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LEAN AND GREEN PRINTING … MARKETING OR MANAGEMENT TOOLS?

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Abstract:

On commission of a packaging printing company, the author has launched a research work in order to find a methodology by which the necessary steps can be explored to turn the application of this modern technology into a business success. The lean manufacturing studies have primarily focused on the human–machine environment, analyzing all the activities that are connected with the operation and servicing of the machines. Step by step, the research has tried to expose those hindering factors, superfluous or less efficient organizational and management process elements that now increase costs. Today, profitable printing production is not feasible by means of price increases; the only expedient way to follow is to cut costs. In this respect, lean management can be supportive.

Keywords:

lean printing, lean and green strategy, improving value chain performance, sustainability

1. OBJECTIVES OF THE RESEARCH

Even the procurement of brand new equipment or the provision of base materials of the highest standards is not a guarantee for the printing business to produce printed products of consistently outstanding quality at a profit. The struggle against electronic communication, the global economic crisis and the sharp competition with the existence of excess capacities put a pressure on printers. One should ensure quicker lead times for the products, offer regulated and cheap prices, and besides steadily excellent quality is to be maintained.

Printers tend to see the source of the growth of production and profit in new investments, which is mostly not true. It is not enough to buy modern printing machines, but they are to be operated with high efficiency in order to see the return of the investment. In the conventional approach, if the printing machine features high printing speed, then it will necessarily boast of significant efficiency and utilization rate. In fact, however, additional parameters should also be considered when the utilization rate and efficiency of a printing machine is examined. Such parameters include the setup time, the time loss, the generation of rejects, the competence level and certainly the speed of the machine.

It is a legitimate question how a favourable situation can be achieved, how we can generate more profit from the given production process?

Recently, a company manufacturing packaging materials (cardboard boxes) has purchased and commissioned new sheet-fed presses with state-of-the-art accessories. However, the expected profit has not been pocketed.

On commission of this company, we have launched our research work in order to find a methodology by which the necessary steps can be explored to turn the application of this modern technology into a business success.

Our studies have primarily focused on the human–machine environment, analyzing all the activities that are connected with the operation and servicing of the machines. Step by step, we have tried to expose those hindering factors, superfluous or less efficient organizational and management process elements that now increase costs.

2. RESEARCH METHODS

The exploration of the human–machine environment principally calls for the methods of organizational studies.

Google the words "Lean Printing" and you will find a wide range of advice on new manufacturing techniques and methodologies, which will allow your business to operate more productively, more effectively, and more profitably. However, you may be disappointed with how much of what you find is new, or original – the reason being that the underlying premise of Lean is based on the principles of sound business sense, and these principles have been around a very long time. The following research explores what "Lean" is and how applicable. "

Lean management is a systemic methodology that identifies, eliminates all forms of losses, as well as all such activities that do not represent any added value for the customer, client. Its aim is to provide the product with ongoing drift and continuous added value. It perfects the process with which the business is able to satisfy the client's demands; it improves production efficiency, and thus opens the way to the generation of further profit. In the past few years, the *lean* work methodology has been applied by several companies involved in graphic communication. As these companies have had hardships and witnessed varied successes in adopting the system, just little published experience is available.

At our printer client manufacturing packaging materials, we got down to implement the *lean* work methodology back in 2010. First, we structured the necessary knowledge base. We elaborated a system for the company as based on the *lean* work methodology, and called it the *SBS (step by step) way*. This method basically follows the *lean* thinking, but in a substantially simpler design. We considered the simplification of the system to be justified, because the company had not relied on such organizational methods before that would have at least been slightly similar to the *lean* system. We deemed the leap from the actual situation of the company to the desired position to be too large, and therefore we wanted to walk this considerable distance in smaller steps in order to avoid failure.

The *SBS way* program aims at the optimization of the printing process. The goal of the project is to improve the utilization rate of the printing machines, minimize time losses (faults, setup times), enhance performance (printing speed) and reduce reject sheets generated in production.

First, the reduction of the setup time and the number of the reject sheets generated in production was targeted. These were the fields where the necessity to transform the human–machine environment seemed to be the most obvious. In the framework of the investment, the company purchased such state-of-the-art technology whose application allowed the fastest possible setup times. Still, the system failed to operate with sufficient efficiency.

To cut setup times, the SMED (Single Minute Exchange of Die) method has been applied.

When the setup process is optimized, in fact the following actions are taken:

- reduction of the number of steps/components to be completed,
- reduction of the number of setups,
- improvement of the accuracy of setups,
- reduction of the generation of rejects.

To clarify the setup time and unveil the processes, causes of the excess time demand, the Fishbone/Ishikawa Diagram was used (Figure 1).

