

Embedded project management: Getting dirty to dig for gold

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Abstract

This presentation describes a project for the implementation of Lean manufacturing. The specific case under examination was a meat processing plant. The need was to increase plant utilisation and reduce work-in-process (WIP). Implementing lean is always a challenging project, because of the need to customise the implementation. There is also the issue of organisational culture and change management resistance. A unique aspect of this project was the embedment of the project engineer in the plant. This developed trust and facilitated subsequent implementation. Changes were then introduced to the plant following the 5S methodology, followed by Value Stream Mapping. The project resulted in a 7% cost saving on labour. Further benefits from the project were that disruption to the daily production activities were kept to a minimum, a reduction of consumables, and elimination of unnecessary burdening of employees. The presentation describes the project approach taken and the results.

1 Introduction

Compared to conventional engineering products, fast-moving consumer goods (FMCG) have some special challenges for production engineers. FMCG plants manufacture goods for direct consumer end-use. Typical FMCG products are meat and fish products, dairy products, bakery products, soap and detergents, and toiletries. Products are sold in large volumes, are being sold quickly, and are sold with a relatively low profit margin. Another characteristic of an FMCG product is that its life cycle can be relatively short – a few months – if the product proves to be unpopular with consumers. Typically, the FMCG market is exposed to seasonality and changing consumer preferences. The FMCG plant will therefore have to be able to cope with fluctuating demand and an ever changing product mix. The plant needs to be flexible enough to be able to cope with fluctuating demand, and, in addition, it needs to be robust enough to assure maximised efficiency for a changing product mix.

Successful implementation of a Lean methodology implies, if not relies on, buy-in from those engaged in production. Even more so, Lean manufacturing relies on employees taking ownership of the production process and initiating improvement projects. In order to make sound judgement as to where to direct improvement efforts in a FMCG plant, employees need to take into consideration short term product volume and product mix, but also long term product volume and product mix. Long term forecasting data for product volume and product mix might be available, and could give an indication as to where to direct improvement efforts, but often such data are not available, or, when available, are not communicated to employees involved with production. In practice, if reliable forecasting data is available, a top-down approach is taken by management with regards to process improvement initiatives, while on the other hand, if reliable forecasting data is lacking, management relies on a bottom-up approach, expecting people on the work floor to initiate improvements efforts. Understandably, the bottom-up approach may lead to employees trying to maintain the status qua, followed by ad-hoc changes to the production processes.

2 Methodology

The purpose of this project was to provide an integrated solution to the problem of optimising plant production flow. That is, to improve process flows, improve equipment utilisation, reduce WIP inventory, and reduce unnecessary movement of stock.

The approach was to apply a systems engineering method to the problem. The specific systems engineering tools used for this project were:

- 5S
- Value stream mapping (VSM)
- Line balancing

This project was contextualised in a research collaboration with an FMCG manufacturer whose main line of business is processing meat. The area under investigation was the value added (VA) area of the plant. The VA area is comprised of multiple process lines where additional work is done on meat to produce more than 80 different products.

The project was approached in the following way (Figure 1). The first stage was the embedment of the researcher in the area under investigation. The second stage was the analysis of the individual processes that, combined, make up the VA plant. The tools used in stage 2 were 5S, VSM, and line balancing. Stage three was the introduction and application of the proposed interventions as deduced from the analysis in stage two. Stage four was the documentation of the efficacy of implemented changes.

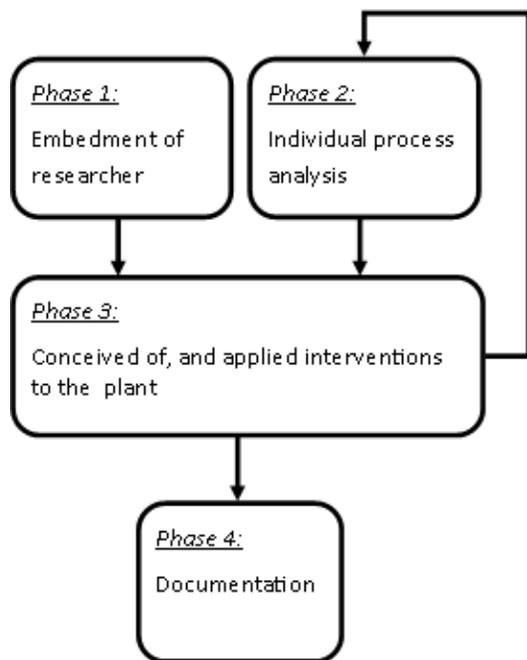


Figure 1. Approach flowchart

2.1 Embedment of the researcher

Stage one was a stage of familiarisation for both the researcher and employees working in the VA area. The researcher worked 180 hours over a period of 2 months alongside employees to engage with individual team members and to become familiar with work processes, procedures, and equipment and

