

Internationalisation



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2021, the ILK's internationalisation work was also influenced by the pandemic conditions. Numerous international activities remained in or had to be moved back into the digital space. Of course, stays abroad had to be postponed or even cancelled, but altogether the extent and intensity of our international activities was only slightly reduced. On the contrary, internationalisation

was influenced in a positive sense, because we not only tested the new tools and methods of the digital world, but made also use of the hybrid formats to enrich our diverse collaborations.

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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) National and Kapodistrian University of Athens
Great Britain	University of Oxford University of Bristol University of Nottingham Queen's University Belfast Imperial College London
India	Indian Institute of Technology (IIT) Delhi, Neu Delhi
Poland	Akademia Górniczo-Hutnicza im. Stanisława Staszica, Krakau Politechnika Warszawska, Warschau Politechnika Śląska, Gliwicz Politechnika Wrocławska, Breslau
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

Scientist exchange and international partnerships

Due to travel restrictions, only limited mobility took place within the framework of the **ERASMUS and IASTE** exchange programmes. Nevertheless, thanks to IASTE, we were able to host six interns from Brazil, Ghana, Greece and Iran at the ILK. Furthermore, we sent an ERASMUS scientist to the University of Inha in South Korea for a three-month research stay. Other researcher exchange with the Chinese Tongji University and the Chinese-German University College (CDHK) had to be postponed until 2022.

The excellent results of internationalisation in 2021 included the successful completion of Dr. Valverde's doctorate in the Joint PhD-Programme with the University of Bristol. The results of his PhD thesis are reported on page 81.

In July 2021, the kick-off meeting of the **DAAD-project "Development of the innovative technology for the production of hybrid structures"** took place. In addition, further visits were realised within the framework of the ILK's cooperation project with the AGH Krakow (Poland): On the one hand, the ILK was welcoming Professors Selboda and Wojtaszek as well as the junior researcher Mr. Zygula in Dresden, on the other hand, Mr. Stanik and Dr. Langkamp from ILK visited the Polish partner in October.

2021, the country network with the Republic of Korea, awarded by the Lighthouse of TU Dresden, was extended to **Inha University (IU)**, Incheon. Although the ILK's partnership with the Inha Institute of Technology (IIT) from the Inha University is still very new, the first experiences have been extremely positive and both sides are strongly motivated. The focus of the cooperation is particularly on the expansion of interdisciplinary PhD supervision: **Joint PhD Programme TU Dresden/IU**. Despite the pandemic we organised a stay of ILK students at the IU. In addition to networking between the members of both institutes, the focus was on research in the field of hydrogen storage. The results will be published and the paper presented at the 20th European Conference on Composite Materials (ECCM20), in Lausanne (Switzerland) in June 2022. A return visit by ILK representatives to South Korea and the continuation of research work are planned for 2022.

Nanyang Technological University (NTU), Singapore is currently ranked eighth in the QS World Ranking for Engineering with an overall score of 91.8. This is making

it one of the best technical universities in the world. A **Joint PhD programme with the School of Mechanical and Aerospace Engineering (MAE)** is currently being established. The deepened networking with NTU Singapore in the field of lightweight engineering that is being pursued in this way fits perfectly into the ILK's already robust internationalisation strategy. The further goal is to strengthen the international education of students and doctoral candidates, the implementation of research projects, the increase of the ILK's international recognition. With its stronger focus on the technical and natural sciences, the NTU can significantly complement the teaching and research at the TU Dresden. In return, the TU Dresden can bring the partnership its competence of high interdisciplinarity in the processing of research questions and expertise in the transfer of scientific solutions into practice. A partnership of both universities combines these diverse competences and allows the institutions to appear internationally as thought leaders of a sustainable and inclusive scientific society. The MAE at NTU is one of the largest mechanical engineering schools in the world, with more than 90 members. Faculty members are recruited from reputable universities worldwide and offer a lot of collective expertise in the traditional and upcoming disciplines of mechanical and aerospace engineering, as well as in the specialised fields of manufacturing, mechatronics, innovative design, nanotechnology or biomedical and computer-based applications. In the context of the industry and in the pursuit of sustainable habitats, MAE is also consistently developing other key skills to support the growth and competitiveness of the mechanical engineering sector in the global landscape. The collaborative research topics of the ILK and MAE are "Smart Structures", "Digital Twins", "Artificial Intelligence", "VTOL Systems", "Electrical Machines" and "Manufacturing Technologies". In addition, UTC Dresden contributes its outstanding qualifications in the areas of lightweight engineering systems, multi-material design and robust design. The prepared Joint PhD Programme will provide optimal conditions for the exchange of doctoral students. In this programme, doctoral students from Singapore and Dresden will be supervised and evaluated in their projects by a Supervision Management Committee (SMC) with equal number of representatives from both universities. The dual doctorate will also include a research stay of at least 6 months at the respective partner university. At the end of 2021, the conceptual work was completed and the agreement for the Joint PhD Programme was submitted for final approval.

