



Powering Economic Mobility: Bridging the Gap to Careers in Advanced Manufacturing

August 18, 2026

Who We Are



JustUSCC.org

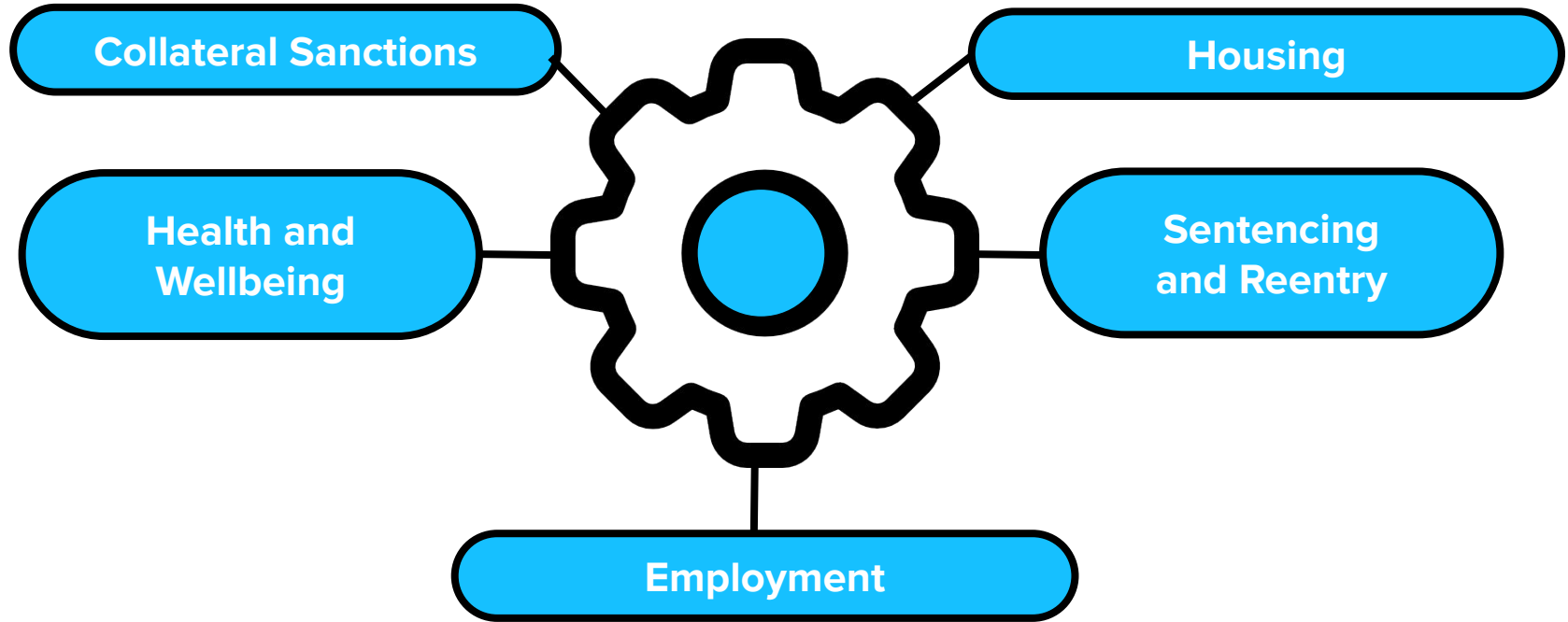
The JCC is a national federal policy table led by and created for individuals who are directly impacted. The JCC forms the connective tissue needed to catalyze full participation in policy practices and changes for formerly incarcerated people and directly impacted individuals and their communities.

Our Why



The voices of those most impacted by the criminal legal system have been missing and/or excluded from decision-making tables.

Priorities



Employment: By the Numbers



50% less Household wealth for families impacted by justice involvement

2% chance of reaching the top income quintile for individuals starting in the bottom quintile



48% of post-release potential earning capacity realized

\$55.2B drained from the U.S. economy annually in lost wages



27% unemployment rate among formerly incarcerated individuals

64% report lacking access to quality employment opportunities

Centered back to people



Manufacturing USA Network: Overview

Brad R. Conrad PhD
Office of Advanced Manufacturing, NIST
on behalf of Manufacturing USA



NIST Mission

To promote U.S. innovation and industrial competitiveness by advancing **measurement science, standards, and technology** in ways that enhance economic security and improve our quality of life.



Industry's National Laboratory

NIST



3,000+ Federal Employees



3,000+ Associates



5 Nobel Prizes



10 Collaborative Institutes



Manufacturing Extension
Partnership program



400+ Businesses Using
NIST Facilities

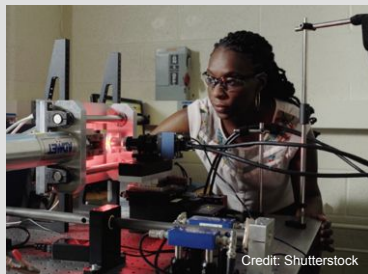


2 Campuses
Gaithersburg, Md (HQ)
Boulder, Co



National Office for
Manufacturing USA program

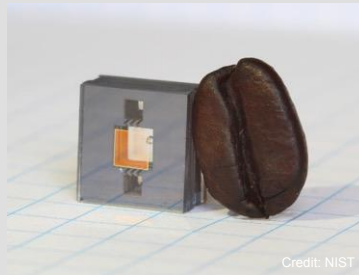
Priorities



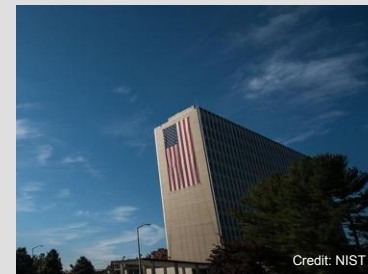
**Critical &
Emerging
Technologies**



**U.S. Leadership
in Standards**



**Adoption of
U.S.
Innovations**



**Research
Infrastructure**

About Manufacturing USA

VISION: Securing U.S. Global Leadership in Advanced Manufacturing

MISSION: Connecting people, ideas, and technology to:

- Solve industry-relevant advanced manufacturing challenges
- Enhance industrial competitiveness and economic growth
- Strengthen our economic and national security



Strategic Goals



GOAL 1

Increase the competitiveness of U.S. manufacturing



GOAL 2

Create and facilitate the transition of innovative technologies into scalable, cost-effective, and high-performing domestic manufacturing capabilities



