

Campbell Deburring Redesign

Project Description:

Campbell Scientific manufactures weather monitoring instruments. They make instrument housings by stamping pieces out of aluminum and steel sheet metal. This process leaves burrs (jagged edges and excess material) which then must be removed. The deburring process is a bottleneck in their workflow. The goal of this project is to implement a new process with increased output and decreased operator interaction.

Requirements & Constraints

Design decisions were made based on the requirements and constraints in the table below.

System	Requirement/Constraint	Units	Target	Actual
Overall Deburring Process	Parts per Hour Output	Parts/Hour	99.7 - 153.3	116
	Maximum Part Size	Diagonal (in)	14-17	14
	Cost	\$,000	200-300	150
	Freq. of Maintenance	Num/Year	2-12	2
	Required Number of Operators	Num	1-3	1
Washer	Parts per Hour Output	Parts/Hour	99.7-153.3	800
	Parts are Cleaned	Not tracked		YES
Dryer	Parts per Hour Output	Parts/Hour	99.7 153.3	800
	Parts are Dried	Not tracked		YES

Performance Review

To ensure our project met the constraints, we performed several analyses and tests. Results are shown circled in blue.

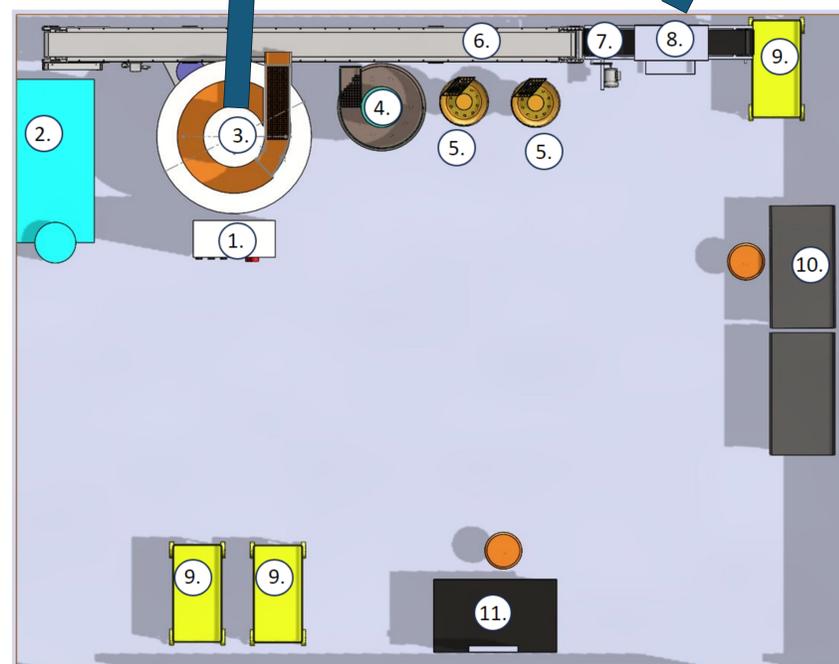
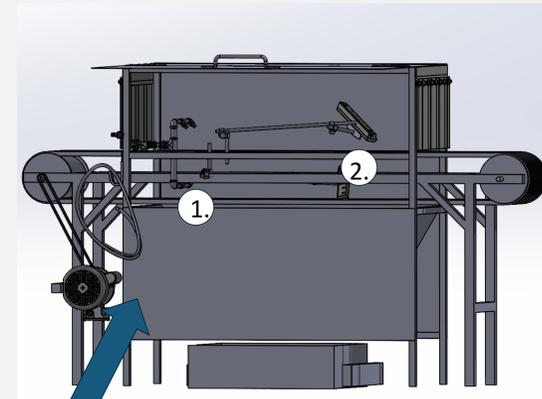
Using production hours, average part output, and speed of the new equipment, we simulated the new output to be 51% higher than with the old system.

A large factor of output is the washing and drying of parts. By testing various pressures, distance to parts, and angles, we determined the best orientation for the sprayers and air knives.

Deburr Bowl



Washer (1), Dryer (2), and Enclosure



Deburring Process Layout

1. Alenco Controller
2. Sediment Tank
3. Alenco Deburring Machine
4. Medium Deburring Machine
5. Small Deburring Machines
6. 22 ft Conveyor
7. Washer/Dryer Conveyor
8. Washer/Dryer Housing
9. Handling Carts
10. Packaging Station
11. Computer Station

Design Overview

Our proposed design incorporates a faster deburring bowl that sifts the parts from the media, a conveyor system that transports parts, and a washer and dryer to automatically clean and dry the parts. These elements vastly reduce handling time.

Conclusion

Our redesign was successful in surpassing or meeting the target in maintenance, number of operators, and cost. However, we only met the threshold on output and minimum part size. The redesign will result in a significant profit for the company; paying itself off in 2.1 years, and netting \$75k every year following.

Throughout the process, our team learned that setting goals and creating a timeline is vital to ensuring the project has a real pathway forward.

Recommended future-work includes: automating start-and-stop of washer and dryer, incorporating more deburring bowls, expanding enclosure to include more washers and dryers.