

Improvements in Pump Housing Manufacturing Cell using Lean Approach



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Abstract:

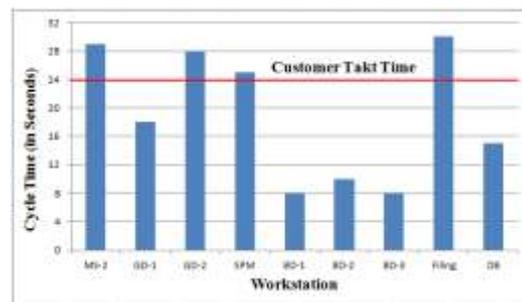
Lean manufacturing is increasingly becoming more and more popular across manufacturing industries with every passing day. Lean provides an organization with a competitive advantage in the market. However, Indian Micro Small Medium Enterprises (MSME) have not been able to embrace lean as successfully as some large scale enterprises. This project was carried out in an Indian small scale company to describe the successful application of lean tools and techniques in MSME.

The aim of this project was to reduce the manufacturing lead time for a fuel injection pump housing manufacturing cell and improve the labour productivity in terms of production output per man hour. The cell faced a lot of issues like high WIP, low productivity, high cycle times, and high waiting time for the component between stations. All these led to a manufacturing lead time of 24 hours and a production output of 17.6 units per man hour. Hence lean approach was used to reduce the proportion of non value added activities in the cell. The project comprised of 4 phases – Basic lean initiatives like training, 5S, visual management, and reward and recognition system, cycle time reduction in workstations, cellular layout redesign, and line balancing. The layout redesign was carried out through discrete event simulation, and SIMIO – a simulation software, was used to validate the layout redesign.

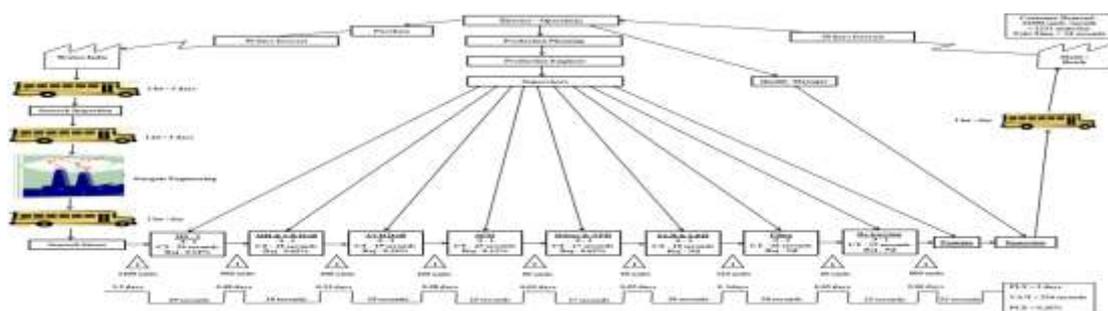
After the improvements, the cellular layout was simulated on SIMIO and it was found that the production lead time had reduced by 10.3% and hence the production output had improved by 101 parts per shift. The line balancing was done by dividing the operational cycle times into manual times and auto times, and it was found that production output per man hour had increased by 33.5%. Finally, when the value stream profit margin was calculated, it was found that the value stream profit margin for the product improved by 8% per month. Thus, lean approach helped the organization in reducing the wastes in its value stream.



Simulation model



Takt time – cycle time chart



Value stream map