GOAL 3

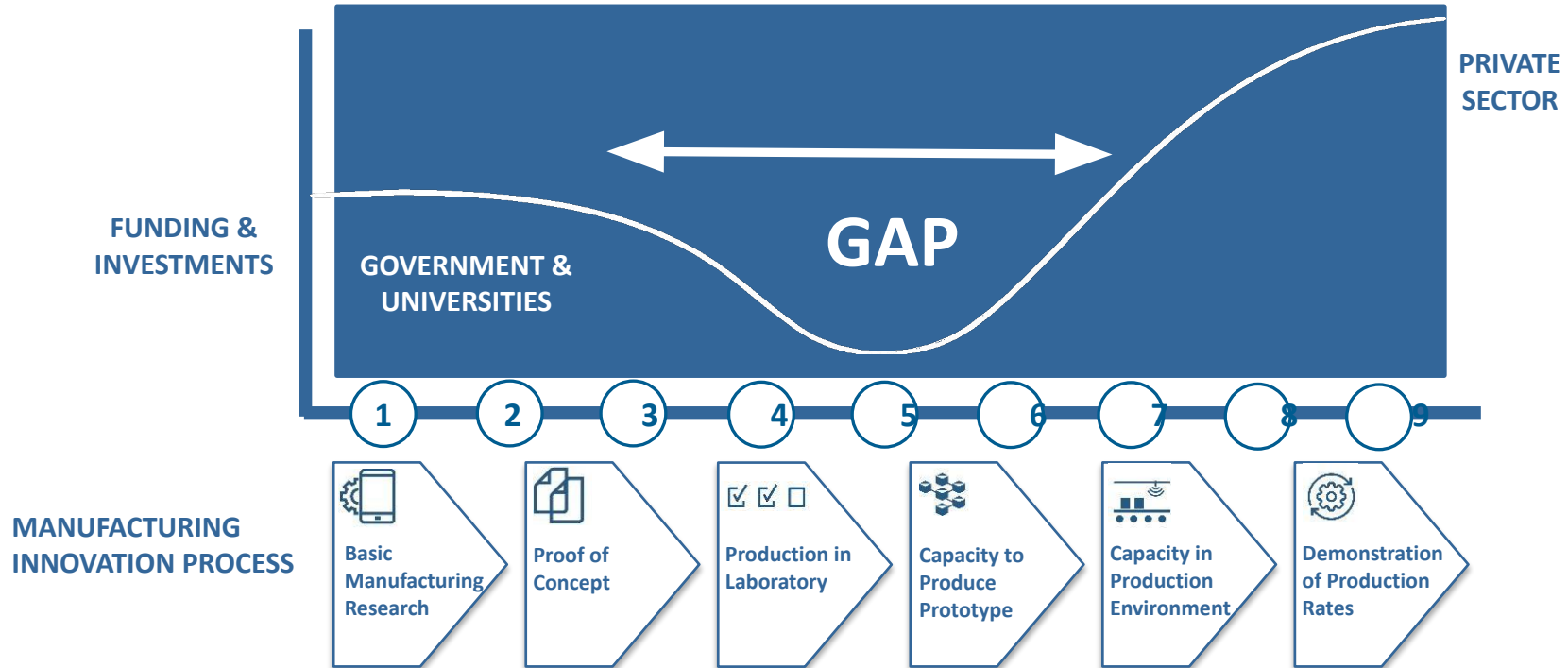
Accelerate the development of an advanced manufacturing workforce



GOAL 4

Promote a network of institutes that build long-term support for and from their communities

