Digital Manufacturing and Simulation Curriculum in a Manufacturing Technology Program

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Computer simulations and advanced 3D CAD applications are being used extensively by major corporations to manage information and manufacturing operations across departmental, geographical and company boundaries. These technologies are important to communicate and consolidate vast amounts of information, especially for concurrent engineering efforts between work teams operating around the world. Schools, students, and companies benefit from opportunities to apply these to actual manufacturing problems in industrial environments.

The manufacturing technology program at our university has historically included several classes using CAD and solid modeling software. For the past twelve years computer simulations have been included to more effectively prepare students for use and application of these advanced technologies. Numerous class projects with local manufacturing companies have been incorporated, and currently a two semester sequence of courses is required for students in our Manufacturing Technology major. The initial course, Digital Manufacturing, introduces students to advanced design, analysis and data management applications, with a primary objective on learning specific advanced simulation software. In the second class, Manufacturing Simulation, students learn another discrete event simulation software. They then create teams and visit local industries where they apply these technologies to real projects, with formal presentation of the results to the company’s management.

This presentation will explain how our manufacturing technology curriculum is utilizing advanced 3D CAD and computer simulation software. Manufacturing projects by student teams have created simulation models of actual industrial operations. Recent projects include Ford Motor Co., General Dynamics, tier one suppliers to Honda, and a Jeep automotive assembly plant. The simulations have analyzed robotics workcells, ergonomics, and discrete event materials and process flow operations. These class projects have resulted in excellent manufacturing partnerships and experiential learning opportunities, and have significantly benefited the students with internships and job placements. Also to be presented is results of a survey to graduates and students who have completed this series of classes for their perspectives on the benefits and issues with this curriculum.

Bibliography:
Paul Nutter, CMfgE, CQE, CQA, is an Associate Professor in the Department of Technological Studies at Ohio Northern University. He has been teaching manufacturing technology since 2000, and has 26 years of experience in industrial and manufacturing engineering, primarily with Rockwell Automotive. Paul is active in the Society of Manufacturing Engineers as faculty advisor for SME Student Chapter S186, and was the 2011 chair of the SME Technical Community Steering Committee. He previously served as chair of the 2009 & 2010 Automated
Manufacturing and Assembly Community, the 2007 & 2008 Simulation Technical Group, on the 2006 Member Council, and the 2005 Student Relations Subcommittee. He has also participated on various committees for annual conferences and youth activities, and received the 2009 national SME Award of Merit.