Case Study of France/a Scott Fetzer company

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Abstract

This paper analyzes the history and potential benefits of lean manufacturing principals. The case study examines France Manufacturing, the only remaining U.S. manufacturer of neon transformers and ballasts for the sign industry. France faces the same problems that many American companies are currently facing in the global economy; their competitors utilize low cost labor from overseas in manufacturing their products.

The case study covers the implementation of lean manufacturing principals into France's main product line in an effort to bring their product cost in line with their competition. It defines the lean manufacturing principals employed in the project, and documents the existing cost state and the cost future state of the product line after the lean implementation.

France/a Scott Fetzer company

Introduction

France is a division of the Scott Fetzer Corporation, A Fortune 500 organization located in Westlake, Ohio. Besides France, the Scott Fetzer trademark names include Kirby Vacuum Cleaners, World Book Encyclopedia and Campbell Hausfeld Compressors.

Berkshire Hathaway, Inc., an Omaha, Nebraska-based holding company, owns Scott Fetzer. Berkshire Hathaway is recognized for its investment strategies and unsurpassed value for their shareholders.

France produces neon transformers and ballasts for the sign industry, in addition to ignition transformers designed for the oil heating industry. Through their 70 years of experience, France has earned its reputation of being the leading manufacturer in these industries. They serve their customer base though contracted distributors, as nearly all of France product used is by professional installers.

Competition

Currently, France is the only manufacturer in the industry remaining in the United States. They have two main competitors in the industry, Lesip and Actown.

The Lesip Corporation, founded in 1953 by Sanyo ElectricWorks Ltd., produces neon transformer products designed in Gifu Prefecture, Japan. In January 2004, the manufacturing moved to LECIP Shanghai Co., Ltd. in Shanghai, China for production of transformers in a consignment arrangement. “Through continuous research and development, the company has now become a leading manufacturer of products for lighting, electric power conversion, and information processing” (LECIP, 2007).

Actown-Electrocoil incorporated in 1962. In 1986, Actown developed its first neon transformer and this became a major product line of the company. As with LESIP, they manufacture their products in China “Actown continues to grow with strategic partnerships in the Far East for high volume production of coils, transformers, and sourcing of raw materials and components. Our goal is to provide a full range of products, capabilities, and price-competitive manufacturing that will meet or exceed our customer's needs” (Actown-Electrocoil, Inc, n.d.).

France faces the same problems that many American companies are currently facing in the global economy. The competition utilizes low cost labor from China in manufacturing their products. The topic of this case study is to implement lean manufacturing principals into France’s main product line, neon transformers, to bring their product cost in line with their competition. Currently, France prices tend to be 20% higher than their competitors are. For France not to only maintain, but to grow their market share, they must eliminate this cost disparity. There are two choices going forward, improve the Fairview operations, or outsource the production to a lower labor cost area.

The case study will define the lean manufacturing principals employed in this project. It will also document the existing state and the future state of the product line after the lean implementation.

Lean Definition

Lean defined is a process of identifying waste from the customer perspective and the endless pursuit to eliminate it. In this context, waste defined is any activity that adds no value to the product from the customer's perspective.

In manufacturing two types of work are performed, value added work and non-value added work. Value added work defined is work the customer is willing to pay for. An operator placing parts into a product is something the customer will pay for. However, if the same operator has to walk to a shelf, spend minutes searching for parts, and walk back to the workstation, this cost the customer will not pay for. This is an example of non-value added work. (Ortiz, p.28)

Example of wasted movement and time (non-value added work)

Walking to the shelf	13 seconds
Looking for parts	130 seconds
Return to workstation	13 seconds
Put in the part	5 seconds
Total Time	161 seconds
Total value added time	5 seconds
Total non-value added time	156 seconds

As this inefficient process is continued, it results in the growth of non-value added work. This cost is not captured in the price the customer pays for the product, so it increases the company's production cost.

