Life after the Equipment Purchase

Sustaining Program Improvement Through Local and Regional Collaboration

CTE Enhancement Funds and the Cross town Manufacturing Hub

at

Glendale CC and Mt. SAC

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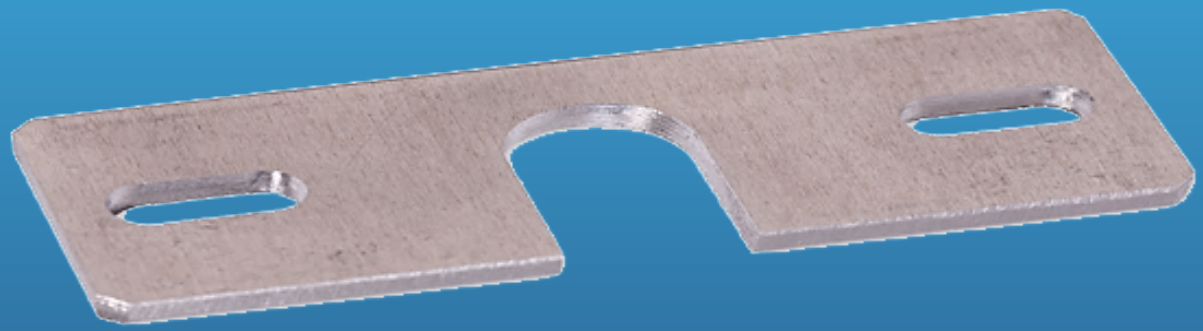
The "Pre-Enhancement Funds" State of Mt. SAC Manufacturing Technology Program Equipment CNC vertical milling machines c. 1980

- Parts were limited to machining 2D profiles-3D machining is commonplace in industry
- Controllers were no longer manufactured or supported.
- Pre-USB electronics could not accept files from current software

Mt. SAC's manual milling machines limited students to the production of simplistic parts.

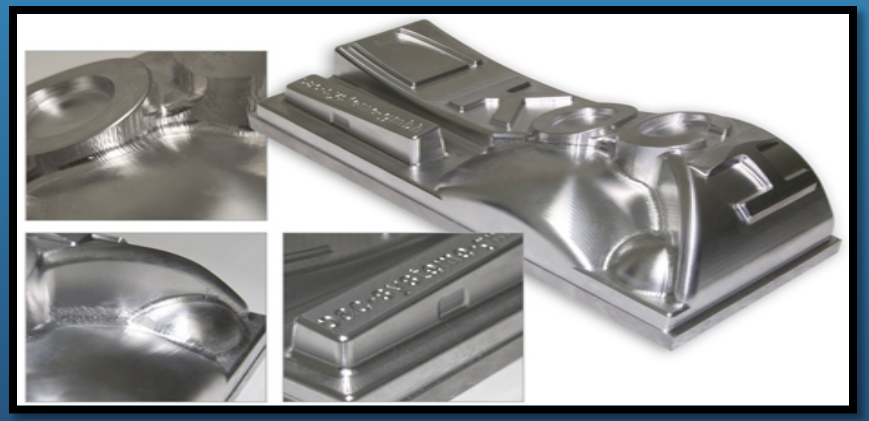


Program Collaboration-Phase 1: Expertise Sharing

As Enhancement Funds became available, Glendale CC faculty, whose Manufacturing program is thriving, provided invaluable assistance to Mt SAC's MFG/IDE Programs in multiple critical areas:

- helping faculty to procure 6 HAAS vertical mill and lathe machining centers
- guiding faculty in the purchase of complex tooling required for the machines
- consulting in updating of CNC curriculum
- teaching CNC-related courses at Mt SAC

These new Haas machines now allow Mt Sac's IDE/MFG programs to produce highly complex and precise parts from student CAD designs.

