

## Manufacturing Automation and Additive Design Excellence PROJECT OUTCOMES - 2022-23

During 2022-23, the Design and Manufacturing Technologies (DMT) Department launched its **NSF Advanced Technological Education (ATE)** project, titled **Manufacturing Automation and Additive Design Excellence (MAADE)**. This three-year project addresses current and emerging **workforce demand** for **additive manufacturing technicians** and **CNC machinists** with knowledge of the latest industry trend. The specific goals of the MAADE project are as follows.

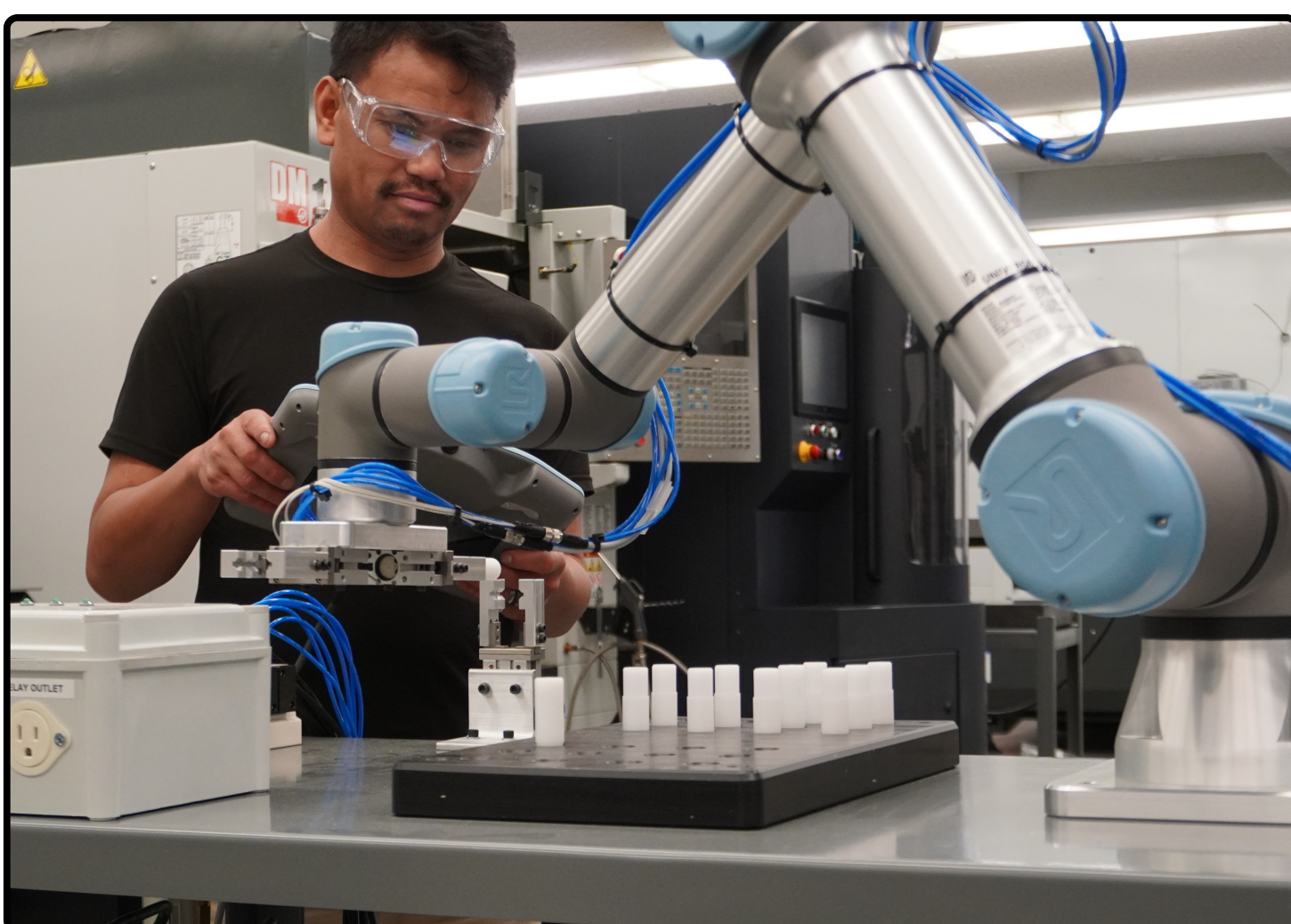
- **Enhance DMT curriculum** in **additive manufacturing/3D printing (AM)**, **CAD**, **multi-axis machining**, and **robotic automation**.
- **Expand industry partnerships** with local manufacturing enterprises, research centers, and national laboratories.
- **Promote** diversity, equity and inclusion (DEI) in the DMT program and **participation** of **women** and **underrepresented** populations.
- **Lead** high school and community college **faculty professional development** courses in the areas of AM, multi-axis machining, and robotic automation.

