



ABSTRACT

The Project emphasis is to implement One-Piece Flow Line for Power-End Assembly by conducting Time-Studies, Line Balancing, Takt Time analysis, and Eliminating Non-value-added activities.

INTRODUCTION

Weir Oil & Gas is one of the three operating divisions at The Weir Group PLC, located in Fort Worth, TX. The company provides highly engineered and mission-critical solutions to upstream markets. Products include pressure pumping, pressure control equipment and aftermarket spares and services.

In this project, DMAIC methodology is used to approach Weir Oil & Gas to study the company situation and propose an implementational plan for one-piece flow power-end assembly line. The production process of Power-End of the pumps currently faces issues such as Excess Material Handling, Labor inefficiency, Unorganized work area, assembly process variation and Non-standard WIP control.

REFERENCES

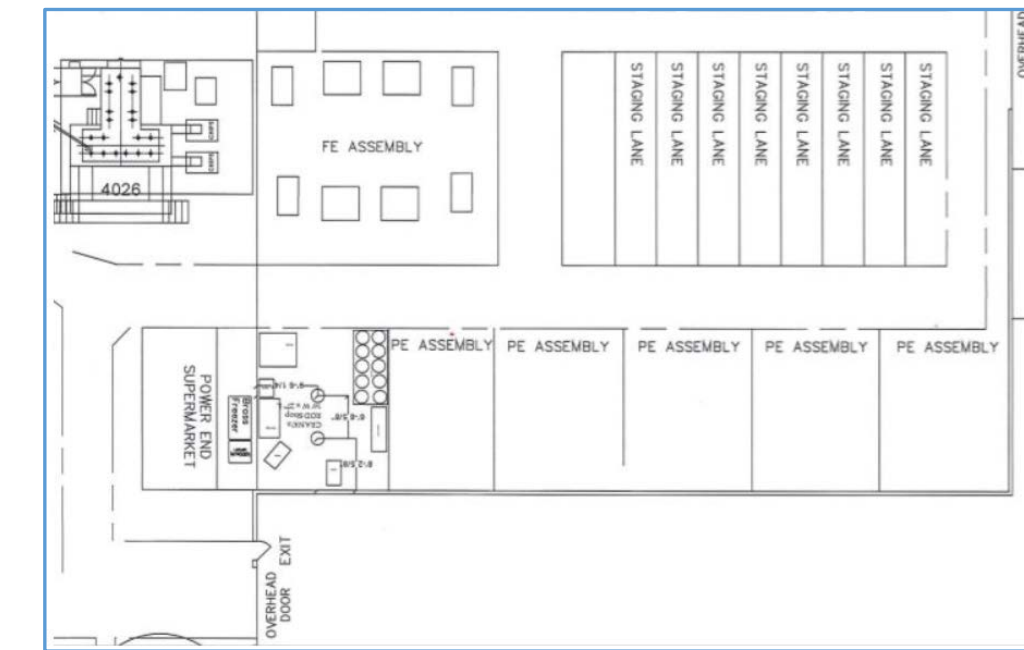
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METHODOLOGY

Define-Problem Statement:

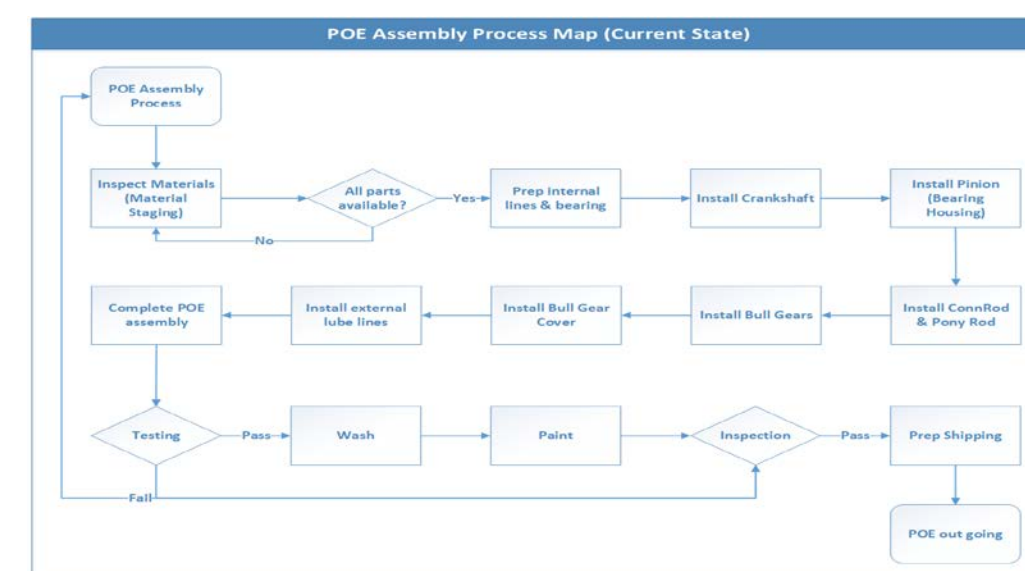
Current state shows excessive waste:

