Lean Six Sigma
Assembly Transformation

Assembly Operation converted to one piece flow assembly lines to improve throughput and efficiency.

Problem Statement

- The first issue was ramping production to meet demand:
  - getting employees up to standard
  - extremely long training cycle.
- The second issue was that we were 10% higher in cost than a China imported due to our labor. Losing customers to import tables

Mapping approach

- Spaghetti diagram to illustrate how much walking was being done by the operator to retrieve components

- Created a value stream map from beginning to end to produce a complete table. The final table assembly was broken into natural sections

Analysis and Improvement

We brainstormed what could be done to improve efficiencies and throughput

- We simplified the number of bolts and screws from 8 to 3
- We decided to put a one piece flow system in place that matched balanced segments
- We implemented automatic screw guns to eliminate handling
- We implemented a supermarket for components behind each work station
- Implemented a manual roller conveyor system to move the 5 foot long product
- Used 5 S to build efficiency in the work stations – everything had its place. We standardized and sustained these work stations.

Results

- Completed the project in 5 months
- Reduced labor by 70%
- With 2 lines we could meet spikes in demand
- Lead time for rush jobs was reduced form 75 minutes to12 minutes
- This process was key in being able to match the China import table costs.
- Walking was reduced to a few steps verses hundreds
- Excessive motion was reduced by work station layout as well as the screw automation.

Assembly process converted to pull kanban pull system

Problem Statement

- Product lines were having an issue meeting demand.
- Batch system with lots of WIP at each station
- If a quality issue was detected – large amount of rework created. Work stations were not in a sequence. No signal was utilized
- Was very difficult to track and maintain control of production. Product would get lost.
- We could not hire and maintain enough staff to support production

Analysis and Improvement

- Created VSM map along with spaghetti diagram of current situation along with WIP, rework flows, queuing and throughput. We took a snapshot
- Introduced cellular flow process concepts
- Determined to use kanban squares – 12 parts per tote for handling and care.
- Each station had one kanban square in queue.
- If the queue in front of them was not open, they would stop producing.
- Designed multiple cells per product line
- Visual Factory – Production boards at end of cells

Results

- It took 4 months to become 95% on-time
- Required 27% less people versus not being able to hire enough.
- Doubled our production throughput
  - Line flow efficiency
  - Less rework

Work Cell Design

Problem

- Large metal enclosure assembly cell
- Be able to assemble any and all enclosures
- One person must be able to perform 99% of the assembly alone.

Analysis and Improvement

- Mapped out the assembly process for each family of canopies
- Assembled each family of canopy, documented and verified the process
- Set up a tooling matrix of required tooling for each canopy
- Research and defined electric lifting and moving operator assists
- Trained all operators in the new process
- Implemented 4 single work cells

Single Station Work Cell Design

- Designed for lean six sigma
- Minimize the 8 wastes
- 5S stations – only required tooling in the area with shadow boards.
- Standardized work- video taped process
- No Cables – battery operated tools
- Operators assist
- Visual factory – all locations marked on floor