Manufacturing USA Purpose



Manufacturing USA Network

ELECTRONICS



Integrated Photonics
Albany, NY
Rochester, NY



Flexible Hybrid
Electronics
San Jose, CA



Wide Bandgap
Semiconductors
Raleigh, NC

MATERIALS



Advanced Fibers
and Textiles
Cambridge, MA



Advanced
Composites
Knoxville, TN



Advanced
Materials
Detroit, MI



Sustainable
Manufacturing
Rochester, NY

DIGITAL/AUTOMATION



Additive Manufacturing
Youngstown, OH
El Paso, TX



Advanced Robotics
Pittsburgh, PA



Smart
Manufacturing
Los Angeles, CA



Cybersecurity
in
Manufacturing
San Antonio, TX



Digital
Manufacturing
Chicago, IL

BIOMANUFACTURING



Regenerative
Manufacturing
Manchester, NH



BioMADE

Bioindustrial
Manufacturing
St. Paul, MN



Biopharmaceutical
Manufacturing
Newark, DE

ENERGY/PROCESSES



Electrified Processes for
Industrial eXCeLLence

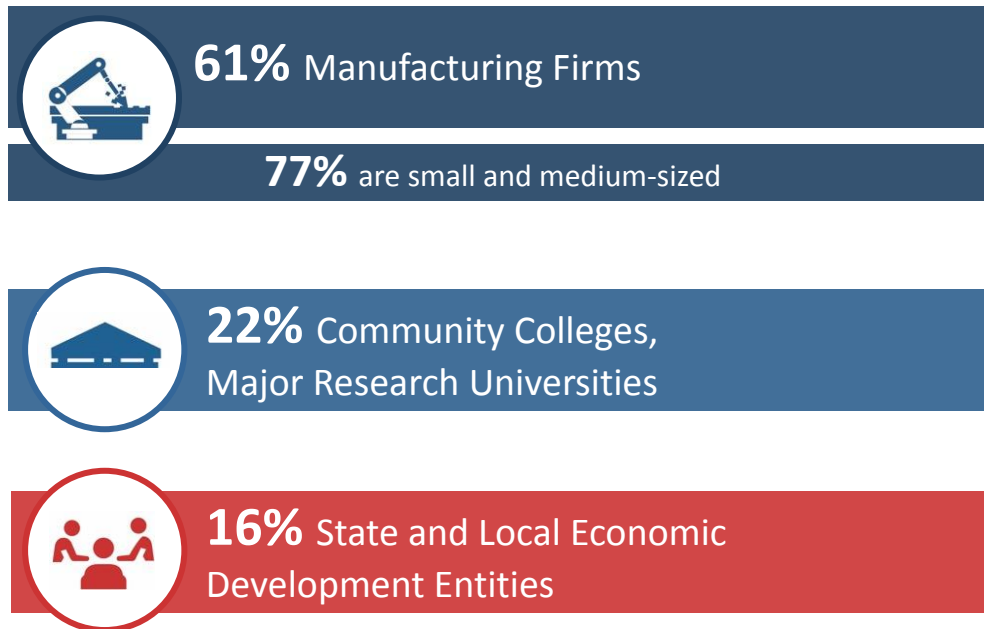
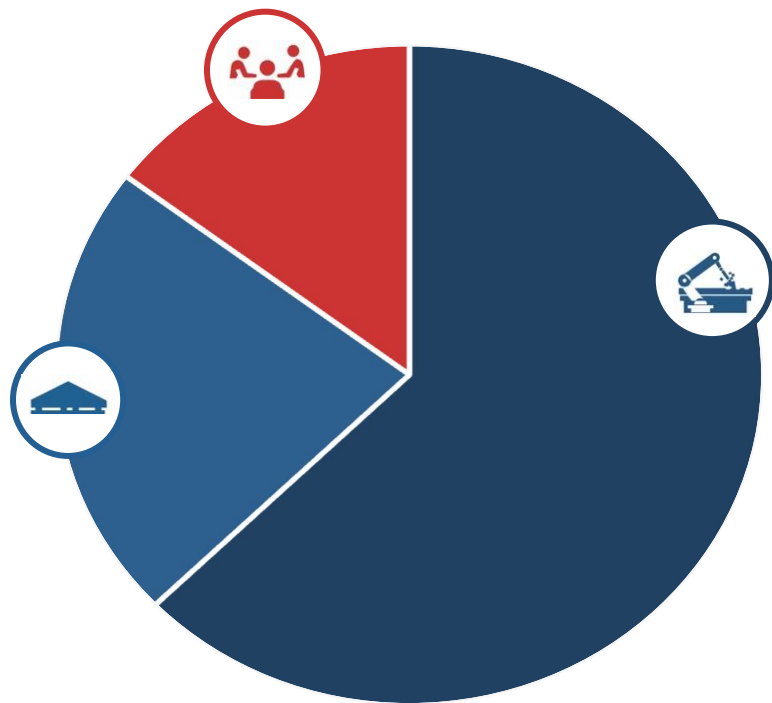
Electrified Industrial
Processes
Tempe, AZ



Modular Chemical
Process Intensification
New York, NY



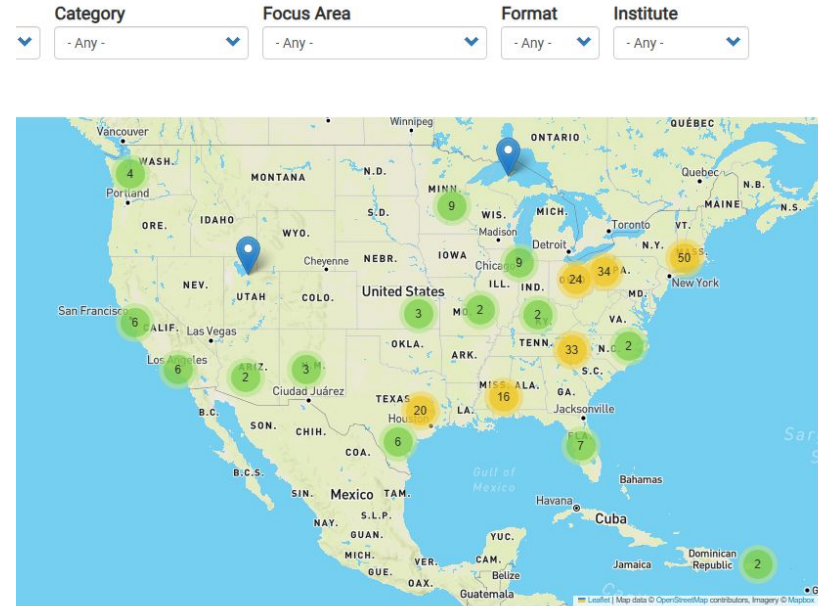
Manufacturing USA Network: Nearly 3,200 Member Organizations



Network-wide Workforce Development Efforts

In FY 2024:

- **+4,100** training providers
- **+195,000** participating in institute projects or internship programs and training
- **237** separate workforce development projects
- **+52,000** manufacturing workforce participants



EWD Connect

www.manufacturingusa.com/ewd-connect

Manufacturing USA Modern Makers

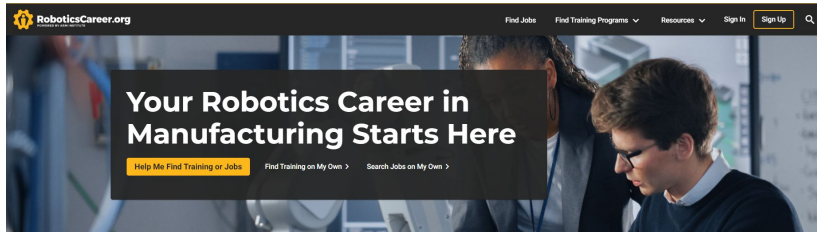


Modern Makers celebrates individuals whose efforts help secure the future of U.S. manufacturing through innovation, collaboration, and education

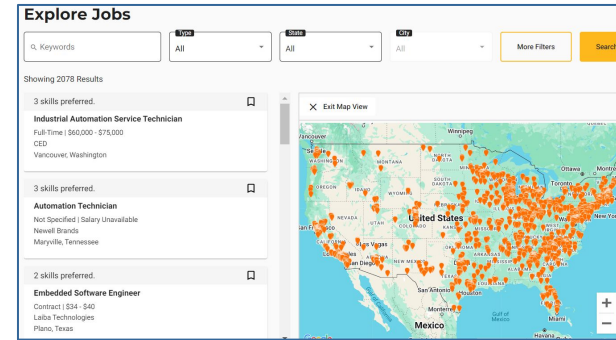
Learn More: <https://www.manufacturingusa.com/modern-makers>

RoboticsCareer.org

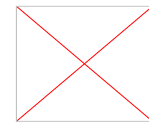
Track Your Career Journey and Goals



Connect to Personalized Job and Training Matches



Find the Most Effective Training Programs



150+
Articles



16,700+
Training
Programs



18,000+
Active Job &
Internship
Postings

Advanced Manufacturing Occupation and Competency Framework

Closing the manufacturing talent gap

This framework supports:

- Co-developing workforce skills for emerging technologies
- Scaling efforts to increase U.S. advanced manufacturing workforce
- Credentialing
- Pre-apprenticeships/Apprenticeships



