



# Digital Manufacturing in the Organic Industrial Base (OIB)

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# MANUFACTURING USA EXISTS TO INCREASE U.S. COMPETITIVENESS





**CONVENE THE ECOSYSTEM**



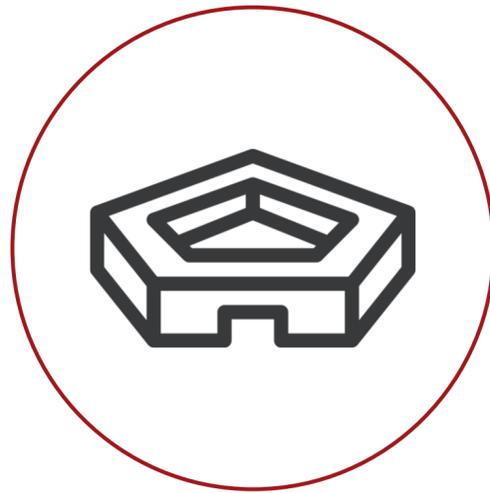
**ADVANCE TECHNOLOGY INNOVATION & ADOPTION**



**EMPOWER THE WORKFORCE**



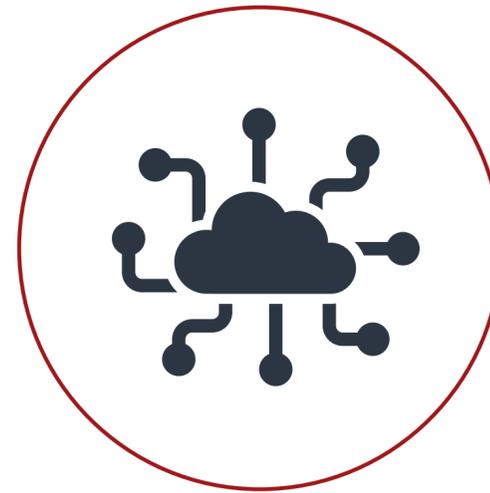
# Who makes up MxD's Ecosystem:



**DoD + Other  
Government**



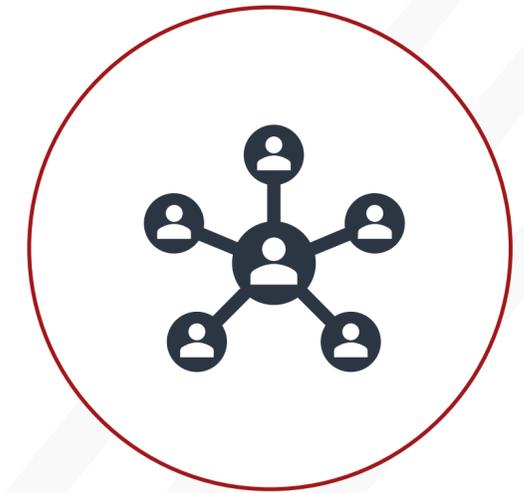
**Manufacturers**



**Solution Providers**



**Academics**



**Non-Profits**



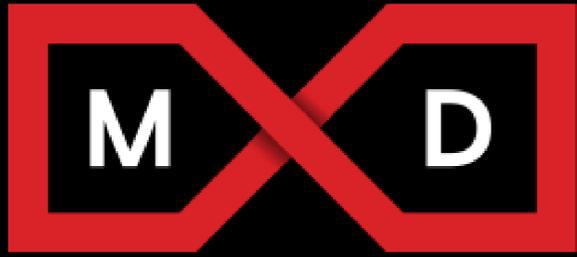
- **Examples of ‘Digital Manufacturing’ / Industry 4.0**

#### **What Needs to be Done**

- Gather information about the process
- Communicate information
- Learn from the information
- Try improvements without interrupting operations
- Drive lessons learned back into the process

#### **What Technology is Required**

- Sensors, Data
- IoT, Communications, Standards
- Analytics, Artificial Intelligence (AI), Machine Learning (ML)
- Digital Twin, Virtual Commissioning
- Control Systems, Augmented Reality (AR), Systems Integration



# OIB Modernization Cross-Institute Assessments

# MDMC (OIB Modernization Assessments)



Part of an OIB modernization assessment performed with MxD, America Makes, ARM, LIFT, NextFlex to improve maintenance, repair, and remanufacturing operations.



[https://en.wikipedia.org/wiki/Marine\\_Corps\\_Logistics\\_Base\\_Albany#/media/File:Defense-12.jpg](https://en.wikipedia.org/wiki/Marine_Corps_Logistics_Base_Albany#/media/File:Defense-12.jpg)

## CHALLENGE

- High mix, low volume
- No way to track status of vehicles and necessary parts prior to arrival in repair bay
- System-to-system connectivity
- Workforce availability
- Mix of legacy and modern equipment

## PROJECT SOLUTION & OUTCOME

- The institutes are currently drafting the final assessment, along with recommendations for process improvements and future projects at MDMC.

