Improving the flow of materials and information from a Lean perspective

- A study performed as a part of a project improving efficiency at Faiveley Transport Nordic AB

Christopher Carlström & Peder Emond

Engineering logistics, Lund University,
Faculty of Engineering SE-221 00 Lund, Sweden

This article is based on the master thesis: "Improving the flow of material and information from a Lean perspective" that was conducted at Faiveley Transport Nordic AB in Landskrona, November 2010 to April 2011. The purpose was to develop improvement suggestions that would increase the visibility, availability and cost efficiency at Faiveley.

Introduction

Faiveley Group is an international company present in 22 countries, with their headquarters in France. The Faiveley Group provides "turnkey" solutions for the global railway industry. They are present within several product categories for example brakes and couplers, onboard electronics, platform screen doors and customer service.

The subsidiary Faiveley Transport Nordic AB, Faiveley, is situated in Landskrona and has around 130 employees. Faiveley is responsible for the Nordic and Baltic markets and is also the competence centre for the development of the BFC train brakes. Faiveley is currently in a changing period and various projects are currently in progress, including hiring outside Lean consultants, working to streamline the company. The authors had the possibility to participate in this improvement work with a master thesis on the subject "Improving the flow of materials and information from a Lean perspective". The thesis was delimited to only cover the purchased articles, called k-articles, which needs no further processing.

Problem definition

From this starting point the authors have worked with the research questions:

- How can the material flow and material handling be improved to meet higher demands on visualizations, cost efficiency and availability?
- How can the information flow and work routines in the supply chain be improved to meet higher demands on visualizations, cost efficiency and availability?

Research methodology

The authors' way of conducting logistical research is based on the foundation that logistics handles real-life problems in a complex and constantly changing environment. The research is conducted as a cyclical process with both empirical and theoretical studies, giving it an abductive approach. Case studies are a

strategy with similar characteristics and are intimately connected to system thinking. Data collection methods like interviews, observations, time studies and archive analysis provides researchers with both better in-depth understanding and also a possibility to triangulate the research. This makes the improvement suggestions more reliable and valid to Faiveley.

Theoretical framework

A central part of the research is the Lean philosophy and the importance of implementing the whole concept of Lean and let it permeates the entire company. The authors also try to give more concrete, short term, suggestions on improvements, which include tools from all the different parts of the "House of Lean" (see Figure 1). A special focus have been on Kaizen, continuous improvements, Heijunka, minimize irregularities, Kanban, pull system, and in general reducing the eight types of waste.[1]

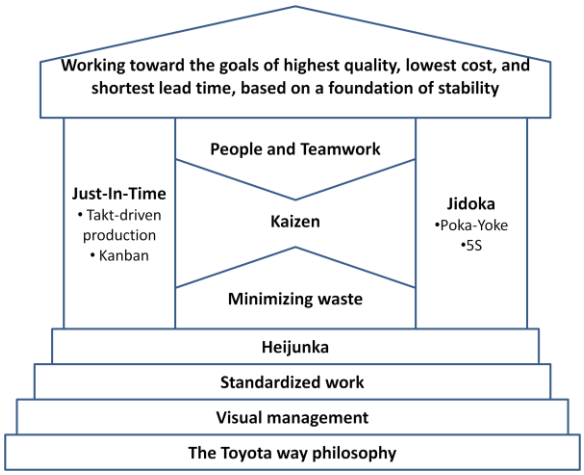

Figure 1: The House of Lean

Time studies are used to determine downtimes and unit times for certain operations and products. A time study is usually used when there are demands on how a worker performs his tasks due to a special method, quality or health and safety reasons. [2]

Sequence-based Activity and Method analysis is a further development of the Method-Time-Measurement system. Sequence-based Activity and Method analysis was developed to help companies to meet increased customer demands and changing demands on work environment. Activities are broken down into basic movements that in turn are summed up and translated into time. For example some of the basic movements are Get [G], Place [P], Note [N], Step [S], Read [R].[3]

Empirical framework

The low visibility of the material flow was due to Faiveleys relatively wide k-article assortment and relatively high quantities in circulation. The connection between articles and their material flow was vague and mostly dependent on pick lists. The pick lists are a time consuming but crucial part of the information flow. There were even occasions when suppliers had to remind Faiveley that some articles already were available in stock but under different article numbers or with small functional differences, which could be used instead of placing a new order. Most k-articles were stored in the automatic storage units which are dependent on counting all articles that is stored and picked, to keep track of the articles. There is no direct insight for the warehouse workers to get an estimation of the amount of articles stored in the automatic storage units. Most routines and areas of responsibility are unofficial and not documented or measured.

The availability of articles varied a lot depending on how much work was needed during each

[1] Liker, J.K. (2009)

[2] Olhager, J (2000)

[3] SRF (1990)

week. The internal and external demand of articles and finished products is very irregular. In combination with capacity constraints and reprioritizations of work makes it hard to keep a high availability of k-articles. Faiveley has problems to estimate and plan the amount of work needed for each week or month, in order to meet the internal demands in the different parts of the company. During interviews and through observations it was noted, that the automatic storage units were one of the biggest bottlenecks.

The authors found that the cost efficiency, connected to the flow of materials and information, had the most improvement potential. Especially by reducing the time connected to the storing and picking of k-articles. There is also improvement areas where increased cost efficiency can be achieved through more efficient space utilization, standardization, classification, and generally working with constantly reducing the waste through Lean improvements. Involving the personnel in the development of the improvements and their implementation is, at Faiveley, a relatively untapped source of knowledge and creativity.

An analysis of the internal picks showed that 20 percent of the k-articles accounted for 80 percent of the work. Improving the material flows for these 20 percent, by storing them in racks instead of the Automatic Storage Units, much waste will be saved.

