WPI

Automated Tool Prep/Crib & Tool Tracking

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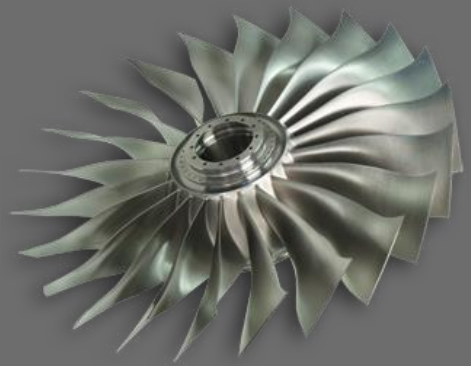
General Electric Aviation (GE)



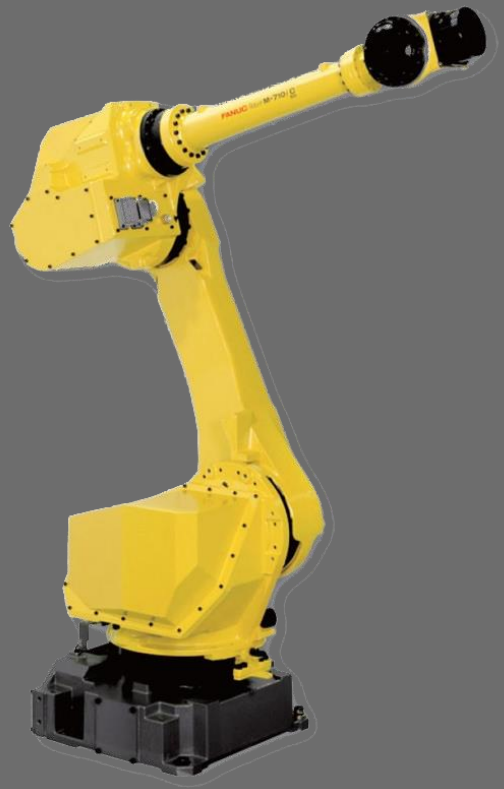
- Create bladed disks
- Use CNC mills to machine
- Workers have to manually change end mills

The Idea

GE has come to WPI with three different objectives that were combined into this project:

- Replace end mills in tool holders and store them (prep)
- Give out new tool holder and end mill combo, an assembly, to a worker when needed (crib)
- Ability to track tool holders (not covered here)