Advanced Manufacturing Occupation and Competency Framework

Key takeaways

The MFG USA Competency Framework contains:

421

unique KSAs

113

occupations

13

competencies

79

sub-competencies

over

1,700

data points
("connections")



Example: 2026 NextFlex Essential Occupations

- Manufacturing Technicians
 - 32 KSAs
- Process Engineers
 - 23 KSAs
- Mechanical Engineers
 - 23 KSAs
- Electrical Engineers
 - 15 KSAs
- Electrical Design Engineers
- Logistics and Supply Technicians
- Materials Scientists
- Quality Technicians
- Software Engineers
- Test Engineers

Example: 2026 Robotics common knowledge, skills, and abilities

4.2.6 Automated Systems and Control Operations

Use computers, computer-interfaced equipment, robotics or high-technology industrial applications to perform work duties

4.2.6 Automated Systems and Control Operations

Understand and use factory automation technologies

4.2.6 Automated Systems and Control Operations

Operation and control of automated systems

4.2.9 Industrial Productions

Use computers, computer-interfaced equipment, robotics, or high-technology industrial applications to perform work duties

4.2.9 Industrial Productions

Operation and control of manufacturing machinery

4.2.11 Production/Process Monitoring

Operational Technology (OT)

4.3.1 Maintenance, Installation, and Repair - Critical Work Functions

Maintenance equipment, tools, and workstations

4.3.27 Programmable Logic Controlled Equipment Maintenance, Installation, and Repair

Robotic programming

4.6.8 Safety Procedures

Understand and follow safety procedures

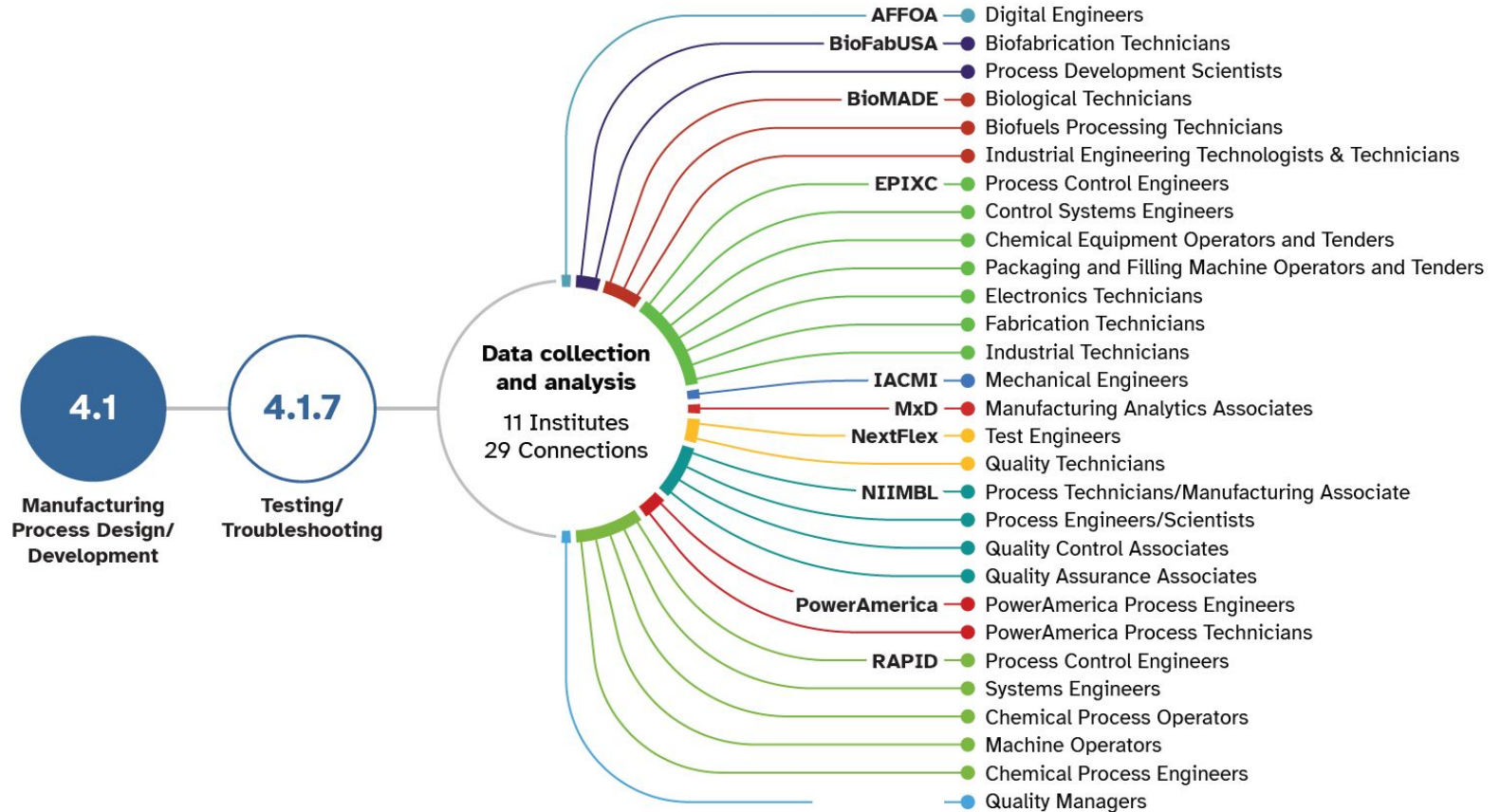
4.6.8 Safety Procedures

Safe material movement

5.3.1 Programming

Knowledge and use of programming skills (Python, C++)

Example: Skills to occupation mapping



Advanced Manufacturing Occupation and Competency Framework

Shared Language for Careers in Advanced Manufacturing

This technical report:

- Identifies translatable skills across forward looking occupations
- Describes career pathways connections
- Augments other workforce models for varied company sizes
- Examines technology area workforce linkages

Purpose: Accelerate advanced manufacturing training program development and adoption

NIST Advanced Manufacturing Series
NIST AMS 600-20

Analysis of the Manufacturing USA Occupation and Competency Framework

A Shared Language for Careers in Advanced Manufacturing

NIST Office of Advanced Manufacturing

This publication is available free of charge from:
<https://doi.org/10.6028/NIST.AMS.600-20>



2025 Competency Correlation

If an occupation needs 'Knowledge and use of computer-aided design (CAD)/computer-aided manufacturing (CAM) software' for Technical Drawings and Schematics as part of Manufacturing Process Design and Development

- Understanding of thermal, mechanical, and optical material properties
- Basic understanding of electrical and optical principles
- Mechanical engineering
- Data collection/analysis
- Work with project managers on production efforts...

