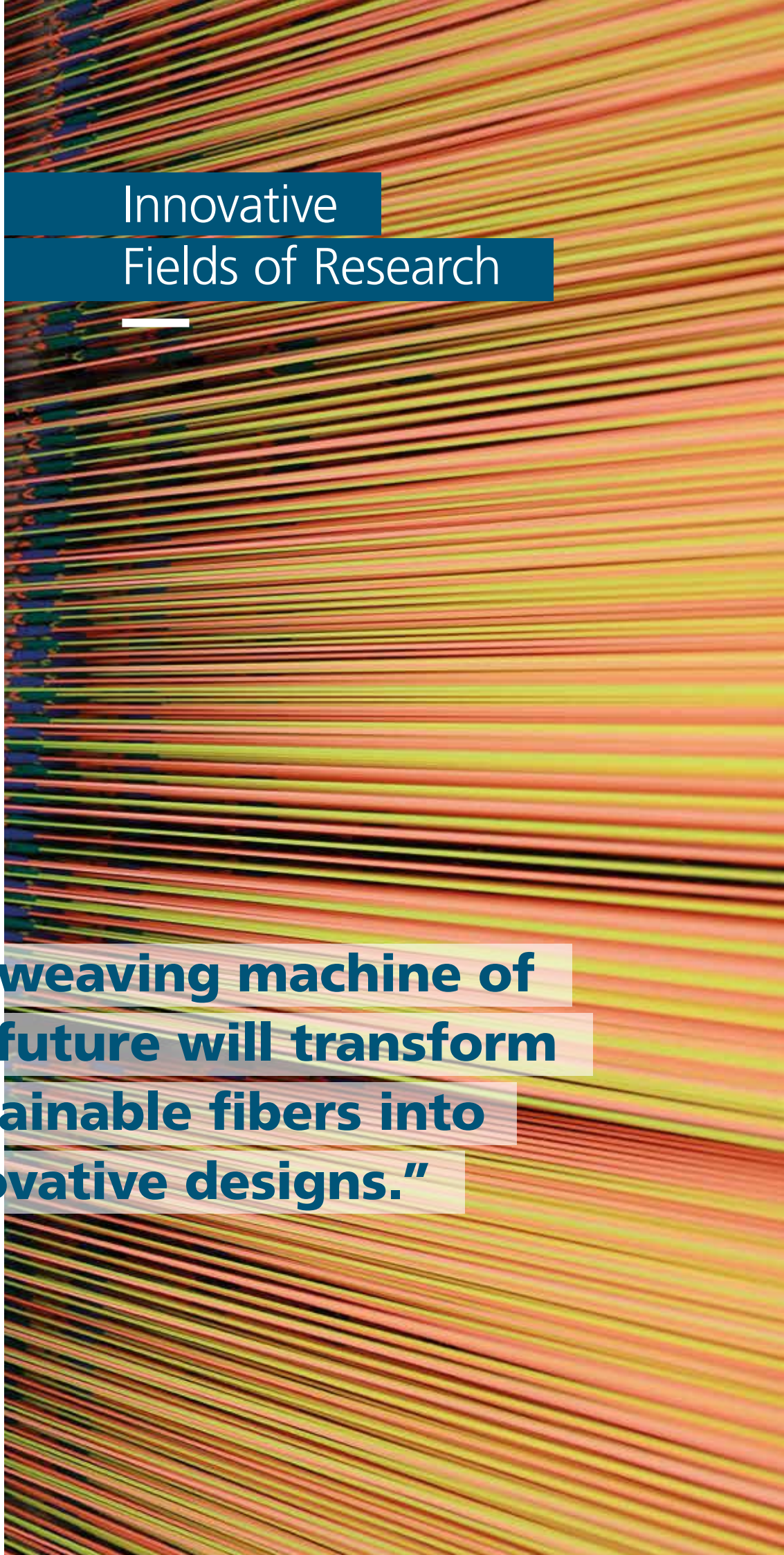
Mitarbeitende

Im Berichtszeitraum waren rund 165 Mitarbeitende, davon 30 Prozent wissenschaftliches Personal, Ingenieurinnen und Ingenieure sowie Promovierende, im Fraunhofer WKI beschäftigt.

70 Prozent der Mitarbeitenden kommen aus den Fachgebieten Technik, Labor, Verwaltung und Informationstechnologie. Ferner werden auch Bachelor- und Masterstudierende sowie studentische Hilfskräfte zur Unterstützung für die Forschungsarbeiten am Institut eingesetzt.

Das Fraunhofer WKI bildet in den Berufszweigen Fachinformatik, Bürokommunikation, Industrie- und Holzmechanik sowie im Bereich Medien- und Informationsdienste aus.

Innovative Fields of Research



“The weaving machine of the future will transform sustainable fibers into innovative designs.”

Dr. Nina Ritter

Technology for Wood and Natural Fiber-Based Materials

Composites made from wood and other lignocellulosic raw materials have a unique character: They are environmentally-friendly, degradable and exceptionally functional.

In the "Technology for Wood and Natural Fiber-Based Materials" department, we address the development of composite materials, the recycling of waste wood and biocomposites, and image-processing methods for process and quality control. The spectrum of our material developments ranges from classic wood-based materials (particle board, fiberboard, insulation board, OSB, plywood, LVL) through hybrid materials and on to biocomposites, 3D molded parts and material composites.

For the preparation and production of the materials and for the application of the binders, technical facilities are available which offer a direct industrial orientation. This allows us to map the complete process chains from raw commodity through to material.

In addition to the further development and optimization of existing process technologies and the combination of positive properties in the material production, we also perform testing on formaldehyde-free binders, bonding and modification processes. Our portfolio is completed through new sorting processes and utilization methods for an efficient recycling of waste wood, biocomposites and their coatings and constituents as well as non-destructive measuring and testing methods.

Head of Departments

Dr. Dirk Berthold
Phone +49 531 2155-452
dirk.berthold@wki.fraunhofer.de

Group Leader HOFZET®

Dr. Nina Ritter
Phone +49 531 2155-353
nina.ritter@wki.fraunhofer.de

Application Center HOFZET®

The aim of our strategic cooperation with the Institute of Bioplastics and Biocomposites IfBB, Hochschule Hannover – University of Applied Sciences and Arts – at HOFZET® is, in collaboration with industrial partners, to identify new applications for sustainable composite materials and to develop pioneering products and technologies.

Our research fields extend from simple material developments through to complex complete solutions for products, components and semi-finished products. We develop sustainable solutions ranging from the selection of raw materials, material production and processing, through material-appropriate designs and simulations, and on to ecological evaluation and production maturity.

The emphasis is placed on the development of thermoplastic, extrusion-produced, short-fiber-reinforced compounds as well as the production of textile semi-finished products and their processing into thermoset and also thermoplastic composites. The focus in materials development is thereby directed at the utilization of cellulose-based fibers, yarns and fabrics as well as the incorporation of biopolymers and recyclates.

With a particular awareness of the need for an efficient recycling economy, current research activities are increasingly being oriented towards issues relating to the utilization of recycled and residual materials, as well as their extraction, characterization and definition for potential areas of application.

Our developments are always carried out under consideration of the corresponding impact categories of a life-cycle assessment, with the result that the topic of sustainability is taken into account from the selection of the raw materials, through component production and the life cycle, and on to recycling.

Material Analysis and Indoor Chemistry

In the department "Material Analysis and Indoor Chemistry", we comprehensively address the measurement and evaluation of indoor air contaminants and consumer-related products. The spectrum of materials investigated ranges from classic wood-based materials, through plastics and building products, and on to products from the automotive, consumer goods, electronics, aircraft and food industries.

The development of new analysis and sampling techniques, olfactory examination methods and the construction of emission test chambers and cells are further important areas of our work. We address questions concerning indoor hygiene and room climate with respect to the environment, health and consumer protection. We investigate and evaluate real indoor environments in private and public buildings, educational and recreational facilities, and modes of transportation, including consideration of the air quality in display cases and in museum collection rooms. We measure and model the size and distribution of particles and (bio-)aerosols in indoor air and investigate the efficiency of air-purification devices. Furthermore, we develop model systems with the help of which the complexity of indoor areas and the resulting air hygiene can be calculated in dependence on widely differing parameters (climate, materials installed, chemical-physical reactions).

Current main topics concern the influences of short- and long-term climatic changes on indoor air quality for the Central European region, and the correlation between building-product emissions and indoor air quality. We contribute our expertise to the relevant bodies. Furthermore, we cooperate with numerous research institutions – both in Germany and abroad – within the framework of scientific exchange programs.

Head of Department

Dr. Alexandra Schieweck
Phone +49 531 2155-924
alexandra.schieweck@wki.fraunhofer.de

Binders and Coatings

With a commitment to the environment, in our "Binders and Coatings" department we develop bio-based coatings, adhesives, printing inks and 3D-printing materials derived from vegetable oils, sugars, lignin and other vegetable residues. From binder synthesis, through formulation and on to processing, we are at your side as a competent research partner.

Wood hereby also forms the focal point for us. In addition to the development of wood coatings which protect wood from environmental influences, wear and fire, we also develop binders for adhesives used in the bonding of wood and other materials as well as in the production of wood-based materials. Connected to this is damage analysis, which involves rapid and unequivocal clarification of damage cases in coated woods, wood adhesives, wood-based materials and solid woods.

Our bio-based binders are also deployed in the field of printing inks and additive-manufacturing processes. In the printing-ink sector, we primarily substitute health-endangering ink constituents for diverse printing processes. For additive manufacturing, we develop novel polymeric materials for UV-curing and thermoplastic processes.

Standardized tests, damage analyses and the development of methods for the assessment and optimization of the weathering resistance of materials round off our profile.

Together with our partners and clients we work hard on future bio-based binders for engineered wood products.

Head of Department

Dr. Steven Eschig
Phone +49 531 2155-433
steven.eschig@wki.fraunhofer.de

Quality Assessment

With its three core areas of "Testing, Monitoring, Certification", "Research and Development" and "Knowledge Transfer", the "Quality Assessment (QA)" department expresses its versatility. The focus is thereby directed towards the topics of "Structural Bonding", "Wood-based Materials" and "Formaldehyde".

The QA department is a nationally and internationally recognized testing, monitoring and certification body. In addition to the certification and monitoring bodies "Wood-based materials and solid wood", "Timber construction" and "Elements", the focus of the testing bodies is on all adhesives for load-bearing timber construction, mechanical properties and the determination of formaldehyde in wood and wood-based materials. In addition to this, we offer our customers the possibility of proof of suitability for the bonding of load-bearing timber components, which includes operational testing and construction-site monitoring in accordance with DIN 1052-10 and which is supplemented by damage analyses, tests and expert reports.
The expertise of our scientists creates the basis for the R&D activities in the department regarding "Structural bonding and mechanics" and "Formaldehyde testing methods". The focus here is on the assessment and evaluation of bonding and bonding processes in load-bearing timber construction, as well as the optimization and new development of hybrid materials with wood or on the basis of wood.

The **WKI | AKADEMIE®** offers courses on "Bonding in wooden construction" and "Repair of bonded load-bearing timber components". Participants are thereby able to prove their professional suitability or the special expertise required in order to perform the relevant activities. The portfolio furthermore includes established training courses on topics such as "Grading of sawn timber" and "Formaldehyde testing methods". Individual training requests can also be accommodated.

Head of Department

Dipl.-Ing. Harald Schwab
Phone +49 531 2155-370
harald.schwab@wki.fraunhofer.de

Center for Light and Environmentally-Friendly Structures ZELUBA®

At the "Center for Light and Environmentally-Friendly Structures ZELUBA®", we develop sustainable solutions for the construction industry. We support our industrial partners from the wood-based materials, construction and manufacturing industries in the development of new building materials and components.

Our main focus and competency is to transfer fundamental research results into actual application in the building sector.

We combine building physics, mechanical-constructive research methods as well as the consideration of the complete life cycle of a product. We apply advanced computer modelling and focus on structural dynamics and vibrations. Our spectrum ranges from the development of innovative materials, through the complex issues of individual details, and on to entire building-material systems and their recycling.

A further research focus is the development of reactive fire-protection systems for the improvement of building-material behavior and the fire resistance of building elements and structures, as well as the development of hybrid building-material systems.

Wood and other renewable raw materials form the primary focus of our activities.

Head of Department

Prof. Libo Yan Ph. D.
Phone +49 531 120496-14
libo.yan@wki.fraunhofer.de

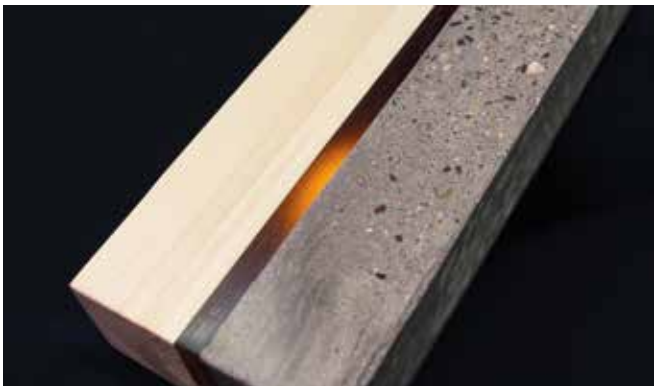
Research Highlights

“The concept of wooden towers for wind turbines has great potential for the energy transition in Germany.”

Malte Mérono

Bonded wood-concrete composite elements for multi-story building construction

Hybrid components, and therefore also bonded timber-concrete composite elements, are characterized by a large-area and force-fit connection between the individual joining parts, whereby their positive properties are optimally utilized. While the wood absorbs the tensile forces, the concrete exhibits advantages in the areas of fire protection, sound insulation and compressive strength. The bonded material combination extends the range of applications for timber components, in particular in multi-story building construction, which in turn contributes towards an increased utilization of renewable raw materials in solid construction.



Bonded wood-concrete-composite shear-test specimen.

Timber-concrete composite components (TCC components) optimally combine the specific material properties of wood and concrete. Due to its low weight and high tensile strength, wood is perfectly suited for lightweight construction. The combination with concrete improves the load-bearing capacity, fire resistance and sound insulation, while simultaneously enabling a slender component design. TCC elements are particularly suitable for multi-story building construction as a result of their high compressive strength, in particular with exclusive indirect support of the concrete in the wall areas.

In the current "SafeTeCC" research project, the Fraunhofer WKI, in cooperation with the Technische Universität Braunschweig, the University of Kassel and industrial companies participating in the project, is developing processes and technologies for the fast, simple and secure production of high-quality TCC elements using an innovative rapid-bonding technique. The novel joining technology improves the structural properties, cost-effectiveness and recyclability of TCC components. In addition to the predominantly industrial use of softwood products, the research project also focuses on the use of so-called hardwood-based engineered wood products (EWP).

