

Borealis Innovation Award 2022 for the best HTL final papers

VIENNA, 30 May 2022. Austria's industry is setting the pace, in many respects. In this context, young technicians who are shaping the future of the industry with their innovative ideas, already play a major role. To support these young talents, the best final papers of Austrian higher technical secondary school (HTLs) graduates were honoured at the 17th Borealis Innovation Award ceremony.

Measured in terms of value added, the manufacturing sector is the largest industry in Austria; its innovation potential, which is reflected in the approximately 1500 patents granted annually, is on a high level. An important factor contributing to this success are the graduates of the Austrian HTLs. Therefore, each year Borealis awards the best HTL final papers in the field of plastics and environmental technology at the TGM Vienna to promote young talent.

Modern technologies thanks to innovative solutions

While the automation of processes and the ongoing digital transformation ("digitalisation") play a major role in the public perception, modern technologies also require innovative materials. This is reflected in the final papers awarded this year, which dealt with topics such as process monitoring, processing optimisation, and flame-resistance of plastics in e-mobility.

Marie Dekan and Klara Hummer researched the use of artificial intelligence to monitor the quality of manufacturing processes in plastics manufacturing. This innovative approach was awarded with the first place by an expert jury.

The runners-up, Felix Petutschnig and Xaver Rosnagl, were honoured for their paper on the intrinsic reinforcement of polyethylene. Their research aims to facilitate the production of plastic components that have the same mechanical properties as steel.

Teodora Aleksic, Carina Bachmayer and Marko Cilek improved the safety of electric vehicles by developing a fireproof battery compartment, for which they achieved third place.

Addressing challenges together.

The exceptional quality of the award-winning papers is reflected in the topicality of the subject matters, amongst other things. "The close link to current economic issues is what makes our HTL graduates' final papers stand out," Klemens Reitingner, head of the TGM department, explains. "It is thanks to the close relations between academia and industry that such projects can be carried out successfully and fully in line with current trends."

This close cooperation is also reflected in Borealis' support for education programmes, and in the awards presented to students, honouring their academic achievements and innovation. Markus Horcher, Director Sustainability & Public Affairs at Borealis, put an emphasis on this fact during the award ceremony: "Our society's path into the future is set by global, social and ecological challenges which can only be met with cutting-edge compound material solutions and technologies."

Borealis sees the big challenges facing our society when dealing with the consequences of climate change, and at the same time meeting the increasing resource requirements of a growing global population. Horcher adds: "In line with these trends, we at Borealis are focusing on the comprehensive expansion of a sustainable circular economy, as well as on delivering innovations to achieve climate neutrality. To succeed in finding the right solutions to these challenges, we require young technicians with high commitment; this is why Borealis makes it a priority to support them."

The commitment to a close cooperation between the TGM and the Austrian plastics industry was further illustrated by the large number of participants. Almost 150 representatives from commerce and industry attended the award ceremony in the ballroom of the Austrian Trade Association at the Palais Eschenbach.

Award Winners of the Borealis Innovation Award 2022

Winners

Topic: Process capability analysis through artificial intelligence

Project team: Marie Dekan and Klara Hummer

Partner company: Gabriel-Chemie GmbH



Photo: Recording of the process parameters on a processing machine.
(f.l.t.r.: Klara Hummer, Marie Dekan)

Summary:

In industrial production, the quality inspection of products often takes place at a later stage than the manufacturing process itself. If defective parts are discovered during these checks, a large number of products often have to be discarded. This problem could be remedied by an artificial intelligence (AI)-based system that is able to predict the quality of products in real time based on production parameters.

In their paper, Marie Dekan and Klara Hummer investigated the suitability of so-called neural networks for describing production processes in plastics technology. Their results showed that these AI models can identify important influencing variables and thus help reduce the reject rate.

