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## Project Overview



The TCC Advanced Manufacturing Training Center, AMTC, needs a course aid for a future PLC/Manufacturing maintenance course.



The teaching aid will be a conveyor controlled via a programmable logic controller (PLC) to sort objects based on size and material type.



A key teaching component is that instructors will be able to create malfunctions in the system for students to troubleshoot and debug.

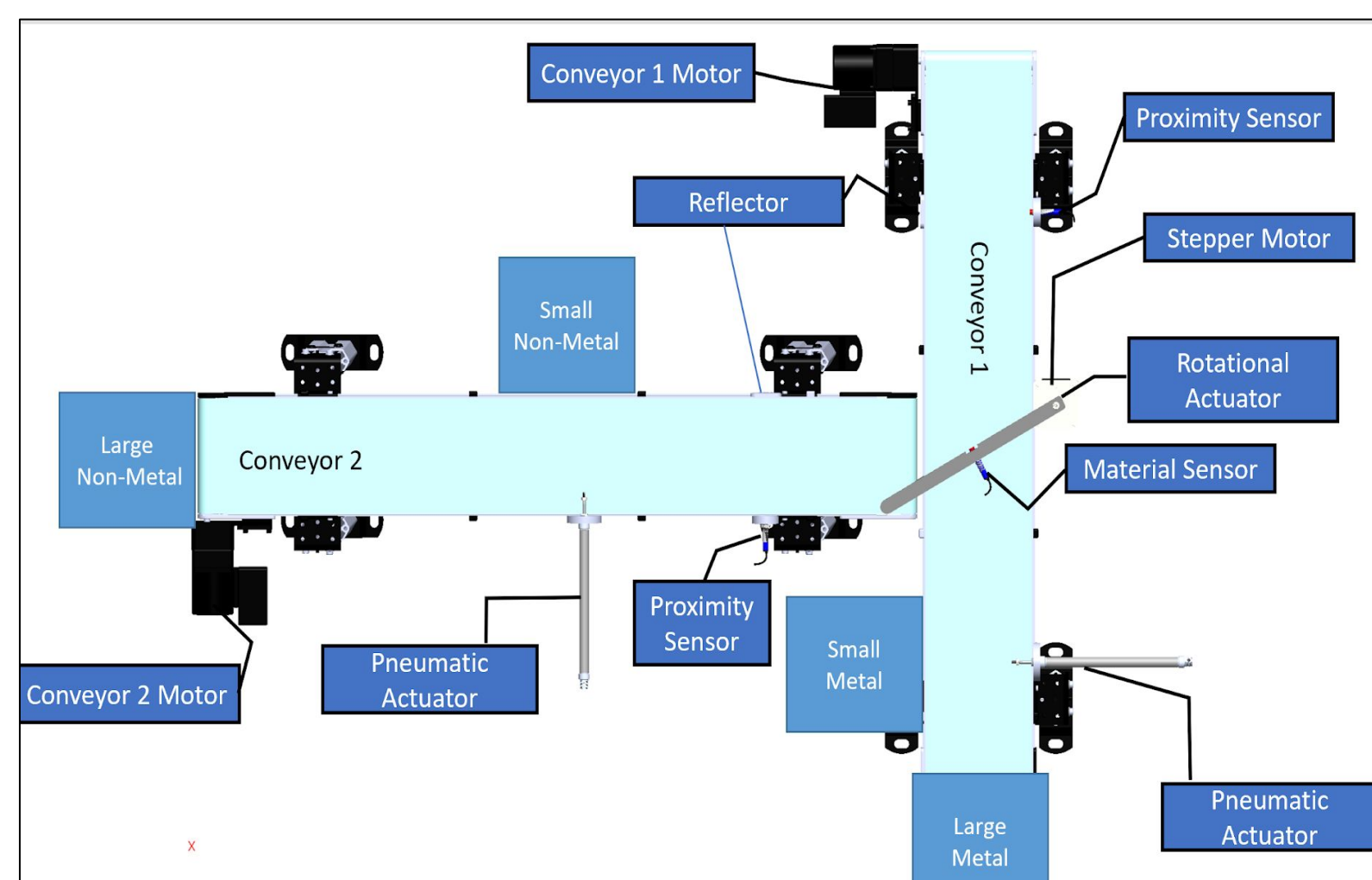
## Deliverables

**PLC controlled conveyor system.** Sorts between small (1 or 2 in.<sup>3</sup>) and large objects (3 or 4 in.<sup>3</sup>) as well as material type (metal or non-metal)

**Lab Manual Style Text.** The text will consist of 10 lab lessons for students to troubleshoot. It also provides user manual information.

