

Improvement of ULT Freezer Assembly Workstation

Thermo Fisher Scientific Inc.



PROBLEM STATEMENT

Initially, the scope of the project was to improve the ergonomics of the freezer tank assembly process. At the outset of the project, Thermo Fisher was experiencing very high demand for Ultra-Low Temperature freezers. This demand caused great strain on the workers assembling the freezers, so the team explored options to mitigate operator fatigue.

Throughout the course of the project, the demand for ULT freezers was declining. Eventually the demand became low enough to reduce the need to address the ergonomic issues of the assembly process. The change in freezer demand led to a change in the scope of the project. The new project scope is meant to address inventory balancing and throughput issues.

Ultimately, the final problem statement is as follows:

The workflow of the ULT Freezer Assembly Workstation needs balancing to assist in inventory level optimization to fit the recent change in freezer demand.

OBJECTIVES

- Create a Value Stream Map for the tank taping process.
- Calculate the ideal batch size in each station to maximize tank throughput.
- Evaluate the ideal start and finish tank counts for inventory control.

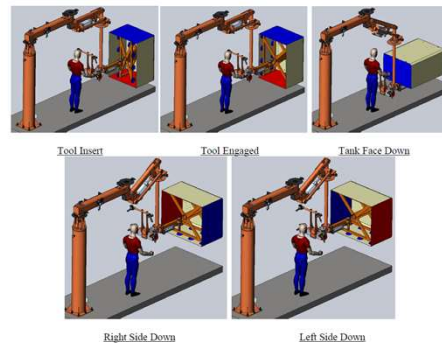
REQUIREMENTS

#	Description
1	Determine inventory levels needed to match new demand.
2	Create Value Stream Mapping of the current and improved processes.
3	Improve inventory throughput and reduce WIP inventory.
4	Reduce waste.

FINAL DESIGN, APPROACH, PLAN

Detailed below are the final design solutions. Included is the design from the original project scope, as well as the design from the updated project scope.

This first figure is a design for a tank lifting mechanism. This equipment would allow an operator to lift and rotate the freezer tanks with minimal strain. Due to economic circumstances, this design will not be implemented before the end of the project term.

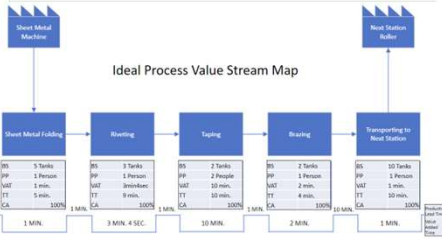
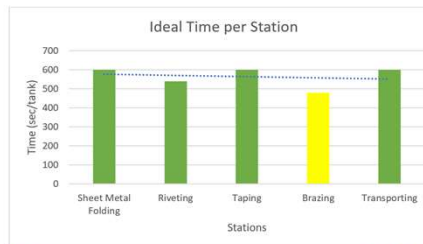
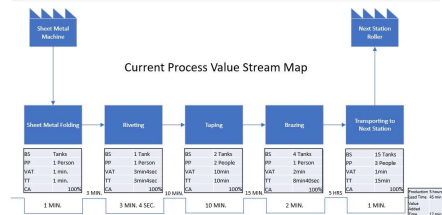
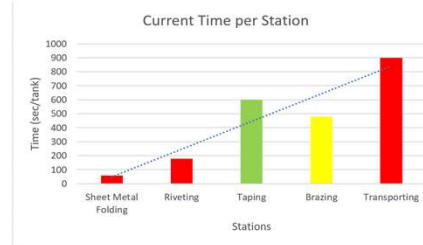


The table below represents the final design solution for the updated project scope. Numerous time trials were conducted to determine an average time for each stage in the process. These average times were then used to determine the ideal batch size and number of operators at each station to balance the workstation.

Stations	Avg. Time (sec/tank)	# of Tanks	# of Operators	Total Time (sec)	Throughput (tanks/hour)
Sheet Metal Folding	60	5	0.5	300	600
Riveting	180	3	1	540	540
Taping	200	2	2	400	600
Brazing	120	2	0.5	240	480
Downtime					
		Total 12		Total(hour)	0.67 18
Transporting	60	10	1	600	600
Total Downtime					
		Total 22		Total(hour)	1 22

RESULTS

Each stage of the process was added to a Value Stream Map which was used to find the longest process stage. The taping process was the most time-consuming, so it was used to set the pace for every other step. By moving around the operators and increasing or decreasing the tank batch sizes, an optimized process time was calculated.



SUMMARY AND CONCLUSIONS

The workstation was balanced by readjusting batch sizes for each station to better match new inventory requirements.

Sheet Metal Folding: 5 tanks

Riveting: 3 tanks

Taping: 2 tanks

Brazing: 2 tanks

Transporting: 10 tanks

This change resulted in the employees saving 24 minutes of labor every hour and a total of 3.2 hours for every 8-hour shift.

FUTURE WORK

Depending on how the ULT tank market goes and if volume increases again, the next steps would be to look at the whole assembly process. Optimization in just one section could potentially cause bottlenecks in other areas of the process. Looking at the whole process from when material is received for the tanks all the way to shipment of tanks can provide a more optimal inventory management solution. For this, much more data would be needed, such as order info and a wider look at the whole process.

TEAM & ACKNOWLEDGEMENTS

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