## IMPACT

- This project will create an assessment of automated, advanced, and additive manufacturing technologies that can improve maintenance, repair, and remanufacturing operations that could be scaled to other depots.



<https://www.albany.marines.mil/Resources/MCLB-Offices-Staff/>



# Watervliet Arsenal (OIB Modernization Assessments)



Part of an OIB modernization assessment performed with MxD, America Makes, ARM, LIFT, and NextFlex to improve maintenance, repair, and remanufacturing operations.



<https://api.army.mil/e2c/images/2017/01/17/462709/max1200.jpg>

## CHALLENGE

- Historic status of all buildings on property
- No dedicated production lines for each product
- Workforce availability

## IMPACT

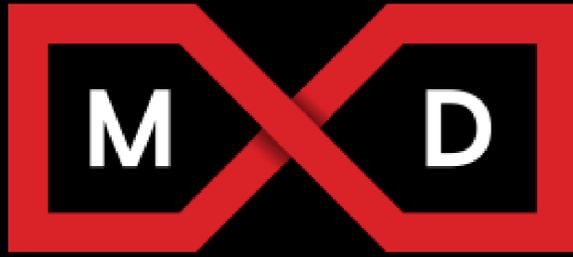
- This project will create an assessment of automated, advanced, and additive manufacturing technologies that can improve maintenance, repair, and remanufacturing operations that could be scaled to other depots.
- MxD is drawing on previous experience and lessons learned from projects at RIA to suggest potential projects and upgrades at WVA.

## PROJECT SOLUTION & OUTCOME

- The institutes are currently planning site visits to Watervliet to begin the assessments.
- Recommendations will be shared with Watervliet by the end of the year.



<https://api.army.mil/e2c/images/2013/02/26/283599/max1200.jpg>



# Picatinny Arsenal Feasibility Studies

# Picatinny Feasibility Assessments



MxD is working with Picatinny Arsenal on two feasibility studies/ pilot projects:

- Jacket Forming for small-caliber bullets
- Tracking machine tooling and inventory



<https://www.quora.com/What-is-the-difference-between-jacketed-and-unjacketed-bullets>

## CHALLENGE

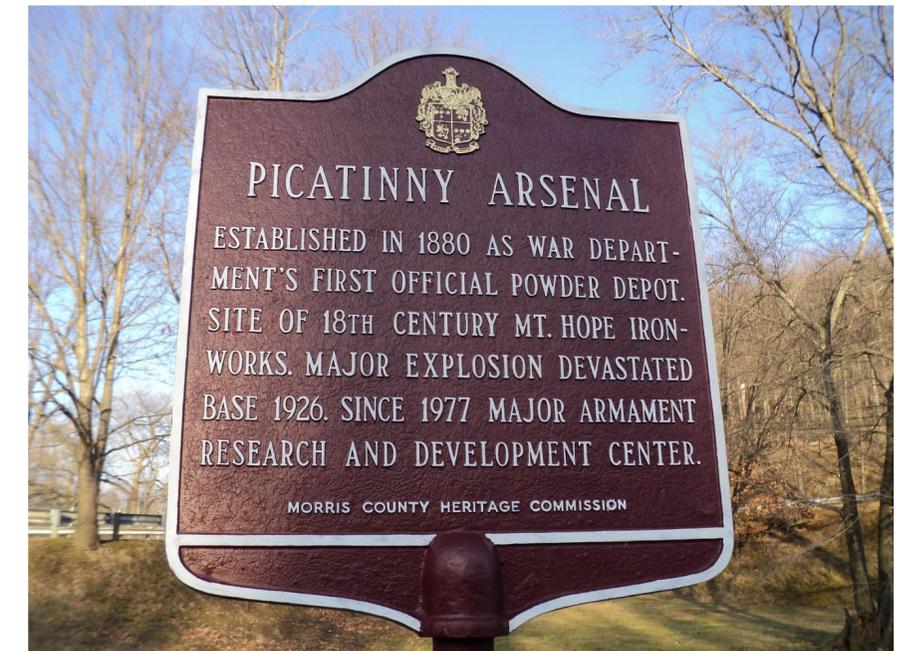
- When Picatinny makes design changes to small-caliber bullets, there are challenges associated with ramping to production.
- Currently, tracking machine tooling and inventory is difficult in real-time and requires manual operator verification.