Model project EDI:TUD. Study success of international students of the ILK

1. Promotion and teaching of academic language:

In cooperation with ILK teachers, the SZD, central institutions at the TU Dresden and external experts, coaching for the practical use of academic language has been designed and implemented since the winter semester 21/22. This creates a specific offer for language use and language didactics that not only sensitises teachers to the needs of international students, but at the same time provides tools for teaching academic language and supports the practice of a uniform grading concept that takes into account the (linguistic) challenges of international students.

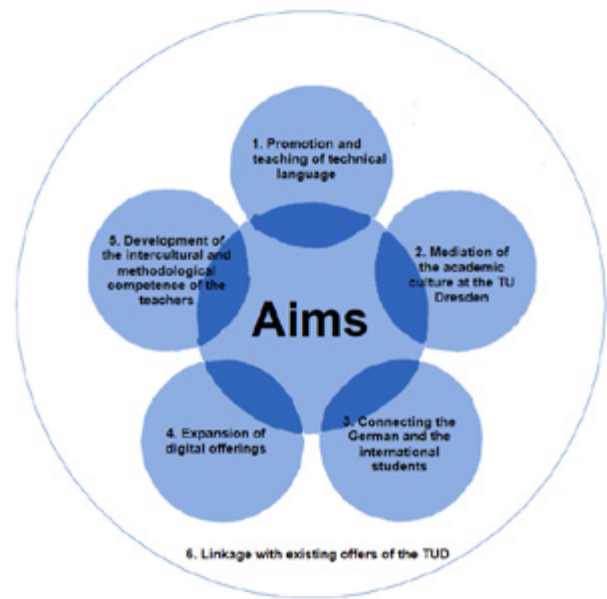
2. Mediation of the academic culture at the TU Dresden:

Since June 2021, a tandem programme has been implemented at the ILK. Each tandem consists of two students - the tutor supports, translates and advises his/her foreign tandem partner and mediates between students and teachers. In a further step, the tandems act as mediators or mentors for other German students interested in the tandem activity. Handouts and guidelines are also being developed with ILK teachers to achieve this goal. The website OPAL for students provides information and advice about studying, culture and everyday topics. New FAQs with the most important questions for international students have been created, as well as testimonial and explanatory videos that allows insights into life and studies at TU Dresden.

3. Connecting the German and the international students:

The basic idea behind the third goal is to reduce segregation by origin through the formation of interest groups. To enable German and international students to interact with each other, peer-to-peer activities are implemented, with tutors functioning as intermediaries between international and German students. Moreover a matrix-based exchange platform is currently being organised to get to know each other easily before the start of the semester.

4. Expansion of digital offerings: The analogue and digital support services of the TU Dresden will be better linked to enable international students to learn independently. This should give international students easy access to (i.) necessary information (e.g. via forums, wikis and self-tests on OPAL), as well as to (ii.) interactive tools where their specific questions and needs can be specifically addressed (e.g. current set-up of an interactive Python notebook).



© TUD, Source: Schulze-Stocker et al., Successful, digital and integrated study - a project to increase the academic success of international students at the TU Dresden (in press)

5. Developing the intercultural and methodological competence of the teachers:

A further effort is to update and systematise the already existing teaching materials (especially for e-learning) and to supplement them with newly recorded ones. The aspects of interculturality, internationalisation and e-learning didactics are given special consideration. In addition, the teachers take part in internal and external continuing education programmes. Besides intercultural training (together with SPRINT) was organised for sensitisation in dealing with Chinese students.