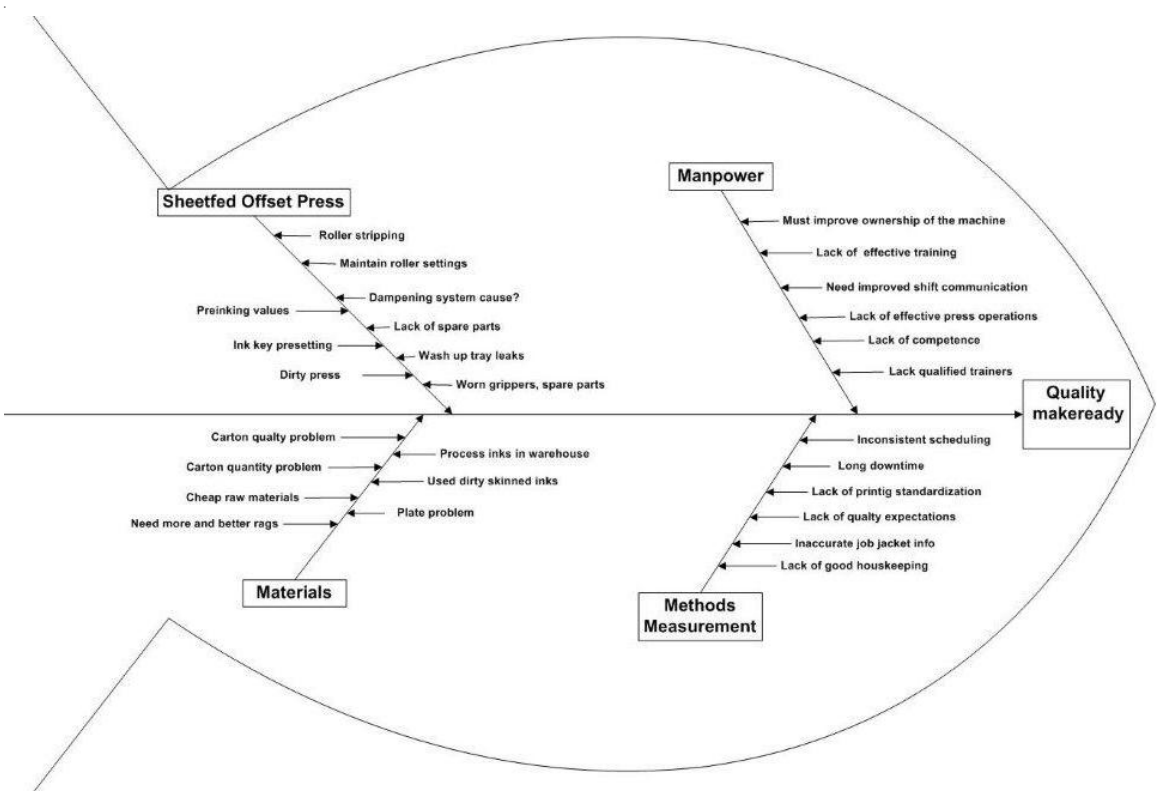

Figure 1: Makeready Fishbone diagram

The SMED makes a distinction between so-called external and internal operations that jointly form the setup process. Internal operations can be executed when the press is in standstill, for instance during the replacement of the die plate. External operations can be completed in the course of the printing of the actual copies, when the printing machine generates marketable products, for example during the preparations for the replacement of the die plate.
The optimization of the setup time consists of three main phases.

Phase 1: Separation of internal and external operations.
Phase 2: Conversion of internal operations into external operations.
Phase 3: Harmonization of all the elements of the setup operations.

To *separate internal and external operations*, the process of changeover was subjected to value stream analysis by way of making and evaluating a video recording. After the making of the recording, the video shots were replayed in the presence of the work team, each of the operations performed was identified, and they were also determined quantitatively (in terms of time). In addition to the video recording, a motion diagram was also compiled (Figure 2) in order to visualize and easily recognize losses.