Hardware Provided

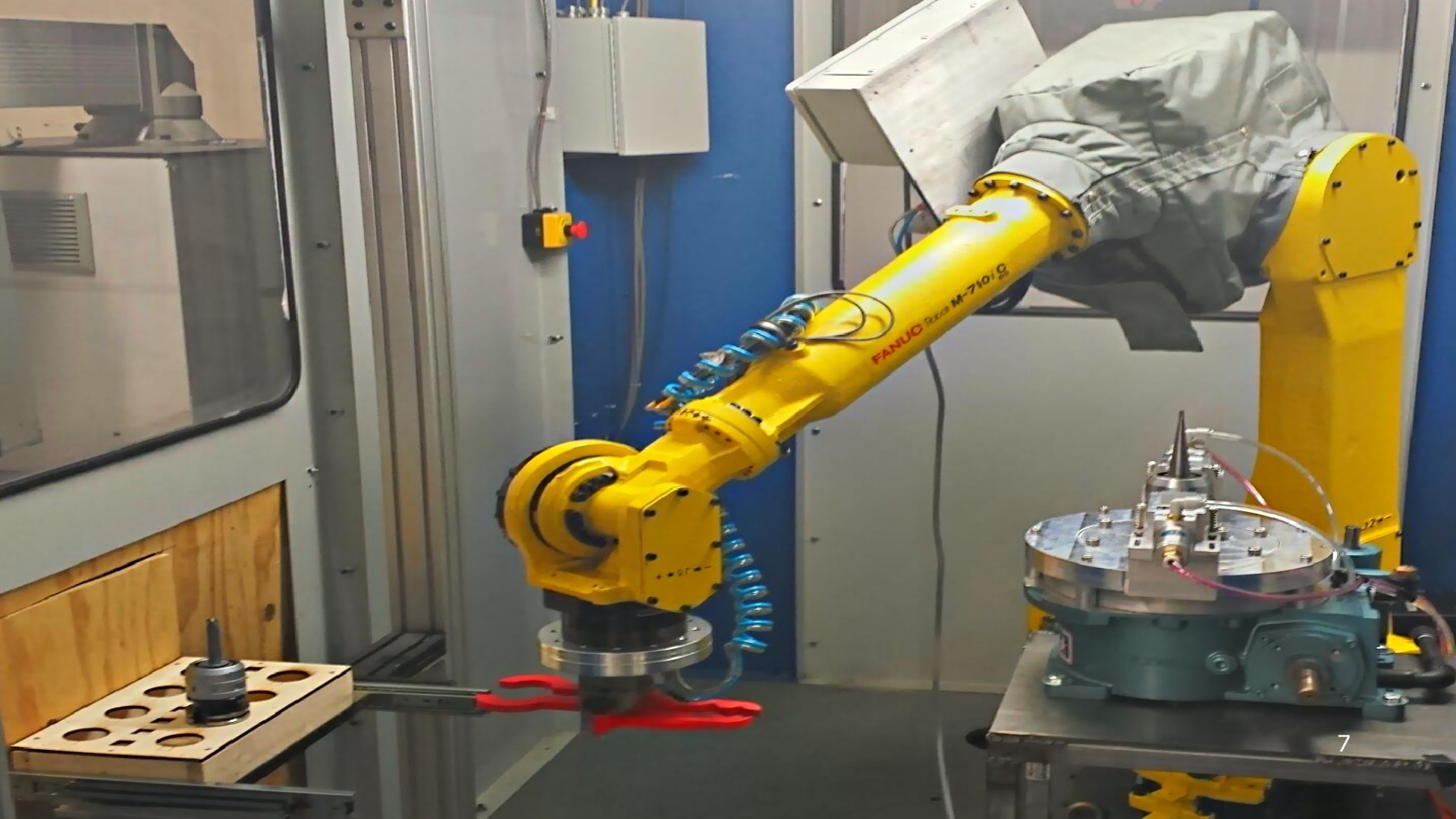


The Work Cell

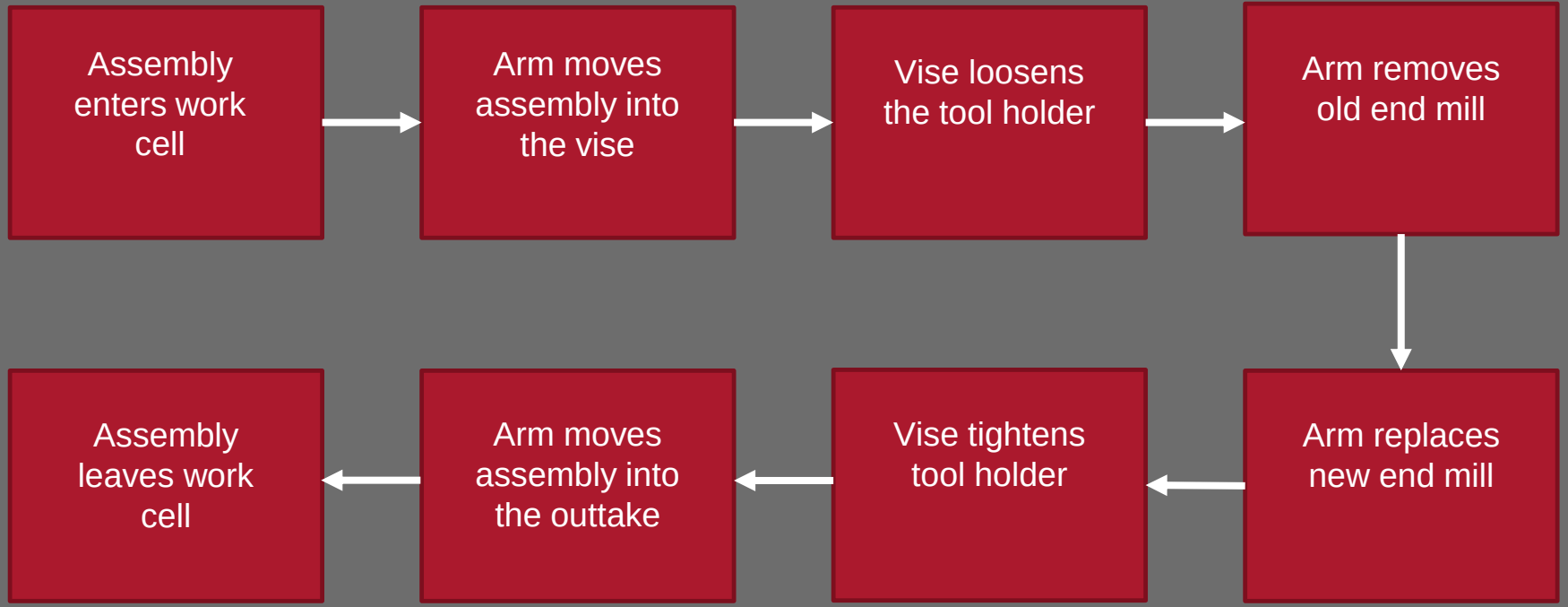
- Made by ACT
- Currently on loan
- Located in WB

