SMITH & RICHARDSON, INC.

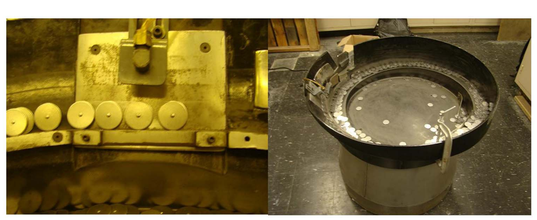
Mechanical

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.

Methodology

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

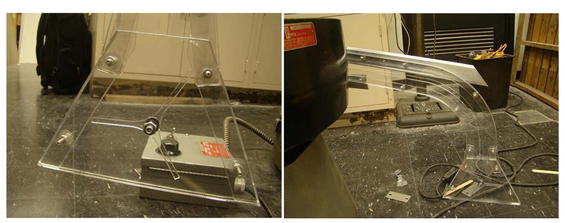


Objectives

-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.

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.
  i. 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.

Database

Problem

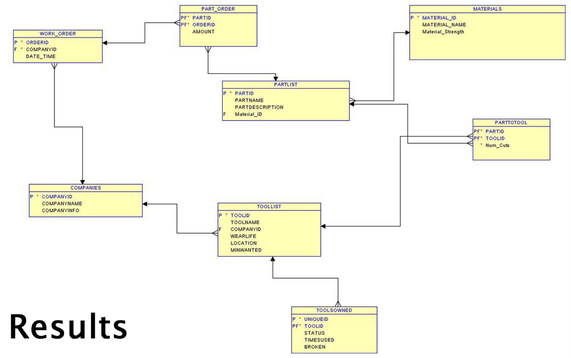
- Tools are kept track of with an outdated paper and pencil system.
- The company has no way of predicting when they will need to order new parts.

Methodology

- Group:
  - o Jonathan Perry – Mechanical
  - o John Powers – Computer Science
  - o Ben Sanborn – Psychology
  - o Meagan Sarratt – Psychology
  - o 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.

Objectives

- Develop a comprehensive electronic tool management system that will keep track of the location of Smith & Richardson's tools.
- Find a way to easily transfer information from the paper tool system into the database.
- Create a program that will help predict tool-wear life for the purpose of preventative maintenance.



Results

- The current shop management system that Smith & Richardson possesses will be used to keep track of tool locations.
  - o 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.
  - o Tool-wear life is calculated using an estimation process:

Quantity * Material
Coefficient * Number of Cuts
= Approx. Use of Tool

Conclusion

- The company will eventualy 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