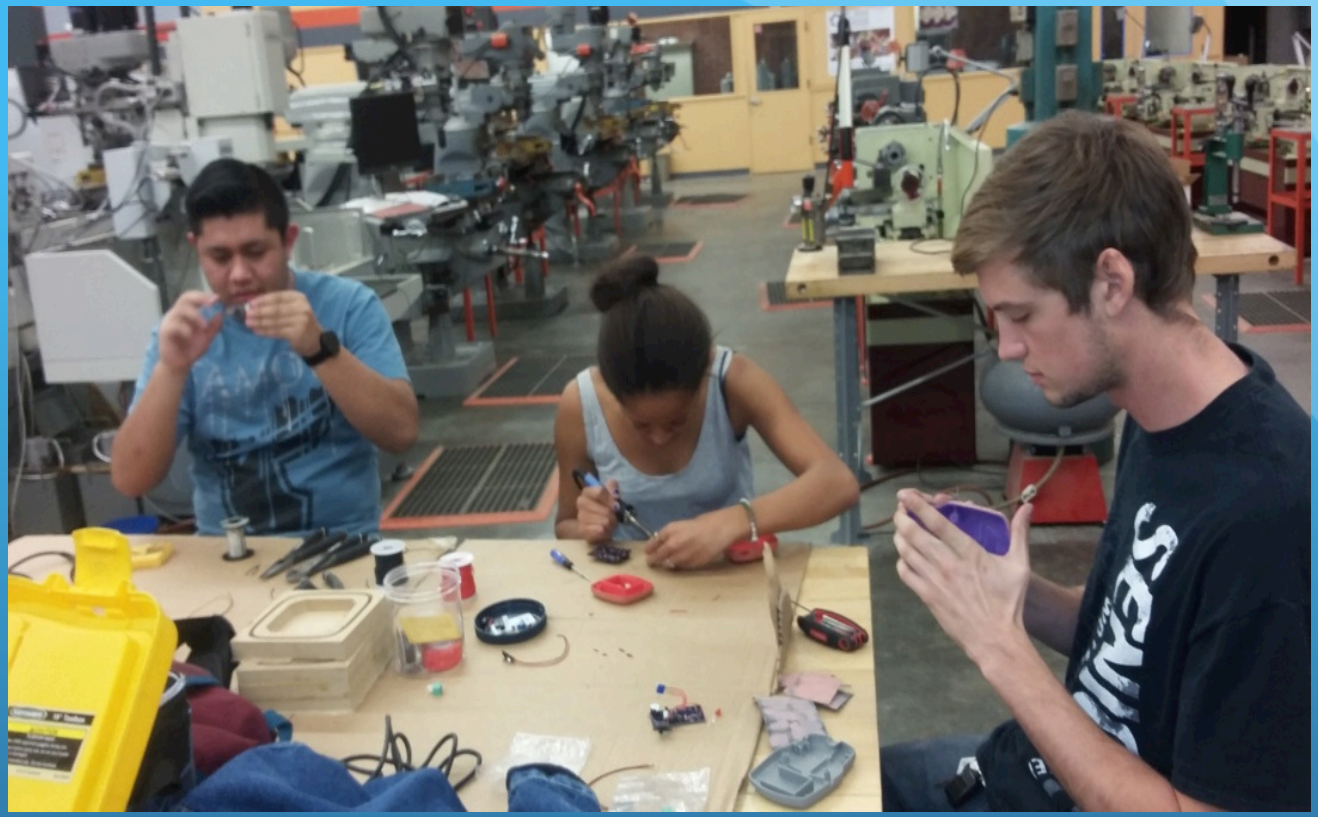


Impact of Phase One

- The new equipment has begun to both attract and better-prepare students
- The new equipment, along with the revised curriculum, has increased program credibility in industry
- MFG/IDE programs are now positioned to partner with programs on campus and with other colleges in dynamic, student-centered activities

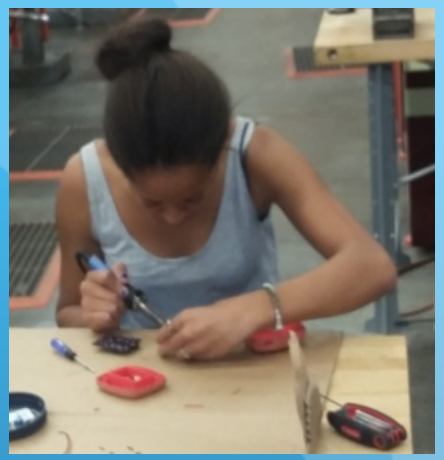
Collaboration-Phase 2:
Inter-disciplinary Projects at Mt. SAC

Electronics and IDE students collaborated on a creating a device that could turn on/off another device such as a light, radio or buzzer.