## IMPACT

- Being able to share data acquired during the design changes at Picatinny with other ammunition plants in the US will result in large time savings
- Being able to track inventory and tooling digitally will allow Picatinny to increase efficiency by:
  - Reducing machine downtime due to incorrect tooling
  - Showing minimum inventory alerts
  - Tracking tool inventory

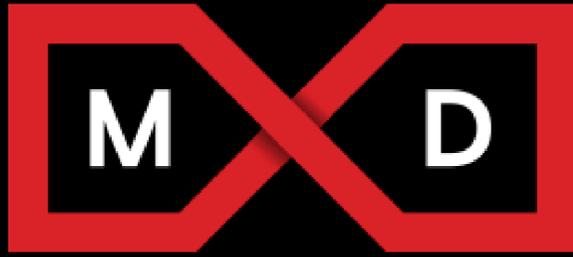
## PROJECT SOLUTION & OUTCOME

- Study current environment and propose a plan to fit machines with sensors to convey machine health, help schedule preventative maintenance to minimize machine downtime, and assist other arsenals with data and lessons learned throughout this jacket-forming feasibility study.
- Real-time tracking of machine tooling and inventory will allow Picatinny to track the tooling on which machine in real-time without the need for an operator to manually verify.



Photographed By Bill Coughlin, January 1, 2012



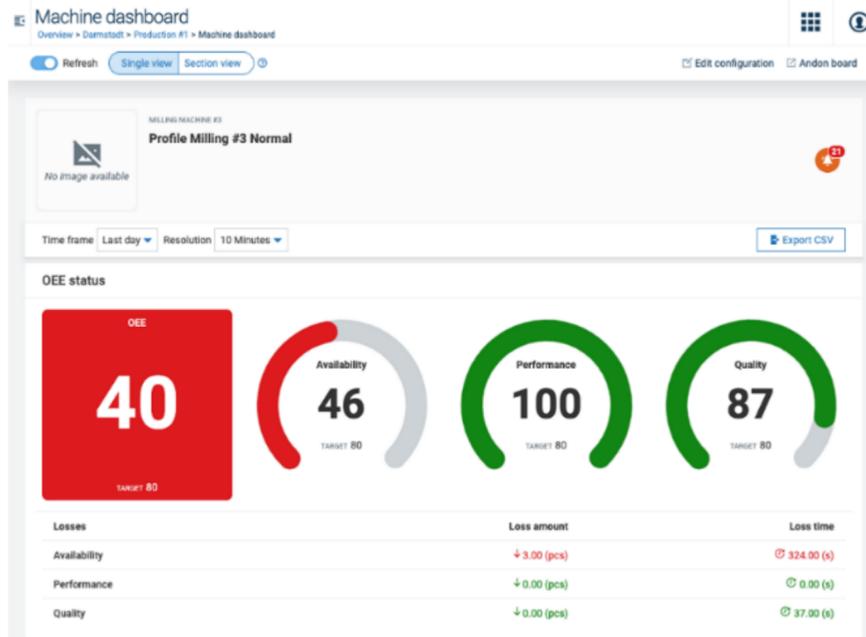


# ROCK ISLAND ARSENAL JMTC - MODERNIZATION PROGRAM

# Rock Island Modernization



The goal of Rock Island Modernization programs is to pilot the implementation of digital engineering and manufacturing concepts for broader use throughout the OIB.



<https://cumulocity.com/guides/oe/oe-dashboards/>

## CHALLENGES

- Mix of legacy and modern equipment
- Lack of data collection at key points in process
- Lack of connectivity

## PROJECT SOLUTION

- WiFi Mapping, WiFi installation: Expand the reach of the ICN with ability to display information from factory floor in the main office.
- Machine Health/Machine Status Dashboard: Improved predictions of when a machine will fail or require additional maintenance, better planning of maintenance downtime to reduce the impact on facility.
- Part Inspection Dashboard: New systems to reduce the workload and likelihood of error from human manual inspection.
- Robotic Paint Planning: Show the feasibility of ending manual painting of vehicle parts, increase the safety of personnel.
- CAD/CAM transition: Study and quantify holistic cost to change over to a new CAD/CAM solution.

## IMPACT

- This initiative will help improve U.S. manufacturing and maintenance organizations and the JMTC's ability to manufacture, maintain, repair, and overhaul various ground systems and their associated components in a more efficient, effective, and affordable way.
- This project is considered a pilot with the potential and intention of being implemented not only at RIA-JMTC but also at other Department of Defense facilities across the country.
- This partnership puts the benefits of digital manufacturing to work for the direct support of the U.S. warfighter.





# The Digital Manufacturing & Cybersecurity Institute

