



  
**IGNITE**  
Mastering Manufacturing



# IGNITING OPPORTUNITIES

Manufacturing continues to be a large economic sector in the U.S., with a better paid workforce and better benefits than other sectors, particularly in high-value export sectors. Employment opportunities exist in global market giants, medium-sized enterprises, and small firms.

From a 2015 survey of senior manufacturing executives, Deloitte projects nearly 3 1/2 million manufacturing jobs will need to be filled over the next decade. Two million of those jobs are projected to go unfilled because of a lack of workers with the required knowledge, skills and abilities.

The range of employment needs in manufacturing presents broad economic opportunities for prospective workers seeking great jobs and careers and significant challenges for manufacturers who need workers with "upscaled" knowledge and skills, now described as "high tech" or "advanced manufacturing." These requirements mean the U.S. has to teach and train our next generation manufacturing workforce differently.

The IGNITE curriculum has now been developed. This educational pathway will IGNITE student interest and engagement in learning, because it blends interactive multimedia learning with virtual simulations. IGNITE will ensure students master manufacturing, because it couples learning with project-based experiences built around real industry problems and challenges. By mastering manufacturing technologies, processes, and systems, students will be equipped for success in the 21st century production environment and prepared for additional postsecondary education to become engineering technicians, technologists, or engineers.



**3.5 MILLION** manufacturing jobs projected to be available over the next 10 years.



Multi-Skilled  
Advanced  
Manufacturing  
Technician



**TECHNOLOGY  
SPECIFIC  
COMPETENCIES**



**ADVANCED  
TECHNICAL  
SKILLS**



**CORE  
TECHNICAL  
SKILLS**



**MATERIALS  
SCIENCE**



**COMMON  
EMPLOYABILITY  
AND IT SKILLS**



Enrollment Into  
IGNITE Program

**EDUCATIONAL  
PATHWAY**

In response to this recognized need, the Manufacturing USA Institutes funded by the Department of Defense together developed a competency model foundation for the "multi-skilled technician" needed in today's manufacturing workplace. That competency model has now been translated to an educational pathway that recognizes the next generation manufacturing "technical" workforce must, in fact, be a workforce of highly skilled "technicians" – individuals with the knowledge, skills and abilities who understand materials science and can optimize manufacturing technologies, processes, and systems.

# CURRICULUM PATHWAY



# WHERE THE JOBS ARE FOR IGNITE STUDENTS

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Manufacturing begins in an R&D environment – where new products, product features, capabilities, problems to be addressed, and solutions to be created are the focus. IGNITE students will be introduced to and experience hands-on application of emerging tools, developing technologies, and application-ready processes, so a research environment may be their choice of workplace.

IGNITE provides a grounding in Materials Sciences and the properties of materials needed to prototype a new product or solution. This foundation prepares students for their first entry into the world of design – the core competency of engineers.

From product design to product fabrication, IGNITE introduces students to advanced manufacturing, the movement from manufacturing that designs products around materials to a field that tailors materials to specific use. Students who understand new computational tools in manufacturing are the technicians who bridge design and production.

IGNITE ensures students are prepared for SMART factories where the Internet of Things has provided for an entirely “networked” system of manufacturing tools and world-class equipment. In this environment, educated and trained technicians will optimize manufacturing processes and systems.

As advanced manufacturing increasingly moves to customization and individualization of products, IGNITE-educated technicians and technologists will be exploring the “next generation” of advanced manufacturing in the U.S.



# A FOUNDATION FOR SUCCESS

IGNITE will feature capstone, project-based learning modules as a key component of the new generation “masters of manufacturing” upscaled learning. Each of the three Institutes that participated on the curriculum development team helped design their thematic, project-based learning as capstone experiences for IGNITE students.



Since its founding, LIFT’s manufacturing focus has been on lightweight and advanced metals that offer major performance enhancements and great energy efficiency. LIFT works with its industry and university partners on projects with applications in automotive, aerospace, shipbuilding, railroads, fabrications, and other sectors. Recognized as the Manufacturing USA leader in workforce education, LIFT also focuses on addressing the skills gap in advanced manufacturing and aligning technology and talent development.



America Makes is the national accelerator for additive manufacturing (AM) and 3D printing (3DP) and is the nation’s leading and collaborative partner in AM and 3DP technology research, discovery, creation, and innovation. Structured as a public-private partnership with member organizations from industry, academia, government, non-government agencies, and workforce and economic development resources, America Makes is working to innovate and accelerate AM and 3DP to increase our nation’s global manufacturing competitiveness.



The Digital Manufacturing and Design Innovation Institute (DMDII) is where innovative manufacturers go to forge their futures. In partnership with UI LABS and the Department of Defense, DMDII equips U.S. factories with the digital tools and expertise they need to begin building every part better than the last. As a result, our more than 300 partners increase their productivity and win more business. DMDII has invested approximately \$90 million in more than 60 applied research and development projects in areas including Design, Product Development, and Systems Engineering; Future Factory; Agile, Resilient Supply Chain; and Cybersecurity.

## **PARTNERS**

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### **The Development Team:**

LIFT – Lightweight Innovations  
For Tomorrow

DMDII – Digital Manufacturing and  
Design Innovation Institute

America Makes

Amatrol Inc.

ASM Materials Education Foundation

The Ohio State University

The PAST Foundation

 **IGNITE** Mastering Manufacturing

LIFT

1400 Rosa Parks Blvd.

Detroit MI 48216

313.309.9003

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For more information, please email [IGNITE@LIFT.Technology](mailto:IGNITE@LIFT.Technology)  
Or visit [Lift.Technology/IGNITE](http://Lift.Technology/IGNITE)

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