Traceability in a Sanitary Ware Production System  

A Case Study at Ifö Sanitär

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ABSTRACT

This thesis deals with the implementation of a traceability system in a sanitary ware production system. It was carried out in cooperation with the Swedish sanitary ware producer Ifö Sanitär. The production system is highly automated, which the traceability system needed to be fitted to. The investment also needed to be cost-beneficial for the factory. A frame of reference was compiled through literature studies and the current description of the production system was made through observations and interviews. A solution was presented including a marking direct part marking on the product, and a concept for a traceability system for the whole factory.

1. INTRODUCTION

Sanitary ware has been produced in Bromölla since the mid 30’s, and since the mid 70’s under the brand Ifö Sanitär. Approximately a decade ago considerable changes were made to the factory’s production system in order to become competitive and to make sure that the production could be maintained in Bromölla. A state-of-the-art pressure casting technology was implemented, and now, a decade later, the factory in Bromölla has become the most efficient one in the Sanitec group.

During the last few years there has been an increased discrepancy in the internal warehouse stock account at Ifö in Bromölla, which has triggered the need for better traceability through the production. All of the production reporting is performed manually, which in some cases results in faulty inputs due to high work intensity. Therefore, Ifö desires to automate the production reporting to decrease the amount of faulty inputs.

The Ifö quality system also requires a traceability of the products, which today is deficient because there is no easy way of determining when a product has been made. This becomes more complicated with the water closets, since they are made from multiple components that can have been produced at completely different points in time. The traceability needed for dealing with customer claims is lacking, consequently the management at the factory in Bromölla believes that a lot could be gained by improving the traceability at the factory. There are no legal requirements for traceability in the industry Ifö operates in, and the need of extensive traceability is purely driven by the factory’s desire to improve their operations.

2. PURPOSE

The purpose of this thesis was to investigate how to implement a product traceability system in Ifö’s factory in Bromölla, and how to integrate automated production reporting with their current ERP-system or with a standalone system. A specification of requirements was established both for the marking method and the traceability system as a whole. This was carried out in order to find the most suitable marking method and to fit the traceability system in a satisfying matter in the production system. It was also required to establish whether it is cost-beneficial to implement a traceability system in a production system, in an industry that does not have certain regulations or requirements from their customers regarding extensive traceability.

Figure 1 - The three concepts of traceability, adapted from (Kvarnström, 2010)

3. DELIMITATIONS

The focus of the project was on the factory in Bromölla, and thus it would only cover the material flows of products produced there, from raw material to end-customer. The low quantity production line was not included in the project, and no changes were to be made to the material flows unless sanctioned by the management of the factory.

4. TRACEABILITY

Traceability is the ability to document and trace a product forward and backward and its history through the whole or part of a production chain, from harvest through transport, storage, processing, distribution, and sales (Jansen-Vullers,
et al., 2003). The demand for traceability have increased significantly during the last decades, most known is the demand for traceability on agricultural products after the outbreak of mad-cow decease in the 90's. Traceability is also a vital support in conjunction with Lean production, in order to identify root causes of defects.

5. METHOD
The research method that is used in this thesis is a combination of action research and experimental methods. A literature review, observations and interviews were performed in order to identify existing traceability theories and applications as well as to fully understand the production characteristics of sanitary ware manufacturing. Data was gathered from observations and interviews with personnel from different functions in order to explore the different processes and to understand the implication they have on the ability to trace products. Further, time studies were carried out to realize the non-value adding time that was spent on manual production reporting. In addition, experiments were performed in order to evaluate the most suitable traceability application for the use in an automated sanitary ware production system.

6. CURRENT TRACEABILITY
The products manufactured in Bromölla can be backtracked through the production process from the inspection, inspections are carried out on all products before they are assembled and packed. It is however, a time-consuming activity and when a product has left the inspection the ability to backtrack it decreases considerably. The ability to determine the age of a single product is poor, which complicates the claims handling significantly.

7. RESULTS
This study identified that there are a need for traceability at Ifö. The need for traceability arises when it becomes cumbersome or impossible to trace changes made to process parameters and relate them to the outcome of quality of the products.

During the study several traceability methods were evaluated in order to acquire the most suitable for the production system in Bromölla. The use of industry-specific ceramic labels was excluded, due to limitations in the ability to automate the application process, these labels would also incur a current expense on the procurement of new labels. This current expense would significantly affect the cost benefits of traceability, every year. Laser engraving was also evaluated and omitted, since major changes would need to be conducted to the production cells, in order to handle the fumes and vapor that is released during the marking. Another vital aspect was the initial investment in the laser equipment, which was extensive in comparison to the other techniques. The ink jet technology was evaluated and displayed promising results, it was excluded though, due to it being very sensitive to rubbing and scratching during the time of marking. The ink jet technique that was evaluated would also prompt a continuous flow of ink, which would not be feasible in the production system.

This study resulted in a proposal for an automated traceability system, integrated into the existing production system. The use of electro-mechanical dot peening to create Data Matrix bar codes in green ware, and the subsequent reading of them by image-based readers, will allow for complete traceability throughout the production system. These permanent bar codes will also allow for the traceability of warranty claims which will enable the quality control personnel to trace process parameters in order to improve the processes. The cost-benefit analysis concluded that much time can be saved with the use of an automated traceability system since the need for manual production reporting is minimized. This meant that the traceability system would pay itself back within 1.37 years.

8. CONCLUSIONS AND RECOMMENDATIONS
The reformation of the factory production system a decade ago awarded Ifö a prominent position in the sanitary ware industry. But, in order to maintain their position and excel further, knowledge-wise, the ability to trace defects will need to increase.

The conclusion is that even in demanding production processes, and where there are no legal requirements for traceability, an investment in such a system can provide for numerous benefits that far exceeds the investment cost of an automated traceability system.

In addition, a company embracing the LEAN philosophy will have a lot to gain from a traceability system. Since the use of complete traceability in a production process will enable personnel to trace root causes, the ability to improve processes and quality becomes much better. Furthermore, the ability to track products supports the optimization of
WIP stocks throughout the production process which will yield savings by reducing the tied-up-capital.

9. DISCUSSION

There are more areas that can be addressed in order to fully reap the benefits of a traceability system. The authors have only investigated the traceability in the production facilities, other areas that should benefit from increased traceability are the finished goods warehouse and the supply of raw material. This will give a complete traceability of the products produced in Bromölla.

Further, many work roles within the factory will be significantly affected by a traceability system. As it is today many unnecessary, and non-value adding activities needs to be carried out in order to manually file traceability information, as well as to manually file production reports. Removing these types of actions from the work roles will focus these roles to add value to the products, and to carry out the activities that the role is entitled to.

10. REFERENCES
