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July 26, 2018

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LIFT Releases Third Set of Recommendations to Prepare Higher Education Students for Lightweight Manufacturing Careers

College & University Faculty Team Recommends Paths to Addressing Competencies and Workforce Strategies for New Lightweighting Technologies

DETROIT – A [new report](#) from leading higher education and workforce experts details a third set of recommendations for colleges and universities to modify current curricula to reflect the knowledge and skills necessary for jobs encompassing new lightweighting technologies, materials and processes.

Designed to integrate workforce competencies required by technology advancements being infused into industrial work places with educational pathways to develop the design and production manufacturing workforces, the third report in the series focuses on approaches both two-year and four-year institutions can implement to address competencies in emerging lightweighting technology areas including: Refill Friction Stir Spot Welding; Joining Titanium to Steel; Inorganically Bonded Sand Molds; Friction Stir Extrusion.

The report was crafted by a team of college and university faculty (Expert Educator Team, or EET)—experts in materials science, engineering disciplines, and education and workforce preparation. The team has been assembled by LIFT – Lightweight Innovations for Tomorrow, and supported by the Association of Public and Land-grant Universities (APLU) and the National Center for Manufacturing Sciences (NCMS).

“Manufacturing becomes more sophisticated every day through the infusion of technology across all sectors,” said Emily DeRocco, education and workforce development director, LIFT, who designed the EET concept for the Institute.

“Education and industry must work together to incorporate the evolving needs of the workforce to foster a pipeline of ready-to-work talent.”

Some highlights of Education and Workforce Development recommendations made by the EET are:

- **Refill Friction Stir Spot Welding and Joining Titanium to Steel:** These technologies require curriculum enhancements at both the technician and engineer level. While welding is part of many two-year programs, courses on welding and solid-state joining/solidification processes are not generally included in materials engineering programs. Such courses, as well as courses in physical metallurgy and materials characterization (microstructure and properties), should be considered for development and inclusion in the engineering curriculum.
- **Inorganically Bonded Sand Molds:** If institutions have courses that cover sand casting at all, this topic is likely minimally mentioned and does not include the advances in this technology. Once educators are made aware of the technology, courses in microstructure and mechanical characterization, and exposure to statistical process control as it impacts this new technology, should be considered for development and inclusion in the materials engineering curriculum.
- **Friction Stir Extrusion:** Most institutions have existing coursework in mechanical deformation, microstructures and mechanical properties which can prep students for the complexities of FSE. However, the curriculum should contain relevant modeling and simulation modules, solid state joining processes, metal forming and severe plastic deformation.

“It is imperative today to identify the knowledge, skills and abilities workers at all levels will need to deploy lightweighting technologies, materials, and processes, and also to engage higher education in addressing these needs,” said Jim Woodell, vice president for economic development and community engagement, APLU.

“Strengthening the connection between emerging technologies and educational programs is core to preparing a capable workforce that can meet industry standards,” said Rebecca Taylor, senior vice president, NCMS.

The eight EET members were selected from APLU’s member universities and other LIFT university research partners because of their significant knowledge of manufacturing technologies and experience within the manufacturing industry.

They are: **Fazleena Badurdeen**, associate professor and director of graduate studies for manufacturing systems engineering, University of Kentucky; **Kapil Chalil Madathil**, Assistant Professor, Departments of Industrial & Civil

Engineering, Clemson University; **Amy Clarke**, associate professor and site director, Center for Advanced Non-Ferrous Structural Alloys, Colorado School of Mines; **Mel Cossette**, Executive Director/Principal Investigator for the National Resource Center for Materials Technology Education; **Chad Duty**, associate professor, Department of Mechanical, Aerospace, and Biomedical Engineering, University of Tennessee Knoxville; **Muhammad Jahan**, assistant professor, Miami (Ohio) University; **Gene Liao**, professor and director electric-drive vehicle engineering and alternative energy technology, Wayne State University; **Kelly Zelesnik**, dean, engineering, business, and information technologies, Lorain County Community College.

The final project report, which will provide an even deeper-level of university and technical-level competency mapping for the twelve lightweighting technologies explored over the course of this effort, is due this fall.

LIFT, operated by the American Lightweight Materials Manufacturing Innovation Institute (ALMMII) and one of the founding [Manufacturing USA](#) institutes, is a public-private partnership dedicated to developing and deploying advanced lightweight metal manufacturing technologies, and implementing education and training programs to better prepare the workforce today and in the future.

For more information about the project, visit <http://www.lift.technology/eet>

ABOUT LIFT

LIFT, operated by the American Lightweight Materials Manufacturing Innovation Institute (ALMMII), is a Detroit-based, public-private partnership committed to the development and deployment of advanced lightweight metal manufacturing technologies, and implementing education and training initiatives to better prepare the workforce today and in the future. LIFT is one of the founding institutes of Manufacturing USA, and is funded in part by the Department of Defense with management through the Office of Naval Research. Visit www.lift.technology or follow on Twitter [@NewsFromLIFT](#) to learn more.

ABOUT APLU

[APLU](#) is a research, policy, and advocacy organization dedicated to strengthening and advancing the work of public universities in the U.S., Canada, and Mexico. With a membership of 237 public research universities, land-grant institutions, state university systems, and affiliated organizations, APLU's agenda is built on the three pillars of increasing degree completion and academic success, advancing scientific research, and expanding engagement. Annually, member campuses enroll 4.9 million undergraduates and 1.3 million graduate students, award 1.2 million degrees, employ 1.2 million faculty and staff, and conduct \$43.9 billion in university-based research

ABOUT NCMS

The National Center for Manufacturing Sciences (NCMS) is a cross-industry technology development consortium, dedicated to improving the competitiveness and strength of the U.S. industrial base. As a member-based organization, it leverages its network of industry, government, and academia to develop, demonstrate, and transition innovative technologies efficiently, with less risk and lower cost. For more information on NCMS, visit www.ncms.org.