### 1) Developed New Curriculum in AM, Advanced Machining & Robotic Automation

- Compiled list of industry-defined Knowledge, Skills, and Abilities (KSAs) for **Additive Manufacturing Technicians**.
- Created new **Certificate of Achievement - Additive Manufacturing: 3D Design and Production**.
- Certificate includes the fundamentals of CAD, **design for additive manufacturing (DfAM)**, and 3D printing using **fused deposition modeling (FDM)**, **stereolithography (SLA)**, **material jetting**, **selective laser sintering (SLS)**, and **direct metal laser sintering (DMLS)** technologies.
- Developed **robotic arm** and **machine tool integration** operation and programming applications.
- New courses in **Multi-Axis CNC Machine Simulation**, **Robotic Automation** and **Live-Tooling CNC Lathes** are forthcoming.



### 2) Expanded Existing and Created New Manufacturing Industry Partnerships



- Reestablished connections with **NASA/Ames Research Center** and **SLAC National Accelerator Laboratory**.
- Completed Pathways to Innovation **Business and Industry Leadership Team (BILT)** Academy.
- Formed **Additive Manufacturing/3D Printing BILT**.
- Signed **Statement of Work** with **NASA's HUNCH** program to offer project-based learning experiences to students.
- Augmented network of industry partners to include major players within the AM sector: **Carbon 3D**, **Velo 3D**, **Intuitive Surgical**, **Indicate Technologies**, and **Meta**.
- Forged collaborations with companies offering **internship** and **employment** opportunities, including **Joby Aviation**, **VanderBend**, **FM Industries**, and **Peterson Precision**.

### 3) Increased Participation of Women and Promoted Diversity, Equity, & Inclusion

- Implemented strategies to **increase participation** of individuals who identify as **female**, as well as **Black** and **Latinx** students.
- Recruited **new adjunct faculty** who reflect the diversity of DMT students. Spanish and Vietnamese-speaking staff and faculty offer in-language, culturally-responsive instruction.
- Offered **two Dual Enrollment classes** in partnership with Fremont Union High School District: **Survey of Design and Manufacturing Processes** (DMT 55) in Fall 2022 and **3D Printing & Rapid Prototyping** (DMT 53) in Winter 2023
- Dual Enrollment courses continuing in 2023-24.
- Hosted **guest speakers** from Carbon 3D, Women in 3D Printing, Boston Scientific, and Hawk Ridge Systems.



### 4) Facilitated Faculty Professional Development Weekend Short Courses



- Participated in **industry-sponsored training** at Indicate Technologies (additive manufacturing and inspection), Renishaw (CNC machine tooling), and Universal Robots.
- Sponsored **three professional development short courses** for high school and college educators.
- Developed accelerated curriculum for CNC Milling to leverage educators' prior knowledge and experience.
- **Intro to CNC Milling Parts I & II** were offered on consecutive Saturdays during **Winter 2023** with in-person lecture/ demos and hand-on labs.
- Created new AM/3D printing professional development course to extend career opportunities for students.
- **Intro to 3D Design and Production** was offered **Spring 2023**.
- Featured overview of the major **ISO/ASTM additive manufacturing** processes and **3D printing** technology.

### MAADE Program Improvement Initiatives for 2023-24

- **Incorporate BILT KSA recommendations** into **AM Support Technician** (DMT 56) and **Design for Additive Manufacturing** (DMT 57) courses.
- **Convene BILTs** for **CAD** and **CNC Machining**, analyze industry-vetted KSAs, and **identify skills gaps** in existing offerings.
- **Implement MAADE professional mentoring**, foster belonging among women, and **improve outcomes** across all student populations.
- **Host** manufacturing **educators conference** and intensive **professional development** offerings in **Advanced Multi-Axis CNC Milling**, **Robotic Automation** for CNC Machining, and **Design for Additive Manufacturing** (DfAM).

[Design and Manufacturing Technologies](https://www.deanza.edu/dmt/maade/)  
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