In addition to the actual verification of the bonding ability of smooth-surfaced prefabricated concrete components with wood using various adhesives, in particular the long-term behavior of the bonded TCC elements is being systematically investigated in the research project. For this purpose, a large number of tests from the fields of adhesive type-testing and the product-testing of bonded timber components were adapted and transferred to timber-concrete bonding. Diverse testing devices and equipment were developed and validated specifically for this purpose at the Fraunhofer WKI.

To conclude the project, the industrial feasibility and quality assurance are to be demonstrated by means of real components with a length of approx. 8 meters and a width of 1.5 meters.

In collaboration with fischerwerke GmbH & Co. KG, bonded TCC elements have already been successfully installed as suspended ceilings in a multi-story construction project. The company is striving to obtain national building approval (abZ) for this. The accredited and recognized Fraunhofer WKI testing body "Structural Bonding" is the official approval testing body for this hitherto unique project.

Contact

Malte Mérono, M. Sc.
Phone +49 531 2155-354
malte.merono@wki.fraunhofer.de

Funding | "SafeTeCC"

Federal Ministry for Economic Affairs and Climate Action (BMWK) via Industrial Collective Research (IGF) and the International Association for Technical Issues Related to Wood (iVTH) as well as industry

Indoor air quality in habitats for residence in extraterrestrial areas

For the simulation and testing of various human activities in extraterrestrial environments, such as Moon or Mars, analog missions are performed. The Austrian Space Forum (ÖWF) conducted such a Mars analog mission in Armenia in 2024 in cooperation with the Armenian Space Agency under the name AMADEE-24. During this mission, six analog astronauts lived and performed research in a specially designed, self-contained habitat for four weeks. The experiments also encompassed measurements of the indoor-air quality. Non-conventional research set-ups like this help Fraunhofer WKI to gain new insights and networks for its air quality expertise.

Habitat in Armenia seen from above.

One of the next goals in manned space travel is the establishment of habitats in extraterrestrial areas, starting with Moon and Mars. The prospective aim is for people to spend several months at a time in such locations. For test purposes, habitats and life within them are simulated within the framework of so-called analog missions. In the case of Mars, longer travel times in the spacecraft will play an additional role. As a result, the relevance of exposure to airborne substances and odor-relevant compounds will also increase. Against this background, the importance of the topic for the Department Material Analysis and Indoor Chemistry at the Fraunhofer WKI becomes apparent. Within the scope of the last Mars analog mission AMADEE-24, the department carried out measurements to determine the indoor air quality over a period of two weeks (end of March/beginning of April). The measurements of formaldehyde were performed continuously, while those of other (V)VOCs were accomplished discontinuously six times plus a reference measurement in the outdoor area. Some volatile organic compounds (VOC) showed relevant concentrations when being compared with toxicological derived limit values. For example, the concentrations of benzene in the habitat exceeded the provisional guide value (GV) of 0.0045 mg/m³ published by the AIR (German Committee on Indoor Air Guide Values) on all measurement days. Furthermore, at times the concentrations of formaldehyde, 2-ethyl-1-hexanol, furfural, the sum of C4-C11 aliphatic aldehydes and styrene exceeded the respective GV I, and those of butyric acid, hexanoic acid and hexanal exceeded the respective odour guide values.
A number of substances were released into the indoor air as a result of the activities of the analog astronauts. These included cleaning processes, the carrying out of experiments, and EVAs (Extra Vehicular Activities). An overall hygienic assessment of the indoor air quality can be obtained with the aid of the TVOC value (Total Volatile Organic Compounds). In three measurements in the habitat, this value was between 2.5 and 2.7 mg/m³ and was therefore in the hygienically conspicuous range, while three measurements were in the hygienically critical range.

At the beginning of the mission, the analog astronauts' subjectively perceived exposure to substances in the air was so high that the habitat had to be ventilated at various points in time, which is contrary to realistic use. This must be taken into account when evaluating the results. It can also be assumed that emissions resulting from the building materials utilized for the habitat had already abated to some extent, as the measurements only began around two weeks after the start of the mission. Nevertheless, the results demonstrate the relevance of the topic of indoor air quality for space travel and extraterrestrial missions.

Contact

Dr. Jan Gunschera
Phone +49 531 2155-352
jan.gunschera@wki.fraunhofer.de

Funding | "AMADEE-24"

Internal preliminary research

Optimized mycelium-based thermal-insulation materials

Sustainable thermal insulation materials for buildings can be produced using fungi! In collaboration with the Braunschweig-based start-up YcoLabs, we utilized fungal mycelium as a natural binder to process plant residues like hemp hurds and wood shavings into insulation materials with optimized properties. We produced and tested prototypes in order to demonstrate their functional capabilities, thereby aiming to develop marketable products for the construction industry, thus increasing renewable raw materials in buildings and also supporting climate-protection goals.

The project "WKImeetsYcolabs" aims to develop mycelium-based thermal-insulation materials from plant residues through a controlled process of inoculation and incubation with fungal mycelium as a biological binder and a final heat pressing step for drying and compaction. We seek to create sustainable alternatives to conventional insulation materials that rely on fossil and finite resources. By optimizing production processes and improving technical properties, such as fire resistance, hydrophobicity and compressive strength, the project intends to enhance competitiveness against traditional materials such as EPS, mineral wool and wood fiber insulation boards.

In collaboration with the start-up YcoLabs, we have set up the interdepartmental infrastructure for biological substrate processing with mycelium from the fungal species Ganoderma lucidum. The project is organized into two phases, with the first phase successfully yielding a mycelium-based insulation demonstrator with a size of 1 m^2 (see Figure). The ongoing second phase focuses on refining the manufacturing processes, thereby reducing production time and enhancing material properties. Optimized parameters include substrate source and geometry, heat-pressing and drying parameters, as well as addition of benign biobased additives for decreased flammability.

The project has successfully produced mycelium-based insulation materials via partial heat-pressing, yielding products with improved compressive strength, internal bond, water stability and decreased flammability. The materials were achieved without synthetic binders, thus minimizing harmful emissions. In the future, the materials will be adaptable for lightweight-construction applications, with varying densities achieved through careful substrate selection. Prototypes have been created and tested in practical environments, demonstrating significant potential for market application.

Freshly pressed! Mycelium-based thermal-insulation panel with optimized properties after heat-pressing step.

Future initiatives will include pilot projects with the construction industry to further establish mycelium-based insulation materials in the marketplace, and public projects to raise awareness for the technology. Potential applications extend beyond construction, including packaging, transport protection, and components for various industries. By effectively using regional plant residues, the project will lead to cost savings, reduced greenhouse-gas emissions, and healthier indoor environments, ultimately contributing to sustainable living solutions.

Contacts

Dr. Henrik-Alexander Christ | Phone +49 531 2155-349
henrik-alexander.christ@wki.fraunhofer.de

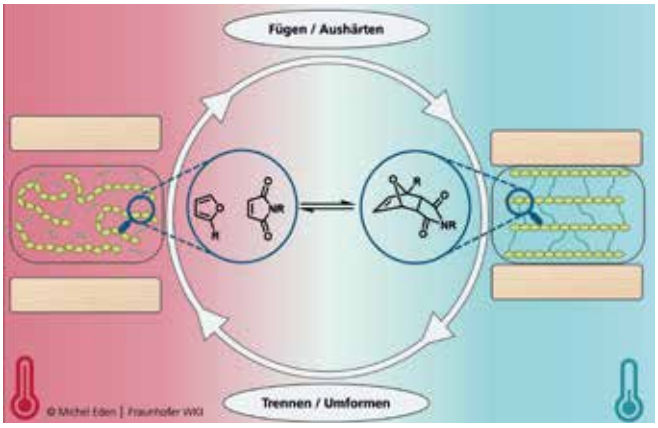
Dr. Steffen Sydow | Phone +49 531 2155-282
steffen.sydow@wki.fraunhofer.de

Funding | "WKImeetsYcolabs"

Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V. via the technology transfer program "AHEAD"

Switchable adhesives for re-formable bonded laminates

In the "AdHoMe" project, we are developing surface adhesives whose adhesive effect can be repeatedly switched ON and OFF. Using these special adhesives, panel-shaped wood-wood and wood-metal laminate materials are produced that can be formed into 3D components further along the process chain. In addition, new repair and recycling possibilities are created as a result of the switchability of the adhesive bond.



Functional principle of the switchable adhesives.

The aim of the project is the development of a switchable polyurethane surface adhesive for re-formable wood-wood and wood-metal laminate composites. The switchability of the adhesive is based on a temperature-dependent chemical equilibrium reaction between furan and maleimide groups. These special structural elements are chemically bound in the adhesive resin. Below 80 °C, they react with one another, thereby forming chemical bonds. The adhesive resin cross-links and the adhesive effect is switched "ON". Above 120 °C, these bonds are broken again. The cross-linking is terminated and the adhesive effect is switched "OFF". The process can be repeated several times.

For the production of the switchable adhesive resins, bio-based polyether diols, glycerin and an in-house-developed furan-containing diol are reacted with an excess of diisocyanate to form branched isocyanate-(NCO)-terminated polyurethanes. Furfuryl alcohol is then added, which reacts with the terminal NCO groups, thereby integrating further furan groups in the resin. The furfurylated polyurethane resins produced are ultimately crosslinked with a bismaleimide.

Resin properties such as glass transition temperature, molecular weight and viscosity can be specifically adjusted via the composition of the resins. In addition to the degree of branching, in particular the molecular weight of the resulting resins can be adjusted via the molar proportion of glycerin. The glass transition temperature Tg is influenced by the ratio of polyether-polyol to fu-diol. In addition, increasing the fu-diol content increases the furan functionality of the resins. This allows higher cross-linking densities and improves the mechanical strength, but reduces the flexibility of the resins.

The cross-linked resins were pressed into thin films using hot-pressing machines and utilized in the production of wood-wood and wood-metal laminate materials. Joining was carried out via hot-pressing at 100-120 °C at a pressing force of 0.5 N/m^2 to 1 N/m^2. For pure-wood laminate materials, shear tensile strengths of > 10 MPa were determined under optimized pressing conditions. The test specimens exhibited solely material failure. For the production of wood-metal bonded laminates, the metals were first pretreated. In particular the test specimens irradiated with corundum hereby showed promising results, with tensile strengths of > 5 MPa.

The next steps are to investigate the repeated bonding of the wood-metal layer composites in order to demonstrate recyclability, as well as the upscaling of selected adhesive formulations.

Contact

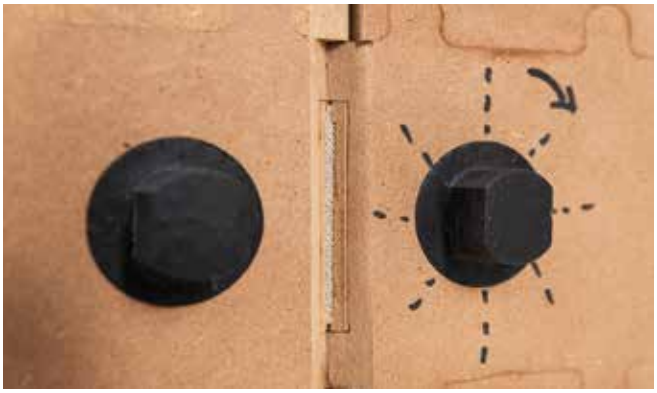
Dr. Steven Eschig
Phone +49 531 2155-433
steven.eschig@wki.fraunhofer.de

Funding | "AdHoMe"

Federal Ministry of Food and Agriculture (BMEL) via the Fachagentur Nachwachsende Rohstoffe e. V. (FNR)

Recycling-compatible design of functional fittings

Furniture hinges are predominantly made of metal. In the "ReKonFu" project, the Fraunhofer WKI, in collaboration with the Institut für Holztechnologie Dresden gemeinnützige GmbH (IHD) and business partner Topp Textil GmbH, developed an adjustable and detachable textile hinge for wooden furniture. As a result, the consumption of metals can be reduced and the recyclability of furniture improved at the same time.



Wooden construction with tensioned textile fitting as a sustainable alternative to conventional metal hinges. The screwdriver notch (black) serves the tensioning of the textile fitting.

Within the scope of the waste-wood recycling process, the separation of predominantly screwed or pressed-in metal hinges is a challenge and can require complex process technology. In this context, the natural-fiber-based fittings developed by the Fraunhofer WKI and Topp Textil GmbH represent a promising alternative to conventional metal fittings. The textile fittings are not permanently attached to the IHD's wooden construction developed in the project; flexible handling is therefore guaranteed. This is in particular due to the fact that the fittings are adjustable and removable. This flexibility facilitates repairs and adaptations to color trends in furniture doors and promotes their usage in areas such as furniture-to-go and flat-pack furniture, where modularity is of central importance.

In collaboration with Topp Textil GmbH, the scientists at the Fraunhofer WKI have developed a multitude of fabric variants for the textile fittings. By utilizing Jacquard technology, the researchers were able to create a multi-layer fabric with a tunnel structure on a double-rapier weaving machine; this enables the insertion of a hinge pin which thereby increases the functionality of the fittings. Furthermore, solutions for a smooth, non-fraying selvedge were developed in order to ensure the durability of the textile fittings.

The project partner IHD developed an off-center force-fit hinge pin, which enables infinite adjustment of the hinge. A screwdriver notch serves the tensioning of the textile fitting, consequently extending the service life of the construction and increasing the user-friendliness and adaptability of the furniture.

Within the framework of quality assurance, tests were performed in order to evaluate the static load-bearing capacity of the natural-fiber-based fittings and the textile-wood hinges. Thereby taken into account were, for example, the criteria defined in DIN EN 15570 for vertical and horizontal static overload. Within the scope of *Design for Recycling*, a prototype was developed that enables the wood component to be easily separated from the textile fitting for separate recycling channels. In the application case of modular furniture, the development can therefore provide a contribution towards increasing the recyclability of waste wood and have a positive influence on the further design of environmentally-friendly and recyclable furniture and furniture fittings.

Contact

Leon Freitag, M. Eng.
Phone +49 511 353248-16
leon.freitag@wki.fraunhofer.de

Funding | "ReKonFu"

Federal Ministry of Food and Agriculture (BMEL) via the Fachagentur Nachwachsende Rohstoffe e. V. (FNR)

Development and optimization of new flexible insulation materials

A number of ongoing projects revolve around flexible insulation materials that are produced from recycled wood such as balsa wood from old rotor blades (ReuseaBlade), are formed into 3D shapes using various bico fibers in automated molding machines (Hylight), or are optimized in terms of their thermal insulation for the filling of hollow bricks using hardwoods, in particular beech fibers (Beech-wood insulation).

Brick filled with various insulation materials, including a mixture of beech and bicomponent fibers.

Currently, almost all wood-fiber insulation materials are produced by the industry from softwoods such as spruce or pine. For this purpose, the wood is shredded into chips and then ground into fibers or fiber bundles in refiners. These are subsequently pressed into solid insulation boards using either a wet process without the addition of adhesives or a dry process with adhesives.

In the case of flexible insulation materials, bicomponent (bico) fibers are added and then bonded by means of thermal influence to form a mat with a relatively low density.

