Problem
- Casting chaplets is only a semi-automated process, which wastes both manpower and time.
- It’s impossible to make the disks face the same way with the system that is currently in place.
- Different sized disks mean the feed mechanism needs to be flexible.

Objectives
- Identify methods, materials, and systems that can be used to automate a semi-automatic sorting and placement operation for casting chaplets.
- Build a deliverable prototype.

Methodology
- Group:
  - Daniel Chiu – Aero/Mechanical
  - Joseph Cicero – Mechanical
  - Ross Hill – Mechanical
  - Woong-Kyo Lee – Aerospace
  - Ran Xu – Mechanical
- Researched methods to orient the disks
- Individually developed designs for various stages of the problem:
  - Disk orientation
  - Equal diversion of the disks to the two plates.
  - Track system
- Final designs were constructed using sheets of acrylic cut using a table saw and the laser cutter in MSI.

Results
- Designed a prototype mechanism that will automate the feeding of disks into a welding machine.
- Able to orient all of the disks into a one-track system using a vibratory bowl provided by the company.
  - The track has a section that is interchangeable, depending on the disk size.
  - A flipper mechanism is then used to divert the newly sorted discs into the welding assembly.

Conclusion
- Tests run on the prototype show that automation of the welding process is a practical expectation.
- The company will hopefully be able to construct a real feed mechanism device from our prototype.
- A worker will no longer be required.

Problem
- Tools are kept track of with an outdated paper and pencil system.
- The company has no way of predicting when they will need to order new parts.

Methodology
- Group:
  - Jonathan Perry – Mechanical
  - John Powers – Computer Science
  - Ben Sanborn – Psychology
  - Meagan Sarratt – Psychology
  - Robert Williams – Electrical
- Extensive research was conducted in the area of tool management programs.
- Attempted to make changes to the company’s program, but this was determined to be unfeasible.
- Designed a “tagalong” program to their tool management system that can keep track of tool–wear life.
- Researched data input systems and determined that OCR would be the easiest method.

Results
- The current shop management system that Smith & Richardson possesses will be used to keep track of tool locations.
  - They will use an OCR program to input data from their paper tool sheets.
- Our group developed a supplemental Microsoft Access application that can calculate and predict tool–wear life.
  - Tool–wear life is calculated using an estimation process:
    - Quantity * Material Coefficient = Number of Cuts
    - Use of Tool

Conclusion
- The company will eventually be able to estimate how long tools will last, and when they will need to be replaced.
- Using the OCR technology, the company will also be able to quickly feed large amounts of “back–data” into their tool management software.