Careers: Digital Engineers; Electrical Engineers; Textiles Technicians; Designers; First-Line Supervisors; Electronics Technicians; Industrial Technicians; Machinists; Mechanical Engineers; Electrical Design Engineers; Semiconductor Manufacturing Engineers; Manufacturing Engineers; Process Engineers; Fabrication Technicians; Quality Managers, etc ...

Cast. Forge. Create.

METAL

Metallurgical Engineering Trades Apprenticeship & Learning

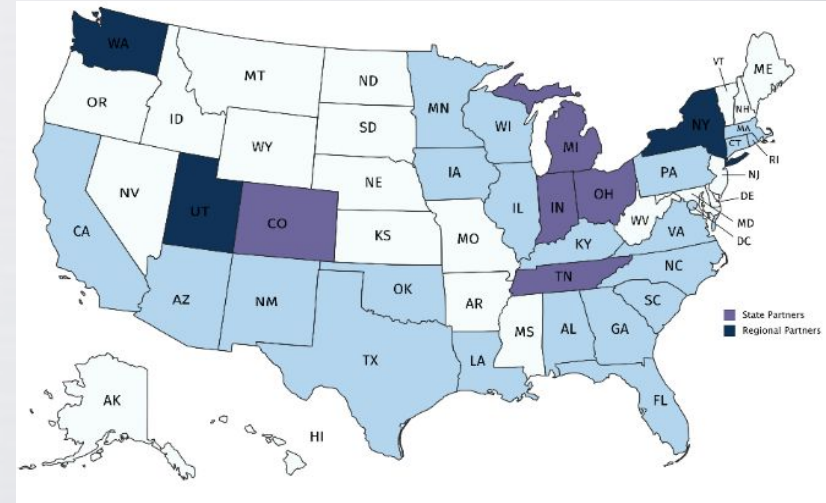
JCC Speaker Series Presentation

August 18, 2026



IACMI - Institute for Advanced Composites Manufacturing Innovation

- One of 18 Manufacturing USA Institutes - a national network designed to address U.S. advanced manufacturing jobs and technologies that our country needs for its own competitiveness and security
- Established 2015 by the Department of Energy

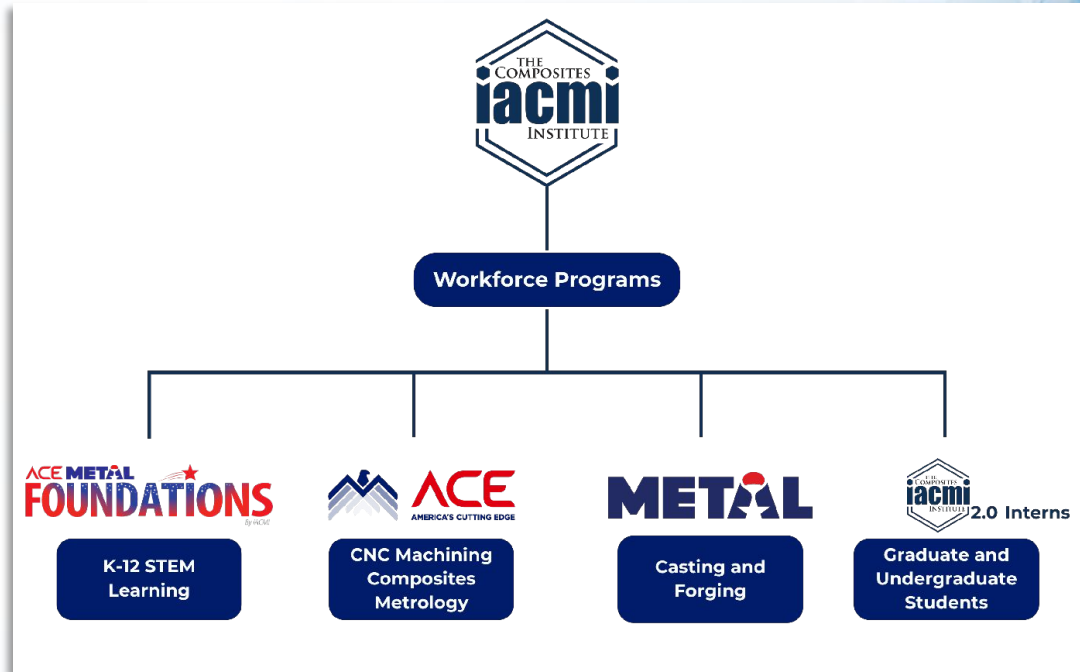


- 180+ member consortium of industries, universities, national laboratories, and federal, state, and local government agencies in 35 states
- [View IACMI's Member Directory](#)

Cast. Forge. Create.

Goals

- Strengthen America's manufacturing workforce through foundational and advanced training (e.g., ACE, METAL).
- Inspire K–12 students with hands-on STEM kits that spark interest in manufacturing and trades careers.
- Develop future industry leaders through internships and apprenticeships that drive innovation and workforce readiness.





METAL

Overview

Cast. Forge. Create.

METAL – Metallurgical Engineering Trades Apprenticeship and Learning

METAL

*Revitalizing
U.S.
Manufacturing*



- **METAL** is an industry led national initiative to rebuild U.S. capabilities in the Casting, Forging, and Plate Production industries, including training to build a skilled workforce, enhanced focus on automation, and K-12 outreach.
- **METAL** is supported by the Department of War (DoW) Industrial Base Analysis and Sustainment (IBAS) Program from the Office of Industrial Policy

Founding Partners

- IACMI-The Composites Institute
- Pennsylvania State University
- The University of Tennessee

Cast. Forge. Create.

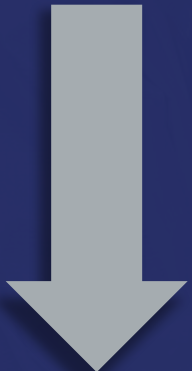


Demand is rising while capacity is shrinking



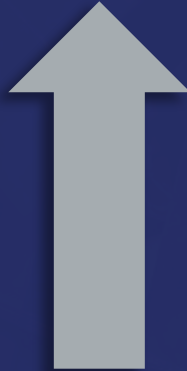
Demand

Demand increasing across platforms and sustainment.