The micrometer-thick bico fibers consist of a polymer core with a higher melting point than the fiber sheath. If the wood-bi-co-fiber mixture is heated, e.g. in an oven with hot air or under the influence of steam, the fiber sheath melts and bonds the wood fibers together. The non-melted core fibers serve as a flexible mesh which, together with the wood fibers, forms a flexible insulation material that can be used, amongst other things, for insulation between rafters.

For the recycling of balsa wood from rotor blades (ReuseaBlade), these are first cut into pieces approx. 10 m long and 2.5 m wide using a water-jet cutter and then shredded into hand-palm-sized pieces in a twin-shaft shredder. The wood is then largely free of adhering glass fibers and epoxy resin; the components, however, are still in a mixed state. By means of the float-sink technique, the balsa wood can be skimmed off at the surface of the water while the rest sinks to the bottom. The skimmed, still-wet balsa wood can subsequently be ground into relatively coarse fibers in the refiner and mixed with bico fibers to make mats or other products.

In the "Beech-wood insulation" project, the focus is on the utilization of beech fibers and the optimization of the formulation for insulation materials as a filling for hollow bricks. For this purpose, the fresh beech wood must first be shredded into chips and then ground into fibers or fiber bundles in the refiner. Because beech wood has very short fibers, grinding-disc spacings > 0.8 mm must be preferentially used in the refining process in order to minimize the fine-particle content. Once the dust has been sieved off, hot steam or hot air is utilized in order to produce excellent insulation mats with densities of 50 kg/m³ to 100 kg/m³ and a low bico-fiber content, which can be clamped into the cavities of the bricks to avoid heat losses by convection.

In this project, particular emphasis is placed not only on the horizontal alignment of the fibers in order to optimize the thermal conductivity, but also on the utilization of new fire retardants.

In the "Hylight" project, the type of wood being utilized is less important than the type of bico fibers. The polymer is selected in such a way that the fiber sheath melts at a low temperature or can be melted by high-frequency excitation in the molding machine. In addition to various types of wood such as balsa, poplar and beech, grasses from paludiculture and treated woods such as Accoya and Kebony were also utilized.

The mixing of the wood and bico fibers is performed using a newly developed and fast-rotating spiked roller/fiber turbine. This allows the many tested bicomponent fibers such as PE/PP, PA/PP, PE/PET, CoPLA/PLA and CoPET/PET to be optimally mixed with the wood fibers. The aim is to minimize the polymer content while achieving the required mechanical-technological parameters. Boards and even relatively complicated molded parts with densities of up to 200 kg/m³ can be produced (Figure 2), which can be used for insulation materials, packaging materials or furniture components.

An effective recycling concept for the described insulation materials is based on the production of highly compacted materials with densities between 800 and 1000 kg/m³ through the hot pressing of the lightweight insulation materials. In this process, the thermoplastic polymer fibers (mono fibers are also suitable here) once again act as a binding agent. Board-shaped insulation materials can be directly compacted in such a recycling process, while for molded parts, a multi-stage process is necessary: First, the fibers are separated again, then they are dispersed and finally pressed again under the influence of heat. The resulting boards are particularly suitable as a replacement for HDF core boards in laminate flooring, for example. Furthermore, this process enables the production of new high-density 3D molded parts. These materials not only help to improve recyclability, but also open up a wide range of applications in the construction and furniture industries, with a clear focus on a resource-conserving circular economy and products with an excellent environmental footprint.

Funding | "ReuseaBlade", "Hylight" and "Beech-wood insulation"

Federal Ministry of Food and Agriculture (BMEL) via the Fachagentur Nachwachsende Rohstoffe e. V. (FNR)

Molded part consisting of recycled balsa wood and bicomponent fibers made from PE/PP.

The technology for producing molded bodies from wood fibers can be used, for example, with higher densities for the furniture industry or with lower densities for the packaging or insulation industry.

Contacts

Dipl.-Phys. Peter Meinlschmidt
Phone +49 531 2155-449
peter.meinlschmidt@wki.fraunhofer.de

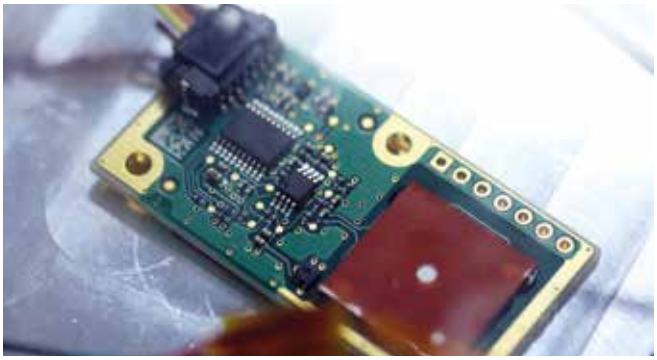
Dr. Nina Ritter
Phone +49 531 2155-353
nina.ritter@wki.fraunhofer.de

Dr. Julia Belda
Phone +49 531 2155-427
julia.belda@wki.fraunhofer.de

Low-cost VOC sensors – performance under real-world conditions

In the creation of healthy, energy efficient and smart living spaces, low-cost sensors are important tools for the regulation of on-demand ventilation or air cleaning and for monitoring of indoor air quality. We studied the performance of several commercially available MOS VOC sensors under realistic conditions and compared their output to reference methods.

Increase in energy prices, comfort requirements or the effects of climate change are factors that currently drive the trend to make buildings 'smarter' – by providing heating, cooling, ventilation or lighting directly depending on the specific demand of the dwellers. This requires a building control system that is supplied with relevant data (on occupation, air quality, temperature, humidity, window status, shading etc.). Low-cost sensors are important for collecting this data, and for several parameters (temperature, relative humidity) the data is known to be sufficiently accurate. Sensors for gases and volatile organics are deemed less reliable; we therefore studied a selection of different sensors for VOC (volatile organic compounds) currently on the market.



Sensor board.

Four different sensor types were tested, with eight individual units of each type being mounted on a PCB in a flow channel. All sensor types provided VOC output signals in ppm/ppb or mg/m³, which were used without further calibration. To ensure that all sensors can finish possible internal auto-calibration procedures, they were operated over four weeks prior to the experiment in the test environment. To assess the suitability or potential limitations of the sensors for indoor-environment applications, three different test scenarios were set up: 1) Exposure to specific single substances and substance mixtures in the flow channel, 2) exposure to the air of a test chamber loaded with building materials and furnishings to simulate typical indoor air in a living area, and finally (3) to kitchen air during a cooking event. The third part took place in a test room equipped with tables, chairs and a kitchenette, with eight persons present to prepare a lunch. VOC concentrations in the air were determined continuously using a PTR-QMS, and discontinuously by sampling on sorbent tubes with subsequent thermal-desorption GC/MS analysis. It was found that all sensor types can successfully follow the increase and decrease of VOC concentrations in air. The reaction time was fast and fully comparable to that of the PTR-MS. The concentration values reported by the sensors, however, deviated significantly from those confirmed by reference methods: Depending on the scenario, the sensor readings were often 10 to 100 times higher than the reference TVOC concentration at that time. During the cooking event, one sensor type showed 1000 times higher concentrations and was saturated for the rest of the experiment. Our study confirmed that the tested sensor sets were capable of detecting changes in concentrations (and thus activities in the room). This fact is essential for their use in smart building control systems. The absolute values reported by the sensors were found to be less useful, as they were affected by other factors - additional experiments showed a significant sensitivity to certain gases (ethanol, H_2, formaldehyde, acetaldehyde etc.), which explains to some extent the observed higher values.

Contact

Dr. Erik Uhde
Phone +49 531 2155-369
erik.uhde@wki.fraunhofer.de

Funding

Industry

Long-term study on adhesively bonded wood-concrete and wood-fiber-reinforced polymer composites

The Junior Research Group at the Center for Light and Environmentally-Friendly Structures (ZELUBA®), a joint venture between the Fraunhofer WKI and the Institute of Building Materials, Concrete Construction and Fire Safety (iBMB) at the TU Braunschweig, investigated adhesively bonded wood-concrete and wood-fiber-reinforced polymer (FRP) composites to optimize their performance and application in construction. A multi-scale, multi-method approach, including short- and long-term studies, was adopted.

The durability of wood-concrete joints was tested using shear specimens manufactured via wet (fresh concrete bonded to wood) and dry (prefabricated concrete bonded to wood) methods with epoxy and polyurethane (PUR) adhesives. For the wet method, concrete with and without steel mesh reinforcement was used. After 12 months of exposure to outdoor conditions, shear bond strength and stiffness remained unchanged in wet wood-concrete joints but decreased in dry joints due to swelling and shrinkage of the wood.

Creep deflection of glulam-concrete panels was monitored under a 560-kg load and outdoor conditions over 600 days. Panels were manufactured using both wet and dry methods with and without steel reinforcement. The results showed no significant differences in mid-span deflection trends across the panels, regardless of manufacturing method, adhesive type, or reinforcement. Post-exposure destructive bending tests revealed no significant differences in ultimate bending load (41.4 ± 2.7 kN), mid-span deflection (82.7 ± 10.4 mm), or effective bending stiffness (674.7 ± 23.4 × 10^6 kNmm²) compared to unconditioned panels.

The long-term durability of FRP-wood joints was studied under hygrothermal conditions (50°C, 95% RH) and wet-dry-UV cycles. Laminated veneer lumber (LVL)-HFRP joints showed strength reductions of 34.8-57.0% after hygrothermal ageing and 4.6-31.8% after wet-dry-UV ageing. FTIR and DSC analyses revealed lignin degradation and matrix oxidation in polyurethane- and epoxy-based HFRP, causing strength losses but increasing glass transition temperatures (Tg) due to cross-linking.

Adhesively bonded wood-concrete and wood-fiber-reinforced polymer (FRP) composite panels subjected to sustained bending loads under outdoor environmental conditions.

Large-scale FRP-wood beams, exposed to outdoor conditions under 20% of their maximum load for 664 days, underwent four-point bending tests. FRP reinforcements improved bending load capacity (by 60%) and stiffness compared to unreinforced beams. CFRP-wood beams exhibited higher stiffness than HFRP-wood beams. Post-exposure, stiffness remained stable or slightly increased, except in CFRP-wood beams.

In this FNR junior research group, 28 high-impact journal articles, 10 book chapters, and several conference papers were published. The group delivered 20 colloquia, 75 internal and 13 public presentations, featuring prominently at key conferences and fairs such as Hannover Messe, LIGNA, and Composite Europe. The project supported 4 postdocs, 9 student assistants, and supervised 34 bachelor's and master's theses as well as case studies. Four members successfully defended their PhDs (2023–2024), showcasing significant contributions to sustainable construction research.

Contact

Prof. Dr. Libo Yan
Phone +49 531 120496-14
libo.yan@wki.fraunhofer.de

Funding | "Junior Research Group"

Federal Ministry of Food and Agriculture (BMEL) via the Fachagentur Nachwachsende Rohstoffe e. V. (FNR)

Sustainable building with reused waste materials

The "ReMatBuilt" project aimed to repurpose construction and demolition waste, as well as plant-based residues from agriculture and forestry, to develop high-performance, sustainable building materials for structural applications. By utilizing these diverse waste streams, the project sought to reduce environmental impact, promote circular-economy practices, and enhance the durability and sustainability of modern construction materials.

Concrete component made of recycled aggregates and rice-husk ash with rice-straw insulation.

The project sought to revolutionize sustainable construction by proposing and investigating two innovative structural systems. The first was an advanced roofing system comprising a timber-concrete composite constructed using adhesively bonded recycled aggregate concrete. The second was a wall system constructed from recycled aggregate concrete block units which were also insulated with renewable insulation materials made from agricultural plants (e.g. rice husk).

These designs addressed resource efficiency through several strategic innovations, including: 1) optimizing high-performance recycled aggregate concrete using recycled aggregates from old concrete and masonry waste, 2) incorporating rice-husk ash from rice-milling processes to substitute ordinary Portland cement in concrete production, 3) employing natural plant-fibre textiles (i.e., flax) as reinforcement materials within concrete instead of steel, 4) utilizing plant-based residues (i.e., rice husk) to manufacture insulation boards for recycled aggregate-concrete brick-wall systems, and 5) integrating cross-laminated timber with recycled aggregate concrete to create innovative timber-concrete-composite flooring systems.

The project, concluded successfully in July 2024, was a collaborative effort involving multiple WKI departments – including ZELUBA, HNT, and HOFZET – in partnership with academic institutions and industry experts. Rigorous optimization processes improved the mechanical properties and long-term durability of the proposed materials and structures. Comprehensive testing ensured enhanced seismic, thermal, and fire resistance, addressing critical performance metrics for modern construction applications.

The outcomes of the "ReMatBuilt" project were widely disseminated to various stakeholders to maximize its impact. This included participation in 4 international conferences and 5 specialized workshops, alongside the publication of 17 scientific journal articles. Broader engagement was achieved through 2 podcast and radio interviews (with Deutschlandfunk and The Urbanist) and coverage in 12 magazines and professional websites across several languages: English, German, French, Spanish, Serbian, and Italian. Additionally, results were showcased at 3 professional fairs, ensuring extensive exposure within the construction industry and the wider scientific community.
By leveraging agricultural, forestry, and construction waste, ReMatBuilt not only demonstrated the feasibility of sustainable building practices but also paved the way for broader adoption of resource-efficient materials. The project's outcomes could play a crucial role in the reconstruction of Ukraine after the war. The successful implementation of pilot and demonstration projects based on ReMatBuilt's innovations could provide efficient and immediate solutions for Ukraine's post-war reconstruction.

Contact

Prof. Dr. Libo Yan
Phone +49 531 120496-14
libo.yan@wki.fraunhofer.de

Funding | "ReMatBuilt"

Federal Ministry of Education and Research (BMBF) via the Project Management Jülich, Forschungszentrum Jülich GmbH (PtJ)

Wood of the future: pine

In the joint projects "Sustainable utilization potentials for large-dimension pine wood - a holistic examination of its volume, silviculture, harvesting and exploitation (KiefernStolz)" and "Digital value chain for pine-based timber construction in Berlin-Brandenburg (DiKieHo)", researchers from the Technology for Wood and Natural Fiber-Based Materials department are focusing their research on pine.

On the basis of the German national forest inventory data, a shift can be seen in the coming decades regarding the age structure of pine towards the end-use stage. Pine was planted after World War II, in particular in Northern Germany, and the trees are now maturing relatively simultaneously. To date, the species has also proven to be climate-stable. As a result, the proportion of higher-quality trunk wood is increasing significantly.

The aim of "KiefernStolz" is the development of decision-making aids for the forestry and timber industry, which guarantee not only the natural and financial sustainability of forestry operations but also the long-term supply of the timber industry with specific large-dimension pine assortments.

