Center of Excellence in Intelligent Engineering Systems

CENTER OF EXCELLENCE IN INTELLIGENT ENGINEERING SYSTEMS

SEMINAR

Speaker: Prof. Dr. Eng. Ahmed Sherif El-Gizawy

Professor & Director, Industrial &Tech. Development Ctr. (ITDC), Mechanical and Aerospace Engineering, University of Missouri, Columbia, USA.

Distinguished Adjunct Professor, King Abdul Aziz University

Dr. El-Gizawy received his B.Sc. and M.Sc. in Mechanical Engineering from the University of Cairo in 1976, and Ph.D. in Mechanical Engineering from the University of Waterloo, Ontario, Canada in 1983. He was awarded a Distinguished Research Fellow at the University of Missouri (faculty endowed position) in 1990. He is listed on Who's Who in Science and Engineering, Marquis since 1998. Dr. El-Gizawy received the honor of Best Paper Award by ASME Division of Computers and Information in Engineering in 1999. He also received the honor of Best Paper Award, in 2006 by the Division of Simulation of Complex Physical Behavior of the International Institution Design Society, France. El-Gizawy is Member of the National Research Council (NRC) team for assessment of research doctorate programs in the USA and a member of the Review Panel for the National Science Foundation's Course, Curriculum, and Laboratory Improvement (CCLI) Program, USA. Over the last thirty years with funds from federal agencies and private industries in USA, Dr. El-Gizawy's research focused on developing mechanistic-based models to make the essential predictions of quality and damage management in materials subjected to severe process environment of thermal and mechanical loading during fabrication. His work characteristically has a strong experimental component, but leads to the predictions which are essential for application to process and product design. Dr. El-Gizawy has supervised twenty one Doctoral Degree Candidates and over fifty MS Students during his tenure at University of Missouri. He has published more than hundred technical papers in the open literature. Dr. El-Gizawy gave more than seventy technical presentations at international meetings in the United States, Canada, Europe and the Middle East.

Date: **Monday, August 24, 2015**

Time: **1:00 PM**

Venue: **Engineering Building, Third floor, Dean of Engineering Meeting Room**

Title

PREDICTIVE MODELS FOR THE DESIGN OF 3D-PRINTED PRODUCTS

Abstract

This presentation presents an integrated approach for characterization of the process-induced properties of 3-D printed materials, and for effectively applying these properties to typical predictive analyses for the design of 3-D printed products. Two methods of applying anisotropic part properties are discussed. The first method involves using finite element software to split the part into layers (corresponding to 3-D printed layers) and applying the raster angles individually to the layers. The second method employs classical laminate theory to calculate effective bulk properties from the number and orientation of the layers. Case studies using 3-D Printed ULTEM 9085 structures are presented in order to verify the developed models. Both methods are accurate and are shown to be more beneficial than the assumption that 3-D processed materials are isotropic. Additionally, the analysis procedures are consistent with one another, affording the user with the luxury of choosing which method is most appropriate for a given analysis/application. The design method of effective bulk properties for 3D Printing technology was successfully introduced in the design process covered in the Capstone Design Class at Both University of Missouri in USA and King Abdulaziz University.

ALL ARE CORDIALLY INVITED