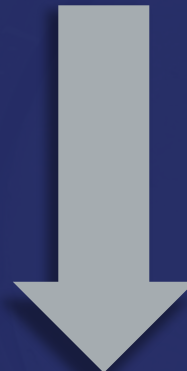
Capacity

Legacy supplier base has significantly contracted.



Urgency

Readiness depends on manufacturing responsiveness.



Supply

Supply chain gaps threaten timely delivery of critical components.

"The shrinking supply chain for critical defense materials demands an immediate response. We must rebuild a modern workforce, technologically adept and capable of meeting the demands of our defense industry with efficiency and innovation."

Dr. Matt Draper
Deputy Director -
Industrial Base Analysis
and Sustainment Program

The METAL Impact – Answering the Call

METAL

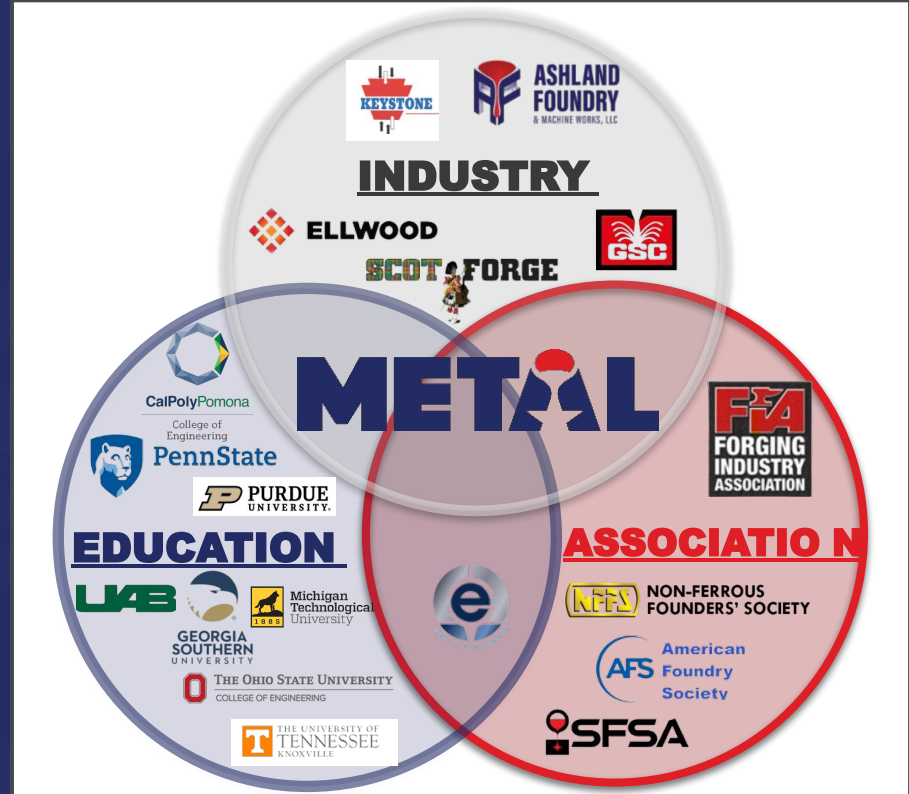
- METAL aims to address these challenges by developing a national training network to sustain the metal manufacturing workforce through 2050
- **We believe manufacturing is a pathway to prosperity for people of all ages and backgrounds**
- We work closely with employers to match real-world needs and align training to lead directly to skilled jobs



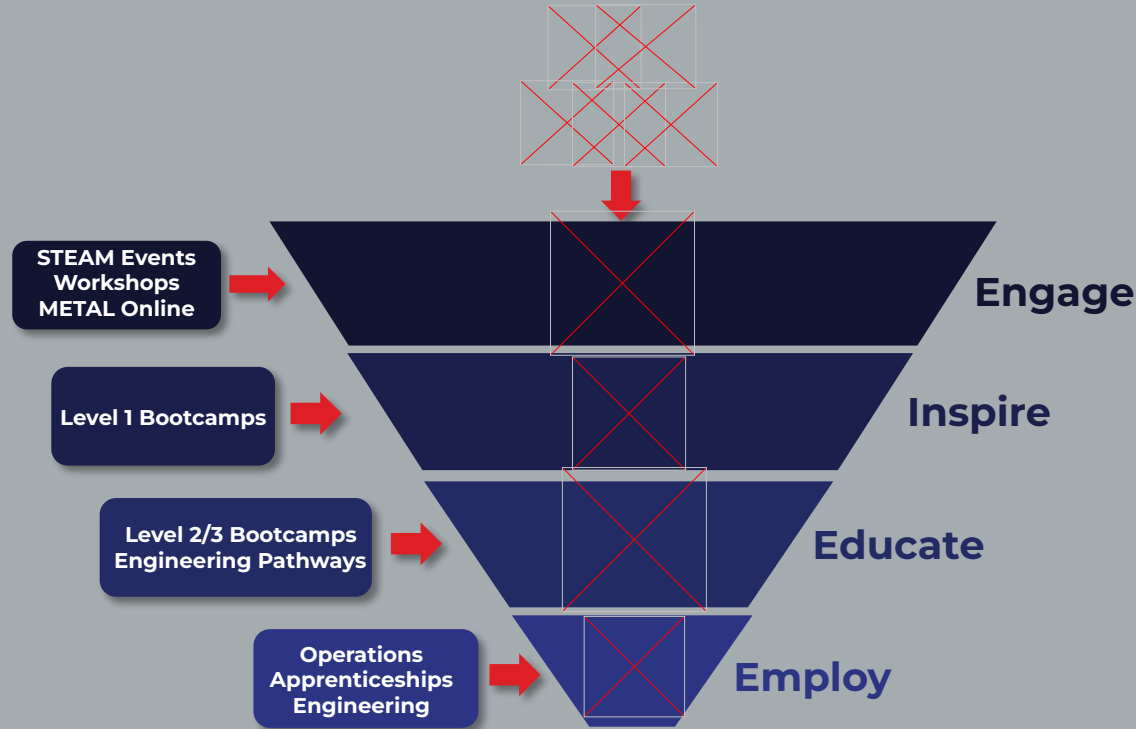
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Building Relationships

METAL is collaborating with Industry, Education, and Associations to fill the workforce gaps



METAL Program Vision



Engage

Engage with K-12 students through STEAM events, workshops, camps and embedded curriculum in CTE programs

Inspire

Inspire by allowing individuals to pour liquid metal during Level 1 in-person bootcamps and teach the basics using online curriculum

Educate

Level 2 and 3 bootcamps including training opportunities in specialized topics and Engineering

Employ

Hire workers, apprentices, engineers, and interns interested in casting and forging industries

Cast. Forge. Create.