Goals

- Develop a process for changing an end mill
- Replace 1 end mill within 1 tool holder
- End mill placed at desired length within a ±0.05” tolerance
- 10% acceptable failure rate
- Present said assembly to a worker


FANUC Series M-710iC

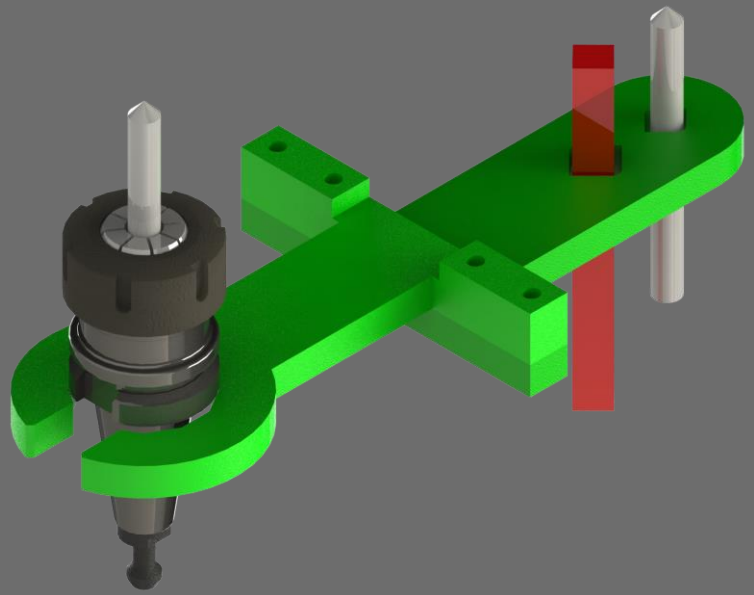
The Process


Assembly enters work cell
Arm moves assembly into the vise
Vise loosens the tool holder
Arm removes old end mill
Arm replaces new end mill
Vise tightens tool holder
Arm moves assembly into the outtake
Assembly leaves work cell

