2014

Meritor brake assembly bench part setup process improvement

N. Drenosky
H. Dupree
C. Guinn
F. Petroski
M. Sidhorn

See next page for additional authors

Follow this and additional works at: https://tigerprints.clemson.edu/foci

Recommended Citation
https://tigerprints.clemson.edu/foci/83

This Article is brought to you for free and open access by the Research and Innovation Month at TigerPrints. It has been accepted for inclusion in Focus on Creative Inquiry by an authorized administrator of TigerPrints. For more information, please contact kokeefe@clemson.edu.
Brake Assembly Bench Part Setup
Nick Drenoski, HaLee DuPree, Chris Guinn, Frank Petroski, Marco Sidhom
Dr. Scott Mason and Dr. Kapil Chalil Madathils
Clemson University – Industrial Engineering

Abstract: In partnership with Meritor’s Manning, SC facility, this capstone project is focused on the changeover process of the brake assembly process at this facility.

Problem
The changeover process is the greatest source of the downtime an operator spends preparing the workstation for the next set of brake orders.

Objective
The teams goal is to use process improvement techniques to reduce downtime in between brake orders.

Introduction:
The team met with Meritor, a Brake manufacturer for industrial vehicles to understand the changeover process during brake assembly. Five concepts were chosen for testing after concept generation.

The key business goals for our final concept to be chosen
- Reduce the downtime at each brake assembly bench by 32%
- Have a return on investment within 1 - 1.5 years
- Reduce the need for overtime workers and a second shift workforce
- Reduce the physical strain on employees.

Current State of the System
- Project area within the facility involves 4 benches called “Cell 3”
- Total of 12 brake assembly benches present in the plant
- Each bench contains two workers
- Current changeover process can take as long as 20 minutes for experienced workers.

Methods:
- Identified Key Business Goals
- Developed list of Important Needs and Metrics
- Simulated current system using ARENA
- Generated and evaluated initial concepts

Results:

Using Arena, a simulation software, we tested one of our concepts seen below. This resulted in a 32% reduction in cam transfer time.

<table>
<thead>
<tr>
<th>Total Distance (feet)</th>
<th>Current System: Total Time for round trip (Minutes)</th>
<th>New Concept: Total Time for round trip (Minutes)</th>
<th>Time Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Bench 9 to Station A</td>
<td>116</td>
<td>6.54</td>
<td>7.73</td>
</tr>
<tr>
<td>From Bench 10 to Station A</td>
<td>90</td>
<td>19.25</td>
<td>6.00</td>
</tr>
<tr>
<td>From Bench 11 to Station A</td>
<td>111</td>
<td>13.88</td>
<td>6.48</td>
</tr>
<tr>
<td>From Bench 12 to Station A</td>
<td>75</td>
<td>11.08</td>
<td>6.08</td>
</tr>
<tr>
<td>From Bench 9 to Station B</td>
<td>231</td>
<td>19.95</td>
<td>4.55</td>
</tr>
<tr>
<td>From Bench 10 to Station B</td>
<td>237</td>
<td>21.97</td>
<td>4.84</td>
</tr>
<tr>
<td>From Bench 11 to Station B</td>
<td>257</td>
<td>11.78</td>
<td>3.38</td>
</tr>
<tr>
<td>From Bench 12 to Station B</td>
<td>126</td>
<td>13.88</td>
<td>3.68</td>
</tr>
</tbody>
</table>

Initial testing results pertaining to a new concept in anchor pin transportation is shown in the table below. The data shows that this new concept being tested can have as much as a 17 minute time difference. This will have an impact on overall setup time.

Conclusions:
- Although it is not immediately clear which concept will reduce Meritor’s setup time and associated costs, the five concepts that remain have the potential to provide a significant impact.
- They each aim to increase the efficiency of the process in different ways, providing a diverse opportunity for improvement.
- The transportation and setup of cams has become the main focus of the team at this point in time because it has been recognized as the least efficient part of the process.
- The team is attempting to change Meritor’s method of process setup, possibly drastically, to provide them with cost savings within their 1-1.5 year time frame. The future steps of the team will be to select a final concept and implement it into facility.

Acknowledgements:
Our client, Bob Edwards: Site Manager, John Leasure: Quality Engineer, Robert Burnstingle: Manufacturing Engineer, Justin Shorter: Operations Leader and project mentor at Clemson University, Melissa Paul.

References: