PURDUE UNIVERSITY | Environmental and Ecological Engineering

EEE Research Seminar

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LOCATION: via Zoom

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Life cycle engineering for lightweight structures

Lightweight structures are increasingly necessary to meet current engineering requirements. Weight reduction in diverse applications such as automobiles or machine tools is achieved either by using less material or by substituting material with a lighter one, which provides more functionality per unit of weight. To be an effective enabler for sustainability, lightweight structures should result in lower environmental impacts per functional unit when compared to conventional structures on a life cycle basis. However, applying new materials and manufacturing processes often leads to an increase in environmental impacts from the raw materials and production stage of the life cycle. In addition, the expected efficiency gains from the use of lightweight structures depend on how the overall market and technical systems respond to them. Consequently, the environmental evaluation of lightweight structures in engineering entails various methodological challenges. Organized around a life cycle engineering framework, this presentation provides insights into the model-based evaluation and engineering of lightweight structures on the example of the automotive industry. The presentation concludes with the need for integrated computational life cycle engineering approaches that allow for an effective application during product planning and design.

Bio

Prof. Dr.-Ing. Christoph Herrmann is university professor for Sustainable Manufacturing & Life Cycle Engineering and co-director of IWF, Institute of Machine Tools and Production Technology, Technische Universität Braunschweig as well as director of the Fraunhofer Institute for Surface Engineering and Thin Films IST since November 2018.

Prof. Herrmann has studied mechanical engineering/production engineering. After his doctor degree (Dr.-Ing.) in 2003 he habilitated in production engineering in 2008 and was appointed associate professor (apl. Prof.) in 2011. In 2013, he became full professor. As a company's founder (2002-2007), he has transferred tools and services to support design for environment into the electric/electronic and automotive industry. From 2005 to 2008 he was also scientific director of KERP Center of Excellence Environment & Electronics, Vienna. From August 2009 to February 2013 he was scientific director and member of the NFF (Niedersächsisches Forschungszentrum Fahrzeugtechnik / Automotive Research Center Lower Saxony), Germany. Prof. Herrmann has conducted various industry and research projects in the context of life cycle engineering and sustainable manufacturing on national and international level. He was chairman of the international conference series Eco-X in 2005 and 2007 in Vienna and chairman of the 18th CIRP Conference on Life Cycle Engineering held in Braunschweig in 2011. Since 2012 he is Visiting SIMTech Fellow at the Singapore Institute of Manufacturing Technology.

From April 2017 until March 2019, he was dean of the Faculty of Mechanical Engineering of the Technische Universität Braunschweig.

He has published more than 300 papers and book publications as author, co-author and editor. Prof. Herrmann is member of the German Academic Association for Production Technology (WGP) and of the International Academy for Production Engineering (CIRP).

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