Generic Case Study

This example is based on an actual project. Names of people and details about processes have been hidden. To achieve the current state it took 25 months, 1 full-time kaizen leader, dedicated employees, and approximately 150 consulting days. The size of the project consisted of a pilot phase including 3 preceding processes, 4 assembly lines, 12 different products, 4 distinct customers, 143 direct labor employees and 3 shifts. Today the organization is continually seeking manufacturing excellence mainly with its own internal resources.

Initial Condition

- Stability
  - Standards were vague and there were no formal training procedures. As a result, defects in the process were created and passed on to the following process, and eventually to the customer. Team members were not cross-trained and unscheduled time off required daily attention and management.

  - Machine maintenance procedures were not standardized and total productive maintenance was not implemented. Machines broke down often during production leading to overtime, need for extra machinery and occasional missed shipments.

  - Material regularly arrived at the process late. Defective parts forced the operators to leave the area to get new material on a daily basis.
- Methods for insuring reliable use of information were not in place. Production schedule changed several times during the day due to shortages, quality issues and conflicts in production priority. Meeting daily output was hard work.

2. Process & Equipment Layout

- Complex process layout made it difficult to understand the flow of material through the plant. Only a few people could react quickly to unscheduled changes, making the plant inflexible and vulnerable.

- Complex machinery with long changeover from one part to the next forced large lot sizes of production. Also, isolated processes forced large lot sizes of conveyance from one process to the next. As a result, longer lead time forcing forecast manufacturing, hidden defects and poor quality feedback made the plant unstable and unflexible.

3. Jidoka: Intelligent Automation

- Problems went unnoticed by the operators and/or machines until serious defects occurred. Then team members were left to solve complex problems by themselves while production stopped and/or defects passed on to the following process.

- Team members were waiting, with no work, while machines were cycling. Machines always controlled operators, leaving team members with no sense of control.

- The combination of “passing defects” and “wait without work” gave a sense to the operators that their labor could be wasted, leaving them without a sense of meaningful work.

4. Just-in-Time

- Production schedule was based on an MPR forecast rather than actual demand. Each isolated process receives its own weekly schedule and worked at different pace of production. Products were pushed to the following process leading to overproduction throughout the factory.

- Takt time was not established. Customer fluctuations were passed directly to the shop. The manufacturing department keep their assets (man, machine, material) high at all time to cover for pick demand while the planning department keep finish good constant in the warehouses to prevent customer shortages.

5. Supply Chain Management

- Customers and suppliers were not linked in a value stream of operations. Each process along the value stream was carrying the cost of managing assets against market fluctuation and process instability. Several suppliers were used for similar parts to protect against instability.

- Price for value was based on perceived value only rather than on work content, lead-time and quality.
After Condition

1. Stability

- Standards are made clear. There is a formal training program; team members are cross-trained on every job within the team. Daily attendance is managed by the team and is reflected in the team’s scorecard. Output is met with the team leader’s help if needed.

- Increased machine up time through one-by-one systematic problem solving as well as increased efficiency allowed the plant to go from 3 to 2 shifts. A total preventive maintenance program is implemented on the 3rd shift. Machine down time is reduced by over 40%.

- Material delivery is standardized in frequency, quantity and location, making it easy to see problems quickly. It is the responsibility of material conveyance to address material related problems.

- Methods for production, conveyance and production authorization are standardized, making the shop floor autonomous in responding to changes. There is no schedule. Every 12 minutes each final line is responding directly to the pull signal of the customer. Everyone’s roles and responsibilities are defined and documented.
2. Process & Equipment Layout

- Great attention is given to material flow. Machines and processes are arranged to accommodate a simple flow with minimum convergence and divergence of product material. Conveyance between processes is eliminated or simplified. It is easier to see how the product flows through the plant.

- Long changeovers are reduced through standardization and kaizen, or are eliminated altogether. At each process the lot size is fixed to equal to the box quantity pulled by the customer. In the future, the final assembly lines will make every unit one-by-one, regardless of box quantity. In-process inventory is reduced and quality problems are visible more quickly and easier to address.

- This reduced the manufacturing lead-time, allowing processes closer to shipping to build to actual demand as opposed to forecast.

3. Jidoka: Intelligent Automation

- In addition to better flow, problems were made visible more quickly through the use of visual and audible signals (also called andon). As manpower efficiency improved, excess labor was utilized to create the team leader position within each team. His or her responsibility, amongst others, is now to help solve line problems as soon as they appeared.

Auto stop, auto eject and standard-work-in process is utilized to separate people's work from machine's work. Great attention was given to hard work, ergonomic and safety. The percentage of value added work increased making the operator's work more meaningful boosting everyone's sense of contribution and ownership.

4. Just-in-Time

- The need for a weekly MRP production scheduled is eliminated. Each process switched to a demand-driven production method facilitated by a pull system. Production and conveyance are now strictly limited to what is needed by the following process. Both high volume parts and service parts are using the same production line. Response time to customer orders is fast, easy and autonomous.

Takt time and level load production (heijunka) is established. Fluctuations are tempered by the ability of the shop floor to respond methodically, quickly and by a small buffer of parts. Resources, labor, materials and machines are rationalized based on customer demand datum (takt time). Excess capacity is utilized to service new business and overall production costs are reduced.

5. Supply Chain Management

- As the plant progresses toward implementation of a world-class operation, efforts are directed to suppliers with the intention of creating a boundary-less production process.

- Suppliers are strategically selected to become part of a stream that delivers value to the customer. The Toyota Production System is making its way back upstream.
Results

- Labor efficiency:
- Equipment uptime
- Lead-time
- Floor Space
- Inventory