Team 6: Capacitor Assembly Automation

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Sponsor: Mr. Walker **Advisor:** Dr. Moore **Instructor:** Dr. Shih

Introduction/Background Research

- Unison Industries is subsidiary of GE
- Specialize in electrical components for jet engines and ignition systems
- Capacitor Assembly Automation
  - Making a manual process automated in order to reduce assembly time and cost

Objectives and Goal Statement

- Goal: Design and develop an automated process in order to improve the manufacturing and assembly of the capacitor
- Objectives:
  - Reduce assembly time from 27min to 15min
  - Develop automated and manual processes to improve the assembly

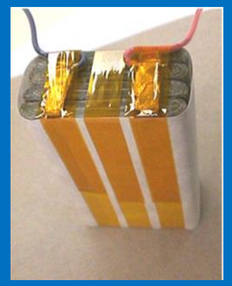
Key Assembly Steps

1. Placing tape on individual sections
2. Stacking
3. Soldering Tabs
4. Wrap the stack with insulation paper
5. Wrap tape around entire assembly
6. Dimensional Checks

Acknowledgements

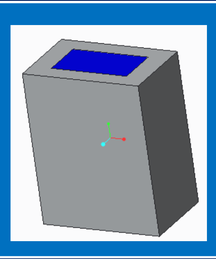
We would like to thank Dr. Gupta and Dr. Shih for teaching the class and providing their feedback. We would also like to thank Mr. Walker, our sponsor, for his generosity and guidance in overseeing this project. Lastly, we would like to thank Dr. Moore for advising us and sharing his knowledge and suggestions on what future steps we could take.

Capacitors



Dimensional Check: Manual

- Checks all three dimensions at once
- Max dimensions:
  - Thickness: 1.38”
  - Width: 2.62”
  - Height: 4.25”

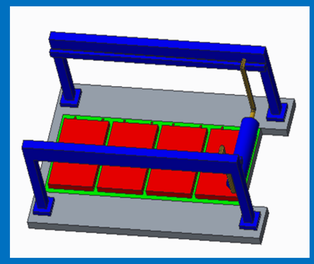


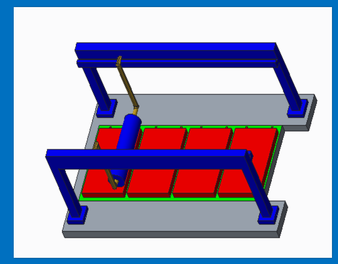
Future Work/Challenges

- Create design for wrapping tape on the assembled capacitor
- Explore the option of adding the robot into the stacking step
- Finalize designs and have our sponsor approve them
- Order material and begin building prototype
- Test the prototype and make any changes as needed

Tape Roller: Automated

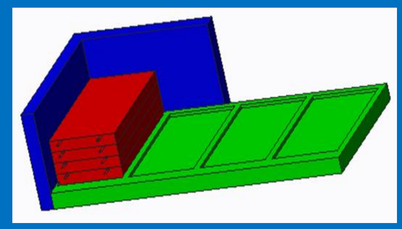
- Roller arms move down the track
  - This places tape on the capacitors
- Powered by motor
- Dimensions: 15”x 8”x 5”





Stacking: Manual

- Green plate slides from tape roller into L-Gauge
- L-Gauge guides the stacking of the capacitor
  - Eliminates error in the X and Y direction
- Dimensions: 11.5”x 5”x 4”



Wrapping: Automated

- Green arms spin clockwise to wrap assembly
- Red plate presses against assembly while tape roll creates tension on insulation paper
- Dimensions: 15”x 15”x 6”