- Students worked in teams of 2 or 3
- Electronics students designed, etched, and fabricated both the circuit and circuit board
- IDE students designed, 3D printed, and fabricated the enclosure

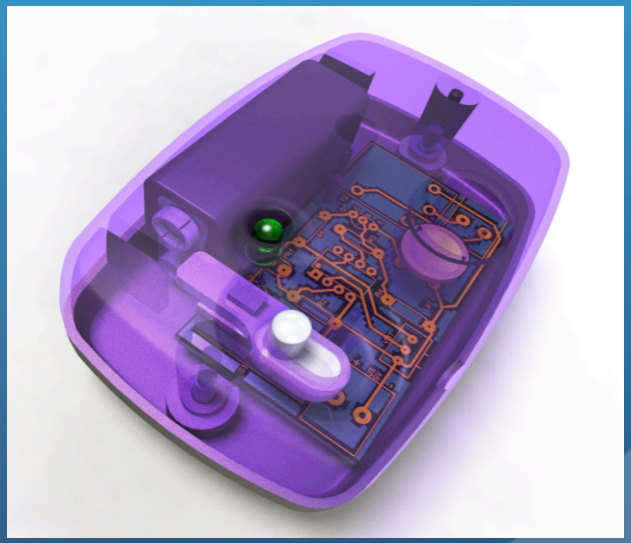
Impact of Phase Two
Students established and communicated:



- Design requirements
- Location/orientation of input features (switch, adjustment, power/output jacks)
- Placement of components for efficient use of circuit board space
- Reverse engineering of existing components to match CAD models to actual parts
- Effective attachment of various components and PCB to enclosure
- Limitations and constraints of 3D printing, PCB fabrication, and various other fabrication methods and design approaches

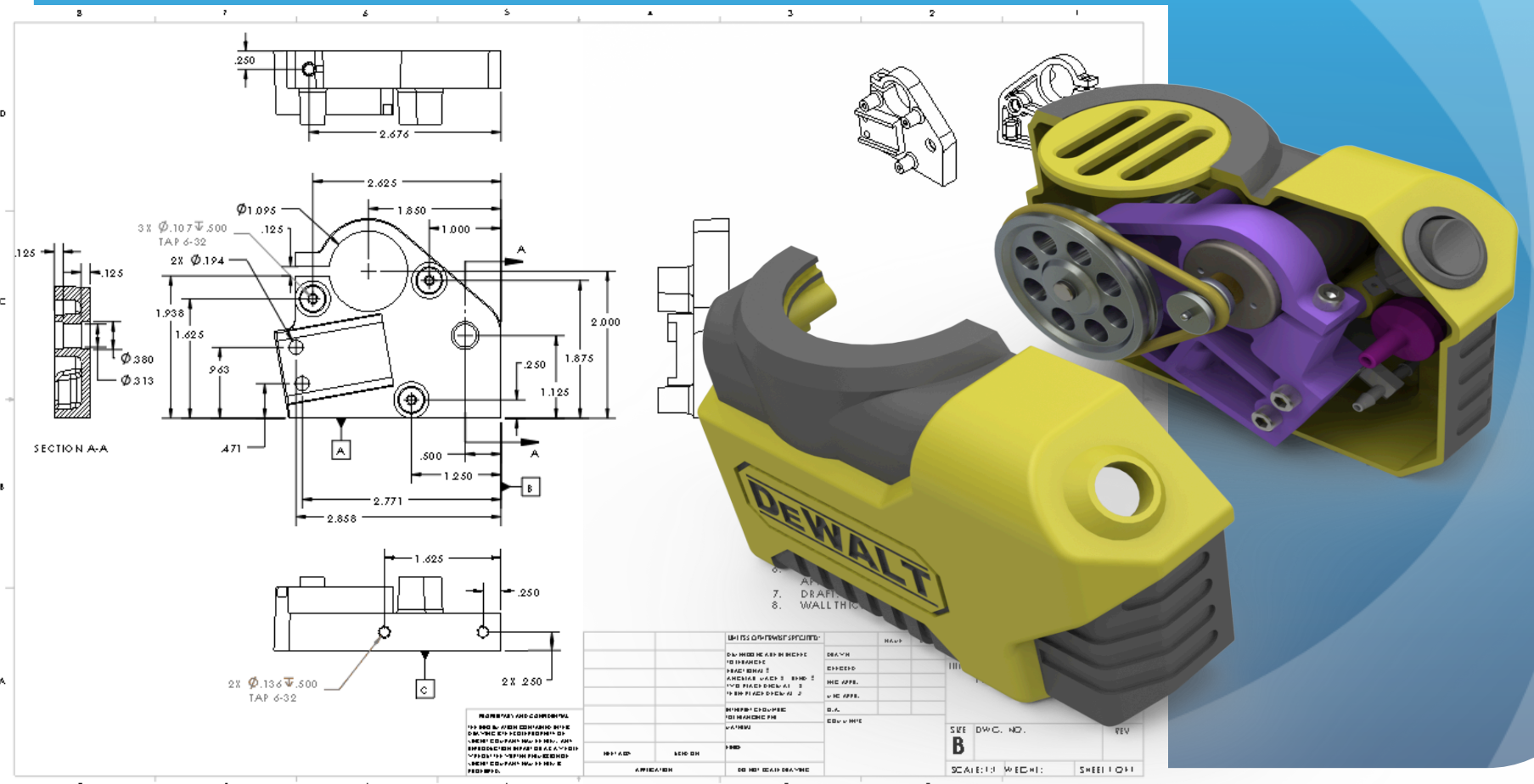
Student teams walked away with functioning devices for their own use, including:

- Light-beam tripwire for Paintball contests
- Light-based radio alarm
- Cellphone-connected remote sensor



Program Collaboration-Phase 3: Cross-Region Student Collaborations

Air Compressor Project

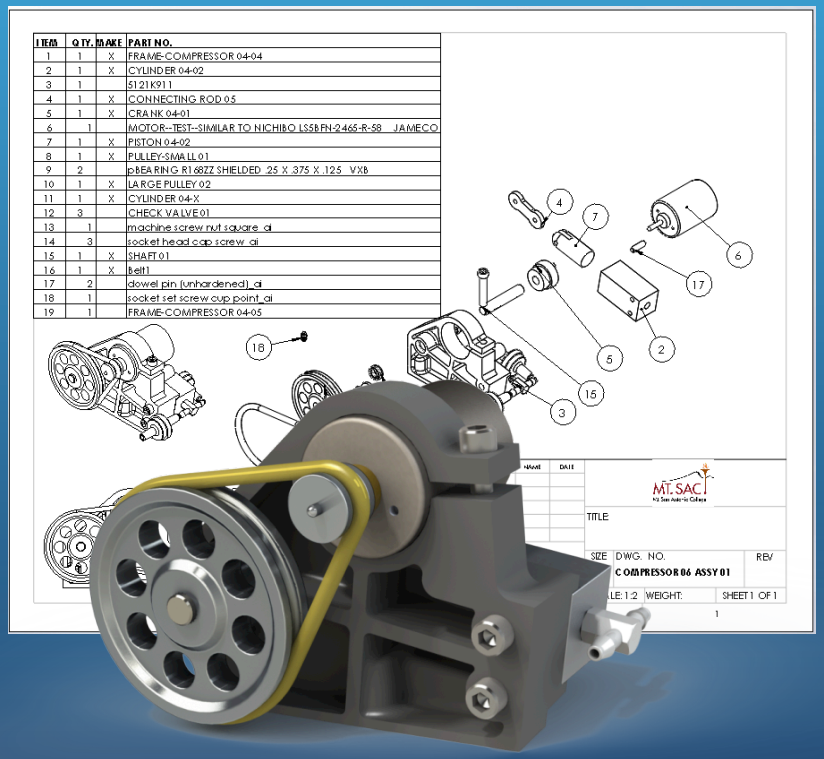


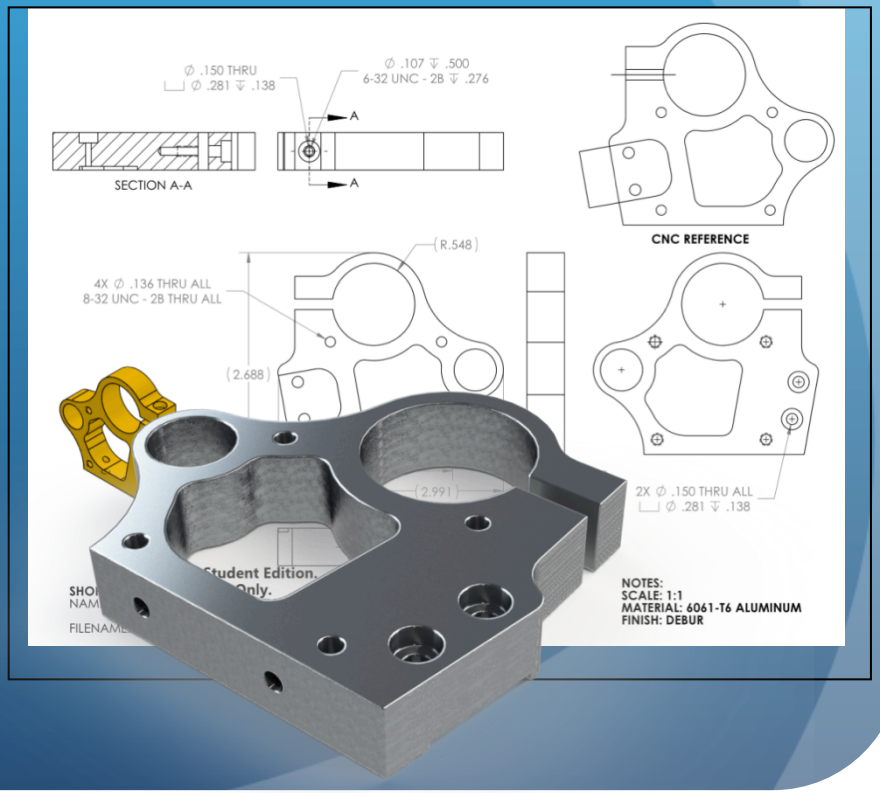
Student Assignment:

- Build 3D CAD models and make 2D “blue prints” of each part
- Design a housing based on design cues from an existing brand such as DeWalt, Makita, Bosch
- Machine the mechanical components using manual & CNC equipment
- 3D print the enclosure
- Assemble and add wiring

Drafting/ Machining Cross-Region Collaboration

- Two-student “Engineer” teams at GCC design/make prints of mechanical parts
- “Engineers” send prints to two-student “Machinist” teams at Mt. SAC
- Mt. SAC “Machinists” fabricate parts (including CNC machining)
- “Machinists” send parts back to “Engineers” at GCC