At the Fraunhofer WKI, application possibilities for large-dimension pine wood for load-bearing high-performance materials were therefore analyzed, and high-quality 2D and 3D structural components made from veneer materials for the construction and mobility sectors were produced and examined. Amongst other things, various adhesives were hereby utilized and the veneer qualities were investigated in detail. With regard to the quality of the veneer materials, it was determined that the mechanical material properties can be improved through modifications to the peeling process. An increase in the plastification temperature from 70 °C to 90 °C resulted in a 10 % increase in the bending strength of laminated veneer lumber panels. A difference in strength to the same degree was determined between section assortments from the trunk base and the middle/upper sections. It was therefore possible to compensate for density differences in the trunk height by adjusting the process.

Stack of trunk-base logs from the Altmark region.

The aim of "DiKieHo" is to strengthen digital networking for the value chain in urban multi-story timber construction using the Berlin-Brandenburg region as an example, thereby ensuring the efficient utilization of regionally available pine wood in the construction industry. A systemic approach is hereby being researched, with which the interaction of material and information flows between the participants is being investigated. For this purpose, veneer-based materials and glulam made from pine from the Märkisch region were produced and evaluated. Emissions of volatile organic components of terpenes have proven to be a major obstacle in the use of pine products in indoor areas. To address this, the Fraunhofer WKI is working in collaboration with project partners on approaches to reduce emission rates by means of various coating products.

Contact

Tobias Krenn, M. Sc.
Phone +49 531 2155-279
tobias.krenn@wki.fraunhofer.de

Funding | "KiefernStolz" and "DiKieHo"

Federal Ministry of Food and Agriculture (BMEL) via the Fachagentur Nachwachsende Rohstoffe e. V. (FNR/ Waldkimafonds)

Collaboration as a strategic success factor - cooperation with the TU Braunschweig

In recent months, we at the Fraunhofer WKI decided to update our WKI strategy. In 2026, the Fraunhofer WKI will undergo an external strategy audit, which takes place every five years. This is an important instrument for both the institute and the Fraunhofer Executive Board, which is responsible for the entire organization. It is the task of the institute's top management to lead the way, coordinte a continous strategic engagement and set strategic guidelines for the internal discource within the executive committee (ILA) as well as the institute as a whole.

One of our guiding principles for the strategy update is the targeted expansion of cooperation with strategic research partners. In the context of ever-faster innovation cycles and the convergence of technologies and disciplines such as information technology and materials science, it is almost impossible to achieve innovative system solutions alone. Complementary and synergetic cooperation, however, enables new solutions within shorter time scales - both of which reflect the obvious expectations of our partners and customers in contract research.

Cooperation cannot therefore be an end in itself, but must instead be focused and goal-oriented. For the Fraunhofer WKI, this means seeking selected collaborations on three fundamental levels:

1. Locally, at our main premises with our partner university, the TU Braunschweig
2. Within the Fraunhofer-Gesellschaft, with sister institutes in competence profiles that specifically complement one another
3. Internationally, with a small number of partners in key areas of the Fraunhofer WKI's range of services

A special opportunity of the Fraunhofer WKI is its campus, which is shared with the Fraunhofer IST. Technical and spatial proximity leads to original mutual ideas and, for another, efficiency potential can be leveraged the joint location in overarching administrative and operational processes.

Cooperation with the partner university at the location is naturally of particular importance for Fraunhofer institutes, including the Fraunhofer WKI, and is a success factor for both the institute and the location. For the Fraunhofer WKI, the research portfolio of the TU Braunschweig offers particularly valuable potential, as in a number of research fields, it merges very well to form a collaborative approaches. One of these jointly identified fields is construction research.

In construction research, Braunschweig offers an internationally visible and, in many respects, outstanding combination of expertise with the renowned institutes of the TU Braunschweig and the Fraunhofer WKI. The collaborating institutes of the TU Braunschweig – ITE: Structural Design, IBMB: Building Materials, Concrete Construction and Fire Safety, IKON: Construction, IBEA: Building Climatology and Energy of Architecture and, last but not least, iBHolz: Timber Structures – are scientifically renowned and operate unique research infrastructures (e.g. ITE: Digital Building Fabrication, IBMB: Center for Fire Research ZEBRA). The Fraunhofer Institute for Wood Research, WKI is well-known worldwide for its orientation and infrastructure complementary to the TU Braunschweig (e.g. materials development at the WKI for modern timber construction at the iBHolz, and infrastructure for collaboration: Center for Light and Environmentally-Friendly Structures ZELUBA®).

Our mutually identified goal in the field of construction research is to provide a clear, effective and urgently necessary impetus for building innovation from Braunschweig for Lower Saxony and the federal government in order to overcome the German housing crisis. At our location, we possess all the necessary expertise for the entire process chain. We are convinced that we can utilize digital construction fabrication to link components that have so far been considered in isolation.

We cover the whole building life cycle from planning to dismantling, and to specifically address the current problems of serial and modular prefabrication, which arise primarily at the transition point on the construction site.

The basic approach is to rethink the process chain from the perspective of the construction site. This means that it is not the technological capability of serial production that is the driving force (push), but rather that the specific requirements at the construction site make use of individual serial components (pull) in the sense of mass customization. Modern timber construction – with its specifically high level of prefabrication – is able to offer today in a way that virtually no other construction system can.

Our shared vision is the "social neighborhood". We provide the impetus and the technology for its implementation. We call the new approach: Sufficient digital housing construction (Suffizienter digitaler Wohnungsbau). We want to provide a decisive contribution towards solving the housing crisis, thereby enabling the associated social and societal resilience and sustainability in urban areas: individually planned and embedded, serially produced, for living and working, all generations, all origins - sustainable.

Our goal is to serve as a scientific enabler, technology driver and provider of political impetus in developing technology. We aim to support the immense performance capabilities of the companies in the building sector and the regional value chains to be successful and profitable. If we can achieve this success, we will not run out of further questions that need to be solved through research and development.

This is underlined by a small thought experiment: At the beginning of the last century, the relative proportion of timber construction was considerably higher and was displaced in the post-war period by the newly emerging reinforced concrete and masonry. Wood was a scarce resource.

Wilhelm Klauditz, the founder of what is now the Fraunhofer WKI, had to invent the particle board in order to be able to partially compensate for this. Today, timber construction is experiencing a renaissance – as a result of technological innovations, e.g. in multi-story timber construction, as well as the advantages of a renewable, CO_2-binding resource with excellent material properties. Nevertheless, the relative proportion of the construction volume is still comparatively low. If the widely desired doubling were to occur, the new challenges would immediately become clear: a new shortage could arise, thereby necessitating

- even greater material efficiency (lightweight construction),
- the increased use of modern wood-based materials in construction, produced using alternative assortments (new species of wood, annual plants, small-dimensioned wood assortments) and
- systematic separability and recyclability (enabled by a digital twin of the value chain).

Building research in Braunschweig is ready to solve these current and future issues and is excellently positioned – if we succeed in pooling our strengths wisely. We are highly motivated to make it happen!

Contact

Prof. Dr. Raoul Klingner
Phone +49 531 2155-212
raoul.klingner@wki.fraunhofer.de

Research Facts

“Scientific excellence is not measured by the number of publications, but by the benefit to society.”

Prof. Tunga Salthammer

Scientific excellence | Wissenschaftlichkeit

Public funding sources | Öffentliche Fördermittelgeber

AIF	Allianz für Industrie und Forschung e. V.
BBSR	Federal Institute for Research on Building, Urban Affairs and Spatial Development
BBR	The Federal Office for Building and Regional Planning
BLE	Federal Office for Agriculture and Food
BMBF	Federal Ministry of Education and Research
BMDV	Federal Ministry for Digital and Transport
BMEL	Federal Ministry of Food and Agriculture
BMUV	Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection
BMWK	Federal Ministry for Economic Affairs and Cimate Action
BÖLN	German Federal program for organic farming and other forms of sustainable agriculture
DGUV	German Social Accident Insurance
DLR	German Aerospace Center
DLR PT	German Aerospace Center - Project Management
DVS	Forschungsvereinigung Schweißen und verwandte Verfahren
EBA	Federal Railway Authority
EU	Commission of the European Union
FNR	Agency of Renewable Resources
FZJ	Forschungszentrum Jülich GmbH
IUTA	Institut für Umwelt und Energie, Technik und Analytik e. V.
iVTH	International Association for Technical Issues related to Wood
KIT	Karlsruher Institute of Technology
MWK	Ministry of Science and Culture of Lower Saxony
PTJ	Project Management Jülich
TÜV	TÜV Rheinland Consulting
UBA	German Environment Agency
WKF	Waldklimafonds

Project overview | Projektübersicht

On the following pages you will find an overview of all ongoing and finished publicly funded projects during the reporting period. In total 79 projects generating > 6.2 Mio.€ of public revenue in 2024.

Auf den folgenden Seiten finden Sie eine Übersicht über alle laufenden und abgeschlossenen öffentlich finanzierten Projekte im Berichtszeitraum. Insgesamt 79 Projekte, die im Jahr 2024 mehr als 6,2 Mio. € an öffentlichen Einnahmen generierten.

Project Title | Projekttitel	Promoted by | Förderstelle	Project leader | Projektleitende
European sustainable biobased nanomaterials community	EU	Dr. Tobias Robert
Building a Sustainable Joint between rural and urban areas through circular and innovative wood construction value chains	EU	Dr. Arne Schirp
Biobasierte Flammschutzbeschichtungen für Möbel und den Innenausbau mit Holz und Holzwerkstoffen; Teilvorhaben 1: Entwicklung biobasierter Synthesebausteine, Formulierung von Flammschutzbeschichtungen und Produktbewertung	BMEL über PT FNR	Dr. Claudia Schirp Dr. Arne Schirp Dr. Alexandra Schieweck
Evaluierung der passiven Thermografie für die Zustandsbewertung von Rotorblättern an Windenergieanlagen; Teilvorhaben: Vergleich passiver mit aktiver Thermographie	BMWK über PT PTJ-FZJ	Dr. Jochen Aderhold
Entwicklung eines hybridisierten Holzwerkstoffs für Strukturbauteile durch Umformung eines strandbasierten Verbundhalbzeugs, Teilvorhaben: Herstellung, Modifizierung und Technologiebewertung des HyEnd-Woods	BMEL über PT FNR	Claudia Burgold
CO_2-einsparende Leichtbaulösungen am Demonstrator Batteriegehäuse der nächsten Generation; Teilvorhaben: Erforschung, Umsetzung und Test neuer Konstruktionsprinzipen zur Integration thermischer Funktionen in Strukturbauteilen	BMWK über PT PTJ-FZJ	Dr. Steven Eschig
Materialeffiziente Herstellung von Produkten aus leichtem Holz Teilprojekt: Optimierung von Holzwerkstoffen aus leichten Laubhölzern durch Holzartenkombination und Faserverstärkung	BMEL über PT FNR	Peter Meinlschmidt Ole Gonnsen
Design und Fabrikation von 3D-gedruckten Bauteilen aus Biokompositen/Filamenten aus Endlos- und Kurznaturfasern; Teilvorhaben 2: Materialentwicklung und Herstellung von Filamenten	BMEL über PT FNR	Dr. Arne Schirp
Humine zur Imprägnierung und Verklebung von Holz	BMEL über PT FNR	Dr. Julia Belda Dr. Steffen Sydow
Sauber, wenn es drauf ankommt: Entwicklung eines spezifischen Grabwespen-Nisthabitatsystems zur rückstandslosen Entfernung von Blattläusen aus Gemüse- und Zierpflanzenkulturen; Teilvorhaben: Entwicklung und Herstellung von Holzschäumen und Holzröhren als Nisthabitatsystem	BLE über PT BÖLN	Dr. Nina Ritter
Entwicklung eines nichtbrennbaren A1-Schaums für 3D-Schalendämmungen und zur Abdichtung von Wanddurchbrüchen oder als Montageschaum für Brandschutztüren	BBSR im BBR	Dr. Torsten Kolb
Entwicklung formaldehydfreier Dispersionsklebstoffe auf Basis von Polyvinylacetat zur Herstellung von Biokompositen; Teilvorhaben 1: Applikationstechnik und Werkstoffherstellung	BMEL über PT FNR	Dr. Claudia Schirp

Project Title | Projekttitel	Promoted by | Förderstelle	Project leader | Projektleitende
Entwicklung und Evaluierung eines Prüfstandards für die Wirksamkeit von Luftreinigern zur Reduktion der Virenfracht in Innenraumluft; Teilvorhaben 1: Bioarosol-Prüfkammer	DGUV	Dr. Annette Clauß
Entwicklung eines kombinierten mechanisch-klimatischen Schnellalterungsverfahren für konstruktive Holzwerkstoffe	BMWK über PT AIF/DLR PT über iVTH	Dr. Steffen Sydow
Zusammenhang zwischen Bauproduktemissionen und Innenraumluftqualität: Experimente in Referenzprüfräumen und numerische Simulation	BMUV über UBA	Dr. Alexandra Schieweck
Biobasierte Harze für die serielle Verarbeitung faserverstärkter Bauteile; Teilvorhaben: Materialentwicklung und Prozessanpassung	BMEL über PT FNR	René Schaldach Ole Gonnsen Dr. Stefan Friebel
Langzeitverhalten von klebstoffgebundenem Holz mit Faser-Kunststoff-Verbund (FKV)- und Holz-Beton-Verbund (HBV)-Hybridsystemen für gebaute Nachhaltigkeit	BMEL über PT FNR	Prof. Dr. Libo Yan
Entwicklung eines nachhaltigen Schutzplankensystems aus hochbeanspruchbaren Holzverbundelementen; Teilvorhaben: Koordination, Versuchsdurchführung und Nachhaltigkeit	BMEL und BMUV über PT FNR (WKF)	Prof. Dr. Libo Yan
Acetylierung dünner Furniere und Holzfasern mittels in situ erzeugtem Keten zur Verbesserung der Beständigkeit daraus hergestellter Holzwerkstoffe; Teilvorhaben: Acetylierung und Herstellung der Holzwerkstoffe	BMEL über PT FNR	Dr. Julia Belda Dr. Stefan Friebel
Untersuchung von Extraktstoffarten und -anteilen in Abhängigkeit des Wuchsstandortes und deren Einflüsse auf die Verklebung; Teilvorhaben: Nasschemische und mechanische Analysen der Einflüsse von Extraktstoffen auf die Klebstoff- und Verklebungseigenschaften	BMEL und BMUV über PT FNR (WKF)	Malte Mérono
Leittechnologie-Gesamtprojekt: Biobasierte Brennstoffzellen; Teilprojekt 2: Entwicklung holzbasierter Endplatten für Brennstoffzellen	BMWK über PT AIF/DLR PT über iVTH	Dr. Dirk Lukowsky Dr. Dirk Berthold
Leittechnologie-Gesamtprojekt: Biobasierte Brennstoffzellen; Teilprojekt 3: Entwicklung biobasierter Compounds für Bipolarplatten zur Anwendung in Brennstoffzellen	BMWK über PT AIF/DLR PT über IUTA	Dr. Dirk Lukowsky René Schaldach
Leittechnologie-Gesamtprojekt: Biobasierte Brennstoffzellen; Teilprojekt 1: Konzept, klebtechnische Fertigung und Funktion von Brennstoffzellen-Demonstratoren auf Basis nachwachsender Rohstoffe	BMWK über PT AIF/DLR PT über DVS	Dr. Dirk Lukowsky
Verbesserte Ressourceneffizienz nachwachsender Rohstoffe durch die Verwendung von Land- und Forstwirtschaftsabfällen sowie Bau- und Abbruchabfällen für eine nachhaltige Gebäudeumwelt	BMBF über PT PTJ-FZJ	Dr. Torsten Kolb Norbert Rüther Peter Meinlschmidt
Altholzgewinnung aus Sperrmüll durch künstliche Intelligenz und Bildverarbeitung im VIS-, IR- und Terahertz-Bereicht; Teilvorhaben: Erkennung von Holz und Holzwerkstoffen in Sperrmüll mittels Farbbildverarbeitung und bildgebender NIR-Spektroskopie	BMEL über PT FNR	Dr. Jochen Aderhold
Life Cycle Technologien für hybride Strukturen; Teilvorhaben: Holzbasierte Strukturen und zerstörungsfreie Prüfung für Multimaterialsysteme	BMBF über PT KIT	Dr. Dirk Berthold
Nachhaltige Nutzungspotentiale für Kiefernstarkholz - eine ganzheitliche Betrachtung ihres Aufkommens, Waldbaus, der Holzernte und ihrer Verwertung; Teilvorhaben: Furnierbasierte 2d- und 3d-Verbundwerkstoffe für lasttragende Anwendungen auf Basis Kiefernstarkholz	BMEL und BMUV über PT FNR (WKF)	Dr. Dirk Berthold