Runners-up

Topic: Self-reinforcement in polyethylene through shish-kebab structures

Project team: Felix Petutschnig and Xaver Rosnagl

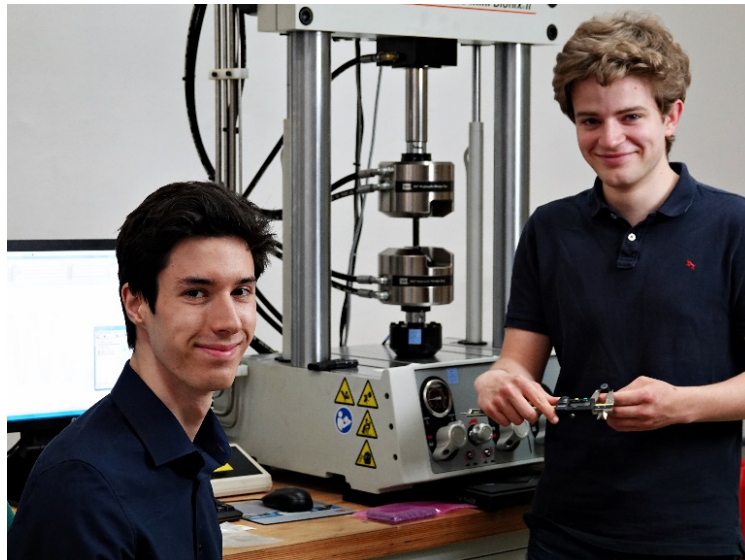
Partner company: Laboratory for Plastics Technology Ges. m. b. H.

Summary:

High-strength components made of plastics seem rather unusual to many people, as plastic is commonly associated with products that are not very robust. This makes it all the more surprising that Felix Petutschnig's and Xaver Rosnagl's made it their goal to produce high-strength plastic products that can compete with steel.

For this purpose, a standard plastic (polyethylene) exhibiting distinct crystal structures due to a special processing method, using high pressure and orientation, was chosen. These structures, which are called "shish-kebab" because of their appearance, produce extraordinarily good mechanical properties.

Initial results have already been promising. By modifying the molecular lengths, the team was able triple material strength. With their work, the two plastics engineers hope to pave the way for the production of lighter yet stronger components in the future.



Pfoto: Determination of the mechanical properties.
(f.l.t.r.: Xaver Roßnagl, Felix Petutschnig)

3rd place

Topic: Flame-retardant lightweight structures for battery compartments

Project team: Teodora Aleksic, Carina Bachmayer, Marko Cilek

Partner company: State Research Institute for Mechanical Engineering

Summary:

While electric mobility has seen a major upswing for some years now, fire incidents involving battery systems regularly show the potential hazards of this technology. Electric motorbikes from MotoE, for example, caught fire several times while charging the lithium batteries; similarly, vehicle fires at several well-known car manufacturers have also triggered a discussion about the safety of electric vehicles.

For this reason, Teodora Aleksic, Carina Bachmayer and Marko Cilek designed a flame-retardant battery compartment that is particularly light and intended for racing. The specially developed plastics and the lightweight components produced using 3D printing ensure low mass, while still delivering a high load-bearing capacity. The result is an energy-efficient battery compartment with enhanced fire resistance, which is already being tested in racing.



Photo: Testing the fire resistance of the battery case.
(f.l.t.r.: Marko Cilek, Teodora Aleksic, Carina Bachmayer)

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Photos (usable free of charge)

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The photos shown can be downloaded in higher resolution via the link below. Photos of the award ceremony will also be available online from 31 May 2022.

<https://magentacloud.de/s/EzbP5ej2bYxy5GC>

About TGM

TGM - Die Schule der Technik (The School of Technology) is the largest HTL in Vienna with around 2,800 students and more than 300 teachers. The school's curriculum includes biomedical and health technology, electronics and technical informatics, electrical engineering, information technology, plastics and environmental technology, mechanical engineering, as well as industrial engineering.

www.tgm.ac.at

About Borealis

Borealis is one of the world's leading providers of advanced and circular polyolefin solutions and a European market leader in base chemicals, fertilizers and the mechanical recycling of plastics. We leverage our polymers expertise and decades of experience to offer value adding, innovative and circular material solutions for key industries. In re-inventing for more sustainable living, we build on our commitment to safety, our people and excellence as we accelerate the transformation to a circular economy and expand our geographical footprint.

With head offices in Vienna, Austria, Borealis employs 6,900 employees and operates in over 120 countries. In 2021, Borealis generated total sales and other income of EUR 10,153 million and a net profit of EUR 1,396 million. OMV, the Austria-based international oil and gas company, owns 75% of Borealis, while the remaining 25% is owned by a holding company of the Abu-Dhabi based Mubadala. We supply services and products to customers around the globe through Borealis and two important joint ventures: Borouge (with the Abu Dhabi National Oil Company, or ADNOC, based in UAE); and Baystar™ (with TotalEnergies, based in the US).

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