U.S.-Based Fluid Power Research Gains International Recognition

Impact of the work done by the Engineering Research Center for Compact and Efficient Fluid Power (CCEFP) was most recently evident at the 6th Fluid Power Net International (FPNI) PhD Symposium held at Purdue University in June. FPNI is a worldwide community for networking in fluid power and fluid techniques, and its PhD symposium provides a forum for engineering graduate students to present their fluid power research on a world stage. Attendees at this year's symposium included 50 faculty, 160 graduate students (45% of them from the U.S.), 25 undergraduates, and 55 industry participants from 14 countries: Austria, Canada, China, Czech Republic, Finland, France, Germany, Italy, Japan, Poland, Serbia, Sweden, United Kingdom and the United States.

Eight of the 72 papers presented at the symposium received special recognition for their merit. Five of the eight presentations receiving these awards were presented by CCEFP graduate students based on their work on CCEFP-funded or associated projects:

- Aaron Enes, Georgia Tech: "Toward Shared Control of Hydraulic Excavators"
- Richard Klop, Purdue University: "Validation of a Coupled Pump-Motor-Line Model to Predict Noise Sources of Hydraulic Transmissions"
- Jonathan Meyer, University of Minnesota: "Energy Management Strategy for a Hydraulic Hybrid Vehicle Using Stochastic Dynamic Programming"
- Christopher Williamson, Purdue University: "Stability and Motion Control of Inertial Loads with Displacement Controlled Hydraulic Actuators"
- Joshua Zimmerman, Purdue University: "Reduction of Engine and Cooling Power by Displacement Control"

CCEFP students and faculty will play key roles in IFPE 2011, scheduled for March 22-26, 2011 in Las Vegas, Nev. Papers based on CCEFP research and presented by Center students and faculty, will be featured as a part of the 52nd National Conference on Fluid Power, March 23-25. The Center will also hold its 5th Annual Meeting in conjunction with IFPE. Industry supporters are encouraged to participate in the meeting, which is scheduled for March 22 in an area immediately adjacent to the IFPE show floor. Following the Annual Meeting, students will present posters describing CCEFP research. More information can be found at www.ifpe.com or www.ccefp.org.

CCEFP Receives Renewal and Major Funding

The National Science Foundation (NSF) has announced that it will award the Engineering Research Center for Compact and Efficient Fluid Power (CCEFP) a four-year, $16-million dollar grant. Industry partners will augment NSF funding with cash and in-kind contributions, and the Center's seven universities will contribute an additional $3.2 million.

The Center's education and outreach program is equally ambitious, with over 20 projects designed to

- attract the nation's pre-college students to science and engineering generally and to hydraulics and pneumatics in particular
- educate all mechanical engineering undergraduate students about fluid power and raise the general public's awareness of the ubiquity of fluid power
- increase the diversity of students and practitioners in fluid power research and industry
- establish lasting forums where industry and academia can exchange ideas and strategize

New Grant Highlights the Growing Reach and Impact of the CCEFP

The National Science Foundation (NSF) awarded a grant to the CCEFP to develop a "Novel Compressed Air Approach for Off-Shore Wind Energy Storage." The grant is a continuation of the open accumulator research initially sponsored by CCEFP.

The four-year, $2-million award is made through the Emerging Frontier in Research and Innovation (EFRI) and the Grant Opportunities for Academic Liaison with Industry (GOALI) programs. The investigators of the research are Perry Li (Principal Investigator) and Terry Simon (Co-Principal Investigator) at the University of Minnesota, Eric Loth at the University of Virginia, James Van de Ven at the Worcester Polytechnic Institute, and industry partner Lightsail Energy.

The research proposes to develop a localized method for storing off-shore wind energy before conversion to electricity in high-pressure compressed air vessels. In addition to allowing the storage of wind energy during periods of low demand, the concept will achieve load leveling so that components can be downsized for average instead of peak power. The concept makes use of the comparative advantages of hydraulics and pneumatics in a so-called "Open Accumulator" architecture and an isothermal air compressor/expander design. The interdisciplinary research involves fluid flow, heat transfer, machine design, and systems and control.