tools. The researcher partook fully in the production process. The rationale behind emerging the researcher fully in all the different attributes of VA-plant production, was firstly, to let him experience first-hand the work processes and procedures used in the plant: it might be difficult for employees to express and communicate verbally the requirements for running the machines and using the tools effectively. Having insight into the extent of tacit knowledge being used to run the plant might be of an invaluable importance to the researcher. Secondly, the embedment of the researcher was envisioned to gain trust in order to secure buy-in from employees. Trust can be defined as one party holding the belief in another party's honesty, fairness and benevolence. Before any change could be implemented employees had to feel assured that the researcher's main concern was to address the shortcomings of the system, as opposed to exposing the shortcomings in individual team members. For this project, having the researcher working alongside the VA team, and having him recognise, experience, and then cope with the shortcomings of the system himself, was a deliberate action meant to instill in people a trust in the researcher's motivation to help them to overcome the shortcomings of the system.

2.2 Individual process analysis

The second stage of the project was the analysis of the individual processes within the VA plant. The main premise was to build on the trust gained in stage 1, and expand this trust by introducing and implementing adjustments and reversible changes. By not implementing major changes immediately, but starting off with reversible changes, employees were left to feel 'in control' while letting go of familiar ways of doing things. Over time the interventions became more intrusive with a greater impact on the overall plant layout. The adjustments and changes were instigated by the implementation of the 5S and VSM methodologies.

5S is a Lean tool for improving the housekeeping of an operation. The principle: Clean it up, make it visual. Developed in Japan, where the five S's represent five Japanese words all beginning with an S, that is, Sort, Straighten, Shine, Standardise, and Sustain. In the context of 5S these mean:

- Sort: Eliminate parts and tools not required in the process
- Straighten: Eliminate all tasks that do not add value to the product
- Shine: Keep it clean and organised
- Standardise: Ensure uniform procedures and set-ups throughout the process
- Sustain: Ensure disciplined adherence to rules and procedures

VSMs are commonly used to reduce the lead time. The VSMs in this particular project were also used as a starting point for discussion with VA team leaders as well as a means to communicate to the VA team the envisioned changes. The visual nature of the VSMs proved an invaluable tool. The following steps were implemented to construct the VSMs:

1. Identifying a target process
2. Constructing a current state VSM by identifying the steps making up the target process and collecting data on these steps.
3. Constructing a future state VSM by eliminating, where possible, from the current state VSM the steps that constitute waste.

2.3 Conceived of, and applied interventions to the plant

Stage three was the introduction and application of the required interventions as deduced from the analysis of stage two. While stages one, two, and three are presented in this paper as occurring in sequence, in practise they were concurrent and progressive.

2.4 Documentation

The fourth and final stage of the project was measuring and documenting the efficacy of the implemented changes.

3 Results

The approach taken to gain the trust of employees and engage them actively in the change process resulted in a staged introduction of interventions that were gradually increasing in intrusiveness. The original plant layout (Figure 2) was cluttered and unorganized; employees were competing for floor space, while equipment was sitting on the plant floor unutilized. Product had to be transported across the floor to be further processed: requiring consumables, and increasing WIP.

After completion of the project, utilisation of equipment has increased. The decision to move table A1/A9/B1 to its current position (Figure 3) resulted in a more organised approach and equipment becoming obsolete. For example, the processes executed on table B1 and table A1/A9/B1 (Figure 2) are now being executed on table A1/A9/B1 only (Figure 3). Other equipment, for example process line A4, is used more effectively by exploiting its mobility. The introduction of a conveyor prior to process C2 (Figure 3) saw the complete elimination of required transport in the plant for this particular process. Directly resulting in less WIP and the requirement for consumables. Balancing of process line A8 resulted in becoming obsolete of yet another piece of equipment, further increasing the available floor space.