Intake & Outtake - Prep & Crib

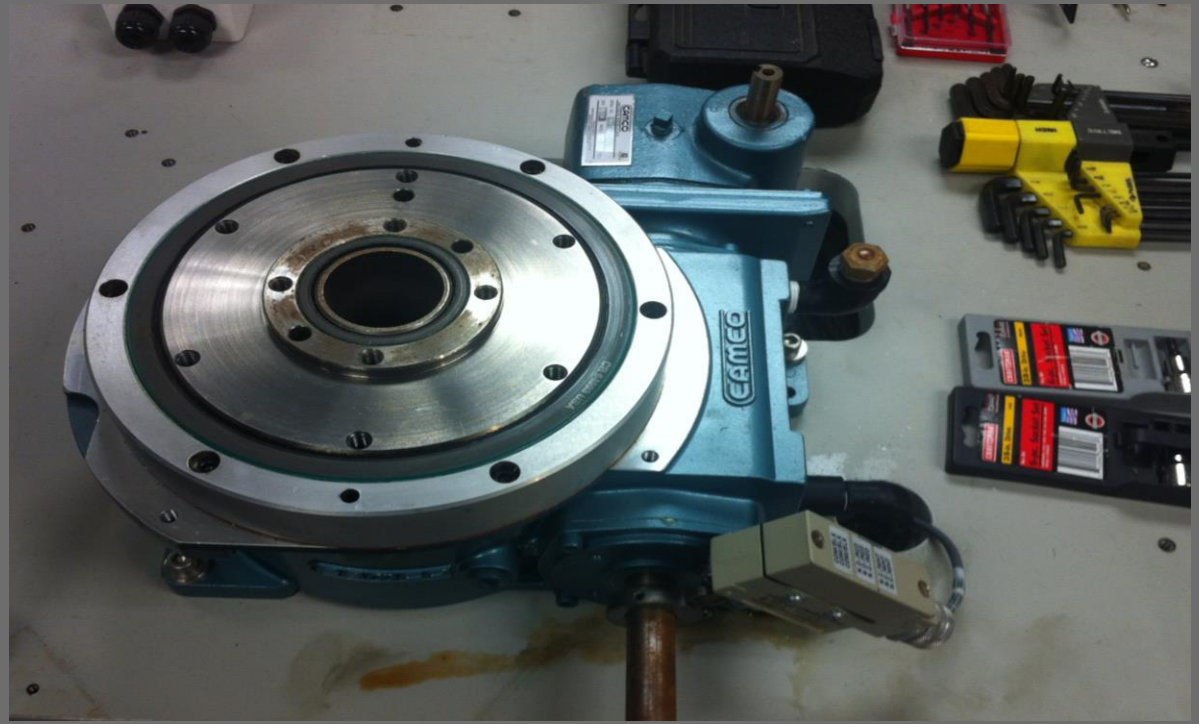
- Accepts assemblies along with new end mills
- Pull out of cell to load up
- Outputs new assemblies

Gripper



- Able to manipulate end mills and tool holders
- Attached to parallel jaw gripper

