



Internationalisation

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Australia	Deakin University, Melbourne/Geelong
Belgium	Ghent University
China	Tongji University, Shanghai University of Shanghai for Science and Technology (USST) Tianjin University
Greece	University of Patras (UoP)
Great Britain	University of Oxford University of Bristol University of Nottingham Queen's University Belfast Imperial College London
India	Indian Institute of Technology, Neu Delhi (IIT Delhi) Indian Institute of Technology, Madras (IIT Madras)
Latvia	Technical University, Riga
Netherlands	Technical University Delft
Poland	Politechnika Warszawska, Warschau Politechnika Wrocławska, Breslaun Akademia Górniczo-Hutnicza, Krakau Politechnika Śląska, Gliwicz
Singapore	Nanyang Technological University (NTU)
South Korea	Inha University (IU), Incheon Korea Institute of Science and Technology (KIST), Jeonbuk Branch Korean Institute of Material Science (KIMS), Changwon Jeonbuk National University (JBNU), Jeonju

Think globally, act jointly: The ILK's international research network

Finding joint answers to the questions of our time requires interdisciplinary cooperation worldwide. Throughout its 29-year history, the ILK has always been committed to building relationships and supplementing its own competences with the expertise of international partners. From student exchanges and visits by visiting researchers to the realisation of joint international projects and events - a broad international network with leading research institutions and renowned scientists has been established at all levels and continues to grow from year to year. Our strategic focus is on strengthening cooperation with established partner institutions in **India, South Korea, Singapore, China** and **Greece** as well as further promoting and intensifying cooperation with **Poland** and the **UK** in the areas of education, digitalisation, joint research as well as knowledge transfer and knowledge dissemination. Existing collaborations will be bundled and

strategically advanced, particularly with regard to the **UTC Dresden** and the international **DAAD education projects**: the EDI:TUD project with a special focus on the integration of international students, the bilateral IGP project COMPOLL with IIT Delhi and mobility projects as part of the Partnership for Early Career Researchers (PPP) programme, especially with Poland. Finally, the regularly organised international summer schools are of crucial importance for the Institute's internationalisation strategy.

The efforts of ILK contribute to building an international community of researchers and their institutions, promoting cutting-edge innovations and lightweight solutions globally, particularly those that are resource-efficient. The goal is to find collective answers to the pressing questions of our time.

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Successful – Digital – Integrated. The second project year

The STIBET II project "Successful - Digital - Integrated: Studies at the TU Dresden" (EDI:TUD), which was launched in 2021, aims to research and improve the welcoming culture and integration of international students at the TU Dresden. The results of the pilot project, which is funded by the DAAD and the German Federal Foreign Office until 2023 and carried out at the ILK, are to be extended to other faculties and institutions at the TU Dresden in the long term.

The focus of the project is to support international students on their educational path at the TU Dresden through suitable measures and thus promote their integration. The aim is to reduce drop-outs, shorten the overall duration of studies, improve study results and derive recommendations for action. The project places particular emphasis on recognising language barriers as a possible source of uncertainty for students, which in the worst case can lead to students dropping out. Another aim of the accompanying research as part of the EDI:TUD project is to evaluate the study conditions for international students at the TU Dresden. In a next step, this research work will form the basis for a follow-up project to analyse the study and living situation of students. The results of EDI:TUD so far show that the targeted promotion of integrative and interactive meeting spaces between international and German students can make a

significant contribution to improving the welcoming culture and integration. At the ILK, which is home to a considerable number of international students, mainly from China, these findings are particularly relevant. In order to encourage exchange between students, student mentors are appointed to organise various meetings, joint activities and smaller student events. Against this background, the EDI:TUD team plans and realises a variety of sports and cultural events for all ILK students, with a special focus on international participants, in addition to academic activities. These events promote both social integration and mutual understanding and also help to celebrate the diversity of the student body.