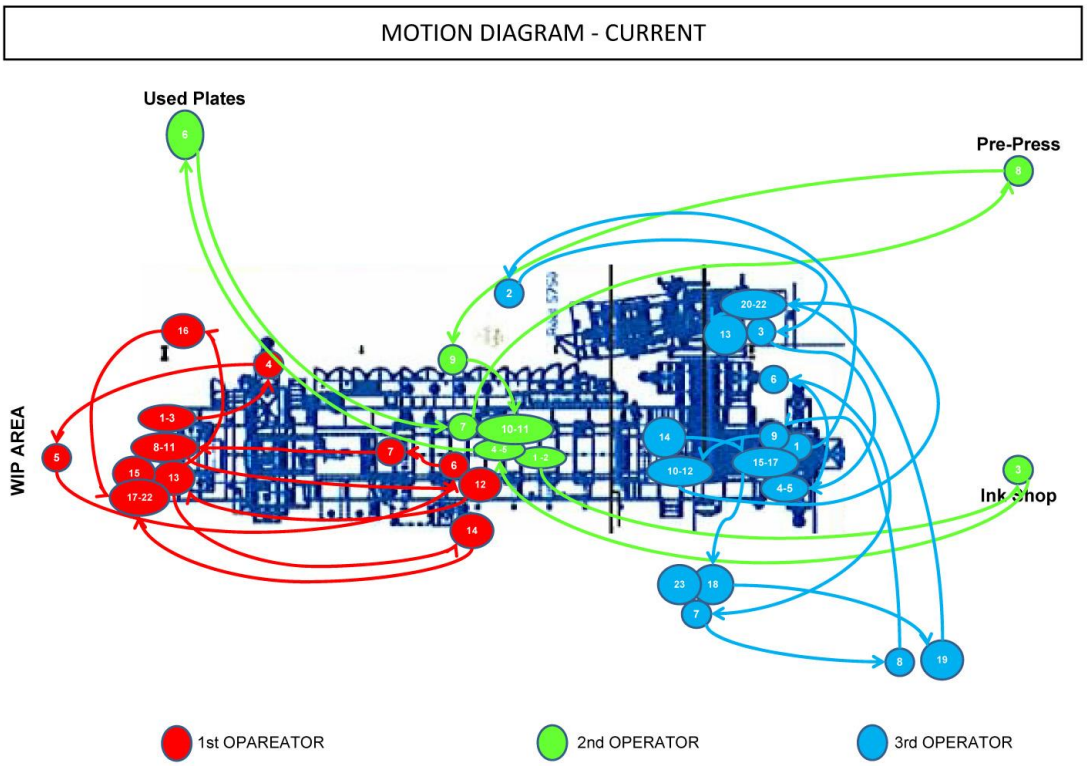

Figure 2: Spaghetti map - current

During the conversion of internal operations into external operations, the following questions need to be answered in the light of the steps that have already been identified.

What is the purpose of the operation?
Why should the machine be in standstill to perform the actions?
Is the operation convertible from internal setup to external setup?

We tried to form the largest possible number of operations in the external setup, as irrespective of the weight of the operation, thereby minimizing the time loss.

The steps included here are:

- documentation steps (completion of the work dossier),
- preparation of the die plate, bending, checking, preparations for the replacement of the plate,
- uploading, checking CIP3 data,
- interpretation of the work dossier,
- preparation of the lacquer form,
- preparation, unwrapping of the print carrier,
- preparation of detergents, materials,
- preparation of printing colours, etc.

Once we had a clear view as to which operations should be performed when and where, we started to *harmonize the operations* and simplify more complex steps. Conventional tasks, such as the development of the die plate and the machine washing process, did not result in considerable

challenges, because the printing presses included in the target group feature a significant level of automation. On the other hand, the synchronization of the work steps of printing engineers proved to be a more difficult task. It brought about changes, and initially they were hardly accepted. Nevertheless, they recognized that if they were working as a team, more steps could be performed concurrently, in parallel. As they also watched the video recording, i.e. how they had been working, it was easier to convince them. The losses were shown before their own eyes. During the SMED project, merely joint team work contributed to the success, because the workers themselves planned work processes, and optimized their operations. Such difficulties were experienced as the differing competence levels. Certain printing engineers were capable of performing only certain steps, thereby deteriorating flexibility, but within the framework of the lean training program the differing competence levels could also be resolved. We tested the newly framed work processes in practice, with success. The same steps were taken by the printing engineers, but in a different order, and thus materially cut the time demand of setup (Figure 3).