Lean Training

With the goal established (20% cost reduction of the main product line), the first step of the implementation was to identify the team members. A wide variety of people from different departments was chosen to ensure every change made to the process would be successful, and that the changes made would not create unseen problems in other areas. The team was represented by the line workers of the product line, maintenance technicians, design engineering, industrial engineering, and management. With the team formed, the next step is to train the team on the lean principals to be used in the project beginning with the seven wastes. As stated earlier, anything that does not add value to the product is waste. The goal of the team is to identify it and develop ideas to remove it from the process.

The seven wastes are:

<u>Waiting</u>

Waiting can happen when the processes are not synchronized causing the operator to be inactive. The need for parts, long setup times, bad equipment, and rejects create waiting. This cost the company unnecessary expense in operation cost.

<u>Motion</u>

Wasted motion is movement that does not add value to the product. It includes unnecessary reaching, looking for parts and tools, walking to and from the workstation, and the process layout are examples of wasted motions. Wasted motion reduces productivity.

<u>Inventory</u>

The easiest way to reduce cost in the process is to reduce the amount of wasted inventory. Excessive inventory is generally associated with what is kept in the stockroom. However, there is also the common mistake of operators building more assemblies than needed. When this occurs, it can create false signals to order more parts or material unnecessarily (Ortiz, 2006, p. 31)

Over processing

This is any unnecessary effort adding no value to the product. Doing more to the product than the customer requires. It can include over protecting the product and over automation of the process.

Transportation

One waste can create another. For example, overproduction can create wasted transportation. Building product beyond requirements creates false indicators to inventory control that cause movement of material out of inventory unnecessarily. Material movement requires labor, forklifts, paperwork, and, of course, money. Wasted transportation will also contribute to inaccurate inventory counts, excessive material storage, and damage to parts during transit (Ortiz, 2006, p. 29).

Defects

"Any process, product or service error. The worst type of defect is the one that reaches the customer; but defects that the company corrects within the process use tremendous resources and are often hidden and unresolved" (Flinchbaugh & Carlino, 2006, p. 12) .

Overproduction

Overproduction is the most common form of waste in manufacturing. Producing more product than is needed and before it is needed is an expensive procedure. The costs caused by overproduction are the excessive accumulation of work in process (WIP), the defects hidden within the WIP, incorrect part counts, excessive labor hours, and bad utilization of inventory.

Once the types of waste are identified, the process of 5S is incorporated in the training to help eliminate them. Through incorporation of 5S, the results are a clean and organized work setting.

The five Ss are:

Sort

Sorting is the removal and disposal of all unnecessary items from the work area. Generally, only a small number of items are actually necessary to do the work. Everything else should be removed. In the average work area, items accrue over time. Tools, shelves, parts, paperwork, tables, stools, and chairs can create a barrier of unneeded items. As these things pile up, the work area becomes a giant storage area of unnecessary items.

If these unnecessary items are not removed, the operator may inadvertently install wrong parts, use obsolete instructions, or waste time looking through the stack of unnecessary supplies. The necessary parts and tools required for the job become hidden and waste production time.

Straighten

After the unnecessary have been discarded, the remaining tools, tables, paperwork, and workbenches must be organized. All items left in the work area need to have a place, and the place should be identified, to keep things organized. Straightening is the process of organizing everything left over from sorting, and includes identifying the locations of the items.

Scrub/Shine

The third S is easy to understand. Everything in the work area must be cleaned to give it as close to a showroom appearance as possible. Scrubbing is not merely good for appearance, but it assist in the prevention accidents and injuries. Equipment should be regularly cleaned, maintained, and be free of dust, dirt, and grease to increase reliability and reduce the risk of breakdowns.

Standardize

The cleaning and organizational standards after completing the first three S's must be put up in each area. Time at the end of each day is provided to clean and place items back into their correct locations. Workers organize as needed placing parts, bins, and tools in order. 5S now is part of the everyday normal operation. Keep everything as standard as possible.