Project Title | Projekttitel	Promoted by | Förderstelle	Project leader | Projektleitende
Optimierung der CO_2-Bilanz durch naturfaserverstärkte Verbundwerkstoffe auf Zementbasis für ein nachhaltiges Bauen; Teilvorhaben: Entwicklung anorganisch gebundener, naturfaserverstärkter Werkstoffe	BMBF über PT DLR	Dr. Dirk Berthold
Formteilautomaten zur energieeffizienten Herstellung komplex geformter, leichter Holzprodukte; Teilvorhaben 1: Mischung, Verklebung und Prüfung verschiedenster Hybridwerkstoffe	BMEL über PT FNR	Dr. Julia Belda
Stoffliche Verwertungsmöglichkeiten für stehend gelagertes Kalamitätsholz der Baumart Fichte in Abhängigkeit von Schadfortschritt und Holzqualität; Teilvorhaben 1: Holzwerkstoffherstellung und -evaluation	BMEL über PT FNR	Dr. Carola Ueckermann Peter Meinlschmidt
Machbarkeitsstudie Geschäumte Abstandsgewebe	BMEL über PT FNR	Ole Gonnsen Dr. Steffen Sydow
Herstellung stofflich vollständig recyclebarer Filter und Dämmstoffe aus Aerogelen aus Altholz; Teilvorhaben 1: Aufarbeitung, Bereitstellung und Charakterisierung der Rohstoffe, Charakterisierung der Produkte, Recycling der Produkte	BMEL über PT FNR	Peter Meinlschmidt Dr. Jan Gunschera Dr. Claudia Schirp
RECREATE - Recycling technologies for circular reuse and remanufacturing of fiber-reinforced composite material	EU	Leon Freitag Peter Meinlschmidt Dr. Steven Eschig
Entwicklung von Einwegprodukten mit biobasierten Beschichtungen aus regionalen Agrarrestströmen der Lebensmittelindustrie	BMBF über PT PTJ-FZJ	Dr. Arne Schirp
Entwicklung eines hybriden Leichtbetonwandelementes aus mineralisierten Holzzuschlägen mit Naturfaserverstärkung für den Außenbereich	BMBF über PT PTJ-FZJ	Dr. Nina Ritter Leon Freitag
Verbundvorhaben: Aufbau einer Pilotanlage zur Nutzung und Evaluierung von Buchenholzfasern als Ziegel-Dämmstoff; Teilvorhaben: Optimierung und Evaluierung von Buchholzfaserdämmstoffen	BMEL über PT FNR	Dr. Nina Ritter Dr. Torsten Kolb
Verbundvorhaben: FSCM - Future Sustainable Car Materials; Teilvorhaben: Entwicklung PLA-Formulierungen für Monomaterial-Composite und PLA-Holz-Materialsysteme für den Fahrzeuginnenraum	BMWK über PT TÜV Rheinland Consulting GmbH	Claudia Burgold
Digitale Wertschöpfungskette für den kieferbasierten Holzbau in Berlin-Brandenburg; Teilvorhaben: Integrationsmethodik und Referenzmodell für die digitale Vernetzung der Wertschöpfungskette auf Basis kiefernbasierter Werkstoffe	BMEL über PT FNR	Dr. Nina Ritter
Biobasierte, schaltbare Klebstoffe für wiederformbare Holz-Holz- und Holz-Metall-Lagenverbunde zur Anwendung im Mobilitätsbereich; Teilvorhaben 4: Klebstoffentwicklung und -herstellung	BMEL über PT FNR	Dr. Steven Eschig
Verbundvorhaben: Förderung der Verwendung von Holzprodukten in Gebäuden des Gesundheitswesens; Teilvorhaben: Funktionalisierung von Polymeren zur Herstellung von antimikrobiellen Bindemitteln zur Verwendung in Holzbeschichtungen	BMEL über PT FNR	Dr. Claudia Schirp
Verbundvorhaben: Entwicklung biobasierter Fassadenanstriche mit IR-aktiver Oberfläche zur Vermeidung von mikrobiellem Bewuchs auf WDVS-Fassaden; Teilvorhaben 2: Biobasierte Fassadenbeschichtungen	BMEL über PT FNR	Dr. Claudia Schirp
Innovative und umweltfreundliche intumeszente Flammschutzlösungen für dekorative Holzoberflächen für Außenanwendungen im Hochbau	BMWK über PT AIF/DLR PT über iVTH	Dr. Torsten Kolb Dr. Claudia Schirp
SMARTWOOD - Innenausstattungen, Möbel und Arbeitsflächen aus Holz mit elektrischen Funktionselementen in Form integrierter Dünnschichten	BMEL über PT FNR	Dr. Stefan Friebel

Project Title | Projekttitel	Promoted by | Förderstelle	Project leader | Projektleitende
Einsatz von Holz für den Trockenbau in Gebäudebereichen mit hohen Anforderungen an den Brandschutz; Teilvorhaben: Koordination, Materialcharakterisierung und Entwicklung der Trockenbauwand	BMEL über PT FNR	Dr. Torsten Kolb Dr. Alexandra Schieweck Mathias Belda
Verbundvorhaben: Recyclinggerechte Konstruktion von Funktionsbeschlägen; Teilvorhaben: Entwicklung eines funktionalisierten Mehrlagengewebes zum Einsatz in Textilscharnieren	BMEL über PT FNR	Leon Freitag
Entwicklung eines ökologischen und ökonomischen Getränkekastens	BMBF über PT PTJ-FZJ	Moritz Micke-Camuz
Ökobilanzierung in der Kunststoffspritzguss-Simulation	BMBF über PT PTJ-FZJ	René Schaldach
Co-Injektion-Spritzguss für elektrostatisch ableitfähige Transportbehälter; Teilprojekt: Fertigung von Prüfkörpern im Co-Injektions-Spritzguss und deren mechanische Charakterisierung	BMBF über PT KIT	Carsten Aßhoff
Verbundvorhaben: LignoLight - Kombination verschiedener Lignin-materialien zur Anwendung in modularen Leichtbaumöbeln; Teilvorhaben: Ligninmodifizierung und Verarbeitung zu Schäumen und Lederimitaten	BMBF über PT PTJ-FZJ	Dr. Steven Eschig Dr. Steffen Sydow Dr. Natalie Vellguth
Verbundprojekt: Entwicklung biobasierter Haftklebstoffe (PSA) für Klebebandanwendungen; Teilprojekt: Synthese UV-härtender Haftklebstoffe auf Itaconsäure-Basis	BMBF über PT DLR	Dr. Tobias Robert
Pyrolyse dickwandiger Faserverbundwerkstoffe als Schlüsselinnovation im Recyclingprozess für Rotorblätter von Windenergieanlagen; Teilvorhaben: Mikrowellenpyrolyse, Beschichtung rezyklierter Fasern und FVK-Prüfung	BMWK über PT PTJ-FZJ	Leon Freitag Peter Meinlschmidt
Prozesssichere Herstellung von geklebten Holz-Beton-Verbund-Bauteilen	BMWK über PT AIF/DLR PT über iVTH	Malte Mérono
Schäume aus Ligninsulfonat für den Einsatz als Kernmaterial in Stoßfängern; Teilvorhaben 1: Entwicklung von Ligninpolymeren	BMEL über PT FNR	Dr. Steffen Sydow Dr. Steven Eschig
Lignin-Hydroxymethylfurfural-Kondensationsharze zur Herstellung formaldehydfrei-gebundener Spanplatten	BMEL über PT FNR	Dr. Steven Eschig Dr. Julia Belda Dr. Alexandra Schieweck Mathias Belda
Reduktion von (V)VOC-Emissionen aus NawaRo-Dämmstoffen unter besonderer Berücksichtigung neu aufkommender Schadstoffe	BMEL über PT FNR	Dr. Jan Gunschera Peter Meinlschmidt
Digitalisierung und Steigerung der stofflichen Verwertung von Altholz durch interoperable und materialerkennende Sortierung und innovative Zerkleinerungsverfahren; Teilvorhaben 1: Erkennung von Störstoffen in Altholz mittels bildgebender NIR-Spektroskopie	BMEL über PT FNR	Dr. Jochen Aderhold
Verbundvorhaben: Erstellung eines Leitfadens zum Bauen mehrgeschossiger Gebäude mit Holz unter expliziter Berücksichtigung von Windlasten; Teilvorhaben 1: Projektkoordination, experimentelle und numerische Untersuchungen zum Schwingungsverhalten	BMEL über PT FNR	Prof. Dr. Libo Yan
Verbundvorhaben: Höhere Wertschöpfung von Betonschalungen durch internes Recycling zur Herstellung von Holzschäumen für Anwendungen bei der Betonfertigteilherstellung; Teilvorhaben 1: Herstellung Holzschaum und EPS-Ersatz	BMEL über PT FNR	Dr. Steffen Sydow
Nachhaltige Erzeugung und Verwertung von Rohrkolben auf Niedermoorstandorten in Niedersachsen; Teilvorhaben 4: Entwicklung, Prüfung und Herstellung sowie Materialeigenschaften Typha-basierter Bauprodukte	BMEL über PT FNR	Dr. Steffen Sydow

Project Title | Projekttitel	Promoted by | Förderstelle	Project leader | Projektleitende
Innovative biobasierte Organobleche mit erhöhter Thermostabilität und Wasserresistenz für Leichtbau-Anwendungen	MWK Niedersachsen	Ole Gonnsen
Entwicklung eines Verfahrens zur Herstellung von nichtbrennbaren Formteilen für die Dämmung von Heizungsanlagentechnik; Teilprojekt: Materialcharakterisierung, Entwicklung eines Recyclingkonzeptes und Begleitung der Entwicklungen mittels statistischer Versuchsplanung	BMBF über PT KIT	Dr. Torsten Kolb
Bioökonomie International 2022: BioSwitch-it – Biobasierte CO_2-schaltbare Polymere aus neuartigen Bausteinen auf Itaconsäurebasis	BMBF über PT PTJ-FZJ	Dr. Tobias Robert
Entwicklung von schnellen, hindernisfreien, umweltschonenden und sicheren Analyseroutinen zur eigenständigen Anwendung durch die unmittelbar an Altholz-Wertschöpfungsketten Beteiligten; Teilvorhaben 2: Probenvorbereitung insbesondere Homogenisierung, ICP Analytik, Validierung und Dokumentation	BMEL über PT FNR	Dr. Alexandra Schieweck
Recyclingfähige Materialien für Rotorblätter und deren Wiederverwertung; Teilvorhaben: Fertigung und Prüfung von Rotorblattkomponenten, vor und nach der Solvalyse, sowie der Aufbereitung der Materialien	BMBF über PT PTJ-FZJ	Peter Meinlschmidt Leon Freitag
Verbundvorhaben: Bewertung und Aufbereitung von Altholz zur Rückführung in den Kreislauf im Rahmen eines Wiederverwendungskonzeptes; Teilvorhaben 2: Chemisch-physikalische Materialanalyse der Holzbauteile	BMEL über PT FNR	Peter Meinlschmidt Dr. Jan Gunschera
Verbundvorhaben: Gesellschaftlicher Dialog und Qualitätssicherung bei der Nutzung von Altholz entlang der Wertschöpfungskette; Teilvorhaben 2: Qualitätsanforderungen an Möbel aus Altholz und Handlungsempfehlungen für die Etablierung eines Qualitätskonzepts	BMEL über PT FNR	Mathias Belda Peter Meinlschmidt
Verbundvorhaben: Leichte und heizbare Materialien für den Möbel- und Innenausbau gezeigt am Beispiel der Caravaning-Industrie; Teilvorhaben 1: Herstellung geschäumter PLA-Halbzeuge-Hybridmaterialien aus Furnieren und PLA sowie die Material-Produktentwicklung begleitende Emissionsprüfungen	BMEL über PT FNR	Peter Meinlschmidt Dr. Alexandra Schieweck
Upgrade of the Centre of Excellence LignoSilva	EU	Dr. Dirk Berthold
Verbundvorhaben: Pappelanbau in Agroforstsystemen und darauf basierende Wertschöpfungsketten; Teilvorhaben 3: Hochwertige Nutzung von Pappelholz aus Agroforstsystemen für nachhaltige Werk- und Baustoffe	BMEL über PT FNR	Dr. Moira Burnett-Barking
REGULUS-Verbundvorhaben: REHA – Regionalstudie Harz: Entwicklungsszenarien für die Wiederbewaldung und ihre sozio-ökonomischen Auswirkungen; Teilprojekt 3	BMBF über PT PTJ-FZJ	Claudia Burgold
Entwicklung eines Dämmstoffschaums aus heimischem Seegras und Treibsel	BMBF über PT PTJ-FZJ	Dr. Steffen Sydow
Verbundvorhaben: Biobasierte Flammschutzmittel aus erneuerbaren Rohstoffen für den Brandschutz von Brettsperrholz; Teilvorhaben 1: Synthese biobasierter FSM, flammgeschützte Beschichtungen, Koordination	BMEL über PT FNR	Dr. Arne Schirp Dr. Claudia Schirp Malte Mérono
Die Umsetzung des hochschulspezifischen strategischen Konzepts »Zukunft FH-Prof« zur nachhaltigen Gewinnung und Entwicklung professoralen Personals; Teilvorhaben: Fraunhofer WKI	BMBF über PT PTJ-FZJ	Dr. Dirk Berhold

Project Title | Projekttitel	Promoted by | Förderstelle	Project leader | Projektleitende
Verbundvorhaben: Numerische Beschreibung der Innenraumluftkonzentration in Holzhäusern in Abhängigkeit von klimatischen Rahmenbedingungen; Teilvorhaben 2: Untersuchungen im Labor und in einer Doppelklimakammer	BMEL über PT FNR	Dr. Jan Gunschera
Verbundvorhaben: Verwendung von Itaconsäure als zyklischer Baustein für Alkydharze mit Anwendung für biobasierte Malerfarben (ITALKYD); Teilvorhaben 1: Monomersynthese und Formulierung/ Applikation Malerfarben	BMEL über PT FNR	Dr. Tobias Robert
Verbundvorhaben: Recycling for Future – Konzepte zur recyclinggerechten Herstellung von Konstruktionen in Holztafelbauart; Teilvorhaben 5: Second-use-Konzepte	BMEL über PT FNR	Norbert Rüther
Verbundprojekt: Machine Learning-basiertes Degradationsmonitoring für Asphaltstraßenbefestigungen; Teilvorhaben: Fraunhofer-Gesellschaft	BMDV über PT TÜV Rheinland Consulting GmbH	Christina Haxter
Geöffnetes Flachsmehrlagengewebe als nachhaltiges Gestaltungselement	BMBF über PT PTJ-FZJ	Christina Haxter
Verbundprojekt: Post-Consumer Recycled Plastics for Exterior in Automotive; Teilvorhaben: Charakterisierung, Entwicklung und Ökobilanzierung von Post-Consumer-Rezyklaten für Exterieurbauteile	BMWK über PT TÜV Rheinland Consulting GmbH	Moritz Micke-Camuz

Standardization committees | Normungsausschüsse

Fraunhofer WKI heavily engages in standardization activities as we believe in the added valued and transfer of research into practise via this pathway.