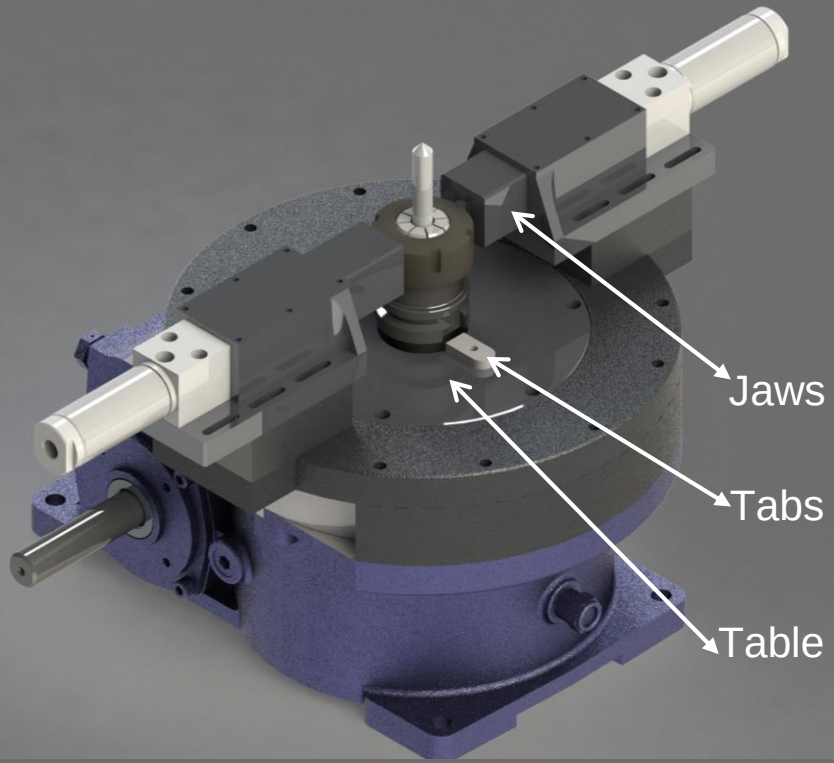
Indexing Table



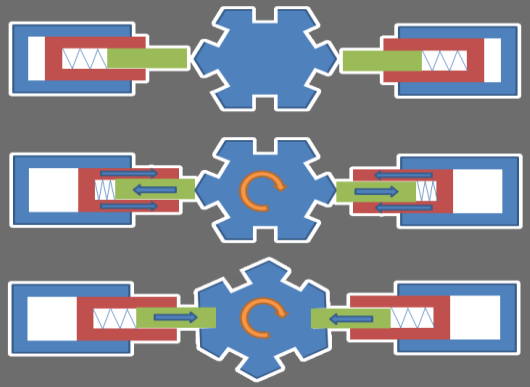
Vise Electronics

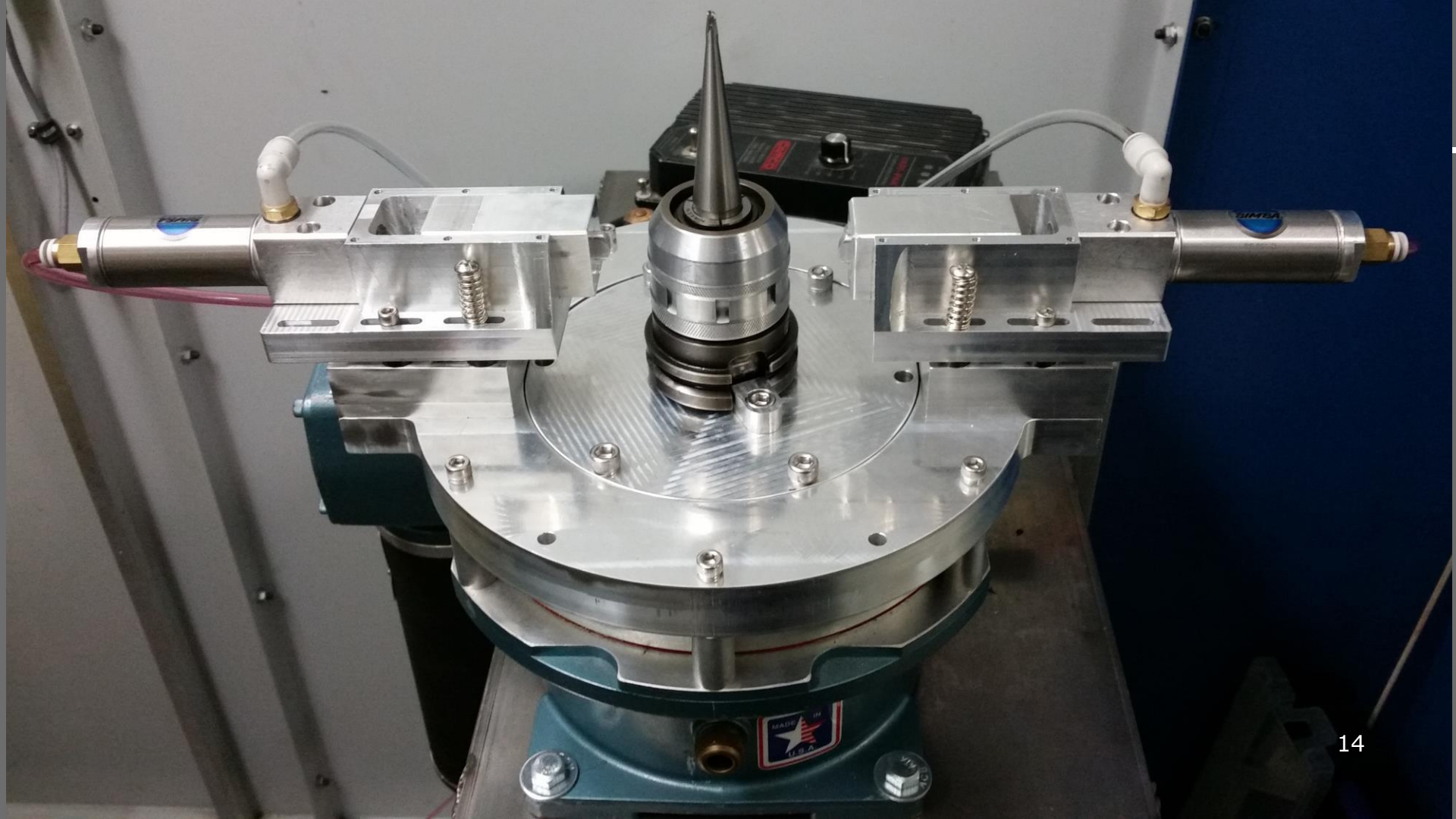
- Motor controller was used to drive the vise
- 3 relays were wired to interface the arm electronics to the controller