Sustain

To ensure 5S is succeeding and the areas are not reverting to the previous wasteful habits, weekly audits of each work area will be completed. On a monthly basis, all areas will inspect and rate each other.

In addition to aiding in the elimination of waste, the 5S program should also be viewed from the customer's perspective. The company must make certain that customers visiting the facility with interest in purchasing products get a good first impression.

If the production floor is dirty, unorganized, cluttered, and visually unappealing, it shows the customer the employees do not care about the company and it is an indicator of poor quality. Therefore, the factory should look as clean, organized, and presentable as possible. Some of you may disagree with the concept of 5S, claiming that manufacturing is dirty and messy by nature. Wrong. In fact, 5S is the most fundamental aspect of all our continuous improvement goals and is critical to future success (Ortiz, 2006, p. 33).

The Current State

With the team now trained on the basic lean principals, the next step is to go out to the production floor and directly observe the work processes. This step is vital to the success of the project. Directly observing work as performed gives the team very accurate information about what is happening in the processes vs. studying stored information. The wastes in processes hide in and are not detected in the stored information.

The team walked through the selected product processes starting at the last process before shipment. The team takes notes of cycle times, movements, workstation organization, and workflow. To aid in the identification of waste, one team member video tapes the processes as the team performs the walk. The team, to refine anything that they missed in the walkthrough, will review the tape. They evaluated all of the processes ending with the delivery point of the raw materials received.

After the completed evaluation of the current processes, the team meets to compare notes of their direct observations and study the tape. Through information in this evaluation, the team prepares a current value stream map. “A value stream is all the actions (both value added and non-value added) currently required to bring a product through the main flows essential to every product: (1) the production flow from raw material into the arms of the customer, and (2) the design flow from concept to launch” (Rother & Shook, 2003, p. 3).

“A value stream map starts with a paper and pencil sketch of the process to understand the flow of material and information needed to produce a product or service” (George, 2002, p. 52). As the team assembles the map, information such as cycle time, wait time between processes and change over time is recorded for each process step. When the map is completed, the team draws a timeline underneath the map indicating the total production lead time. The lead time is the time it takes one part to travel through the plant beginning with raw material and ending at the shipment to the customer. Next, the team calculated the value added times of the map for each process in the value stream. Comparing the total production time to the actual value added time for the processes shows the team how much waste is in the current state. As shown in figure 1, the actual process time to make one part is 23.83 minutes, but the total production lead time for the product to make its way through the plant is 28 days. This indicates to the team that there is waste to eliminate out of the process, and opportunities to lower cost. There are wastes the team can identify and remove from the processing time, but compounding the problem is the total lead-time.

During this analysis it is determined that France must not just compete on price alone, it must create a competitive advantage by decreasing the time to fulfill the customer's orders. It must adhere to the adage give the customer what they want, when they want it, in the right quantity, and at the right price

Figure 1.

Decreasing the total lead-time helps to increase inventory turns, this is a measure of how quickly materials are used or sold. The more the turns per year the company can achieve the higher the return on their inventory investment. “The shorter your production lead time, the shorter the time between paying for raw materials and getting paid for product made from those materials. A shorter production lead time will lead to an increase in inventory turns” (Rother & Shook, 2003, p 30). With the waste identified in the current state of the process, a plan is created to reach the Future State (with waste minimized).

Developing the Future State

As the team studied the current state value stream map (figure 1), several opportunities stood out. Addressed first, the time of the inventory sitting idle in between the processes and the 21 day supply of finished goods. After investigation, the reasoning for the large amount of inventory were long changeover time between models and inflexible machinery, especially the welder in the first assembly area. Once a setup was established, parts are produced regardless of whether they are needed or not. If there were requirements for only 1000 parts, 10,000 would be produced due to changeover difficulties.