Further information on the project and its results can be found in the article "Willkommenskultur im Fokus" by Dr Franziska Schulze Stocker (ZQA - Centre for Quality Analysis at the TU Dresden) in the Dresdner Universitätsjournal:



<https://tu-dresden.de/ing/maschinenwesen/ilk/das-institut/news/edi-tud-im-letzten-dresdner-universitaetsjournal>

Close neighbourhood partnership with the Czech cluster WASTen

The Czech-German workshop "Recovery of Valuable Materials" of the TU Dresden, the Saxon Agency for Structural Development GmbH (SAS) and the Czech cluster WASTen took place on 26/27th September 2022 as part of the cross-border cooperation between the Engineering Sciences Department (ING) of the TU Dresden and the Czech Republic. At the two-day workshop, high-calibre representatives from the TU Dresden, the Jan Evangelista Purkyně University Ústí nad Labem and the Czech cluster WASTen met with various other experts from science, politics and business to discuss the recovery of valuable materials from waste and residual materials. The ING department was represented in the front row by its spokesperson Prof. Michael Beckmann and Ms. Maike Heitkamp-Mai, the department's International Affairs Advisor. The interests and perspectives of the WASTen cluster were represented by high-ranking members of the cluster, such as Dr. Radek Hořenovský, Vojtěch Brož and Tadeas Rusnok. Prof. Maik Gude and Ms. Radka Tomečková, ILK International Affairs Advisor, were present on behalf of the ILK. The highlight of the event was the round table



The participants of the workshop "Recovery of Valuable Materials", Sep. 2022.

discussions, which stimulated a lively exchange. While Prof. Gude presented the innovations of future-oriented, resource-efficient lightweight construction and plastics technology at the "Plastic Materials & Composite" table, Ms. Tomečková was able to support the trilingual, German-Czech-English debates of the experts with her personal background. With around 60 participants, the first Czech-German workshop on important future-oriented

topics in the context of materials science was able to strengthen cross-border cooperation between the TU Dresden and the Czech Republic and systematically expand the individual partnerships into a network. The meeting thus marks an important step towards institutional cooperation and paves the way for future joint projects and initiatives.

Progress and innovations in the Polish Partnership 2022

The Joint PhD Programme between Politechnika Warszawska and the ILK, which was launched in 2017, made significant progress in 2022. Representatives from both institutions met at Politechnika in Warsaw on 11th July 2022 to plan the next steps and strengthen the co-operation. The meeting was attended by high-ranking personalities, including Prof. Anna Boczkowska from Politechnika Warszawska and Prof. Maik Gude from the ILK. Changes to the legal framework on the Polish side made it necessary to adapt the existing agreements between the two universities. The revisions were initiated at this meeting. Two new candidates for the joint PhD programme are also already in the starting blocks.

The fourth Saxon-Polish Innovation Day, which took place on 15/16th September 2022 at the Politechnika Wrocławska (PWR), is another milestone in the sustainable, cross-border cooperation between science and industry between the Free State of Saxony and the Republic of Poland. This innovation summit, which was held under the motto "The future of European industry: flexible – digital – sustainable" and focused on the megatrends of sustainability and digitalisation, was organised by the TU Dresden in cooperation with the Saxony Economic Development Corporation (WFS), the Saxony's Liaison Office in Wrocław and the City of Wrocław.

Saxony's Minister President Michael Kretschmer opened the event, while Justice Minister Katja Meier accompanied the second day of the event. The cooperation agreement between the TU Dresden and PWR was also ceremoniously renewed during the Innovation Day.

Now in its fourth year, the Saxon-Polish Innovation Day remains an important platform for cross-border dialogue on jointly tackling global challenges, particularly in the areas of climate protection and sustainability.



Cooperation with Riga Technical University and Development of new co-operation projects with T.I.M.E. Association

From 18th to 29th July 2022, the summer school on "Fracture Structures" took place at Riga Technical University (RTU), which was organised under the leadership of RTU and with the participation of the TU Dresden, LUT Finland and Politechnika Wroclawska. Scientists from all participating universities jointly designed the programme.

The ILK scientist, Dipl.-Ing. Karsten Tittmann, travelled to Riga as a guest lecturer and presented his research. In the lecture "Damage and Fatigue in Fiber Reinforced Plastics - Phenomenology and Modelling Approaches" he gave a broad overview of the research activities at the ILK and discussed the special features of the damage behaviour of fibre-reinforced plastics under monotonic and cyclic load. In addition to the presentation of the damage phenomenology from numerous experiments, a special focus was placed on the possibilities for modelling the damage. Basic modelling approaches were presented and transferred to advanced fatigue and damage models that have been developed in various past and current ILK dissertation projects.