Das Fraunhofer WKI engagiert sich stark in der Normung, da wir an den Mehrwert und den Transfer der Forschung in die Praxis auf diesem Weg glauben.

DIN – Standards Committees | DIN – Normenausschüsse		Contribution by the Fraunhofer WKI
NA 002-00-15 AA	Bautenbeschichtungen	Sandra Hofmeister, Dr. Claudia Schirp
NA 005-01-36 AA	Erhaltung des kulturellen Erbes (SpA zu CEN/TC 346)	Dr. Alexandra Schieweck
NA 005-04-01 AA	Holzbau (SpA zu CEN/TC 124, CEN/TC 250/SC 5, ISO/TC 165)	Harald Schwab
NA 005-04-01-03 AK	Holzwerkstoffe/Schnittholz DIN EN 13986 und DIN EN 14081	Harald Schwab
NA 005-04-01-04 AK	Geklebte Produkte DIN EN 14080, DIN EN 14374, DIN EN 15497 und DIN EN 16351	Malte Mérono, Harald Schwab
NA 005-04-01-05 AK	Vorgefertigte Bauteile	Harald Schwab
NA 005-04-01-08 AK	Prüfnormen charakteristische Werte	Harald Schwab
NA 005-11-42 AA	Partikelmesstechnik (SpA zu ISO/TC 24/SC 4)	N.N.
NA 005-53 FBR	Fachbereichsbeirat KOA 03, Hygiene, Gesundheit und Umweltschutz (SpA zu CEN/TC 351, CEN/TC 351/WG 3, CEN/TC 351/WG 4 und CEN/TC 351/WG 5)	Dr. Erik Uhde
NA 005-53-02 GA	Gemeinschaftsausschuss NABau/KRdL: Innenraumluft (SpA zu CEN/TC 351/WG 2)	Dr. Erik Uhde
NA 042 BR	Beirat des DIN-Normenausschusses Holzwirtschaft und Möbel (NHM)	Harald Schwab
NA 042-02-01 AA	Faserplatten – Spiegelausschuss zu CEN/TC 88/WG 17	Harald Schwab
NA 042-02-15 AA	Holzwerkstoffe – Spiegelausschuss zu CEN/TC 112 und ISO/TC 89	Harald Schwab
NA 042-02-16 AA	Spiegelausschuss zu CEN/TC 249/WG 13 Holz-Polymer-Werkstoffe (WPC)	Dr. Arne Schirp, Harald Schwab
NA 042-03-01 AA	Holzschutz Grundlagen	Dr. Dirk Lukowsky
NA 042-03-02 AA	Baulicher Holzschutz	Norbert Rüther
NA 042-03-03 AA	Vorbeugender chemischer Holzschutz	Dr. Dirk Lukowsky
NA 042-04-05 AA	Spiegelausschuss zu CEN/TC 193/SC 1 Holzklebung	Malte Mérono, Harald Schwab
NA 042-05-20 AA	Zirkularität von Möbeln	Bettina Meyer
NA 134-04-04-01 UA	Planung von Innenraumluftuntersuchungen	Dr. Erik Uhde
NA 134-04-04-02 UA	Emissionen aus Materialien und Produkten	Dr. Erik Uhde
NA 134-04-04-03 UA	Bestimmung organischer Stoffe in Luft	Dr. Erik Uhde
NA 134-04-04-06 UA	Innenraum von Straßenfahrzeugen	Dr. Alexandra Schieweck
NA 134-04-04-07 UA	Spiegelgremium zu ISO/TC 146/SC 6/WG 24	Dr. Erik Uhde
NA 134-04-04-08 UA	Spiegelgremium zu ISO/TC 146/SC 6/WG 3	Dr. Erik Uhde
NA 134-04-04-16 UA	Olfaktorische Bewertung von Bauprodukten und Innenraumluft	Dr. Erik Uhde
NA 134-04-04-18 UA	Prüfkriterien für mobile Luftreiniger	Dr. Erik Uhde

CEN – European Standards Committees | CEN – Europäische Normenausschüsse		Contribution by the Fraunhofer WKI
CEN/TC 89	Thermal performance of buildings and building components	Harald Schwab
CEN/TC 112	Wood-based panels	Harald Schwab
CEN/TC 112/WG 2	Plywood	Harald Schwab
CEN/TC 112/WG 4	Test methods	Harald Schwab
CEN/TC 112/WG 5	Regulated dangerous substances	Bettina Meyer, Harald Schwab
CEN/TC 112/WG 7	Semi-finished and finished products	Harald Schwab
CEN/TC 112/WG 8	Oriented strand boards (OSB)	Harald Schwab
CEN/TC 112/WG 11	Particleboards and fibreboards	Harald Schwab
CEN/TC 112/WG 13	Mandate	Harald Schwab
CEN/TC 124/WG 1	Test methods	Harald Schwab
CEN/TC 124/WG 7	Preparation of the revision of harmonised standards	Harald Schwab
CEN/TC 139/WG 2	Coatings systems for wood	Dr. Claudia Schirp
CEN/TC 193/SC 1/WG 4	Test methods, classification and performance requirements for adhesives other than phenolic and aminoplastic, for load-bearing timber structures	Malte Mérono, Harald Schwab
CEN/TC 193/SC 1/WG 6	Test methods and requirements for adhesives for glued-in rods and on-site repair of load-bearing structures	Malte Mérono, Harald Schwab
CEN/TC 193/SC 1/WG 8	Revision of EN 301 and EN 302	Malte Mérono, Harald Schwab
CEN/TC 193/SC 1/WG 12	Adhesives for non-loadbearing timber structures	Malte Mérono
CEN/TC 193/SC 1/WG 13	Performance of wood adhesives at elevated temperatures - Test methods and evaluation	Malte Mérono, Harald Schwab
CEN/TC 193/SC 1/WG 14	Testing and requirements for hardwood bonding and chemically modified wood substrates	Malte Mérono
CEN/TC 207/WG 9	Emission from furniture	Bettina Meyer
CEN/TC 249/WG 13	Wood Plastic Composites (WPC)	Dr. Arne Schirp
CEN/TC 351/WG 2	Emissions from construction products into indoor air	Dr. Erik Uhde

ISO – International Standards Committees | ISO - Internationale Normenausschüsse		Contribution by the Fraunhofer WKI
ISO/TC 89	Wood-based panels	Harald Schwab
ISO/TC 89/WG 5	Test methods	Bettina Meyer, Harald Schwab
ISO/TC 89/SC 3	Plywood	Harald Schwab
ISO/TC 146/SC 6	Indoor Air	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 3	Determination of volatile organic compounds (VOCs) in indoor air	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 10	Microbial contaminants	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 13	Joint ISO/TC 146/SC 6 – ISO/TC 22 WG: Determination of volatile organic compounds in cars interiors	Dr. Alexandra Schieweck
ISO/TC 146/SC 6/WG 17	Sensory testing of indoor air	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 18	Flame retardants	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 20	Determination of phthalates	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 23	Determination of amines	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 24	Indoor Air Quality management systems	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 25	Testing air cleaners by the assessment of perceived air quality	Dr. Erik Uhde
ISO/TC 296	Bamboo and rattan	Harald Schwab

Collaboration with expert committees and working groups | Mitarbeit in Fachausschüssen und Arbeitskreisen	
AK Analytik des RAL Güteausschusses »Imprägnierte Holzbauelemente«	Dr. Jan Gunschera
Arbeitskreis Faseranalytik der Industrievereinigung Verstärkte Kunststoffe e. V. (AVK)	N.N.
AK Flammschutz der Forschungsgesellschaft Kunststoffe e. V.	Dr. Arne Schirp
BMU/VCI-Kooperationsprojekt »Human-Biomonitoring«	Dr. Tunga Salthammer
DFO-Fachausschuss »Beschichtungen für Holz und Holzwerkstoffe«	Dr. Claudia Schirp
Sektorgruppe 18 Holzbau der Gruppe der notifizierten Stellen in Europa gemäß Bauproduktenverordnung | Sector group 18 Structural timber products	Harald Schwab
Sektorgruppe 20 Holzwerkstoffe der Gruppe der notifizierten Stellen in Europa gemäß Bauproduktenverordnung | Sector group 20 Wood-based panels	Harald Schwab
Spiegelausschuss zu SG 18/20 Holzbau/Holzwerkstoffe - Erfahrungsaustausch der notifizierten Stellen Deutschlands	Harald Schwab
Technische Ausschüsse Brettschichtholz der Studiengemeinschaft Holzleimbau e. V.	Harald Schwab
ErfA Prüfertagung der RAL Gütegemeinschaften Holzhausbau	Harald Schwab
ErfA Prüfertagung Qualitätsgemeinschaft Deutscher Fertigbau QDF / BMFcert	Harald Schwab
ErfA PÜZ-Stellen pure live	Harald Schwab
ErfA CETPC CARB approved European third party certifier	Bettina Meyer, Harald Schwab
ErfA CPR-GNB deutscher SpA zur Advisory Group of NB for the CPR	Harald Schwab
ErfA Geklebte Produkte EN 14080, EN 14374, EN 15497 und EN 16351	Harald Schwab
Verein zur Förderung der Normung im Bereich Holzwirtschaft und Möbel e. V. (VFNHM)	Harald Schwab
Fachausschuss Holzschutz der Georg-August-Universität Göttingen	Dr. Dirk Lukowsky
Fachgremium des VFF zu Holzfenstern	Dr. Dirk Lukowsky
Umweltbundesamt »Innenraumlufthygiene-Kommission«	Dr. Tunga Salthammer
VDA Verband der Automobilindustrie, AK Innenraumemissionen	Dr. Alexandra Schieweck
IEC International Electrotechnical Commission, IEC/TC59 SC59N JWG2	Dr. Erik Uhde

Publications | Publikationen

The scientist of Faunhofer WKI published 53 scientific paper in peer-reviewd journals in 2024, an important activity to dissiminate research results and prove scientific excellence besides our main focus on contract research for industry.

2024 veröffentlichten die Forschenden des Fraunhofer WKI insgesamt 53 wissenschaftliche Arbeiten in Peer-reviewed Journals. Dies ist neben unserem Hauptaugenmerk auf Vertragsforschung für die Industrie eine wichtige Maßnahme, um Forschungsergebnisse zu verbreiten und wissenschaftliche Exzellenz zu belegen.

Annatelli, Mattia; Sánchez-Velandia, Julián E.; Mazzi, Giovanni; Pandeirada, Simão Vidinha; Giannakoudakis, Dimitrios; Rautiainen, Sari; Esposito, Antonella; Thiyagarajan, Shanmugman; Richel, Aurore; Triantafyllidis, Konstantinos; **Robert, Tobias** et al. (2024): Beyond 2,5-furandicarboxylic acid: status quo environmental assessment and blind spots of furanic monomers for bio-based polymers. In: Green chemistry 26 (16), 8894-8941. DOI: 10.1039/d4gc00784k.

Bianchi, Enrico; Papadopoulos, Lazaros; Soccio, Michelina; Siracusa, Valentina; Gazzano, Massimo; **Robert, Tobias** et al. (2024): Mechanical properties gas permeability and biodegradation mechanism of biobased poly(ester amide)s from 2,5-furandicarboxylic acid and amido diols for sustainable food packaging. In: Polymer degradation and stability 230, Artikel 111049. DOI: 10.1016/j.polymdegradstab.2024.111049.

Bianchi, Enrico; Soccio, Michelina; Gazzano, Massimo; Papadopoulos, Lazaros; **Robert, Tobias**; Bikiaris, Dimitrios; Lotti, Nadia (2024): Melting behavior of compression molded poly(ester amide) from 2,5-furandicarboxylic acid. In: Polymers 16 (24), Artikel 3459. DOI: 10.3390/polym16243459.

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Buschalsky, Fahriye Yağmur Bütün; Imken, Arne A.P.; Adamopoulos, Stergios; Ahmed, Sheik Ali; **Plinke, Burkhard**; Mai, Carsten (2024): Geometric changes of TMP fibres due to thermo-hydrolytic disintegration of waste MDF evaluated by three fibre analysers. In: Wood material science & engineering (Online First). DOI: 10.1080/17480272.2024.2383357.

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Challouf, Oumayma; Zaidi, Sami; Bougarech, Abdelkader; Abid, Majdi; **Robert, Tobias**; Ammar, Houcine; Souhir, Abid (2024): Poly(1,12-dodecylene 5,5'-isopropylidene-bis(ethyl 2-furoate))-based sulfonated copolyesters: Effect of ionic groups and long chain aliphatic spacer on their thermo-mechanical properties hydrodegradability and liquid water sorption. In: Polymer 312, Artikel 127577. DOI: 10.1016/j.polymer.2024.127577.

Chen, Zhijun; Huang, Liang; **Yan, Libo**; Li, Shuisheng; Cai, Heng; Li, Yin; Luo, Xiaofeng (2024): Characterizing mechanical properties and failure criteria of steel slag aggregate concrete under multiaxial stress states. In: Construction & building materials: CBM 424, Artikel 135903. DOI: 10.1016/j.conbuildmat.2024.135903.

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Morawska, Lidia; Yuguo, Li; **Salthammer, Tunga** (2024): Lessons from the COVID-19 pandemic for ventilation and indoor air quality. In: Science 385 (6707), S. 396-401. DOI: 10.1126/science.adp2241.