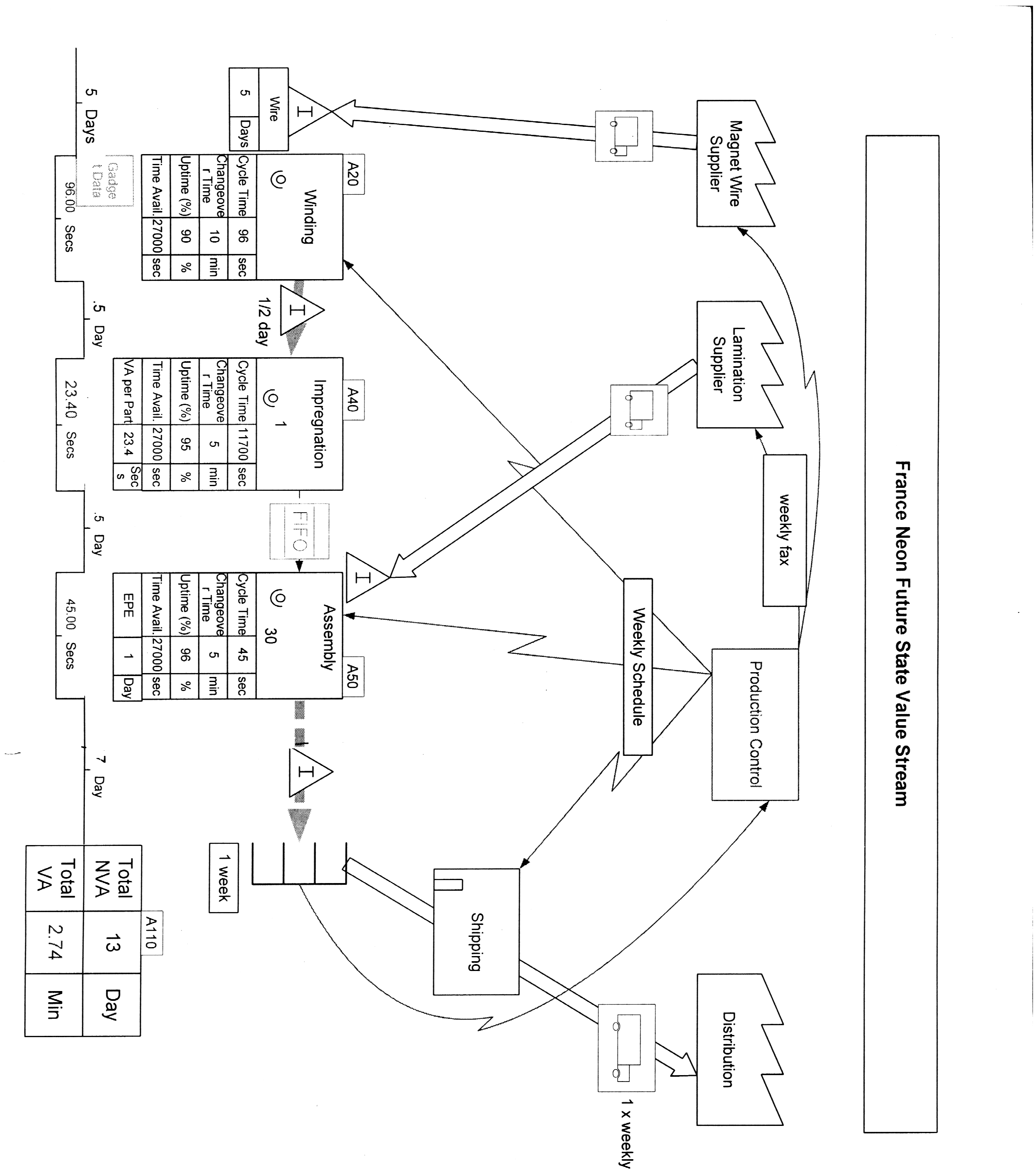
The map also indicated that impregnation of the product was a bottle neck for the whole process. The impregnation process takes 1.5 hours to complete with an output of 85 parts per cycle, it could not keep pace with the upstream or down stream processes. The impregnated product is built in the first assembly process. The product consists of two secondary coils, one primary coil, two shunt assemblies, and are encased by welded magnetic lamination steel. The components are assembled and welded into a completed assembly that is then impregnated to withdraw moisture from the product and prevent over heating of the secondary coils when the product is in service. As the team discussed this problem, they began to challenge the current state. “We impregnate a completed assembly, something we have done for 50 years. In reality, the completed assembly does not need this process, only the secondary coils from the winding department” (personal communication, September 21, 2007). With this information, the team began to brain storm the process.