- GCC “Engineers” inspect and assemble the parts; teams swap roles & repeat!





Impact of Phase Three

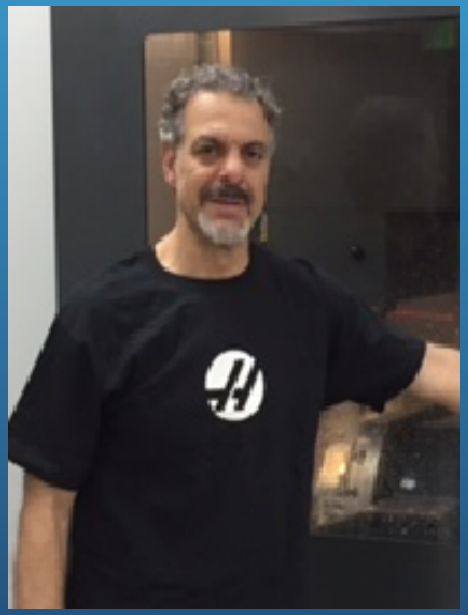
Students are:

- solving problems from design, manufacturing, and inspection perspectives
- communicating complex ideas
- making functional parts that need to fit other parts, rather than stand-alone "theoretical" template parts
- being exposed to routine problems and situations that are usually left out of demonstration-based projects.

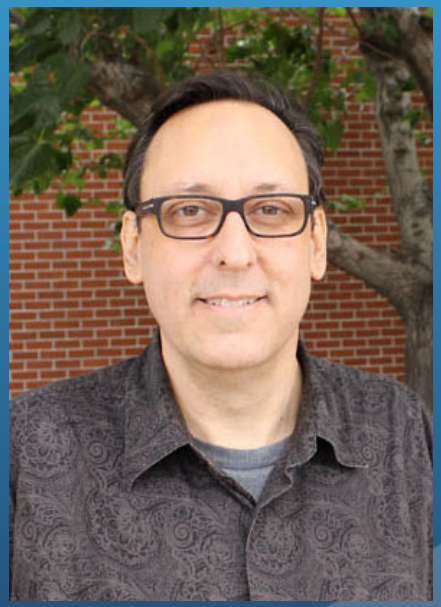
Collaboration allows us to sustain the changes we initiate with categorical funding.

Let's start collaborating now by supporting:

- cross-region sharing of faculty expertise
- faculty- designed local collaborative projects
- faculty-designed cross-region collaborative projects



Aram Ohanis, GCC



Steve James, Mt SAC