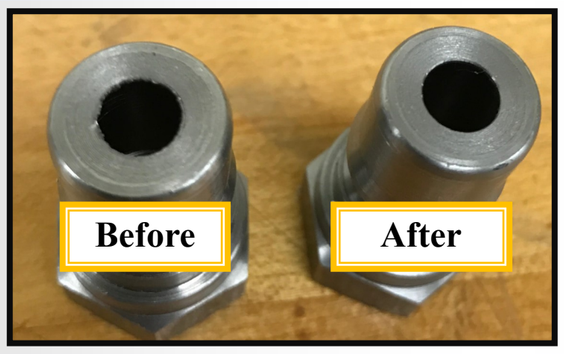
Parker-Hannifin Deburring

Problem Statement

The engineering team at Parker Hannifin is well aware of the issues regarding the current deburring process. The current system is time and labor intensive for the machinists and is vulnerable to inconsistent quality. The current deburring process also introduces the risk for repetitive motion injuries. Parker Hannifin believes that the process can be automated in order to free the machinist from any manual deburring, saving time, preventing potential injuries, and improving the quality of the part after deburring.

Mission Statement

The P.H.D. team will design, manufacture, and analyze an automated deburring system for Parker Hannifin by a final delivery date of May 4th, 2017 that will potentially replace the current deburring process.



Constraints

- Design for Safety
- Automated deburring system must not exceed 20”x40” of the planned work space with a ergonomic height of 39”.
- Must duburr parts at a minimum rate of 7.4 seconds per part.
- $10,000 budget

Current Process

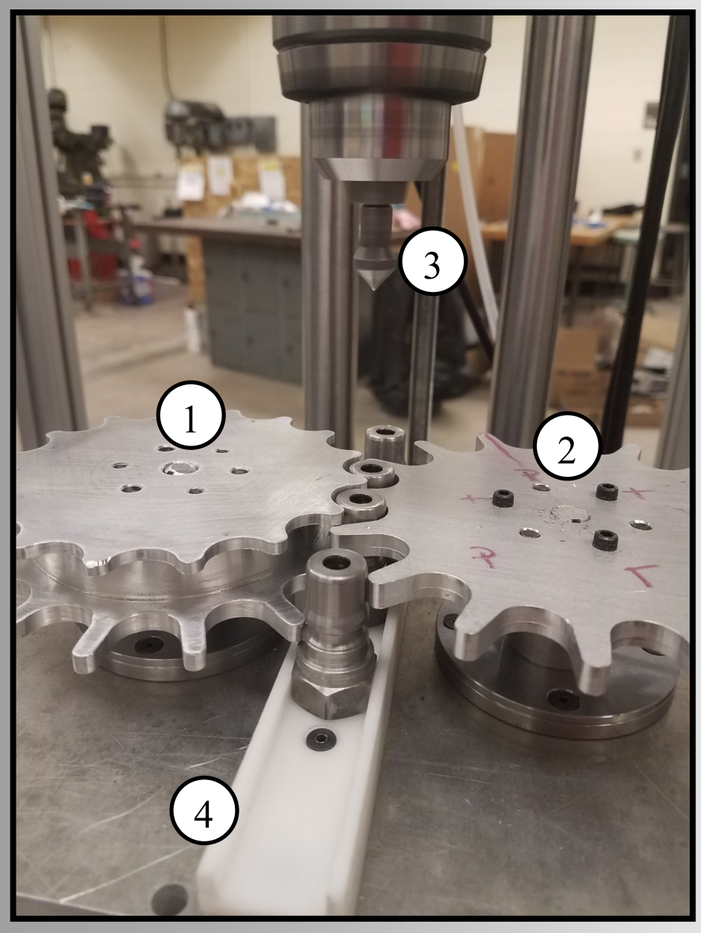
- Requires each part to be picked from a pile and deburred by hand.
- Safety concerns with the relevant OSHA standards, as well as concerns regarding repetitive motion injuries.
- Substantial operator time required

Safety

- Safety is the number one priority at Parker-Hannifin
- Current system ergonomic score based on NERPA criteria is 5.
- The new system has an ergonomic score of based on the same criteria.
- The Dual Gear system removes the operator from the actual deburring operation, eliminating the risk of cuts from the deburring process.