6. Linkage with existing offers of the TUD:

The primary goal of EDI:TUD is to create synergies with existing offers at the TU Dresden, which will be implemented in the ILK as a model institute. Current networking activities are e.g. with the ZiLL, WBZ, TUD Certificate E-Teaching or the PASST?! programme. This also includes the prepared transfer of results for adaptation outside the model project at the ILK and the exchange of experience between the involved partners.

The achieved results will be published in: Schulze-Stocker et. al., *Erfolgreich, digital und integriert studieren – ein Projekt zur Steigerung des Studienerfolgs internationaler Studierenden an der TU Dresden*.

Partnerschaft mit Indien: Counsellor Science & Technology der indischen Botschaft zu Gast am ILK



Tour of the ILK's experimental facilities: (from left to right) Prof. Niels Modler, Maike Heitkamp-Mai, Dr. Madhusudan Reddy Nandineni, Kaushik Ganesh Abhyankar and Dr. Angelos Filippatos.

India – with almost 1.4 billion people the second most populous country and largest democracy in the world – has developed rapidly in recent decades. Therefore, India plays a key role in the fight against climate change, among other things. Especially in the field of science and technology, there are long and intensive relations with Germany, and also with the TU Dresden. Students from India are among the largest groups of international students at TU Dresden. There are active interdisciplinary collaborations with several Indian universities and research institutions, and these cooperations shall be expanded in the future.

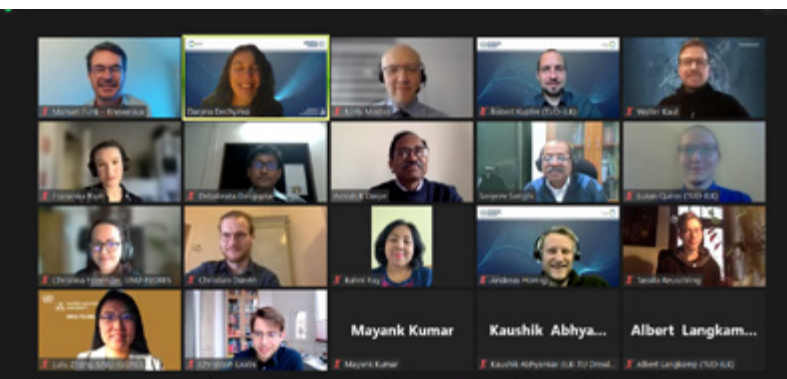
On 20 August 2021, the Counsellor for Science & Technology of the Indian Embassy in Germany: Dr. Madhusudan Reddy Nandineni, was a guest at TU Dresden in order to exchange views on current and future joint projects. In this context, he was also welcomed at the ILK. During his visit, Dr. Reddy was introduced to the current research as well as the international activities of the ILK and enjoyed a tour of our test facilities. Dr. Reddy's visit to the Institute summed up the results of the Indo-German cooperation in the COMPOLL project and opened up new perspectives for our cooperation with Indian universities, companies and public institutions.



Dr. Angelos Filippatos in conversation with Dr. Madhusudan Reddy Nandineni.

In consideration of the constantly growing population, minimising the impact of human activity on the environment is becoming a crucial issue. In particular, noise, air and water pollution as well as waste management have become one of the greatest global challenges. Managing these tasks requires extensive transnational cooperation between societies with their different stages of development, linguistic diversity and cultural backgrounds, as well as their local problems and convictions. The DAAD project "Combating Environmental Pollution through Internalisation of Education" (COMPOLL) wants to achieve a better understanding of the challenges, deficits and possible solutions regarding environmental consciousness in Germany and India. The application and cooperation partners are the ILK and the Indian Institute of Technology Delhi (IIT Delhi). The project intends to increase the awareness of topics such as reducing plastic waste, recycling or sustainable design strategies and, against this background, strengthen the partnership between TU Dresden and India.

With IIT Delhi against environmental pollution. COMPOLL Mini-Conference 2021



On 30 November and 1 December 2021, a mini-conference on “Online Learning Curriculum Design” was held as part of the DAAD-funded project for Indo-German Partnerships (DIP) COMPOLL. The aim of this event, organised by the ILK together with the IIT Delhi, was the exchange of expert knowledge on environmental pollution, especially in the context of online teaching and curriculum design. About 30 guests attended the sessions, participated in workshops and discussed concrete ideas for the future realisation of the cooperation between the two institutes or universities and for strengthening the existing partnership between Germany and India. In the foreground – the COMPOLL topic: How can interdisciplinary and international cooperation overcome the problems of environmental pollution as well as waste management? The existing network between the leading Indian research institutions and the TU Dresden will be used here to increase environmental consciousness: How can we integrate environmental awareness into the curriculum? How can we realise joint study programmes of India and Germany? What does online teaching of the future look like? These and other questions were the focus of the COMPOLL mini-conference.

