

# VALUE STREAM ANALYSIS

- A study at Tetra Pak Dairy & Beverage Systems AB

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Mars 2011

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*This article is based on a report of a master thesis conducted at Tetra Pak Dairy & Beverage Systems AB. The main purpose of the study was to create greater understanding of the material flow, as well as present possible deficiencies and propose corrective measures to improve efficiency and effectiveness in order to reduce costs. This article starts out by an introduction of the company at hand, later on, after presenting the main problems; it reveals findings and presents the recommendations stated in the report.*

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## INTRODUCTION

Tetra Pak is a world leader and a recognized brand in processing and packaging solutions for food. The corporate group has 21 000 employees in 170 countries, of which 4000 are based in Sweden. Tetra Pak Dairy & Beverage Systems AB (henceforth referred to as TP D&B) is a company within the Tetra Pak corporation, located in Lund, Sweden. TP D&B manufactures processing equipment designed for the dairy and beverage industry and in these processing units, there are large amounts of stainless steel piping.

Due to the great number of options that are available to the customer, the piping of each unit is designed according to customer order. The actual amount of piping required for each unit is consequently under influence of substantial variation. TP D&B itself refine the pipes to fit costumer specifications, however, one operation is outsourced to a company located nearby; this company is called EMV Stainless AB

and accounts for the cutting operation, which is the only operation that is not done in-house.

## PROBLEM DESCRIPTION

In the past 5 years, a lot of work has been done regarding production efficiency. Mainly, the layout of the production has been redesigned from a unit production to a line-oriented assembly. As a result of these extensive changes, the production has developed with significant reductions in lead time, from 6 weeks to 5 days for a processing unit. The associated material handling and material flow have gradually been adapted to the new conditions, however, not optimized, but only changed to accommodate the primary needs.

To work out above mentioned problem, following questions have been stated:

- Can the material flow at TP D&B be changed to reduce the costs pertaining to material handling?

- What investments are needed to reduce these costs?
- What savings can TP D&B realize by optimizing the material flow?

## METHODOLOGY

The study is based on a systems approach and has utilized interviews as well as quantitative data to support generated findings. Value Stream Mapping has been the predominant mean, for which theory was obtained from literature studies. In addition to this, other literature have constituted the base, such as Lean Manufacturing, Agile Manufacturing and Process Orientation.

## ANALYSIS

By studying past production history, the authors defined the customer orders that could be considered representative, and was thereby able to focus the study. For the chosen selection, a detailed mapping of the value stream was made and the storage of unrefined steel piping was determined to be the area where improvements would be most beneficial. Since the production at TP D&B depends on a certain amount in stock, the raw material stock is extensive and is the place where pipes spend most part of their lead time. The main reasons for the large stocks were concluded as follows:

- Storage in two places, TP D&B and EMV
- Variations in supplier's delivery lead times
- Variations in estimated demand
- Uncertainty in actual pipe consumption
- Large amount of wasted material at EMV

In order to decrease the inventories of steel piping, these reasons had to be addressed.

By moving the storage of unrefined steel piping from TP D&B to EMV, the amount of handovers can be reduced. This also enables reduction of the total amount of safety stock.

The safety stock is dimensioned according to a chosen service level which can be defined in two ways. Either as the probability of shortage in stock during an order cycle, or as the share of demand that can be delivered straight from stock. The first one considering only the event of shortage and the second how large the shortage actually is.

Assuming that the raw material inventory is only held at EMV, a redimensioning of the safety stock can in average reduce the stock by 50 percent. When considering the maximum inventory level, a reduction by over 60 percent can be achieved.

Due to the large amount of waste in the cutting operation at EMV, the authors developed a computer program that would address this issue. The computer program simulates cutting operations and, not only calculates the amount of waste, but also reveals the optimal cutting order so that the amount of waste is minimized. 3 simulations were run and for each simulation 5 orders were batched. In the simulations, only 3 dimensions were included, 25, 38 and 56 millimeters. Also, the two cutting machines themselves were found to cause a large amount of waste. They require a grip that cannot be used and therefore only a part of the pipe can be utilized.

## RESULTS AND RECOMMENDATIONS

After analyzing collected and documented material, the authors have come to the conclusion that there are changes to be

made that can increase the profitability of TP D&B. These changes, together with associated benefits, are presented below as recommendations.

The authors suggest moving the stock of raw material pipes to EMV in order to reduce the number of handovers and render the extensive material handling more efficient. In addition, the cutting procedure at EMV could be optimized by implementing the computer program developed by the authors. This not only reduces the amount of waste, but also depicts the actual consumption of goods. To further reduce the amount of waste, TP D&B is strongly recommended to invest in a cutting machine that utilizes the pipe length in a more efficient manner. Together with substantial routine changes to the connection between the business system and the physical stock, discrepancies can be controlled.

These measures will enable a smaller amount of pipes in safety stock, which reduces the overall tie-up of capital by 50 percent. By investing in a new machine, it is possible to achieve an estimated reduction of waste of 80 to 90 percent. The pay-back time is estimated to be less than a year; the authors estimate that the total amount of savings each year will exceed 50 000 euro.

To summarize, the recommendations given to TP D&B by the authors are:

- Move the stock of raw material pipes to EMV.
- Implement the computer program
- Invest in a new cutting machine
- Make changes in routines pertaining to the connection between the business system and the physical stock.