

Why Investments in Design for Advanced Manufacturing/Lightweighting Matter

Prepared by: Monica Dumitriu, MBA, Case Western Reserve University, Cleveland, Ohio

A global economy means an increasing demand for employers to equip their teams with the necessary skillsets to succeed in a high-tech job market and serve their constituents. Some of the academic literature, see Bravenboer, points the way to developing future partnership models whereby employers and universities work together to design programs and provide relevant training to their incumbent workers.¹ Investments in continuing education for professional engineers and supporting teams result in increased retention and job satisfaction.

In the midst of yet another industrial revolution, technology-driven companies are looking to capture the additive advantage and use Metal 3D printing and lightweighting innovations. The industries most impacted include transportation - such as aerospace, automotive, public transit and rail – as well as some construction and maritime industries. The engineering objective is to remove weight from parts and reduce cost and emissions, resulting in greater fuel efficiencies. Smart design is central to advanced manufacturing and lightweighting sustainability. There are many economic, technological and environmental standards to consider in lightweighting. However, replacing heavy for light parts is just the beginning, to stay competitive, engineers must use innovation and tested tools including: 3D printing, also known as direct metal laser sintering (DMLS), direct metal printing (DMP) and metal additive manufacturing are the game-changers.²

“Lightweighting success is the convergence of design, manufacturing and materials to drive together the end product design and make the difference. When you save energy, it drops right to your bottom line.”

Sunniva Collins, Associate Professor, Department of Mechanical and Aerospace Engineering at Case Western Reserve University.

“The thrust for the C-Suite decision makers of Fortune 500 and 1000 companies is being able to communicate with their technical people on important lightweighting topics, that are important to their business and understand the language and requirements of the technology to work at a higher level. They don’t need to know how to lightweight, they need to articulate the appropriate business case.”

Malcolm Cooke, PhD, Associate Professor and Executive Director of Sears think[box] at Case Western Reserve University, thinkbox.case.edu.

¹ Darryll Bravenboer, (2016) "Why co-design and delivery is "a no brainer" for higher and degree apprenticeship policy", Higher Education, Skills and Work-Based Learning, Vol. 6 Issue: 4, pp.384-400, <https://doi.org/10.1108/HESWBL-06-2016-0038>

² https://www.3dsystems.com/sites/default/files/2018-04/3DSsystems-eBook-Metal-Lightweighting_0.pdf

Here is a key example from America Makes on Bracket Optimization, contributed by GE Research and other partners, using Metal Additive Technology. The objective was to enable the redesign of a jet engine bracket for reduced weight without impacting performance. The results included designs with reduction upwards of 80%, now undergoing testing for load capacity:

<https://www.ge.com/reports/post/74545243565/meet-the-makers-3d-printing-design-challenge/>



For more information, please visit, America Makes at <https://www.americamakes.us/>.

America Makes is the nation's leading and collaborative partner in additive manufacturing (AM) and 3D printing (3DP) technology research, discovery, creation, and innovation.

Northeast Ohio has become a hotbed of additive technology innovation and lightweighting prowess. JobsOhio has embraced innovation as a core component of its targeted industry strategies and has committed to investing in Team NEO's Innovation Clusters during 2018-2019. JobsOhio is focusing on emerging technologies in many of its sectors, including Advanced Manufacturing, Aerospace, Information Technology, and Energy. This partnership helps establish Ohio as a leader in 3D design, materials, process development, and supports part manufacturers in the region. The partnership allows the region to attract and grow new frontiers in virtual and augmented reality, internet of things, artificial intelligence, cybersecurity, and energy storage.

<http://www.clevelandplus.com/teamneo/>

Case Western Reserve University (CWRU)'s Continuing Professional Studies Division offers noncredit and competency-based certificate programs for working professionals through both open enrollment and customized industry-sponsored courses. In partnership with Lightweighting Innovations for Tomorrow (LIFT) and AmericaMakes, CWRU is offering a Design in Advanced Manufacturing Certificate Training on June 11-13, 2018 at America Makes in Youngstown, Ohio.

The Lightweighting Certification includes distinct modules in Additive Manufacturing, Advanced Materials and Polymers for Lightweighting. The Professional Certification Program in Lightweighting at CWRU is sponsored in part by CWRU's partnership with Lockheed Martin Corporation and LIFT. The national certification is in collaboration with LIFT, NC3 and CWRU. Participants will advance their careers, earn CEU credits, learn to design with lightweight materials and additive manufacturing technologies and create products that are globally competitive. Expertise in additive manufacturing is a high-demand skill, commanding high salary positions for engineers and designers. **For more information and to register, please visit: <http://case.edu/cps/> and <https://case.edu/cps/lift-courses>**

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"The ability to provide complementary education to the mid-career industrial workforce as well as offer focused training for young professionals is critical to the long-term survival of our manufacturing base. LIFT certificate courses – offered as part of the lifelong learning initiative launched by Case Western Reserve University – are satisfying the need for ongoing education as well as pioneering an innovative role for institutions of higher learning."

Stephen P. Johnson PhD, Director - Research & Development, Fortune 1000 manufacturing company
For more discovery, creation, and innovation.