Making HES more Lean - Identification and reduction of waste

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1. Introduction

For four years there has been an assembly line within the Heat Exchanger Systems at Alfa Laval in Ronneby. Six different models of Heat Exchanger System for single family houses are assembled on the line. A Heat Exchanger System is the link between a building and the district heating and it contains among other things a heat exchanger, a temperature controller and a control unit. Both production of standard products to stock and production to customer orders are assembled. In addition to this several other heat exchanger systems, which is different in working tasks and materials, are assembled at separate workplaces within HES. The line was created with the purpose to reach an efficient high volume production with a well defined takt. Workstations and the different roles on the assembly lines was carefully balanced and dimensioned to achieve high effectiveness. During the years the product portfolio and thereby also the working tasks has changed, but there has not been made any new studies for these products to balance the line and its material supply. Therefore the productivity has decreased. The production line and its warehouse have also been moved in the beginning of the year 2010 and at that time the layout of the line was changed but it still needs to be improved in order to be effective.

The purpose with the project is to develop the structure and set-up for HES in Ronneby, by mapping the internal value stream, in order to improve the production. This will be done by studying and applying lean philosophies in order to develop and balance HES production flow, from customer order to finished goods. By mapping the internal flow and compare it with theory the authors will identify the gap between HES current production and a lean production. Then some of the most valuable improvement opportunities will be chosen and analyzed to see which improvements can be made by Alfa Laval. Some of these improvements will be implemented and evaluated during the project and others will be left in form of suggestions, and together it will lead to recommendations to the company.

2. Research questions

HES are today struggling to keep up a high output from the assembly line and at the same time stay flexible to meet the customer demands. There are efficiency problems that need to be investigated so that Alfa Laval could be better prepared for future higher volumes. Understanding these problems is a
key to change due to its effect on flexibility, work in process, stock balance and lead time for the customer. Answering the following questions will structure the work towards a more balanced and efficient flow at HES.

- Where are the largest gap between the current flow and the desired flow according to lean philosophy?
- What can be done to eliminate or at least decrease these gaps?
- What effect will these changes have for HES and their customers?

3. Methodology

Quantitative data as well as qualitative data was gathered from interviews, observations and internal documentations. In parallel to the empiric study, literature on lean philosophies, material supply and assembly systems was studied. After the data was gathered a gap analysis was performed to see where HES could be improved and an identification of where an implementation of a new work pattern would be of most value for Alfa Laval and their customers was made. The implementation was performed according to PDCA (Plan-Do-Check-Act), and was continuously evaluated and revised. The implementation was performed together with the employees who had a key role with their experienced input.

4. Delimitations

The project was performed at Alfa Laval in Ronneby and it only includes the internal flow from customer order to order dispatch at HES in Ronneby, with focus on improving the situation for the assembly.

5. Data gathering

Literature on Toyota was studied to understand lean and to create a best practice that could be compared with HES’s current situation. At Alfa Laval data was gathered from several interviews with personnel from different levels in different departments. The experienced personnel had an important role for us to understand the existing problems and they also came with a lot of suggestions on how they would like to work instead. In parallel with the interviews the authors observed how the daily work to create an own opinion and to see the situation from an outsiders perspective. Some time studies were performed to see the impact on downtime and feedback from the personnel was gathered in form of an anonymous survey.

6. Results

When comparing the current state at HES with lean philosophies the largest gaps where identified as lack of flexibility and visualization in the production, an unstable material supply process and warehousing- and purchasing policies that needs to be reviewed. All these gaps, except the latter one, were reduced within this project and the results are by the authors considered valuable for Alfa Laval.

The internal downtime at a changeover has been reduced from varying 15-60 minutes down to four minutes by changing the material supply process for the assembly line. The new standardized way to supply
material is visual and all the material are secured, prepared and everyone know where to find it. As the production and material supply becomes more visual and transparent it is easier for everyone to see how the production is managing compared to the production plan. It is also easier to detect problems, like deficient product structures or if wrong components are picked. The amount of unnecessary searching and movements has also decreased as moveable things are given dedicated places and due to line material now are kitted in the right amount, which removes the need of continuously checking and refilling material. It is also more visual which tools and frequently used materials that do not have a dedicated spot.

The changes have made the production more flexible and aligned with the sales company strive to satisfy the customers’ demand for a wider product range. Now when the time for a changeover is reduced to four minutes it not necessary to produce in long batches any more. Instead HES should plan the production more according to the customers, as this will reduce the tied up capital and result in shorter lead times.

7. Discussion

There are more problem areas needed to be solved than was included in this project. The next step, according to the authors, should be to review the warehouses as well as the purchasing policies. Standardized rules needs to be applied, such as where to put different material, when and how much to buy at a time and when to perform stocktaking. The warehouses also needs to be sorted, like frequently used material in a good picking height etc., for avoiding waste while gathering material. When the warehouse and purchasing policies are reviewed it is probably possible to reduce the inventory levels gradually and start using Just-In-Time to some extent. This has not been analyzed by the authors.

Introducing takt in the production would visualize which parts of the value chain that has problems keeping the pace and visualize where new improvements are necessary. Meanwhile takt is introduced the daily production target might be beneficial to break down more than today and visualize it for everyone. By doing this the production gets more predictable and the employees knows better at which takt they are supposed to assembly and where they are according to the production plan.

In the future it might be suitable to review the layout of HES. As earlier said/written in the report the production flow does not follow a natural route according to how the products are processed, and this generates a lot of waste over and over again.

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