## Final Design

### Conveyor



### Lesson Plans

#### Hardware Failures

1. Actuator placement
2. Sensor placement
3. Stepper driver error
4. Faulty tubing
5. Blown fuse

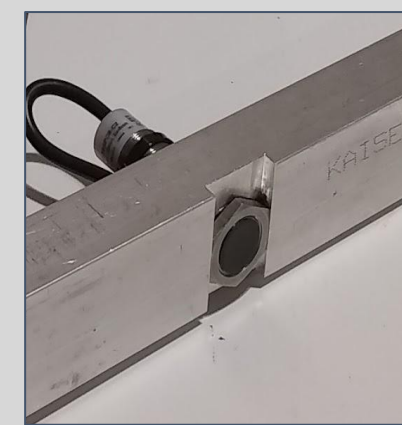
#### Software Failures

1. Sorting algorithm
2. Delays/Timers
3. Stepper Motor
4. Sensor/Actuator Assignment
5. Coding Syntax

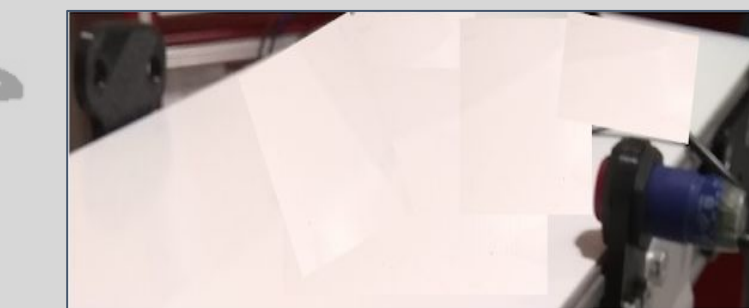
## Conveyor System



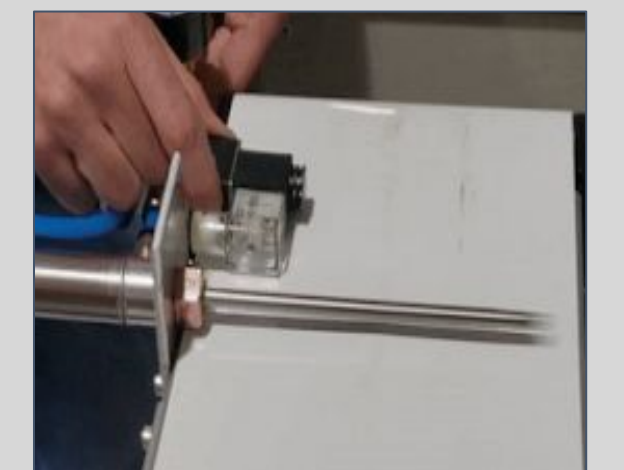
**Electric Rotational Actuator:**  
Diverts non-metallic objects to secondary conveyor. Aluminum rotated by stepper motor.



**Inductive Sensor.**  
Uses magnetic field to detect metallic objects



**Proximity Sensor.**  
Uses light to determine the presence of an object. Used for size and delay.

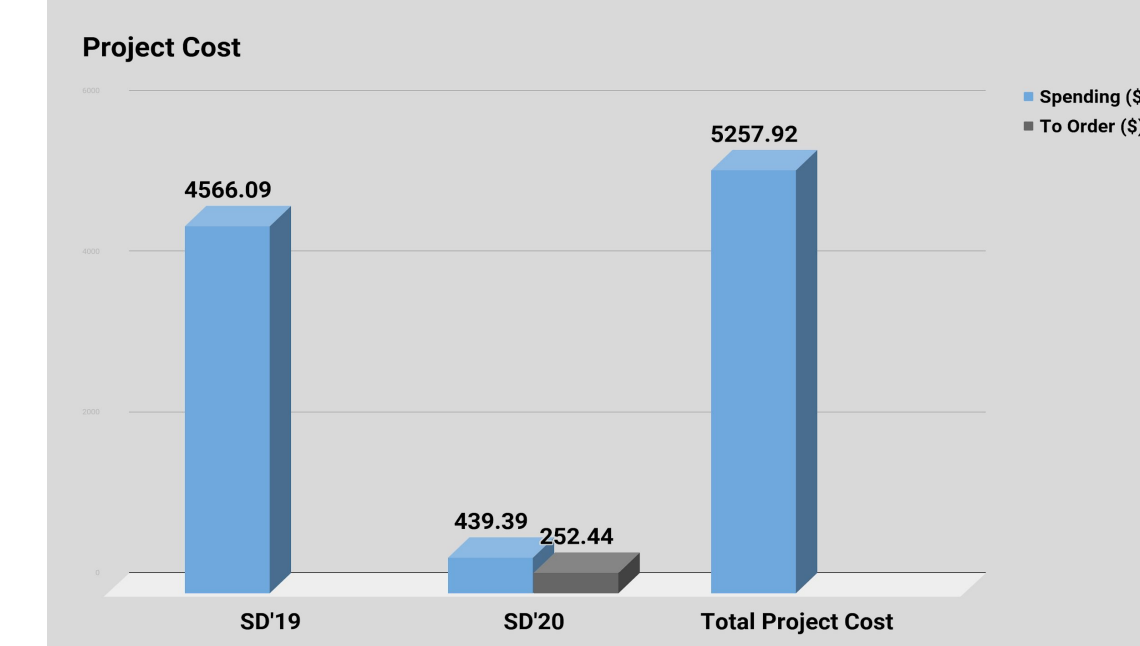


**Linear Pneumatic Actuator:**  
Pushes small objects into desired bin



**PLC Controller:**  
Ladder logic is the programming language of the Allen Bradley PLC

## Budget



## Summary

- Design selected uses perpendicular conveyors
- 5 hardware and 5 software errors
- Two linear actuators and one rotational arm
- Two proximity sensors and one inductive