The team decided to redesign the process and reduce the inventory supply by making the process more flexible and the changeover procedure quicker and easier.

By only impregnating the coils, the process would no longer be a bottle neck and throughput would increase by 300%. Furthermore, since the coils would go straight from winding to impregnation, there was no need for a separate first and final assembly. These cells combined would save substantial space, eliminate work in process and the excessive transportation of moving materials. The future state map was created and the implementation plan organized. The future state map as shown in figure 2, improves the actual process time to make one part to 2.74 minutes, a decrease of 89%. The total production lead time for the product to make its way through the plant improved to 13 days, a 54% decrease. The 21-day supply of finished goods decreased to 7 days, giving the company a build to order capability due to the improved flexibility of the process.

The implementation plan was submitted and approved on October 1, with the implementation scheduled to begin on December 26. The team used the 3-month period to develop the new process and have all the necessary materials, equipment, and workers ready by the implementation date.

Figure 2.


France Neon Future State Value Stream
Magnet Wire Supplier
Lamination Supplier
Distribution
Production Control
weekly fax
Weekly Schedule
Shipping
1 x weekly
1 week
Wire
5 Days
A20
Winding
Cycle Time 96 sec
Changeover Time 10 min
Uptime (%) 90 %
Time Avail. 27000 sec
1/2 day
A40
Impregnation
1
Cycle Time 11700 sec
Changeover Time 5 min
Uptime (%) 95 %
Time Avail. 27000 sec
VA per Part 23.4 Secs
FIFO
A50
Assembly
30
Cycle Time 45 sec
Changeover Time 5 min
Uptime (%) 96 %
Time Avail. 27000 sec
EPE 1 Day
5 Days
96.00 Secs
.5 Day
23.40 Secs
.5 Day
45.00 Secs
7 Day
A110
Total NVA 13 Day
Total VA 2.74 Min

Implementation

The implementation time was provided by the company during the Christmas/New Year shut down period. This gave the team two weeks to complete the changes to the process. A two week window to implement a change this large is a great undertaking to say the least. But, this team is very prepared. There has been a tremendous amount of trial and error experimentation, process pilots, and pre implementation work performed. The team has proved out and scheduled every step in detail and are ready for this challenge.

As the project started, the team spilt into groups performing specific tasks. The 1st week involved: group 1 disassembling the existing first and final assembly lines, group 2 performing 5S on the new cell area, and group 3 implementing quick changeover tooling and methods to the machinery that were built during the 3 month pre implementation period. At the end of each day, the team met and updated the project status.

At the end of the 1st week, the area containing the first assembly was empty space. All material, tooling and equipment from the area that was needed in the new combined cell was sent to the 5S group, the remaining items were discarded. The space is ready for needs the company has for the area.

The final assembly area was prepared for the new cell layout. The group performing 5S on the area removed all material, workbenches, tools, and equipment that was unnecessary for the new process. Everything that remained in the area after the sorting phase was organized and its location identified for the new cell by floor marking and overhead signs. When the straightening phase was completed, everything was cleaned and painted, making everything, even 20-year-old machinery, in the area look new. However, group 3 was still incorporating the new tooling for quick change of the machinery.