The summer school was funded by the T.I.M.E. Association, an association of more than 50 technically orientated universities, of which the TU Dresden has been a member since 2002. Ms. Maike Heitkamp-Mai (International Affairs Advisor at the Department of Engineering Sciences) took the opportunity to take up the cooperation with RTU, especially after the long corona-related break, and to develop new approaches for future cooperation projects at departmental level together with the T.I.M.E. Association partners present.



© Karsten Tittmann

Participants of the summer school "Fracture Structures".

Design, synthesis and integration of intelligent Materials: Review of the DCIM Summer School 2022

From 22th to 25th August 2022, an international summer school on the topic of "Dimensions of Intelligence in Materials" was held with the support of the TU Dresden and DRESDEN-concept. The Dresden Centre for Intelligent Materials (DCIM) organised the event. More than 30 students, doctoral candidates and young scientists came together with internationally renowned experts from the Dresden Technical Collections to discuss the design, synthesis and integration of intelligent materials.

The summer school presented various approaches to defining "intelligent" materials. These materials can perform calculations independently, assemble themselves, have sensory and actuator properties and can be integrated

into complex systems and increase their functionality. The central subject of the summer school was developed from the laboratory scale and approaches for the synthesis of intelligent materials. It was also shown how simulation, modelling and design help to prepare materials for practical use. The lectures were given by renowned representatives from ETH Zurich, the University of Oxford and the University of Auckland. The laboratory visits to the Leibniz Institute of Polymer Research Dresden (IPF), the Helmholtz-Zentrum Dresden Rossendorf (HZDR) and the ILK included in the summer school programme gave the participants an insight into the research spectrum and scientific achievements of the Dresden area. A visit to the Gläsernen Manufaktur of Volkswagen successfully

International DAAD scholarship holders support the ILK doctoral students and contribute to lightweight construction research

Every year, the DAAD programme RISE Germany awards research internships to students from North America, Great Britain and Ireland, which they can complete at the TU Dresden and other Dresden research institutions. The RISE scholarship holders have the opportunity to complete a research stay of up to three months in Dresden, which is funded by the Federal Foreign Office and through institutional cooperation with various research institutions in the city.

As part of this programme, the ILK offered five places for RISE interns in 2022. The RISE programme is characterised by a number of benefits, including the support of dedicated supervisors, the internationalisation of the host institutions, the targeted further training of the scholarship holders and the opportunity to gain cultural experience.

A look at specific research projects reveals the range of topics addressed within these collaborations. These range from the vibration analysis of fiber composite structures and testing methods for hydrogen storage systems to the squeeze-flow behavior of fiber-reinforced plastics. In addition, innovative approaches such as machine

learning for generating microstructures and data-driven prediction of the deformation of compliant mechanisms were explored

To promote networking and exchange not only among ILK fellows but among all Dresden RISE scholarship recipients, the ILK organized a meeting at the 'Fährgarten Johannstadt' on the Elbe River. The event provided an opportunity to exchange experiences and establish new contacts in a relaxed atmosphere.



South Korea.

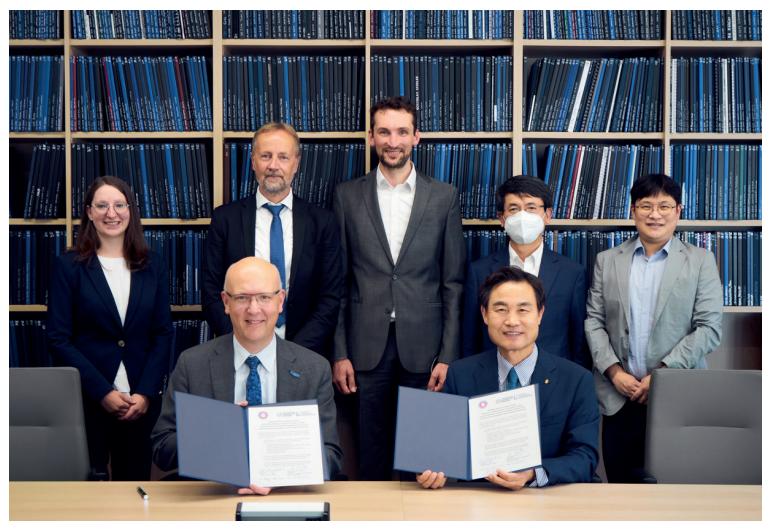
A new 'friendship' within the Lighthouse Countries Network

The ILK has signed a Memorandum of Understanding (MoU) with Jeonbuk National University (JBNU) to strengthen future collaboration between both institutions. JBNU is a key player in the Jeonju region of Korea and is actively seeking international contacts in Europe, particularly exploring opportunities for educational exchanges and mobility activities. This initiative was brought to ILK's attention in 2022, aligning with the university's interest in fostering international partnerships.