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Presentations | Vorträge

31 presentations at scientific meetings and conferences show our committment to transfer our knowledge to our partners and the public.

31 Präsentationen auf wissenschaftlichen Tagungen und Konferenzen zeigen unser Engagement für den Transfer unseres Wissens an unsere Partner und die Öffentlichkeit.

Aderhold, J.: Thermografie mit Relativbewegung – aktuelle Normungsaktivitäten. Zerstörungsfreie Materialprüfung, DGZfP-Jahrestagung, 6. - 8.5.2024, Osnabrück

Aderhold, J.: Sortieren mit innovativen Bildverarbeitungstechniken – Neue Wege im Altholzrecycling.Thermografie-Forum, 19. - 20.9.2024, Eugendorf

Aderhold, J.: Spektroskopische Charakterisierung von Oberflächen mit Zeilenspektroskopie. Seminar Oberflächeninspektion der Fraunhofer-Allianz Vision, 27. - 28.11.2024, Karlsruhe

Brischke, C.; Starke, N.; Günther, B.; Meurer, A.; Trautwein, J.-F.; Ueckermann, C.; Emmerich, L.; Schwartz, M.:
Schutz von lagerndem Rundholz – Verfahren, Wirksamkeit von Schutzmaßnahmen und Qualitätseinbußen. 32. Deutsche Holzschutztagung, 25. - 26.04.2024, Dresden

Burnett, M., Ritter, N., Berthold, D., Heise, J., Ratsch, N., Kahlmeyer, M., Böhm, S.: Impregnation and bonding of hybrid wood-based materials in automotive body shell.
International Conference on Industrial Applications of Adhesives, 2024, Cascais, Portugal

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Christ, H.-A., Eschig, S., Bunzel, F.: Entwicklung myzelbasierter Bindemittel für formaldehydfreie Holzwerkstoffe.
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Eschig, S., Koch, C.: Bio-based, switchable adhesives for reshapable wood-wood and wood-metal composites.
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Fischer, D.; Schirp, A.: Strahlenvernetzung zur Eigenschaftsverbesserung biobasierter Kunststoffe und Potenziale im Hinblick auf den Flammschutz. Nachhaltige Werkstoffe – Kunststoffe im Wandel, 21.2.2024, Ochtrup

Gunschera, J.; Wientzek, S.: First results from the experiments of IAQ-Habitat during the AMADEE-24 mission. AMADEE-24 Science Workshop, 29.11. - 1.12.2024, Salzburg

Lukowsky, D.: Schadensanalysen – Holzbeschichtungen. Frühjahrstagung der Berlin-Brandenburgischen Sachverständigen, 19.4.2024, Döllnsee-Schorfheide

Lukowsky, D.: Spurenlesen an Holz- und Holzwerkstoffen – Methoden der Schadensanalyse. Vorlesung 700026, Georg-August Universität, 14.6.2024, Göttingen

Lukowsky, D.: Spuren lesen. 31. Nordische Bausachverständigentage, 18.10.2024, Wismar

Meinlschmidt, P.: Physikalischer Aufschluss von Altholz. Fachgespräch BMEL, 10.10.2024

Mérono, M.: Windkraftanlagentürme aus Holz – für mehr Nachhaltigkeit in der Energieerzeugung. Hannover Messe, 24.4.2024, Hannover

Mérono, M., Schwab, H.; Wranne, J.: Bonded connections for the Wind of Change Tower – currently the world´s tallest timber wind turbine tower. Internationales Holzbauforum 2024, 4. - 6.12.2024, Innsbruck

Meyer, B., Ciroi, S.: 10 important facts you should know about the new European formaldehyde requirements („REACH"). 13th European Wood-based Panel Symposium, 11.10.2024, Hamburg

Robert, T., Papadopoulos, L., Malitowski, N., Perocheau Arnaud, S., Bikiaris, D.N., Gontad Fariña, F. J.: Poly(ester itaconate)s as bio-based oligomers for additive manufacturing. Konferenz »Polymers 2024«, 28.5.2024, Athen

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Salthammer, T.: The conversion of steady-state formaldehyde test chamber concentrations to different climatic conditions. 18th International Conference on Indoor Air Quality and Climate, Honolulu, United States, 9.7.2024.

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Salthammer, T.: Sie kamen von jenseits der Wissenschaft – die Chemie in Breaking Bad und anderen Filmen. Gesellschaft Deutscher Chemiker (GDCh), Jungchemiker Forum,18.6.2024, Dortmund

Schieweck, A.: Zusammenhang zwischen Bauproduktemissionen und Innenraumluftqualität – Entwicklung von Modellsimulationen. Innenraumluft 2024, 6. - 8.5.2024, Umweltbundesamt, Dessau

Schieweck, A.: Schadstoffe in Museen und Bibliotheken, Raumluft und Staub. Arsen in Büchern, Arbeitsgespräch, Herzog August Bibliothek, 10. - 11.10.2024, Wolfenbüttel

Schirp, A.; Fischer, D.: Wirksamkeit von Phosphinaten und Strahlenvernetzung auf den Flammschutz von Bio-Polyamiden. Nachhaltige Werkstoffe – Kunststoffe im Wandel, 21.2.2024, Ochtrup

Schirp, C.; Schirp, A.; Lettau, M.; Hirth, C.: Bio-based wood coatings for interior application with durable flame retardancy. 13th Woodcoatings Congress, 22. - 23.10.2024, Amsterdam, Niederlande

Schirp, C.; Schirp, A.; Lettau, M.; Hirth, C.: Flammschutz für Holzbeschichtungen – transparent und nachhaltig. VILF Jahrestagung, 14. - 15.11.2024, Neu-Isenburg

Uhde, E., Schulz, N., Zhao, J., Schieweck, A.: Relationship between building product emissions and indoor air quality. 18th International conference of indoor air quality and climate, INDOOR AIR 2024, 7. - 11.7.2024 Honolulu, Hawaii

Zhao J., Salthammer T., Uhde, E., Schieweck, A.: Long-term prediction of the effects of climate change on indoor particle exposure. European Aerosol Conference, 25. - 30.8.2024, Tampere, Finland

Events

“We are using the time to create something new, to further develop ourselves, and to exchange our ideas.”

Dorothee Flötotto

13th European Wood-based Panel Symposium

From the 9th to the 11th of October 2024, experts from science and practice gathered together in Hamburg in order to obtain information on and discuss the latest developments concerning wood as a material. The Fraunhofer WKI organized the Symposium for the 13th time in collaboration with the European Panel Federation. The event was supported by the International Association for Technical Issues Related to Wood and the company Hywax GmbH.

With record attendance and a fully booked hall, the networking event was a resounding success. Around 375 participants from 31 countries were provided with numerous opportunities to exchange their views on the most important trends and challenges in the wood-based materials industry.

A total of 20 specialist presentations over two days provided insights into specific topic areas of the sector. Philipp Sprockhoff (EPF Managing Board) began by providing information on the situation in the European wood-based materials industry. The representative of a major furniture manufacturer identified the future requirements for wood-based materials as “recycled, renewable, bio-based and energy-efficient”. This was reflected in the subsequent contributions, as was the appeal to the European wood-based materials industry: “Working together is the key!”.

The ensuing presentations ranged from the market and raw-material situation, through recycling, and on to developments in adhesives and products. The central topic of one session was, furthermore, the application of artificial intelligence. Without recycling, the sector would lack an important resource. The speakers in this series of presentations focused on medium-density fiberboard (MDF) and the question as to whether solid-wood waste and post-consumer fiberboard are suitable as alternative raw materials for the production of MDF.

Artificial intelligence in the wood-based materials industry – In this session, speakers from the mechanical and plant-engineering industry reported on current developments on the path towards autonomous, self-optimizing operational management. A team of AI developers demonstrated the possibilities of real-time AI for fully automated wood-based-material production, with a view to increasing productivity and the effective utilization of raw materials whilst simultaneously guaranteeing data protection.

13. Europäisches Holzwerkstoff-Symposium

Vom 9. bis 11. Oktober 2024 kamen Experten und Expertinnen aus Wissenschaft und Praxis in Hamburg zusammen, um Aktuelles rund um den Werkstoff Holz zu erfahren und zu diskutieren. Das Fraunhofer WKI organisierte das Symposium zum 13. Mal gemeinsam mit der European Panel Federation. Unterstützt wurde die Veranstaltung durch den Internationalen Verein für Technische Holzfragen und die Firma Hywax GmbH.

Mit einer Rekordbeteiligung und ausgebuchtem Saal war das Netzwerkevent ein großer Erfolg. Die rund 375 Teilnehmenden aus 31 Ländern hatten zahlreiche Gelegenheiten, sich über die bedeutendsten Trends und Herausforderungen in der Holzwerkstoffindustrie auszutauschen.

Insgesamt 20 Fachvorträge an zwei Tagen gaben Einblicke in spezifische Themenbereiche der Branche. Philipp Sprockhoff (EPF Managing Board) informierte eingangs über die Situation der europäischen Holzwerkstoffindustrie. Der Vertreter eines großen Möbelherstellers bezeichnete die zukünftigen Anforderungen an Holzwerkstoffe als »recycelt, erneuerbar, biobasiert und energieeffizient«. Dies spiegelte sich in den nachfolgenden Beiträgen wider, ebenso wie der Aufruf an die europäische Holzwerkstoffindustrie »Working together is the key!«.

Die anschließenden Vorträge reichten von der Markt- und Rohstofflage über das Recycling bis hin zu Klebstoff- und Produktentwicklungen. Zentrales Thema einer Session war zudem der Einsatz von Künstlicher Intelligenz.

Ohne Recycling würde der Branche eine wichtige Ressource fehlen. Die Referenten dieser Vortragsreihe nahmen die mitteldichte Faserplatte (MDF) in den Fokus und die Frage, ob Massivholzabfälle und Post-Consumer-Faserplatten als alternative Rohstoffe für die MDF-Herstellung geeignet sind.

Künstliche Intelligenz in der Holzwerkstoffindustrie – In dieser Session berichteten Referenten aus dem Maschinen- und Anlagenbau über die aktuellen Entwicklungen auf dem Weg zur autonomen, selbstoptimierenden Betriebsführung. Ein KI-Entwicklerteam zeigte die Möglichkeiten der Echtzeit-KI zur vollautomatisierten Holzwerkstoffherstellung mit Blick auf Produktivitätssteigerung und effektiven Rohstoffeinsatz bei garantiertem Datenschutz.

Formaldehyd ist auch weiterhin von großem Interesse in der Holzwerkstoffbranche. Der Beitrag über zehn wichtige Fakten

Formaldehyde continues to generate a great deal of interest in the wood-based materials sector. The presentation covering ten important facts regarding European formaldehyde regulations therefore offered participants a comprehensive insight into the legal situation and its consequences. The method subsequently presented for the online measurement of formaldehyde emissions by means of an in-situ infrared laser analyzer should enable real-time determination of formaldehyde emissions during ongoing production.

In the area of adhesives and additives, the trend continues towards renewable raw resources as starting materials. The development of a bio-based, switchable polyurethane adhesive for surface bonding in the production of re-formable wood and hybrid wood-metal bonded laminates for applications in the mobility sector is the subject of a research project at the Fraunhofer WKI. The fact that wood-based materials can also represent a possible area of application in the automotive sector was demonstrated by a research project on the development of hybrid aluminum-wood composites. Strategies for reducing the product carbon footprint (PCF) in the long term are a step towards sustainability. One example is the sustainable aminoplast-resin production of a major manufacturer, which uses renewable raw materials as well as renewable energies in the creation of intermediate products.

The participants utilized two evening events in addition to the generous breaks between the presentations as opportunities for discussions and networking and, in a poster session, were also able to obtain information on the results of current research work. In the accompanying exhibition, twelve companies presented their services and technical solutions.

The date for the next event has already been set: The 14th European Wood-based Panel Symposium will take place in Hamburg from the 14th to the 16th of October 2026 (https:\\www.european-wood-based-panel-symposium.org).

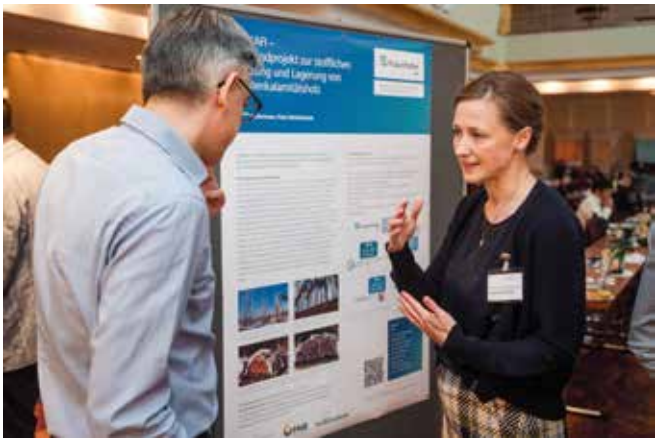
zu Europäischen Formaldehyd-Regelungen bot den Teilnehmenden daher einen umfassenden Einblick in die Gesetzeslage und deren Konsequenzen. Die anschließend vorgestellte Methode zur Online-Messung von Formaldehydemissionen über einen In-situ-Infrarotlaseranalysator soll eine Echtzeitbestimmung der Formaldehydemission während der laufenden Produktion ermöglichen.

Im Bereich Klebstoffe und Additive geht der Trend weiterhin in Richtung nachwachsende Rohstoffe als Ausgangsmaterialien. Die Entwicklung eines biobasierten, schaltbaren Polyurethanklebstoffs für die Flächenverleimung zur Herstellung wiederverformbarer Holz- und hybrider Holz-Metall-Lagenverbunde für Anwendungen im Mobilitätssektor ist Thema eines Forschungsvorhabens im Fraunhofer WKI.

Dass Holzwerkstoffe auch im Automobilbereich ein mögliches Einsatzgebiet darstellen können, zeigte ein Forschungsprojekt zur Entwicklung hybrider Aluminium-Holz-Verbundstoffe. Strategien, den CO_2-Fußabdruck (engl. Product Carbon Footprint – PCF) langfristig zu verringern, sind ein Schritt in Richtung Nachhaltigkeit. So werden bei der nachhaltigen Aminoplastharzproduktion eines großen Herstellers beispielsweise nachwachsende Rohstoffe zur Erzeugung der Zwischenprodukte sowie erneuerbare Energien eingesetzt.

Die Teilnehmenden nutzten zwei Abendveranstaltungen sowie die großzügigen Vortragspausen für Gespräche und Networking und informierten sich in einer Poster-Session über die Ergebnisse aktueller Forschungsarbeiten. In der begleitenden Ausstellung präsentierten zwölf Unternehmen ihre Dienstleistungen und technische Lösungen.

Der Termin für die nächste Veranstaltung steht bereits fest: Das 14. Europäische Holzwerkstoff-Symposium wird vom 14. bis 16. Oktober 2026 in Hamburg stattfinden (https:\\www.european-wood-based-panel-symposium.org).