The two-day mini-conference opened with two keynote speeches. Dr. Madhusudan Reddy Nandineni from the Indian Embassy in Berlin spoke about the new Indian education policy (NEP-2020). With the aim of developing a new higher education system with quality education, fairness and inclusion, the NEP-2020 is particularly supportive of internationalisation activities. Shikha Sinha from the DAAD office in New Delhi presented cooperation projects between India and Germany and spoke about the role of the DAAD in future activities in the field of digitalisation. After these inspiring opening speeches, other invited

speakers from India and Germany shared their expertise and experience. Dr. Patrícia Gallo (Centre for International Postgraduate Studies of Environmental Management, UNESCO CIPSEM) reported on organising online trainings for environmental decision makers - good communication and honesty are the roots of their successful implementation. Dr. Lulu Zhang and Dr. Christina Frommder (United Nations University Institute for Integrated Management of Material Fluxes and of Resources, UNU-FLORES) described the design of environmental education curricula. Then Prof. Dr. Kathrin Harre (HTW Dresden - University of Applied Sciences) spoke about microplastics and her goal to integrate current research results into her teaching concepts. In the afternoon, invited speakers from IIT Delhi shared their views: Prof. Dr. Mayank Kumar spoke about didactics in the context of air pollution, Prof. Dr. Bahni Ray focused on techniques to combat air pollution and finally Prof. Dr. Ashish Darpe discussed a concrete example, namely the IGI airport in New Delhi and the noise pollution that occurs there.

On the second day, the focus was on workshops and actual realisation of the COMPOLL cooperation between India and Germany. The first workshop dealt with the specifics of online learning formats compared to face-to-face teaching and suggested e-teaching formats for the joint programmes of IIT Delhi and ILK while discussing suitable tools and didactic approaches. In the second workshop, the participants discussed the possibility of integrating IIT Delhi's research activities on environmental pollution into the curricula, expanding the cooperation between IIT Delhi and ILK, and the possibility of a cooperatively organised event on air and noise pollution.

At the mini-conference, ideas on curriculum design, tools and didactics, topics for international education in environmentally conscious engineering as well as research on environmental protection in teaching formats and knowledge transfer were developed and will be included in the next steps of the COMPOLL project. The topics of environmental responsibility, recycling and waste management are to be added to the teaching profiles of both universities. Therefore, the preparation of academic staff for the implementation of teaching using new forms of teaching (e-learning) as well as openness to the internationalisation of academic life and work is essential. The COMPOLL mini-conference provided concrete approaches for the realisation.

The Greek-German Autumn School 2021

The DAAD-funded “1st Greek-German Autumn School on Lightweight Engineering and Composite Design” between the TU Dresden and the University of Patras (UoP) took place from November 8-12, 2021 in Patras. The aim of the Autumn School was to introduce the scientific location Dresden to the participants and to familiarize them with the teaching and research approaches at the TU Dresden in general and in engineering sciences in particular. A seven-member delegation from TU Dresden, led by Prof. Niels Modler (ILK, Chair of Function-Integrative Lightweight Engineering), joined Institute Director Prof. Vassilis Kostopoulos and his team for the Autumn School, which was attended by a total of 23 Masters and PhD students from the UoP. The intensive and busy week ended with an information event on studying in Germany and at the TU Dresden, organised together by the DAAD office in Athens and the Goethe Centre Patras.

In addition, the Autumn School brought together the complementary competences of the ILK and the Applied Mechanics Laboratory (AML) of UoP in the field of functionally integrative lightweight structures in order to further develop current research questions and to lay the foundation for further joint projects. Furthermore, the AML and the ILK signed a Memorandum of Understanding and the International Affairs Advisor of the School of Engineering Sciences and representatives of the ILK hold initial talks with the Rectorate of the UoP on the establishment of a Joint PhD Framework Program between the two universities.



Participants of the DAAD Autumn School 2021.



Signing of the Memorandum of Understanding between the AML and the ILK.



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List of Abbreviations

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



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