In summary, the interventions introduced during the project resulted in:

- 7% savings on labour cost
- Reduced WIP
- Reduction of consumables
- Increased equipment utilisation

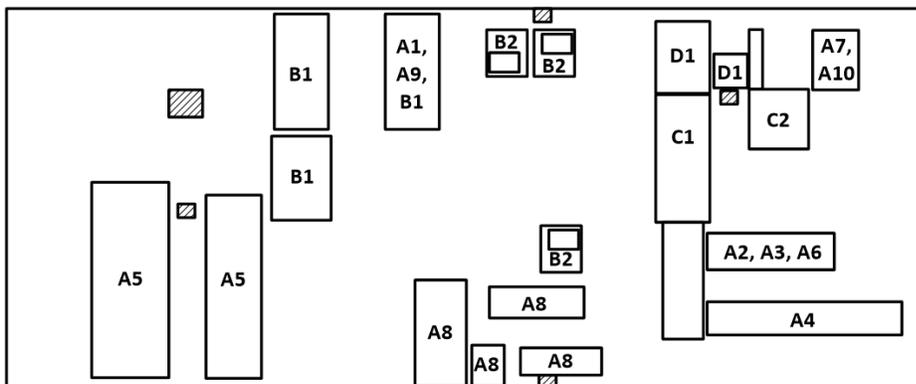


Figure 2. Original layout of the plant.

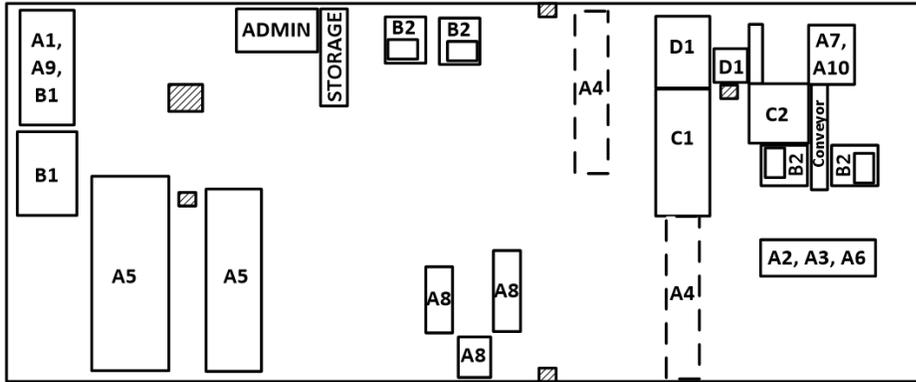


Figure 3. Layout after completion of stage 2.

4 Discussion

This project is an affirmation that bottom up implementation of lean manufacturing principles can deliver prolonged positive results, save a relation of trust exists between the practitioner and employees.

Specifically we have shown that a practitioner working along side operators on shop floor level allows for process improvement efforts being introduced to a team that thus far had been vehemently opposed to change. A strategy of staged introduction of interventions was applied. In the first stage the practitioner was working alongside plant operators; introducing changes in line with the 5S methodology. The changes mainly concerned “housekeeping”. The second stage, building on the trust gained during stage one, saw the introduction of changes instigated by individual process analysis using VSMS and line balancing. Throughout the first 2 stages of the project, trial runs were held for each proposed change. After each trial-run an informal meeting was held in which VA team members were encouraged to give feedback and come to a conclusion whether to proceed with the change.

Having come to a decision as a group meant in practice that those in the group who were sceptical at first were drawn over the line by their peers rather than being made to comply by management, with something they did not, either comprehend, or appreciate. Not only were the team members acceptive and appreciative of the changes the practitioner proposed, they actively collaborated in resolving issues that were hampering more efficient production.

5 Conclusion

The findings demonstrate that lean manufacturing methodologies can be implemented successfully in an FMCG plant. Full collaboration and acceptance of proposed interventions can be obtained if a relationship of trust exist between employees and practitioner. The results suggest - in order to obtain required trust - deployment of a staged introduction of interventions gradually increasing in invasiveness.

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