- Over production
- Excess material handling
- Excess motion
- Assembly process variation
- Unorganized work area
- No standard WIP control



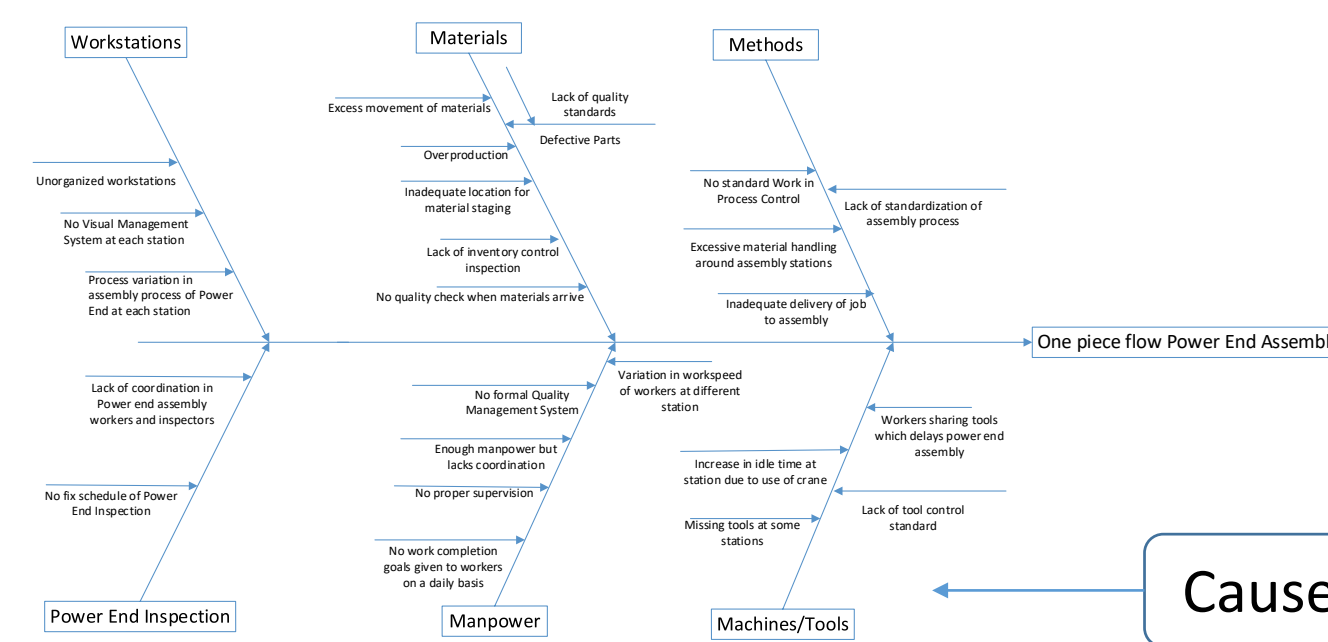
Current Layout

Measure: The team measured the current process by developing a process map of Power-End assembly process along with creating a cause and effect diagram which highlighted major issues which needed to be resolved to implement one-piece flow line.

