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Will Natural Fibers Replace Glass and Polymeric Fibers in Advanced Composites?



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ABSTRACT:

Natural Fibers, particularly hemp and flax, are being investigated as sustainable alternatives to glass and polymeric fibers for reinforcement in advanced composites. Interestingly, natural fibers have been used for millennia in useful applications and are just now experiencing a U.S. renaissance spurred partially by legalization of industrial hemp in the 2018 Farm Bill and processing technology advances in Europe and Asia. In this seminar, Dr. Walczyk will contextualize the renewed domestic interest in natural fiber-reinforced polymer (NFRP) composites and challenges associated with using these materials. He will specifically discuss the constituent materials (fiber, resin), their advantages and disadvantages compared to synthetic composites including mechanical properties, where they come from (farms), how they are processed, current U.S. supply chain problems hindering their wider adoption, and end-of-life options. Dr. Walczyk will then conclude by presenting current research at Rensselaer that focuses on solving process- and supply chain-related problems, and demonstrating NFRP composites in building applications.

BIOGRAPHY:

Daniel Walczyk is a Professor and former Center Director at Rensselaer Polytechnic Institute in Troy, NY and also an ASME Fellow. Dr. Walczyk was a DAAD Fellow at RWTH Aachen (Germany) in 1995 and received his Ph.D. from MIT in 1996, M.S. from Rensselaer in 1991, and B.S. from Syracuse University in 1986, all in mechanical engineering. He also spent seven years in industry as a practicing engineer, primarily with GE, and received his N.Y. State professional engineer license in 1994. Since starting his academic career in 1996, he has helped launch four start-up companies, received 11 issued patents with five pending, and worked with dozens of companies on design and manufacturing R&D projects. His general area of research is new manufacturing processes, but most of his activity for the past 20 years has focused on advanced composite and biocomposite materials.