On 10th August 2022, Professor Dong-Won Kim, President of JBNU, accompanied by the core team from JBNU's Internationalization Office, visited the ILK and its technical facilities. The delegation's visit concluded with the signing of the MoU by Professor Kim on behalf of JBNU and Professor Niels Modler on behalf of the ILK.

Jeonju, the region around Jeonbuk, is an H2 model region – from the production and storage to the utilisation of hydrogen. The ILK is also highly active in these fields. Topics such as H2 compression, transmission and storage in stationary and mobile systems and, in particular, hybrid-electric flying and H2-powered vehicles are among the ILK's areas of interest. The research areas and issues of the JBNU and the ILK overlap considerably here, so that in

the first meetings in 2022, the possibilities for future joint projects between the JBNU and the ILK's "Lightweight Design" specialist group, headed by Dr Sebastian Spitzer, were already discussed in addition to the intended educational cooperation.



Signing of the Memorandum of Understanding by Prof. Modler (front left) for the ILK and Prof. Kim (front right) for the JBNU.

COMPOLL. Mobile again at last! Delegation visit at the end of the year

On 16th December 2022, a TU Dresden delegation led by Prof. Ronald Tetzlaff (CTIO of TU Dresden) travelled to India to deepen the existing university partnerships with IIT Delhi and IIT Madras and to promote the networking of TUD alumni, representatives of German science organisations and industry contacts in India. The focus of the visit was on the cooperation projects ABCD Centre and COMPOLL. During their stay in India, the delegation held talks with the heads of the institutes and faculties of the two IITs to identify opportunities for strategic cooperation. Other important topics of dialogue were the mobility of students and researchers as well as the interdisciplinary nature of potential joint projects.

In addition to the IITs, the commission established contacts with the German Research Foundation (DFG) in India, in particular via the Indo-German Chamber of Commerce (AHK India) and the German Centre for Research and Innovation DWIH New Delhi. The TU Dresden organised a meeting with representatives of German university liaison offices, funding organisations and the German Embassy to discuss the options and challenges for university partnerships and student mobility between Germany and India. The COMPOLL project and the ABCD centre also carried out independent activities to intensify their respective cooperation with the corresponding IIT partner. The two-day conference "Pollution Awareness in Research and Teaching" jointly organised by the IIT Delhi and the ILK provided an excellent platform to present the latest research activities of both COMPOLL partners. This was the event in presence since the project began in 2020.

The poster session, in which excellent students and doctoral candidates from the IIT Delhi could apply for a COMPOLL scholarship with a poster presentation of their research results, was highly successful in terms of exchange and the acquisition of qualified candidates for individual COMPOLL mobilities and research stays at the ILK. In the end, Mr. Jonty Mago and Ms. Sushmita Ghosh shared the first prize for the best poster and thus also the scholarship for 2023.

The COMPOLL travel team also used the week-long stay to hold a partner meeting and various closed meetings with high-ranking department representatives, the Dean's Office and the International Office of the IIT Delhi. The insights gained into the institutional structures of the IIT, campus life and the scientific and technical network enabled structured planning of future measures until the end of the project. The COMPOLL visit to New Delhi was rounded off with intercultural leisure activities organised by the partner – a gala dinner, a city tour through the metropolis of New Delhi and the highlight: a visit to the Taj Mahal.

The COMPOLL project, its implemented activities as well as its prominent position within the TUD delegation in India, emphasise the importance of international cooperation in tackling global environmental problems. The guiding vision is to develop a better understanding of the challenges, shortcomings and solutions related to pollution awareness in the two countries, India and Germany. A comprehensive, bilateral dialogue should enable the identification of the most important aspects.



COMPOLL-Meeting at the Indian Institute of Technology Delhi.



Imprint

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List of Abbreviations

TUD	Technische Universität Dresden
ILK	Institute of Lightweight Engineering and Polymer Technology at the TU Dresden



Overview
research report 2022

https://tu-dresden.de/ing/maschinenwesen/ilk/das-institut/veroeffentlichungen-ilk?set_language=de#

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