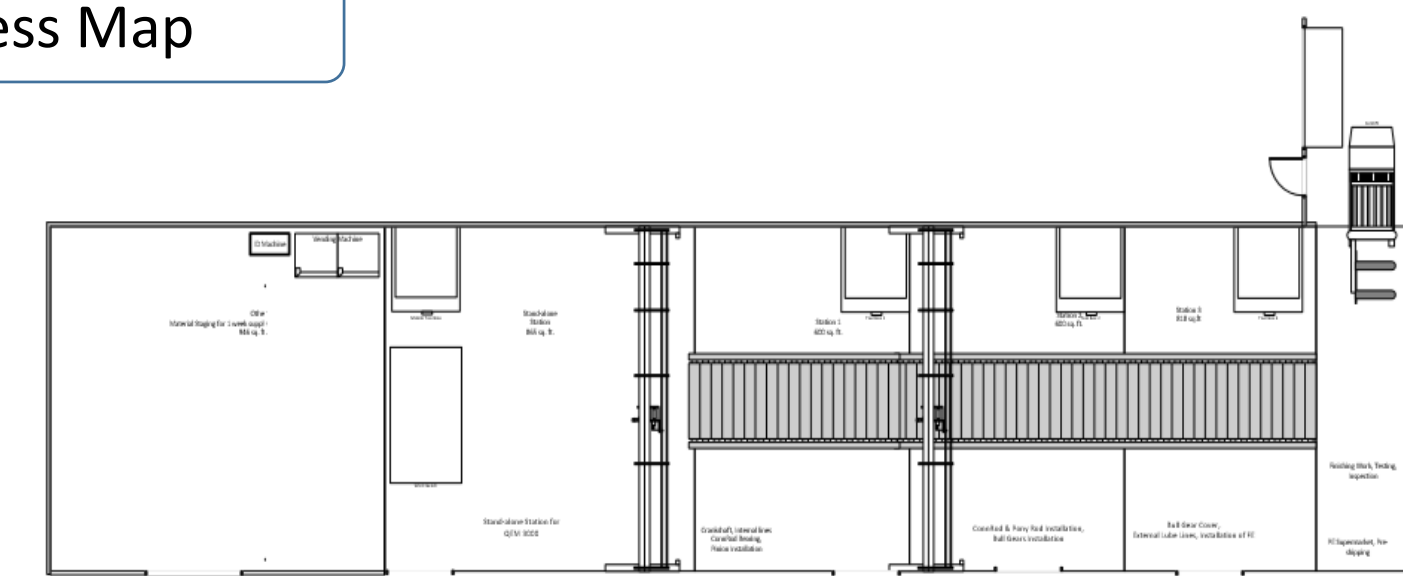


Process Map

Improve: The team selected a layout which would have a material staging area, one stand-alone station and one-piece flow line with 3 stations.



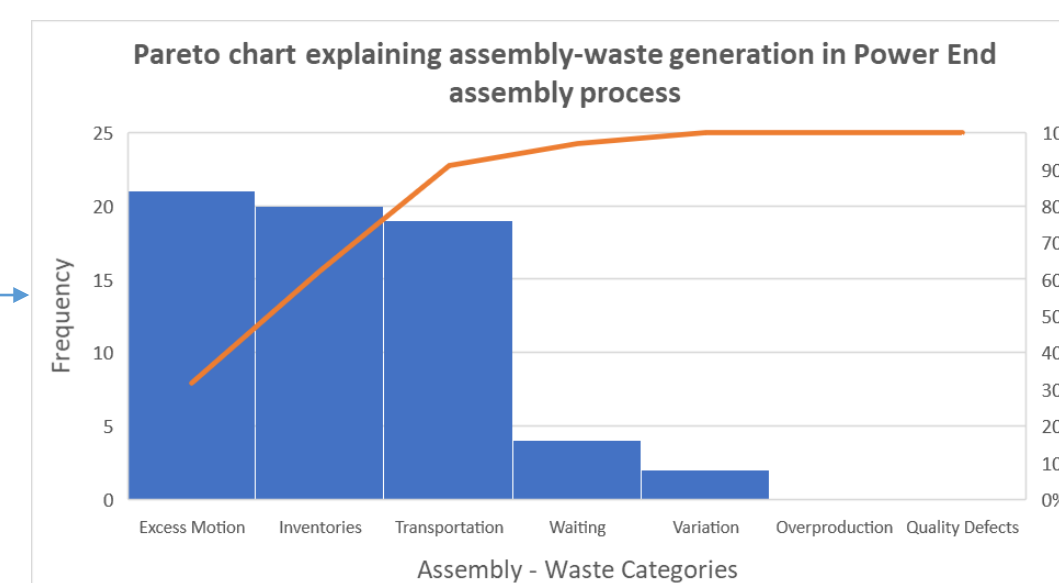
Cause-Effect Diagram



Future layout

Analyze: The team conducted time studies, developed spaghetti diagrams, developed a simulation, analyzed assembly waste and created a pareto chart to visualize the waste.

