MECHANICAL ENGINEERING COLLOQUIUM
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Qing Chang

Wednesday, March 4, 2015
1-2:25pm, MEC 221

"Energy-Aware Operations in Manufacturing Systems"

There is increasing expectation of all industries, including manufacturing, to become more sustainable by reducing material and energy consumption. In modern manufacturing facilities it is imperative to maximize profits by reducing energy costs with minimal throughput loss. To achieve this goal, one must understand the complex energy dynamics of the manufacturing system to properly identify inefficiencies and energy savings opportunities on the production line. We investigate the energy dynamics by developing sustainable energy efficiency indicator and analyze the energy savings opportunities, where certain machines can be turned to energy saving mode with minimal production impact. This directly leads to the identification of the energy profit bottleneck, which is the machine that causes the biggest loss in profit on the line. This bottleneck is proven both analytically and numerically. The mitigation of the energy profit bottleneck is utilized in conjunction with the energy savings opportunities to create a feedback control algorithm, which maximizes profit by reducing energy consumption and minimizing production loss.

Speaker's Bio:

Dr. Qing (Cindy) Chang's research interest includes manufacturing dynamic system modeling and simulation, real-time energy management of manufacturing systems, real-time production control, intelligent maintenance of manufacturing systems and battery manufacturing and re-manufacturing. Dr. Chang received a CAREER award from the National Science Foundation (NSF) in 2014. Before joining Stony Brook in 2011, she worked in General Motors Research & Development Center, where she won General Motors Boss Kettering Awards (2005, 2006 and 2008) and The Charles L. McCuen Special Achievement Awards (2005, 2006 and 2008), for her research works in improving production efficiency and quality. She has published 40+ refereed journal articles and conference papers and holds 3 United States patents. Dr. Chang has served on numerous international/domestic conference/symposium organizing committees and chairmanships of technical sessions for IEEE, ASME, SAE, and SME etc. Dr. Chang obtained M.S. in Mechanical Engineering from University of Wisconsin – Madison in 1996, and PhD in Mechanical Engineering from University of Michigan – Ann Arbor in 2006.

For More Information Contact: Dr. Ian Fischer (973) 596-3354 fischer@njit.edu