Dr. Carola Ueckermann, Fraunhofer WKI, in a technical discussion during the poster session.

Good opportunities for networking at the Hywax GmbH evening event in the St. Pauli soccer stadium.

Fairs and other Events | Messen und andere Veranstaltungen

Kick-off Event LignoSilva CoE | Auftaktveranstaltung LignoSilva CoE

8th February 2024 | Bratislava

The kick-off event for the new mentoring programme of the Fraunhofer WKI took place at the Slovak Centre of Scientific and Technical Information. The aim of the "Upgrade of the Centre of Excellence LignoSilva" project, which is funded by the European Union, is to strengthen scientific excellence and international research contacts. The Fraunhofer WKI will act as a mentor in the coming years.

Hanover Fair | Hannover Messe 2024

22nd - 26th April 2024 | Hanover

From raw materials to recycling – at the "Hannover Messe" the Fraunhofer WKI presented new application possibilities for renewable raw materials at the Fraunhofer joint stand. The examples range from a wooden crash barrier for road traffic through to sustainable concrete construction materials made from residual materials. They demonstrate the potential of renewable raw materials for the circular economy.

Salon of Science | Salon der Wissenschaft 2024

15th May 2024 | Braunschweig

The "Salon der Wissenschaft" offered all interested people a place to meet and exchange ideas with researchers from the region. No lectures were given, the focus was on interpersonal dialog. Over 30 scientists from research institutions in the Braunschweig region explained in four rounds of talks what they are researching and what they are dreaming of. Dr. Tobias Robert rerpresented the Fraunhofer WKI.

Week for Environment | Woche der Umwelt 2024

4th - 5th June 2024 | Berlin

The Week for Environment organized by Federal President Frank-Walter Steinmeier and the German Federal Environmental Foundation took place with around 12,000 participants. Exciting discussions, a large exhibition, and around 190 exhibitors presented their innovative solutions for a responsible design of change in the park of Bellevue Palace. The Fraunhofer WKI presented economic and ecological concepts for the recovery of deployed raw materials and their processing for reutilization. One example is the production of insulation mats using balsa wood from disused wind-turbine rotor blades.

International Timber Construction Forum | Internationales Holzbau-Forum 2024

4th - 6th December 2024 | Innsbruck

As a central congress for the timber construction industry, the forum brought together leading experts, including timber builders, planners, engineers and architects as well as those responsible in building and approval authorities, craftsmen, project managers and practitioners. The congress offered the opportunity to exchange views on current developments and discuss the future of the industry. The organizer FORUM HOLZBAU welcomed more than 2,500 participants and focused on the dialogue between research, practice, and industry in order to further develop timber construction in a future-proof manner. The Fraunhofer WKI presented the results of a collaboration with the company Modvion AB in the development of the "Wind of Change Tower", the first wooden tower for commercial wind turbines (see page 18).

Groups, Alliances and Networks | Verbünde, Allianzen und Netzwerke

Institutes with different areas of expertise cooperate within Fraunhofer Groups, Alliances, Research Fields and Networks in order to collaboratively work on and market a business area. The Fraunhofer WKI is an active member in some of them.

Institute mit unterschiedlichen Kompetenzen kooperieren in Fraunhofer-Verbünden, -Allianzen, -Forschungsbereichen und -Netzwerken, um ein Geschäftsfeld gemeinsam zu bearbeiten und zu vermarkten. Das Fraunhofer WKI ist in einigen davon aktives Mitglied.

Fraunhofer Group for Materials and Components

Fraunhofer materials research covers the entire value chain, from new material development and improvement of existing materials through manufacturing technology on a quasi-industrial scale, to the characterization of properties and assessment of service behavior. The same research scope applies to the components made from these materials and the way they function in systems. In all these fields, experimental studies in laboratories and technical institutes are supplemented by equally important numerical simulation and modelling techniques – across all scales, from individual molecules up to components and process simulation. As far as materials are concerned, the Fraunhofer MATERIALS group covers the full spectrum of metals, inorganic non-metals, polymers and materials made from renewable resources, as well as semiconductor materials.

The Group's expertise is concentrated specifically in the fields of energy and environment, mobility, health, machine and plant construction, building construction and living, microsystems technology and safety. Innovative systems are developed using materials and components customized for specific applications, and based on the assessment of the behavior of a material or component under specific conditions of use. Strategic forecasts promote the development of novel, future-oriented materials and technologies.

www.materials.fraunhofer.de

Fraunhofer Building Innovation Alliance

With its 14 member institutes, the Fraunhofer Building Innovation Alliance offers the market the first single point of contact for integral system solutions in the field of construction. The alliance sees itself as an indicator and initiator of new and innovative topics relating to construction research. It strives to tackle all scientific and research-related construction issues by framing them within the context of its own in-house capabilities and developing one-stop solutions within the Fraunhofer-Gesellschaft.

www.bau.fraunhofer.de

Fraunhofer Research Field Lightweight Construction

The participating institutes of the Fraunhofer Research Field Lightweight Construction offer conceptual and technical solutions in manufacturing as well as testing and evaluation along the value chain of lightweight products.
Customer-specific questions are met by taking into account ecological and economical requirements. Merging the competencies of 15 Fraunhofer institutes complex solutions can be developed.
The portfolio is rounded off by a comprehensive range of further training courses for "Composite Engineers".
www.leichtbau.fraunhofer.de

Fraunhofer Research Area Technical Textiles

Several Fraunhofer institutes have teamed up in order to map the entire textile value creation chain from textile machinery, fiber production, preform and semi-finished product manufacture, textile functionalization, smart textiles, process and product simulation, sustainability – life cycle assessment and recycling, all the way to fiber composite components by bundling individual competences. The Fraunhofer institutes of the Research Area Technical Textiles work together in an interdisciplinary manner to generate optimal, application-specific, product-specific developments of textile-based technologies and plant systems.
www.textil.fraunhofer.de

Fraunhofer Business Unit Vision

The Vision Business Unit at Fraunhofer is an association of specialist departments from several Fraunhofer institutes that work together and pool their expertise in the fields of industrial image processing, machine vision and optical measurement and testing technology especially for use in manufacturing and quality assurance. The central office in Fürth is available as the first contact point for potential interested parties and customers on the topic of image processing.
www.vision.fraunhofer.de

Cultural Heritage Research Alliance

The top priority of this interdisciplinary alliance is the preservation of cultural heritage through material-analysis research and innovation. Written documents, paintings, sculptures and historical buildings are not only invaluable to society in an idealistic sense – they also represent an enormous economic factor.
www.forschungsallianz-kulturerbe.de

Fraunhofer Sustainability Network

The Fraunhofer Sustainability Network aims to focus research and the application of research findings more strongly on the principle of sustainability and, to that end, to raise awareness within the Fraunhofer Gesellschaft of the many different sustainable developments taking place.
www.fraunhofer.de

Fraunhofer Network Science, Art and Design

How can science be inspired by art and design - and vice versa? What do researchers, artists and designers have in common? How can they enter into a creative dialog and take a stand, side by side, on overarching issues? The Fraunhofer Network "Science, Art and Design", which was founded in early 2018, addresses these and other questions.
www.art-design.fraunhofer.de

International Association for Technical Issues Related to Wood e. V. | Internationaler Verein für Technische Holzfragen e. V.

The shortage of wood as a raw material and the obligation to use the available timber economically provided the impulse for the founding of the Association for Technical Issues related to Wood in Braunschweig in 1946. Through its activities, the Association, renamed as iVTH – International Association for Technical Issues Related to Wood e. V., continues to contribute towards the deepening and sharing of knowledge concerning wood as a material as well as its utilization.

The aim of the association is to transfer the knowledge from research projects practice-oriented into the timber industry, in order for procedures and products to be newly-developed or enhanced. The competitiveness of SMEs should thereby be strengthened. The focus of our activities is, after all, placed mainly upon small and medium-sized companies in the timber industry and their suppliers. Nationally and internationally, we maintain close contact with research bodies and businesses with practical involvement.

Our services at a glance

- The iVTH promotes research and development work in the forestry and wood industries and associated fields, both nationally via cooperative industrial research (IGF) and internationally via CORNET (in each case BMWK via DLR Projektträger)
- allocates research projects with currently-relevant objectives,
- organizes scientific events,
- awards the Wilhelm Klauditz Prize for wood research and environmental protection,
- contributes to advisory committees,
- is member of the AIF - Alliance for Industry and Research, the Austrian Society for Wood Research ÖGH, the Joint Committee on Adhesive Technology GAK, the Hardwood Research Interest Group IGLHF and
- is a cooperation partner for initiatives concerning wood as a resource.

Die Knappheit von Holz als Rohstoff und die Pflicht, das verfügbare Holz wirtschaftlich zu nutzen, gaben 1946 den Impuls für die Gründung des Vereins für Technische Holzfragen e. V. in Braunschweig, dem heutigen iVTH – Internationaler Verein für Technische Holzfragen e. V. Durch seine Aktivitäten trägt der Verein auch heute noch dazu bei, das Wissen rund um den Werkstoff Holz und die Möglichkeiten seiner Verwendung zu vertiefen und weiterzugeben.

Ziel des Vereins ist es, das Wissen aus Forschungsvorhaben praxisgerecht in die Betriebe der Holzwirtschaft und angrenzender Bereiche zu transferieren, damit Verfahren und Produkte neu- oder weiterentwickelt werden können. Hierdurch soll die Wettbewerbsfähigkeit des Mittelstands gestärkt werden, denn im Fokus seiner Aktivitäten stehen hauptsächlich kleine und mittelständische Unternehmen der Holzwirtschaft und ihre Zulieferer. National und international pflegt der Verein enge Kontakte zu Forschungsstellen und Betrieben aus der Praxis.

Die Leistungen auf einen Blick

- Der iVTH fördert Forschungs- und Entwicklungsarbeiten in der Forst- und Holzwirtschaft und angrenzenden Bereichen sowohl national über die Industrielle Gemeinschaftsforschung als auch international über CORNET (jeweils BMWK über DLR Projektträger),
- vergibt Forschungsaufträge mit aktueller Zielsetzung,
- organisiert wissenschaftliche Veranstaltungen,
- verleiht den Wilhelm-Klauditz-Preis für Holzforschung und Umweltschutz,
- wirkt in Beratergremien mit,
- ist u. a. Mitglied der AIF - Allianz für Industrie und Forschung e. V., der Österreichischen Gesellschaft für Holzforschung ÖGH, des Gemeinschaftsausschusses Klebtechnik GAK, der Interessengemeinschaft Laubholzforschung IGLHF und
- ist Kooperationspartner für Initiativen rund um den Rohstoff Holz.

Contact

iVTH e. V.
Riedenkamp 3 | 38108 Braunschweig | Germany

Phone: +49 531 2155-209 | Fax: +49 531 2155-334
contact@ivth.org | www.ivth.org

The Fraunhofer-Gesellschaft | Die Fraunhofer-Gesellschaft

The Fraunhofer-Gesellschaft, headquartered in Germany, is one of the world's leading organizations for applied research. It plays a major role in innovation by prioritizing research on cutting-edge technologies and the transfer of results to industry to strengthen Germany's industrial base and for the benefit of society as a whole. Since its founding as a nonprofit organization in 1949, Fraunhofer has held a unique position in the German research and innovation ecosystem.

Die Fraunhofer-Gesellschaft mit Sitz in Deutschland ist eine der führenden Organisationen für anwendungsorientierte Forschung. Im Innovationsprozess spielt sie eine zentrale Rolle – mit Forschungsschwerpunkten in zukunftsrelevanten Schlüsseltechnologien und dem Transfer von Forschungsergebnissen in die Industrie zur Stärkung unseres Wirtschaftsstandorts und zum Wohle unserer Gesellschaft. Seit ihrer Gründung als gemeinnütziger Verein im Jahr 1949 nimmt sie eine einzigartige Position im Wissenschafts- und Innovationssystem ein.

With nearly 32,000 employees across 75 institutes and legally independent research units in Germany, Fraunhofer operates with an annual budget of €3.6 billion, €3.1 billion of which is generated by contract research – Fraunhofer's core business model. Unlike other public research organizations, base funding from the German federal and state governments is merely the foundation for the annual research budget. This serves as the basis for groundbreaking precompetitive research that will become important for the private sector and society in the years ahead. Fraunhofer's distinctive feature is its large share of industry revenue, guaranteeing close collaboration with the private sector and industry, and the consistent focus of Fraunhofer's research on the market. In 2024, industry revenue accounted for €867 million of its budget. Fraunhofer's research portfolio is augmented by competitively acquired public-sector funding, pursuing the right balance between public-sector and industry revenue.

Knapp 32 000 Mitarbeitende an 75 Instituten und selbstständigen Forschungseinrichtungen in Deutschland erarbeiten das jährliche Finanzvolumen von 3,6 Mrd. €. Davon entfallen 3,1 Mrd. € auf das zentrale Geschäftsmodell von Fraunhofer, die Vertragsforschung. Im Vergleich zu anderen öffentlichen Forschungseinrichtungen bildet die Grundfinanzierung durch Bund und Länder lediglich das Fundament des jährlichen Forschungshaushalts. Sie ist die Basis für wegweisende Vorlaufforschung, die in den kommenden Jahren für Wirtschaft und Gesellschaft bedeutend wird. Das entscheidende Alleinstellungsmerkmal ist der hohe Anteil an Wirtschaftserträgen, der Garant ist für die enge Zusammenarbeit mit Wirtschaft und Industrie und die stetige Marktorientierung der Fraunhofer-Forschung: 2024 beliefen sich die Wirtschaftserträge auf 867 Mio. € des laufenden Haushalts. Ergänzt wird das Forschungsportfolio durch im Wettbewerb eingeworbene öffentliche Projektmittel, wobei eine ausgewogene Balance zwischen öffentlichen und wirtschaftlichen Erträgen angestrebt wird.

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Fraunhofer Institute for Wood Research
Wilhelm-Klauditz-Institut WKI
Riedenkamp 3
38108 Braunschweig
Germany

Phone: +49 531 2155-0
Fax: +49 531 2155-334
info@wki.fraunhofer.de
www.wki.fraunhofer.de

Acting Director
Prof. Dr. Raoul Klingner
Phone: +49 531 2155-212
raoul.klingner@wki.fraunhofer.de

Deputy Director
Prof. Dr. Tunga Salthammer
Phone: +49 531 2155-213
tunga.salthammer@wki.fraunhofer.de

Editorial office
Heike Pichlmeier

Concept and design
Manuela Lingnau

Typesetting
Manuela Lingnau
Heike Pichlmeier

Press
Please direct press inquiries to
anna.lissel@wki.fraunhofer.de

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Neuer Weg 48A
38302 Wolfenbüttel
Germany

Contact

Fraunhofer Institute for Wood Research
Wilhelm-Klauditz-Institut WKI
Phone +49 (0)531 2155-0
Fax +49 (0)531 2155-334
info@wki.fraunhofer.de

Fraunhofer WKI
Riedenkamp 3
38108 Braunschweig | Germany
www.wki.fraunhofer.de