Improvement suggestions

The suggestions recommended to Faiveley were based on six different areas of improvements. Each area can in itself improve the material and information flow but the authors are convinced that the maximum result can only be achieved by a combination of all areas.

Classification

Classifying k-articles into clearly defined classes, with defined flows of information and materials, will improve the overall material handling of k-articles by reducing waste like confusion, uncertainty and special treatments of certain articles. Classification will also increase visualization and help to produce easy workable data for future classifications up-dates and improvements. The k-articles should be classified as fast movers, slow movers and Kanban articles, based on a combination of measurements, experience and a classification model. This should be an annual routine, in combination with their Kaizen work. The classification of fast moving articles could initially be based on articles with a total of 100 picks per year or more, and not the volume value of the articles. For 2010 this would mean that, 15 percent of the k-articles are classified as fast moving articles, and stands for 72 percent of the total material handling. Slow moving articles are all other articles, with less than 100 picks a year, which should be stored in the automatic storage units. As many of the fast movers as possible should be converted into Kanban articles.

Standardization

Standardization of articles, carriers and racks is an improvement on its own, but also the foundation for future improvements of the materials flow. Standardizing the k-article assortments for present and future BFC models, starting in the engineering department, will present economies of scale on a long term basis. Standardization will reduce the effects of an increase in the k-article assortment, due to an increase in business, while facilitating

efficient space utilization in the warehouse and at the assembly stations. A more standardized k-article assortment will reduce the material handling.

By choosing small plastic containers, with its robust design, as a new standard carrier, will reduce the number of pieces and weight per carrier and also increase the visualization and easy access. The choice of a plastic container facilitates the use of different colors as signals in the materials flow.

The biggest reason for purchasing new modular racks, that still support the First-In-First-Out principle, is the flexibility in height and the overall ability to experiment with, and modify these racks, as a part of their Kaizen work. Modular racks in combination with the plastic containers will be a very visual, flexible and space efficient way of creating an efficient storage solution. Introducing a new, short positioning number for storing articles, in the below mentioned Fast Pick Area and at assembly stations, in the form of "Rack-Shelf-Position" number, has the advantage of decreasing search time and gives all the information about the articles and their flow.

Fast Pick Area

The introduction of a Fast Pick Area for the fast moving articles and to store the slow moving articles in the automatic storage units makes parallel workflows possible. Articles are transported directly from the arrival station to the Fast Pick Area, where the racks are replenished from behind, according to First-In-First-Out principle. Due to the simple concept of the Fast Pick Area, the visibility and availability of k-articles will be increased, reducing the waiting time and therefore satisfying the internal demand more efficiently. The Fast Pick Area solution allows for different flows, for different types of articles, based on their annual turnover and size. The change from storing and picking fast moving articles, in the automatic storage units, to a Fast Pick Area will result in a reduction of about 25 percent of the total annual pick time.

Kanban

Since an article has to be placed in a plastic container, before it arrives at the assembly station, this should be done immediately, when the article arrives at the Fast Pick Area. A warehouse worker, responsible for the Kanban system, makes a daily round to collect empty Kanbans, which serves as signals for refill, at central collection points in the assembly area. The empty containers are refilled and placed in the Fast Pick Area racks from behind and full Kanbans are picked from the front and delivered to the assembly station. This new procedure would reduce the administrative work by, for example, eliminating the need for pick lists. Given that all fast moving articles were introduced into a Kanban flow, there would be a reduction in the total pick time of roughly 79 percent, compared to piece picking in the automatic storage units.

Heijunka

High internal demand, connected to the article flows and the work that is involved in handling the products are usually transferred throughout the whole supply chain. These irregularities create peaks and valleys in internal demand and needs to be leveled. By working towards the goal of reducing reprioritizing of orders, better planning, smaller batches, smaller minimum orders, higher frequency of orders, shorter lead times from suppliers, shorter internal takt time and better distribution of the workforce, a more leveled and stable organization can be obtained. With a stable and leveled internal

demand, the actual internal demand will be easier to evaluate, problems will surface and a better foundation for improvements will be established.

Kaizen

Kaizen draws its strengths from its simple concept of decentralizing responsibility and harness the creativity of the workers. Problems and improvements suggestions should be brought to the surface and dealt with in an organized way. Kaizen is not only used to solving problems, but also to develop and implement improvement suggestions, to prevent problems to occur in the first place. The whole of Faiveley should take active part in the Kaizen work. The work should be done according to a simple model, for example Plan-Do-Check-Act, and be clearly documented.

Lean promotes standardized work but it needs to be applicable for Faiveley. Work routines and areas of responsibility needs to be established to create a sense of commitment, locate problems and handle them quickly. The workforce still needs to work as a team and should rotate between the different areas of responsibility, to reduce the risk of isolating knowledge. Establishing work routines like a "Fast-Pick-Area-General" will ensure more standardized work with fewer irregularities. The Fast-Pick-Area-General is not a specific person but an area of responsibility. Whoever is working as the Fast-Pick-Area-General has a broad area of responsibility and is constantly evaluating and improving the Fast Pick Area in collaboration with the rest of the warehouse team.

Conclusion

The research questions in this thesis have been answered by developing several suggestions that improves the flow of materials and information at Faiveley. The reduction in capacity constraint, picking time and improved routines and measurements, with help of the different Lean philosophies, will make it possible to handle peaks in demand as well as a future increase in the k-article assortment, without hiring additional workforce. The Fast Pick Area is an example of an improvement, where several of the Lean philosophy models can be implemented to increase visibility, cost efficiency and availability of the flow of materials and information.

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