Vise - Tool Prep



- Able to lock in tool holder
- Jaws hold chuck in place while motor spins





Programming

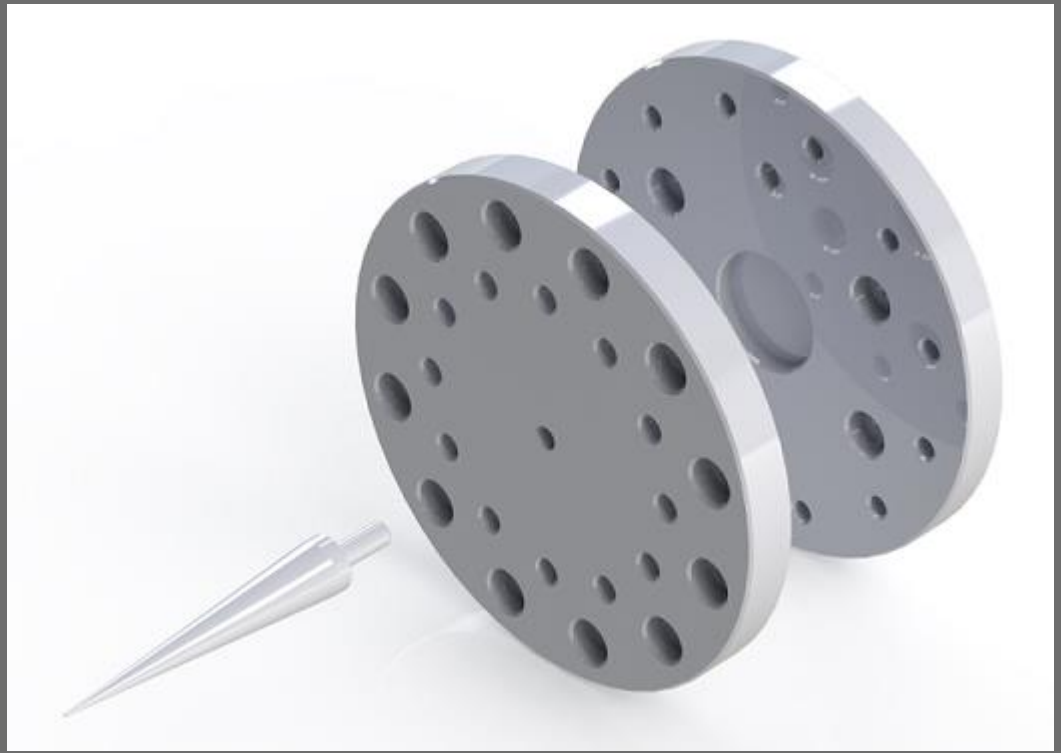
- Arm was moved using the Teach Pendant
- Points were recorded
- Fine adjustments were made to the points

Automatic Tool Changing/Crib

Summary of goals accomplished

- Process was developed
- Able to replace 1 end mill in 1 tool holder
- Due to gripper inconsistencies, length tolerance goal was not met
- Intake and outtake system functions well

Questions?




End Mill
Collet
Tool
Holder

GRIPPER PIC