Pareto-Chart for Assembly-Waste

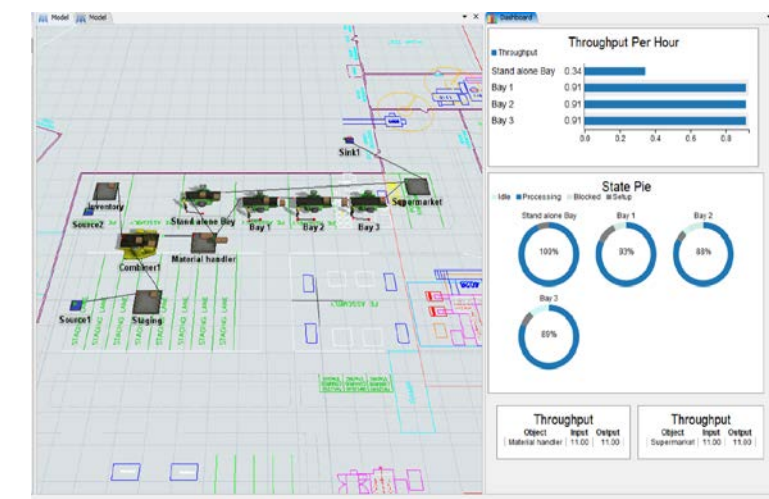


RESULTS

Action Item

Phase	Action Items
Phase 1	Contact vendors for quoting construction change
	Request quoting for material handling equipment
	Work on reducing tools
Phase 2	Generate sequence of material handling
	Create tool inventory standards
	Generate inventory location
	**Implement feeding to each bay by the material
Phase 3	Implementing quality standard at the source/vendor
	Generate new tool for pinion and gear installation
	Reduction/ elimination of tables and excessive use of tool box.
	Balancing the work according to the Power end
	Implement Dashboard
Phase 4	Implement weekly Efficiency report
	Manage the number of employees needed and incorporate new suggested work
	Develop quality standard process including inspection of material received
	Train the employees to facilitate their work with power-end one-piece flow assembly
	Proper placement of materials in the staging area

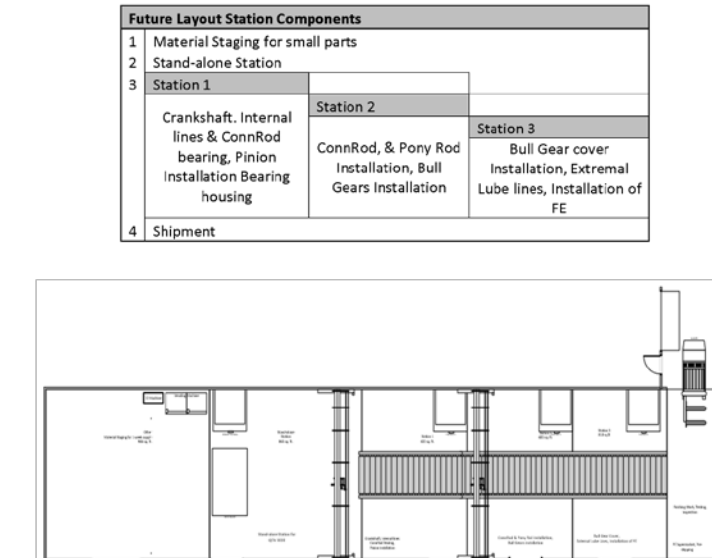
Future Layout



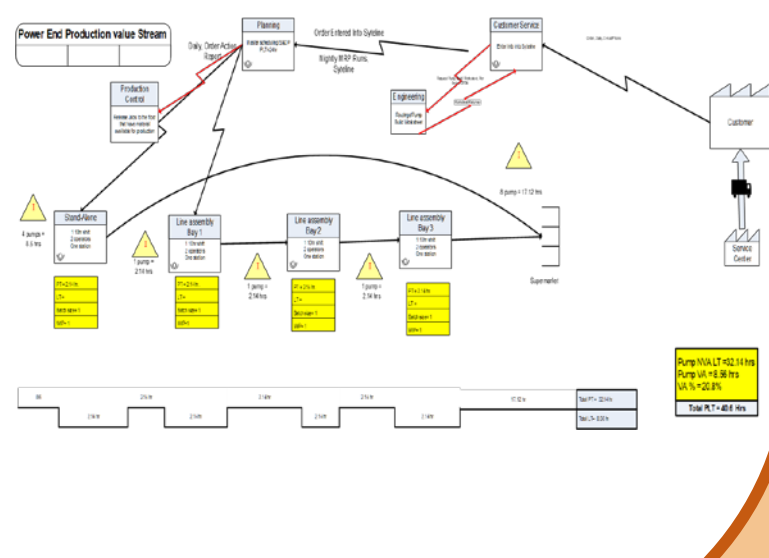
Daily Cycle time				Stations		
Daily Volumen	Faster by 10%	Average scenario	Slower by 10%	1	2	3
15	116.0	128.9	141.7	3.3	3.7	4.0

Takt time: 2,100.00/Seconds/Piece
0.581 hr

Recommended



Value Stream



CONCLUSION

The Team has successfully proposed the layout for one-piece flow Power-end assembly line. Throughout different analysis methods including Takt time, time study, spaghetti diagram, and simulation, the team was able to determine that the one-piece flow assembly line supports company's future production demand and eliminating operating wastes as follows:

Metrics	Current	Future	Total Change
Space (sq ft)	3,016	4,222	-40%
Inventory (BLK)	7	4	43%
Walking Distance (FT)	309	68	78%
Parts Movement Distance (FT)	308	138	55%
Crew Size (Number of operators)	14	11	21%
Productivity (PPLH)	82%	93%	-13%

FUTURE WORK

Implementation of Phase 5:

- Generate a Metric Control:
 - Safety: Total of Incident Rate
 - Quality: Monitor the number of defects
 - On time Delivery: Measure OTD
 - Cost: Measure the cost of over time and over production
- Audit the Metric controls:
 - Fail the Audit, generate Root Cause Analysis.