Starting in the second week, the teamed changed their grouping strategy. All maintenance, technicians and engineers from groups one and two joined group 3 to assist and finish the tooling upgrades. The remaining workers were tasked to enter the standardize phase of 5S on the new cell. Documents for organization and cleanliness of each workstation were developed and posted. When the standardization phase was completed, the work instructions for the new process were arranged and posted to each station of the new cell.

The team met at the start of the remaining 2 days of the project. Group 3 has finished the quick change tooling upgrades. The new cell has all workbenches, tools, and equipment set. The area 5S assignments are completed and all new process documentation is posted. The team is now ready to implement their future state processes.

The team staffed the line to run the cell and look for any waste missed during their design, with team members from engineering monitoring cycle times, ergonomics, and quality. As the process was run, some unnecessary movements were noted as well as material and tooling presentation problems to the workers. The team video taped the run through of the process and met that afternoon with notes of changes that needed to be made.

The last day of the project started out with the team adjusting the process. These changes involved small changes to the workstation designs, relocating tools for better ergonomics, and part presentation to the workstation. The last hours of the day were spent running the new cell looking for any last problems. As none were detected, the team concluded the project and released the new process to full production.

The Results

The new lean process is capable of running any France transformer needed with speed, flexibility, and quality. The process can change from one model to the next in less than five minutes. The new manufacturing process gives the company a great advantage in the market place. With all of their competitors delivering their product from oversea by the boatload, they have little to no flexibility in customer demand. With this new process, a customer can call in and order anything from their neon product line and they can have it ready to ship in less than 4 hours. While providing it at a cost that is lower than the competition

The 20% cost reduction was not only met, but also exceeded. The average cost per unit for France before the project was . Producing the same product through the lean work cell now has an average cost per unit of , a savings of $23.86 per unit and a 35.95% cost reduction.

Cost Detail

Product	Std Hrs	Labor Cost	Variable Cost	Fixed Cost	Material Savings	Total Cost
Transformer pre lean	0.7706	$8.07	$10.15	$12.99	$0.00	
Transformer post lean	0.2870	$3.00	$3.13	$4.01	$3.00	
Savings	0.4836	$5.07	$7.02	$8.98	$3.00	$24.06

In addition to these savings, France also enjoyed these additional benefits:

- Work in process cost were reduced by $15,384 per day due to the implementation of one piece flow and the elimination of lead time between first and final assembly.
- Approximately 5,200 sq ft of floor space was created by the project. This allowed France to bring and store materials in the area, eliminating the need of a rented warehouse. This created an annual savings of $130,000.

Conclusion

In the 20th century, most manufacturing processes were batch and queue. Meaning, companies would set up and produce parts – thousands of them whether they were needed at the time or not. The parts not needed at the time would sit in queue until they were. It was based on economies of scale and mass production. To make money, machines had to run and workers had to produce. This 20th century thinking no longer applies in the 21st century manufacturing realm. Making product for the sake of keeping machines and workers busy is a dangerous practice. Unused inventory cost money and jobs. “About half of the downsizing in any economy is caused by companies and customers working off finished inventories that were built up earlier by mass production” (Arthur, 2006).

This case study shows that a company struggling in the new century of global competition can not only compete, but also grow and prosper. France, in order to compete, put aside their mass production mentality and invested in lean principals. The results were in line with many lean conversions. Lead-time was decreased by 54%, finished goods inventory was reduced by 75%, and cost were decreased by nearly 40%. This study shows that lean manufacturing principals are effective, and aid companies by leveling the playing field against competitors using low cost labor in other countries. In today’s ever-changing marketplace, companies must be able to respond to customers needs quickly. This issue was also addressed by France incorporating lean manufacturing.

Today, France is a strong competitive company poised for current and future growth. Where many US companies are downsizing or closing, France is enjoying prosperous times. These facts show for companies to survive in the 21st century, they must use 21st century thinking, lean thinking.

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