One Piece Flow Line for Power End Assembly
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IE 4350 Capstone Design Fall 2018

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
Sunny Chaleunsakd, Manny Flores, Mark Biery, Vannery Gonzalez. IE 3314, IE 4322, IE 4343, IE 4350

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

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

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.

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

RESULTS

FUTURE WORK

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:

<table>
<thead>
<tr>
<th>Metrics</th>
<th>Current</th>
<th>Future</th>
<th>Total Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space (sq ft)</td>
<td>3,016</td>
<td>4,222</td>
<td>-40%</td>
</tr>
<tr>
<td>Inventory (B/R)</td>
<td>7</td>
<td>4</td>
<td>43%</td>
</tr>
<tr>
<td>Walking Distance (FT)</td>
<td>309</td>
<td>68</td>
<td>78%</td>
</tr>
<tr>
<td>Parts Movement Distance (FT)</td>
<td>308</td>
<td>138</td>
<td>55%</td>
</tr>
<tr>
<td>Crew Size (Number of operators)</td>
<td>14</td>
<td>11</td>
<td>21%</td>
</tr>
<tr>
<td>Productivity (PPH)</td>
<td>82%</td>
<td>93%</td>
<td>-13%</td>
</tr>
</tbody>
</table>

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.