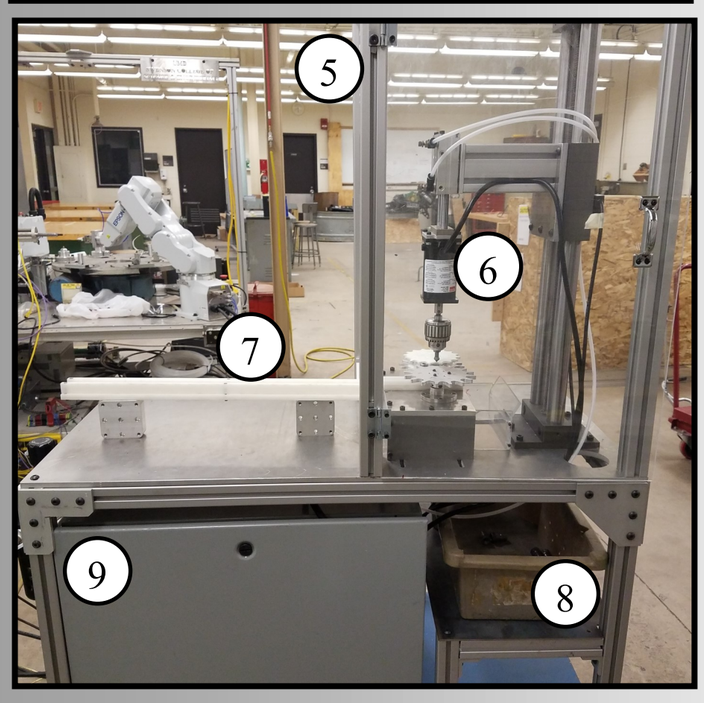
Economics

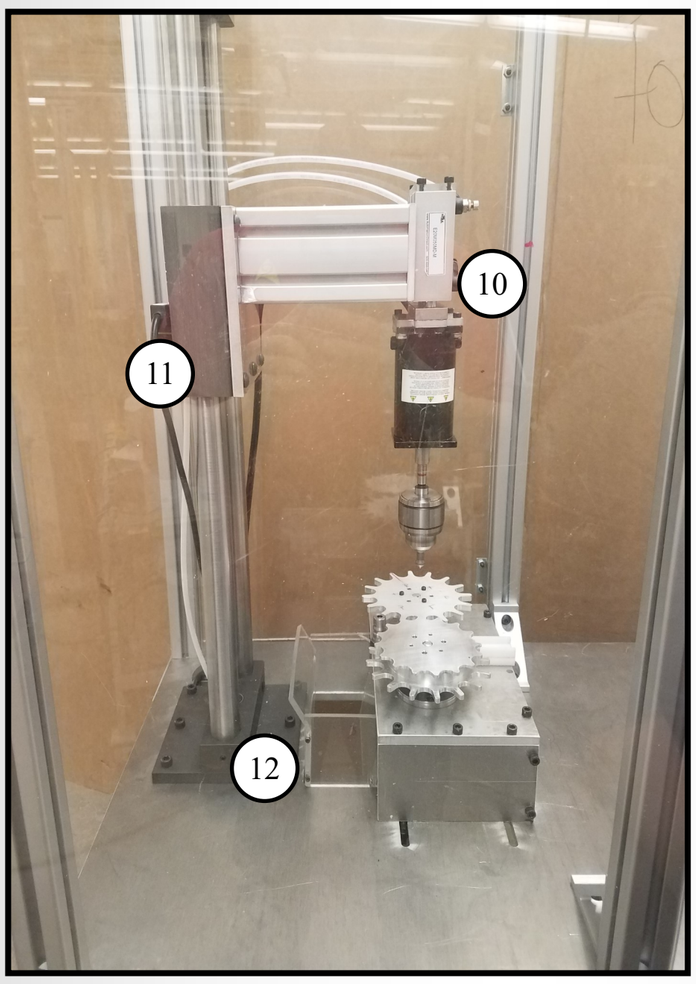
- Net operator time saved per week is 200 minutes.
- Reduced labor costs of over $6,000 annually
- Automation eliminates risk of repetitive motion injuries and severe lacerations, cuts, or punctures with average direct cost of medical bills of $30,000 and $19,000, respectively.



Project Solution

The final solution that the PHD team has constructed for Parker-Hannifin is an automated deburring system. The dual gear system consists of two gears, one of which is connected to a servo motor, and are sized for the specific quarter inch nipple body part. The servo motor, with an accuracy of 10,000 steps, is used to rotate the gears 22.5 degrees, or 625 steps, in order to center the nipple body parts under the deburring drill. The drill is then lowered by a pneumatic piston. This method allows the nipple body part to be brought in, positioned, deburred, and pushed out into a collection bin all in one fluid motion.





Picture Reference

1. Double Gear
2. Solo Gear
3. Deburring Bit
4. Part Track
5. Safety Cage
6. Deburring Motor
7. Part Feeding System Guide Rail
8. Collection Bin
9. Electrical Box
10. Pneumatic Cylinder
11. Adjustable Slide
12. Part Chute

Team P.H.D.

Engineering Team

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Project Manager

Daniel Beal
Product Engineer

Nick Belgum
Design Engineer

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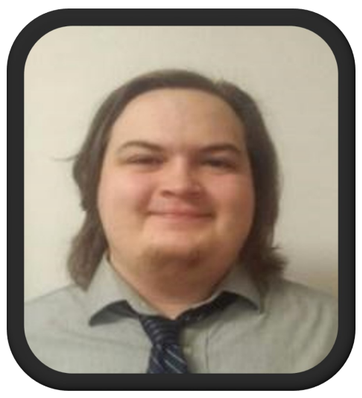

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