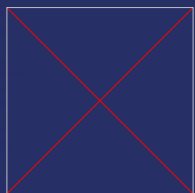




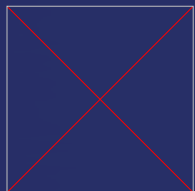
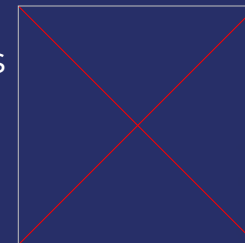
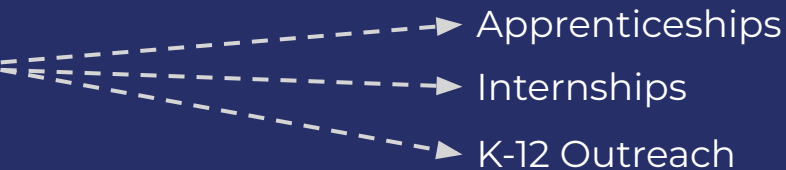
Dylan Cambio
Crane Operator

Cast. Forge. Create.

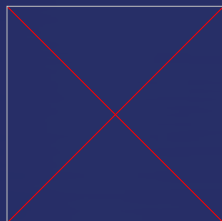
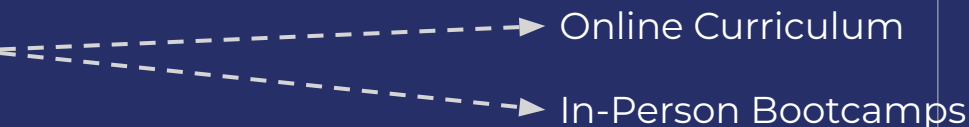
How can METAL help?



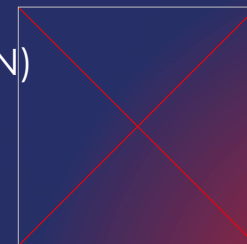
Workforce Shortage



Training/Talent



Connection



Cast. Forge. Create.

Training Tools Offered to Participants

METAL and ACE Curriculum

- Guide your participants to explore career options
 - Have new participants take the online curriculum at their own pace
 - Send those who complete to a bootcamp for hands-on training
- Participants can learn skills and earn Credly badges
- Resources and placement opportunities for your participants directly with industry through new hire and apprenticeship
- **No charge** for courses



Cast. Forge. Create.



METAL Online Courses

2,300+ Online Registrants

- **METAL Level One:** Introductory training covering metal casting, forging, metallurgy basics, and industry career pathways.
- **Digital Technologies for Casting:** Overview of robotics, digital tools, and advanced technologies transforming metal manufacturing.
- **Forging:** Training on forging processes, materials science, tool design, and modern manufacturing methods.
- **Sand Science:** Fundamentals of sandcasting systems, molding materials, and process improvement techniques.
- **Magnesium Casting:** Fundamentals and real-world impact of magnesium casting



METAL



ACE Online Courses

[Link to ACE Website](#)

CNC MACHINING

- ❑ **FUSION 360**
- ❑ **MASTERCAM**
- ❑ Introduction to machining
- ❑ CAM instruction
- ❑ Introduction to machining dynamics
- ❑ Additional CAM instruction using CAM+, app that simulates machining force and vibration
- ❑ Introduction to machining cost
- ❑ 6+ Hours

METROLOGY

- ❑ Introduction to manufacturing measurements
- ❑ Introduction to measurement uncertainty
- ❑ 2+ Hours

COMPOSITES

- ❑ Introduction to Composites
- ❑ **Unit 1: Composites Machining**
- ❑ **Unit 2: Composites in Automotive**
- ❑ **Unit 3: Composites in Energy Storage**
- ❑ **Unit 4: Composites in Aerospace**
- ❑ **Unit 5: Nondestructive Testing (NDT) in Composites**

SMART MANUFACTURING

- ❑ Smart Manufacturing
- ❑ Industry 4.0
- ❑ Industrial Internet of Things
- ❑ Digital Twin
- ❑ Machine Learning
- ❑ Overall Equipment Effectiveness (OEE)

CYBERSECURITY

- ❑ **CMMC 1.0**
- ❑ Network Security Basics
- ❑ Virtual Private Networks
- ❑ Firewall Security
- ❑ Intrusion Detection Systems
- ❑ Cryptographic, Transport Layer, Hashing, and PKI Security
- ❑ 6+ Hours
- ❑ **CMMC 2.0**
- ❑ 24+ Hours

**12 Available
Online Courses**



Be A Maker



Level 1 Bootcamp

A hands-on introduction to casting and modeling that covers processes like lost-foam and sand casting, SolidCast simulation, aluminum and bronze pours, post-processing methods, tensile testing, metallurgy fundamentals, gray vs. ductile iron, and common alloy types.

Digital Technologies in Casting

Industry 4.0 process instrumentation and data collection; data analytics; additive manufacturing augmented castings; augmented reality in casting.

Sand Science

A hands-on training in green sand fundamentals, mold and core making (including 3D-printed cores), and modern process-control practices for green sand, mulling, re-conditioning, and advanced conventional and 3D-printed mold technologies.

High Pressure Die Casting

Hosted at The Ohio State University, providing hands-on training in equipment setup, process optimization, and real-world production applications.

Cast. Forge. Create.