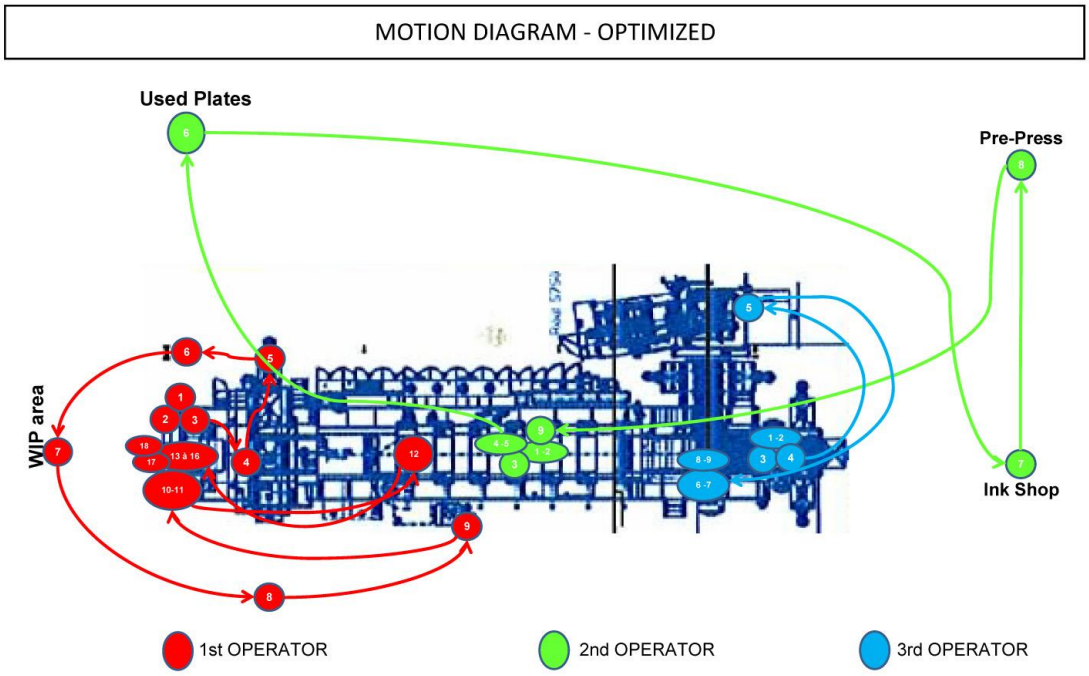

Figure 3: Spaghetti map - optimized

3. SUMMARY OF RESULTS

In 2011, the optimization of the printing process proved to be the key achievement in the life of the plant. Our aim has been accomplished, as the setup times and the numbers of reject sheets have been substantially reduced and permanently minimized (Figure 4). This Figure also shows that the problems associated with the speed of the machine and time losses are still to be tackled. However, it is again an outcome corresponding to our step-by-step approach. For the upcoming year, we should make progress in this latter field, as well. Our successes so far underline the efficiency of the

application of *lean management*, and as a consequence there is rising trust in our researches and the related, practical organizational work.

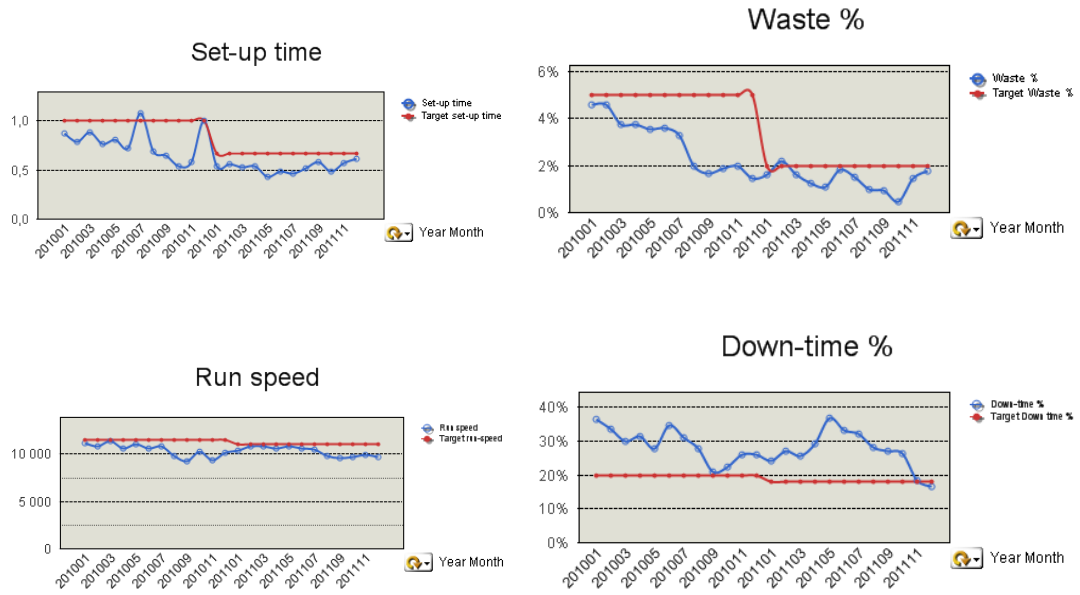

Figure 4: Utilization properties of the printing presses taken as the target group

4. CONCLUSION

Printing production is not feasible by means of price increases; the only expedient way to follow is to cut costs. In this respect, *lean management* can be supportive.

The *lean* simplification we have elaborated, i.e. the SBS (Step by Step) way method has proved its efficiency in making the first achievements, which demonstrates that the printing business is a proper scene for the application of the method, and further cost-cutting solutions can be expected from the continuation of the work.

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