New CD Labs: Building Materials from Residues and Harsh Conditions in Steel Production

Together with innovative partners from business and industry, TU Graz conducts research in Christian Doppler Laboratories on important practical issues. With the CD Laboratory for Material Development Interface Interaction Service Life Assessment and the CD Laboratory for Reliable Intelligent Systems in Harsh Environments, the research landscape is enriched by two industry-related facets.

Susanne Filzwieser

CHRISTIAN DOPPLER LABORATORIES

In Christian Doppler labs, application-oriented basic research is carried out at a high level, with outstanding scientists cooperating with innovative companies. The Christian Doppler Research Society (CDG) is internationally regarded as an example of best practice in promoting this cooperation. Christian Doppler laboratories are jointly funded by the public sector and the participating companies. The most important public funding body is the Federal Ministry of Labour and Economic Affairs (BMAW).

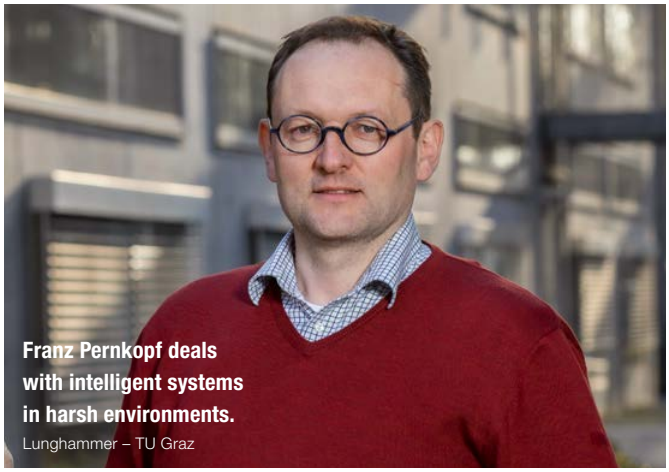
CD LAB FOR MATERIAL DEVELOPMENT INTERFACE INTERACTION SERVICE LIFE ASSESSMENT.

Today, large portions of mineral residues and waste materials from the construction industry and other industrial sectors end up in a landfill at the end of their working life and thus represent an enormous unused material resource. The new CD lab at TU Graz, headed by Cyrill Grengg, wants to change all this. The scientific team wants to use industrial waste materials such as slags, ashes, mineral wool and clay-rich demolition materials mixed with carbon-rich waste materials such as oils, biomass or organic fibres as a basis for new building materials. This mixture produces geopolymer-based binders that can be used as an alternative to the Portland cement most commonly used today. “Chemically, geopolymer building materials are something completely different from Portland cement-based systems, but the physical properties are very similar or even better in some cases,” says Cyrill Grengg, who sees great potential in geopolymers, especially in their much higher resistance to (bio)chemical corrosion. Research is carried out together with renowned partners from industry: voestalpine Stahl Donawitz GmbH, Stahl- und Walzwerk Marienhütte GmbH, brantner green solutions GmbH, Initiative Ziegel, Research Association of the Stone and Ceramic Industry, CharLine GmbH, Kirchdorfer Fertigteilholding GmbH, MM-Kanal- Rohr- Sanierung GmbH and the Community of Styrian Wastewater Disposal Companies (including Linz AG and AWV Wiener Neustadt).

CD LAB FOR RELIABLE INTELLIGENT SYSTEMS IN HARSH ENVIRONMENTS

With an ambient temperature of up to 1,700 degrees Celsius, the inside of a blast furnace is the epitome of a “harsh environment”. Blast furnaces are mainly used in steel production. Refractory materials are accordingly indispensable – such as a lining that can withstand thermal, mechanical and chemical loads. The fact that these facilities are in perfect condition is also a safety-critical aspect, among other things. This is where Franz Pernkopf and the scientific team of the newly opened CD Laboratory at TU Graz come in. They want to support the condition monitoring of the plants with machine learning systems. “In this CD lab, we want to pave the way for the application of machine learning for condition monitoring in industrial environments. The aim is to close the gap between basic research in machine learning and industrial applications in harsh environments,” says Franz Pernkopf. RHI Magnesita is involved in the laboratory as a corporate partner. ■

Cyrill Grengg heads the CD Laboratory for residue-based geopolymer building materials in the CO_2-neutral circular economy.
Lunghammer – TU Graz



Franz Pernkopf deals with intelligent systems in harsh environments.
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