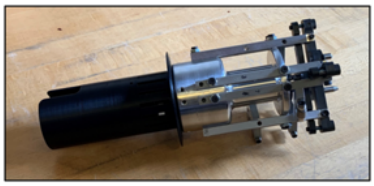
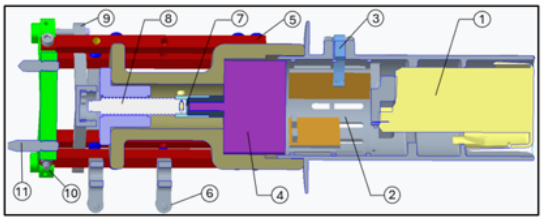
Past Two Year's Senior Design Projects

Mechanical Engineering

APP - Overmolding Insert Device (2024)

- The goal of the project was to design a device which would simultaneously seat 4 inserts into Allegheny Performance Plastics (APP) satellite cover mold prior to injection molding. The tool needed to be accurate and able to repeat its action without flaw. It also had to withstand high temperatures up to 350 F while still not damaging the mold.
- At the conclusion of the project, students were able to:
  - Deliver an ergonomical, handheld device that weighed approximately 3 pounds.
  - The average insertion cycle time was 10.8 seconds.
  - The device will dramatically improve the efficiency of the molding process, positively impacting both line technician and the company.
- This project was supported by Allegheny Performance Plastics (APP).

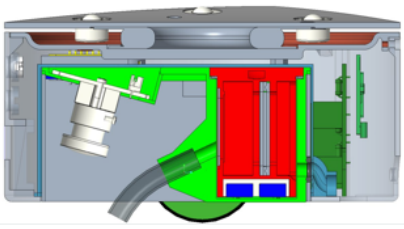




Mechanical Engineering

BPMI – Cleaning Robot (2024)

- This team was tasked to create a tethered, operator-controlled robot which would inspect for and retrieve debris in the operating environment. Debris included chips as small as 0.005 inches in diameter, and tape remnants and their adhesive residue. In addition, the robot had to withstand environmental ambient temperatures of 120 F and surface temperatures of 200 F.
- At the conclusion of the project students were able to:
  - Create a robot that would easily enter the limited-size port and maneuver the annular space with ease.
  - Create a robot that could display visual verification of debris and its successful removal by vacuum and/or scraping, .
  - Lighting was also provided in this small hand-held device.
- This project was supported by Bechtel Plant Machinery Inc. (BPMI).



Mechanical Engineering

Grove City Engineering of Microreactors: Heat Pipe Analysis (2024)

- The goal of the project was to build and test the dynamic performance of a heat pipe and simulate the physics associated with these devices.
- At the conclusion of the project students developed a lab-scale testing chamber :
  - Where no significant dynamic heat transfer complications where found.
  - Where dynamic transition beyond normal limits easily were reserved.
  - Where axial temperature profiles may be a useful diagnostic tool to be used in future work.
  - Where repeatable evidence for steady state and transient physical models of heat pipes was generated.
- This project was supported by Westinghouse.

Westinghouse

Mechanical Engineering

GCC Steam Team (2024)

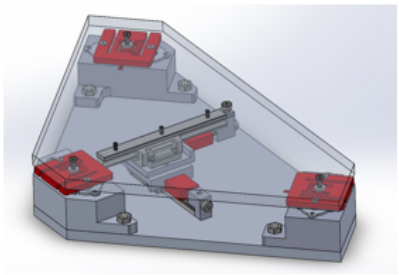
- The goal of the project was to examine and compare the current steam-heating system at Grove City College to a network of decentralized boilers. Cost analysis for feasibility will also be conducted.
- At the conclusion of the project students:
  - Analyzed the current heating system by obtaining measurements for all buildings and then modeling them in TRACE 3D Plus.
  - Various boiler options were considered and annual costs determined.
  - Although a cost savings was found based on energy consumption, the savings were too small to cover the investment in the capital equipment and its depreciation.

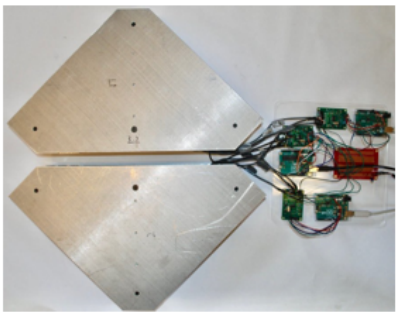
Mechanical Engineering

Highmark Health - LegGo (2024)

- The goal was to design and create two low cost force plates that could be used to evaluate biomechanical asymmetry in college athletes. Applications in biomedical research, physical therapy, and athletic training are also a potential result.
- The project was success in:
  - Building a set of plates that measured forces in all directions using 3 vertical and 2 horizontal sensors.
  - A significant reduction in cost was seen comparing the set of 2 plates to other commercial systems measuring the same data.

This project was supported by Highmark Health.





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Mechanical Engineering

V-Markings Road Line Geo Localizer (2024)

- The goal of this project was to build a working prototype that would detect highway lines within 0.5 meter accuracy by using an actuating arm for the camera along with a GNSS location system. The device could be employed by line marking trucks to immediately update databases of lane changes which will then be used by autonomous vehicles and HD maps.
- Student were able to:
  - Detect lines from a camera stream.
  - Build an arm to hold the camera over the line.
  - Record GNSS and truck heading data.
  - Create a user-interface.
  - Package the system for field deployment and successfully tested the system.
- This project was supported by V-Markings.

V-Markings
CONNECTING ROAD MARKINGS ONE LANE AT A TIME.