

IGNITE
Mastering Manufacturing®

IGNITING OPPORTUNITIES

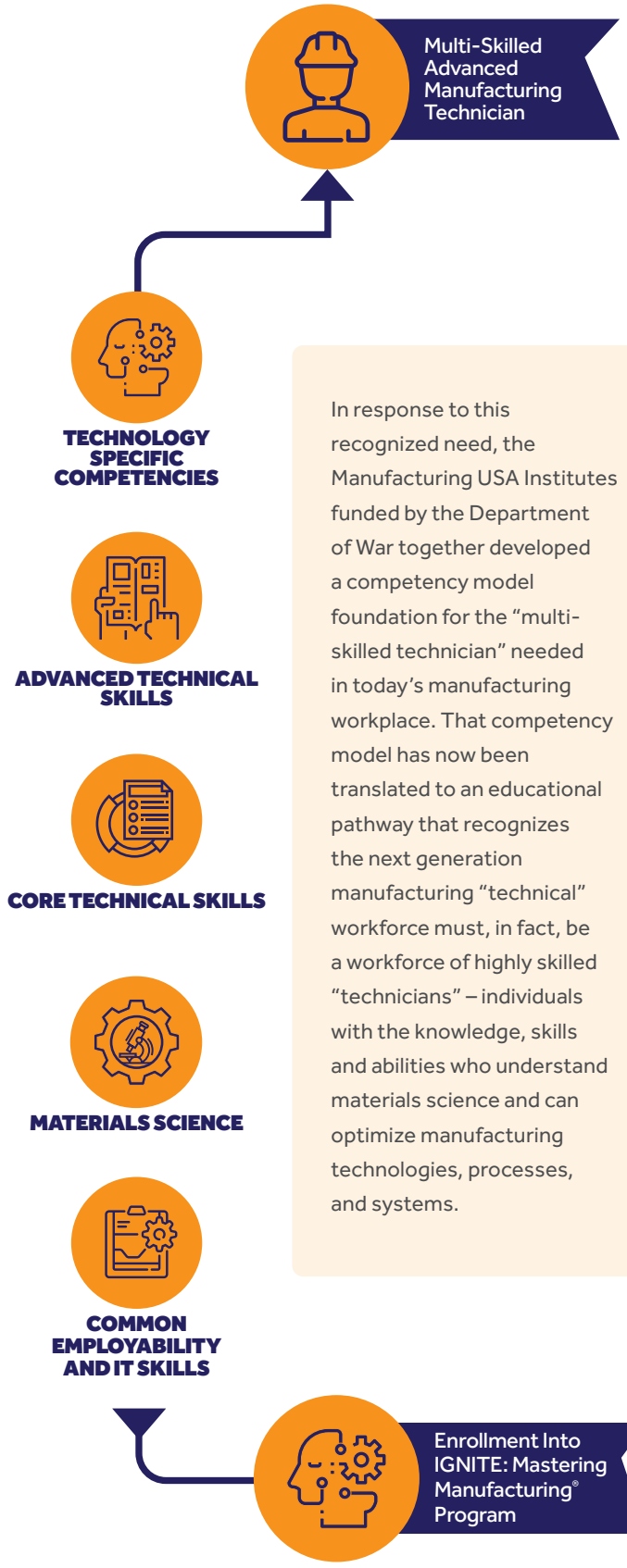
Manufacturing continues to be a large economic sector in the U.S., with a better paid workforce and better benefits than other sectors, particularly in high-value export sectors. Employment opportunities exist in global market giants, medium-sized enterprises, and small firms.

From a 2024 survey of senior manufacturing executives, Deloitte projects nearly 3.8 million manufacturing jobs will need to be filled over the next decade. An estimated 1.9 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: Mastering Manufacturing® 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: Mastering Manufacturing® 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.

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



EDUCATIONAL PATHWAY

In response to this recognized need, the Manufacturing USA Institutes funded by the Department of War 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.

IGNITE Mastering Manufacturing®

CURRICULUM PATHWAY



YEAR 1
SEMESTER 1
MATERIALS SCIENCE–THE HOOK

Introduction to Materials Sciences
Materials Science and
Engineering Design Cycle

Deep dives into metals, ceramics,
polymers/composites,
and materials engineering

The "art" of Scientific Journaling

YEAR 1
SEMESTER 2
[65 HOURS]
INTRODUCTION TO ADVANCED MANUFACTURING

Manufacturing Metrics
Plant Organization
Principles of Materials

Manufacturing
Processes & Technologies

Safety
Measurement
Engineering Drawing Reading
Computer Aided Design & CNC
Programming
Fluid Power Systems
AC/DC Electricity
Robotics Programming

YEAR 2
[130 HOURS]
ADVANCED MANUFACTURING SYSTEMS 1

Lean Manufacturing
Machine and Materials Safety
Quality, Measurement & Control
Mechanical Drives
Fluid Power 2
Electricity & Electrical Relay Controls
Robotics 2
Computer Aided Design 2
Machine Tools

YEAR 3
[130 HOURS]
ADVANCED MANUFACTURING SYSTEMS 2

Lean Manufacturing 2
Programmable Controllers
Fluid Power 3
Computer Aided Design 3
Computer Aided Manufacturing
Materials 2
Plastics
Mold Design
Welding

WHERE THE JOBS ARE FOR IGNITE: MASTERING MANUFACTURING® STUDENTS

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: Mastering Manufacturing® 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: Mastering Manufacturing® 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: Mastering Manufacturing® 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: Mastering Manufacturing® 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: Mastering Manufacturing® 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: Mastering Manufacturing® students.



LIFT, The National Advanced Materials and Manufacturing Innovation Institute, is Driving American Advanced Manufacturing Into the Future through technology and talent development. 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.

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PARTNERS

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