Brake assembly bench part set up and part presentation

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Recommended Citation
Barry, B.; Rogers, W.; Smolinski, J.; Vanest, K.; and Mason, S., "Brake assembly bench part set up and part presentation" (2014). Focus on Creative Inquiry, 82.
https://tigerprints.clemson.edu/foci/82

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In partnership with Meritor, this project focused on improving the part presentation and downtime losses of the current brake assembly process. The way in which the parts are currently presented to an operator causes an ergonomic strain on the worker, which is not ideal for production, resulting in worker downtime losses and an inefficient build rate. The Rapid Upper Limb Assessment (RULA) was conducted to ensure the ergonomic strain on the worker remains at an acceptable level. As a result of performing two fishbone diagrams on the downtime and ergonomic strain, the team quantified the system losses by the amount of time lost and quantified harmful motions by conducting a RULA assessment. Based on the findings of the Pareto chart and utilizing various Industrial Engineering tools, the team was able to provide solutions to reduce the amount of downtime while also ensuring the motions of workers remain ergonomically safe.

ABSTRACT

In order to address the scope of the project, decrease downtime by 10% and reduce RULA scores to less than or equal to 4, Meritor manufactures automobile components for military, trucks, and trailers. The Meritor plant located in Manning, South Carolina is where the team will focus their attention. The Manning facility alone is responsible for supplying brake assemblies for 70% of class 8 vehicles (tractor trailer trucks) on the road in North America. The scope of the project deals with the brake assembly bench setup and part presentation. The team determined two quantifiable business goals in order to address the scope of the project, decrease downtime by 10% and reduce RULA scores to less than or equal to 4. The Meritor Brake Assembly Bench Part Setup and Part Presentation

METHODOLOGY

• Created mission statement and determined the two quantifiable business goals:
  • Decrease downtime by 10% and reduce RULA score ≤ 4
• Determined operator likes and dislikes about the system
• Translated operator likes and dislikes into needs
  • Interviews, surveys, observations, time studies
• Conducted root cause analysis of both quantifiable business goals using fishbone diagrams to determine latent causes and categorize causes into 4 main categories for concept generation
• Created two Pareto diagrams to focus attention on top 80% of those responsible for losses
• Generated concepts to address system losses
• Selected concepts that improved the losses using concept screening matrices

The above charts are system losses for our two quantifiable business goals. The first pertains to the downtime system losses. The second chart pertains to the system losses according to RULA. The frequency refers to how often the loss occurs per day per bench. There are 12 benches at the Meritor plant pertaining to brake assembly process.

The flowchart was necessary because it allowed the team to understand the system as a whole and identify where system losses were occurring. The above flowchart displays the progression of the brake assembly throughout the system. The flowchart was necessary because it allowed the team to understand the system as a whole and identify where system losses were occurring.

The Pareto chart displays the system losses in a bar graph form in order from the highest percentage loss to the lowest. The Pareto chart allows for the accumulation of loss to be correlated with each individual factor. The magnitude and frequency of each system loss is multiplied and the percent effect of each loss is then compared. Typically the factors contributing to a cumulative of 80% loss are identified as necessary for focusing on throughout concept generation.

CONCLUSION

Quantifiable business goals: Decrease downtime by 10% and RULA score ≤ 4

8 Concepts:
• Hand cart for camshaft setup
• Fix packaging software
• Place spider bins closer and use pneumatic lift table
• Temporary storage location for plywood shelves
• Hand carts for brackets
• Handcart and storage on bench
• Pneumatic lift tables
• Shelves on carts

There is no one concept that will satisfy all of the metrics and product specifications. Several concepts will be combined in order to meet the quantifiable business goals.

ACKNOWLEDGEMENTS

