

2018-2019 Conference Competition Proposal

Hosting the 26th CIRP Life Cycle Engineering Conference at Purdue

Submitted by

Fu Zhao

Associate Professor, Mechanical Engineering & Environmental and Ecological Engineering

John W. Sutherland

Professor and Fehsenfeld Family Head of Environmental and Ecological Engineering

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Background of the Conference

Environmental and Ecological Engineering (EEE) has been selected by the International Academy for Production Engineering (CIRP) to host the 26th Life Cycle Engineering Conference at Purdue in May 2019. CIRP is the world's leading organization for production engineering research and is at the forefront of design, optimization, control and management of processes, machines and systems. The CIRP Life Cycle Engineering Conference (LCE) was initiated by Professor Leo Altling and hosted by the Technical University of Denmark in 1993. Over 20 years, CIRP LCE has emerged as the flagship event for researchers, educators, and policy makers to meet and explore engineering and technical solutions to address sustainable development challenges. In the past, CIRP LCE conferences have largely been hosted by universities and research institutes in Europe. University of California at Berkeley hosted the conference in 2012 and remains the only U.S. institute that had hosted this conference.

Purposes for the Conference and Linkage to Purdue's Mission

The theme of the 2019 CIRP LCE conference at Purdue is on advancing industrial sustainability. Due to increased demand for consumer goods from a growing world population with improving quality of life, industrial activities will remain a key part of modern socio-economic systems, and serve as a valuable contributor to wealth generation and job creation for years to come. However, worldwide industrial activities also lead to significant burden on the environment in terms of energy/resource consumption and environmental pollution. Engineering and technologies play an indispensable role in the achievement of the UN's sustainable development goals. In the past decades, industries around the world have started to transition from being only profit driven to a balanced triple bottom line. A new paradigm shifting from eco-efficiency to eco-effectiveness while advancing human development calls for close collaboration of academia, industry, and

government to expedite the development and adoption of engineering and technologies critical for a sustainable world. Opportunities exist to advance industrial sustainability by utilizing recent progress on big data, artificial intelligence, and smart manufacturing. The 2019 CIRP LCE conference aims at providing a dynamic venue for stakeholders to share their findings and opinions and as a whole to define the critical next steps and research agenda in the area of life cycle engineering. Given the purpose and the theme, we believe that CIRP LCE 2019 align perfectly with Purdue's mission to promote world-changing research.

Reputation of Potential Invited Speakers/Lecturers

CIRP LCE conference usually runs 2 days and a half. We plan to have two plenary sessions in the mornings of Day 1 and Day 2, with Professor Tom Graedel and Mr. Mike Molnar as the speakers.

Dr. Tom Graedel is Clifton R. Musser Professor Emeritus of Industrial Ecology and Professor Emeritus of Chemical Engineering at Yale University. Professor Graedel is one of the pioneers of industrial ecology and in the past fifty years he has made outstanding contributions to the theory and practice of industrial ecology, in particular the organizing framework for the study of the interactions of the modern technological society with the environment. He was elected to the U.S. National Academy of Engineering in 2002.

Mike Molnar is the founding director of the Office of Advanced Manufacturing (OAM) at the National Institute of Standards and Technology (NIST). He is in charge of the NIST extramural advanced manufacturing programs and serves as liaison to industry and academia. Mike is also the founding director of the Advanced Manufacturing National Program Office (AMNPO), an interagency team coordinates federal activities in advanced manufacturing, and is the Congressionally designated National Program Office for Manufacturing USA – the National Network for Manufacturing Innovation. Prior to joining NIST, Mike had a 30-year industry career

in advanced manufacturing, with leadership roles in many multinational companies including Director of Sustainable Development at Cummins, Inc.

Critical Mass of Purdue Scholars

The organizing committee consists of the following: Fu Zhao (ME/EEE), Steve Shade (EEE), John Sutherland (EEE), Yung Shin (ME), Carol Handwerker (MSE), John Howarter (MSE/EEE), Karthik Ramani (ME), Hua Cai (IE/EEE), Shweta Singh (ABE/EEE), and Ananth Iyer (Management). In addition, there are many Purdue faculty that are working on related topics and will likely participate in the conference. These include all the EEE core, courtesy, and affiliate faculty that totals over 60 people. These faculty come from a wide range of disciplines and represent almost all colleges and schools at Purdue.

Likelihood to Attract Leading Scholars from Elsewhere

Past LCE conferences have been successful in attracting leading scholars in this field from around the world. Although the US community in the field has grown very fast in the past decade, the research communities in EU and Japan are still larger with leaders in many areas. Given Purdue's international prominence and leadership on this topic, leaders from the U.S. and around the world will be likely attendees. We will deliver a high quality technical program at the LCE conference. To insure robust attendance, we will send personal invitations to leading researchers, and ask them to present their cutting-edge research and more importantly to jointly define the research roadmap for life cycle engineering.

Likelihood to Showcase Purdue

In addition to have faculty and students at Purdue to present their work at the conferences, many activities are planned to showcase Purdue's world-changing research, innovative education efforts,

and modern infrastructure. All the technical sessions will be placed in the new Wilmeth Active Learning Center. Participants will have the opportunities to tour the new Bechtel Innovation Design Center, Indiana Manufacturing Institute, Birck Nanotechnology Center, and Bindley Bioscience Center. During the poster session, we will showcase our interdisciplinary education efforts including the NSF IGERT on Sustainable Electronics, Critical Materials research, and the WHIN Smart Manufacturing effort. EEE is one of the few ABET accredited environmental engineering programs in the U.S., and is the only program with an industrial sustainability emphasis.

Integration of Networking Opportunities

As an international conference, LCE in the past has attracted participants from around the world. LCE 2019 will continue this tradition, and will have leading researchers in the field come to Purdue. Representatives from local and regional enterprises with a strong focus on sustainability will also be invited. These include Subaru, GM, Ford, and Cummins.

The LCE conference has its home in CIRP. In addition, the PI and co-PI have actively engaged in conferences organized by ASME, SME, and AIChE. We will advertise via our professional networks and attract participants from members of these professional societies.

Value to Purdue and External Audiences and the Media

Purdue is one of the leading universities in the U.S. with a strong research presence in the area of life cycle engineering. The other institutes include UC-Berkeley, University of Michigan, Arizona State University, University of Kentucky, and Rochester Institute of Technology. The 2012 LCE conference at UC-Berkeley was led by the late Professor David Dornfeld, a global leader in sustainable manufacturing and smart manufacturing and a member of the National Academy of

Engineering. Hosting LCE conference at Purdue represents a great opportunity to further enhance Purdue's leading position in the sustainable manufacturing field. In fact, both the PI and co-PI are well known in this area. In particular, co-PI John Sutherland is widely recognized as the father of sustainable manufacturing in the U.S.

We expect to have leading researchers around world participate in discussions to define future direction of sustainability engineering, and will work with Purdue News to develop a story highlighting the research agenda.

Proposed Post-Event Impacts

All the conference papers will be published in Procedia CIRP (Elsevier). We expect to enhance existing and develop new connections and collaborations with researchers from EU, Japan, and China, with the goal of have joint research proposal efforts in the future.

Proposed Extramural Sponsorships

In order to bring more domestic participants to the conference, we will submit a proposal to NSF to request funding to support travel of graduate students and early-career faculty. Given the theme of the conference, joint funding by the CBET Environmental Sustainability program and CMMI Manufacturing Machines and Equipment program will be pursued. The PI and co-PI currently have an international collaboration grant on sustainable manufacturing co-funded by these two programs. In addition, we will actively seek corporate sponsorship to cover breakfast and lunch expenses.

Budget Request

The CIRP LCE conferences in the past several years have a regular registration fee in the range of \$450 to \$900. Lower registration fees were charged when the conference organizers were able to

secure financial support from the host university, funding agencies, and industry. To make the LCE conference at Purdue financially attractive, in addition to strong technical program (including world renowned speakers), we plan to offer participants a variety of networking opportunities and industrial/lab tours. Given 300 participants and a \$450 registration fee, the organizing committee needs to raise \$40-45k support in order to meet the projected expenses. This proposal requests a total of \$22k to cover the following:

Two invited speakers: \$2000 each to cover registration fee, lodging, air ticket, and a small honorarium. Subtotal: \$4,000

Expenses for student volunteers at O'Hare Airport and Indianapolis Airport to provide logistical assistance for international participants: \$1,000

Conference website development and maintenance: \$2,000

Conference promotion materials and advertisement: \$3,000

Best paper/poster awards: \$2,000

Defray conference publication expenses: \$5,000

Transportation for industrial tours: \$1,000

Staff time: \$4,000