METAL LVL 1 Casting Bootcamp



METAL Digital Technologies in Casting Bootcamp



Training Sites

21,200+ Total Impact

15

METAL Training Sites

2

Mobile Training Units

13 STATES

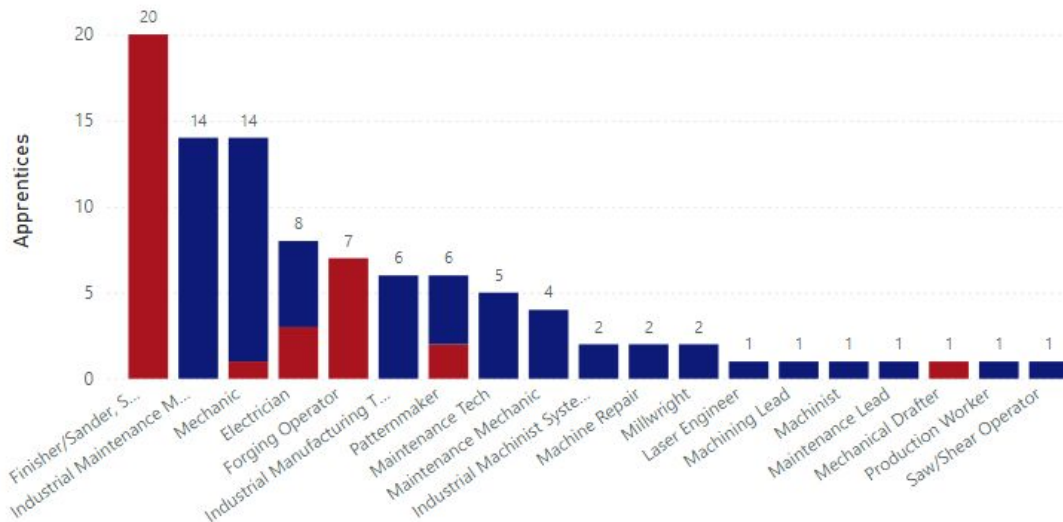


150+ Apprentices Placed

- Apprenticeship program development
- Incentive Funding available
- Access to free curriculum
- Customized apprenticeship programs

Apprentices by Job Title

Apprentice Type ● Non-Registered ● Registered



METAL Program Vision

Engage



METAL Workshops

- Melting tin into a variety of shapes using sand casting
- 3 Hours in Duration

METAL Online Curriculum



STEAM Event

- Large audiences exposed to Casting in several hours
- Melting tin into a variety of trinkets



Inspire



In-Person Bootcamp Curriculum

- Casting processes e.g., lost foam, sand
- Basics of modeling with SolidCast
- Pouring Aluminum and Bronze into mugs and medallions
- Post Processing machine grinding, band saw
- Tensile strength
- Metallurgy basics
- Gray cast iron vs ductile
- Types of alloys



Educate



Education pathways

- Level 2 and 3 bootcamps in development
- Industry 5.0, AR/VR, automation, and robotics
- Specialized training
- Advanced modeling
- Engineering degrees
- Access to existing curriculum from associations such as FIA, SFSA, and AFS

Employ



Employment Opportunities

- Apprentices and Interns
- METAL program is building apprenticeship programs in key regions
- Hire motivated individuals post bootcamp
- Increased supply of the metal industry workforce to meet future demand

Cast. Forge. Create.

METAL



Small But Mighty: TOSOH SMD Powers Semiconductor Innovation with METAL Bootcamp

Cyler McClure has spent his career studying the ins and outs of semiconductors—microscopic metal switches that power today's world. Now, as product engineering manager at TOSOH SMD, McClure empowers the [...]

[READ MORE](#)

[Industry utilizing bootcamp](#)



Pouring Metal and Powering National Defense: DoD Contractors Join METAL Bootcamp

Melissa Walston and Rachel Reed have spent their careers traveling the world, learning languages and guiding U.S. diplomats across foreign nations and cultures. But when it came to navigating a [...]

[READ MORE](#)

[DoD impact](#)

[METAL — Blog Archives - METAL](#)



Penn State's Sand Science Bootcamp Sparks New Thinking Across the Foundry Industry

In October, Penn State hosted its first METAL Sand Science Bootcamp, a hands-on course exploring the chemical and physical principles behind green sand and chemically bonded sand. These are two [...]

[READ MORE](#)

[New Curriculum](#)

Contact US

Workforce Managers

Nationwide: Lucinda Curry – lc Curry@iacmi.org

Southeast Region: Cristina Want – cwant@iacmi.org

Northeast Region: Joanna Markle – jmarkle@iacmi.org

Western Region: Isaac Gonzalez – igonzaez@iacmi.org

K-12 Outreach: Greg Harrell – gharrell@iacmi.org

Canvas Support

Tyler Blevins – tblevins@iacmi.org

Shelby Bledsoe – sbledsoe@iacmi.org

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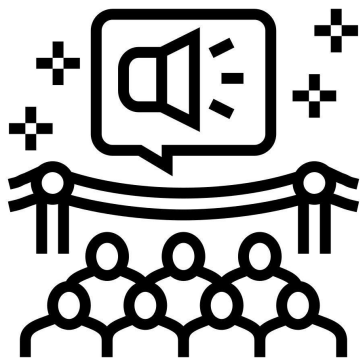
Embedding AM in Your Fair Chance Ecosystem

Mapping Your Local Manufacturing Scene



- **Check Local Hiring Laws:** Use the [Ban the Box State and Locality Guide](#) to look up city and state fair-chance rules before talking with local HR experts and owners.
- **Identify Legal & Financial Hurdles:** Use the [Policy Resources](#) (such as the *State-by-State Fines and Fees Tracker*) to understand the legal and financial challenges candidates face.

Embedding AM in Your Fair Chance Ecosystem



Bringing Groups & Businesses Together

- **Organize Community Meetings:** Use the [Tools of the Game Guides](#) for downloadable frameworks, meeting templates, and advocacy guides that help volunteer teams run professional employer meetings.
- **Host Partner Events:** Follow the [Fair Chances Action Toolkit](#) to host employer roundtables or reentry simulation events that build strong local networks.

Embedding AM in Your Fair Chance Ecosystem



Getting Employers Engaged to Hire

- **Address Safety & Liability Fears:** Share the [Negligent Hiring Liability Report](#) with factory leaders to show data proving fair-chance talent performs safely and reliably.
- **Pair Hiring with Legal Clinics:** Use the [Record Clearance Clinic Playbook](#) to team up with chambers of commerce and legal aids for joint hiring and record-cleaning events.

Embedding AM in Your Fair Chance Ecosystem



Connecting Training to Real, Lasting Jobs

- **Remove Legal Barriers During Training:** Use the [Record Sealing Resources](#) so candidates can clean up past records while earning manufacturing credentials.
- **Find Local Funding & Support:** Point community partners to the [Employment & Training Section](#) to access local workforce development boards and job training grants.



JOIN THE TABLE TODAY!
justuscc.org

CONTACT US

info@justuscc.org

facebook.com/JustUSCoordinatingCouncil

instagram.com/justuscouncil



TAKE OUR SURVEY!