

PERFORMANCE DEVELOPMENT BY KAIZEN METHOD AND APPLICATION IN PACKAGING INDUSTRY – CASE STUDY

Tahir ALTINBALIK, Şahin KARAKAYA

*Trakya University, Department of Mechanical Engineering, 22030, Edirne, Turkey
tahira@trakya.edu.tr*

Abstract

In this study, improving production as much as required at necessary times between production lines and processes was provided for an exclusive company which works in İstanbul/TURKEY. Besides, operations of production were inspected via Lean Management methods and new development methods for products whose amount of production rate are high and for products whose amount of production rate are low were created and applied. Required studies were performed via systems which aim for increasing efficiency in developed world such as KAIZEN, 5S and KANBAN. Especially, KAIZEN system was found efficient and applied for the company. One of the applied KAIZEN methods was defined with details in this study.

Keywords: Lean Management, Production, Kaizen

INTRODUCTION

In recent years, competition in the packaging industry all around the world has remarkably increased. At the sametime, industry reports have indicated that the sector is still responsive.

In case of looking at the sector closer, it is seen that many companies have been encouraged to adopt manufacturing systems which can supply more advantaged cost and quality. Lean production has been focused on by many studies so as to indicate its efficiency. Although there have been many studies so far, the challenges still sustain in the ability for applying lean methods in manufacturing industries. According to Maarof [1], review shows that previous studies have been done to examine the contributing factors and challenges to implement Kaizen successfully among organizations in some parts of the world. Kaizen described as word is derived from two Japanese words “Kai” which means change and “zen” which means for better [2].

This study intents to find some better ways of production system in package manufacturing company in Turkey. Kaizen method as “Before - After Kaizen” was implemented in this study in order to comfort production burden at some processes. In comply with literature, Kaizen methods had been described and then required applications were tried to be performed according to the methods. In addition to all these, the results reveal that many companies perform some ways of lean manufacturing without noticing it.

MATERIAL AND METHODS

Definition of Lean Production

The production and management system, now called as lean manufacturing, was found in the 1950s at the Toyota Motor Company in Nagoya, under the leadership of Eiji Toyoda who was one of the Toyoda family and his engineer Taiichi Ohno. According to Taiichi Ohno, the foremost person of the Toyota Manufacturing System, lean manufacturing is a holistic approach based on eliminating

waste in the system and continuously increasing efficiency of the system. Taiichi Ohno [3] described waste as "an activity that consumes resources but does not create value"; in other words, it is an activity that does not add value but creates cost.

The term Lean Manufacturing was found by John Krafcik in the late 1980s. John Krafcik defines lean production as a production system that does not carry any unnecessary facts and minimizes the facts such as error, cost, stock, labor, development process, production area, waste and customers' dissatisfaction. The most comprehensive definition for lean manufacturing is made in the work of Womack et al [4]. They assert that lean production is a universal process, combining the advantageous aspects of labor-intensive dependent production with mass production. It is defined as a mode of production which is free from the high cost of labor-intensive dependent production and the rigidity of mass production. To produce a wide range of product groups in lean manufacturing, skilled workers are employed at all levels of the enterprise and machines with high flexibility are used.

Lean production, in order to meet the demands of customers instantly, thinks the company as a whole team from top management to workers, suppliers, subcontractors [5].

Some Methods of Lean Production

- KAIZEN
- JIT
- VSM
- Kanban, Milk run
- HEIJUNKA
- SMED
- 5S
- HOSHIN KANRI
- YAMAZUMI
- Poka-Yoke
- Jidoka

Kaizen

The word Kaizen is a Japanese concept derived from the words "kai" and "zen.. "Kai" stands for change and "Zen" stands for better. If we combine the meanings of these two words, the word "Kaizen" means continuous improvement [6]. The most important feature of continuous improvement is to believe that better can be done. In the lean production system, it is stated that it is difficult to achieve the target of zero error and zero stock. In this respect, targets have been determined in the same direction as kaizen in lean production. With continuous improvement in Kaizen, there is an effort to minimize costs by getting rid of wastes in the production system [7]. This effort also serves the same goals of lean manufacturing. In companies that adopted lean production system, continuous and regular works are carried out to improve production at all levels. Improvements to be made at Kaizen should not be short-term improvements. In Kaizen studies, small but continuous improvement of the process should be prioritized. Instead of finding temporary solutions for problems, it is preferable to find permanent solutions with inspecting root cause. The goal is not to save the day, but to save tomorrow by permanent methods. Otherwise, the problem may reappear after some time. Employees in lean manufacturing take an active role in the production system rather than being variable cost. It has been noticed that many improvements have been accelerated after the implementation of the suggestion system in enterprises.

In order to accomplish Kaizen, 3 basic conditions must be met;

- 1- To see the current situation as inadequate,
- 2- To improve human factor,
- 3- To use problem solving techniques widely.

There are three types of Kaizen according to complexity and importance of problem;

1. Before / After Kaizen (Point Kaizen)

It is the improvement works done for the problems which are easy to explain with the photographs that show before and after as a single page form, which usually comes with the suggestions of the employees. It takes a short time to finalize (8 days as average). This type of Kaizen increases motivation, encourages employees to think, makes smarter work, creates the habit of making suggestions. As the most important advantage, it is easily understood by everyone.

2. Kobetsu Kaizen

These are the improvement activities of a team consisting of people from different departments, using the problem solving tools and implementing PDCA (Plan, Do, Check and Act) cycle in order to find the root cause of the problem. It takes longer time than Before/After Kaizen (40 days as average). It is the method used to solve the problem permanently. The main objective is to focus on a topic with a team and to improve the determined issue systematically.

3. Kaikaku Kaizen (System Kaizen)

Unlike Kaizen, Kobetsu is defined as improvement activities in which more radical changes are made. It is coordinated by a team and consists of experts. Production, sales, market situations and financial conditions that may change should be well analyzed at the beginning of the study. It takes the longest time (120 days as average).

CASE STUDY

The Kaizen study performed for this packaging company is called as “Kaizen for joint control”. The packaging products manufactured in the company are wrapped around rolls. There are various defects in the packages on these rolls which reach to customers. These defects are such as black dots on package, printing defects, blade marks, lamination and non-adhesive areas (Shown as figure 1). For this reason, complaints are received from the customers

every year and Kaizen study was carried out to reduce them.



Fig. 1. Black dots and printing defects on package

In Kaizen study, “Joint control” was applied to prevent these faulty products to reach the customers. Production in the packaging company starts primarily in extrusion process (Shown as figure 2). The products from the extrusion process are sent to printing process as next process (if there is no printing process, it is directly passed to the lamination process). In the printing process, when the related design is printed on the products, they are sent to the lamination process (Shown as figure 3). Here, the required layers are laminated according to the structure of the material. For example: Polyethylene-Metalized Pet-Polyethylene structure has 3 layers and lamination process is performed by adding glue-catalyst between the layers. After the lamination process, the final process is slitting process, where the products are slitted as requested amount.



Fig.2. Extrusion and printing processes



Fig.3. Lamination and slitting processes



What is Joint?

So as to show detected problems of all processes when they are at next process, it is made coloured joint/flag (Shown as figure 4). The joint is made in order to determine problems correctly and avoid sending problematic parts to customer via cleaning them. Operators make the joint in accordance with procedure arranged for each process (It is indicated for each process). The joint must easily be seen at the edge of reel and half of it must be out of reel. It must not fall down from reel. As soon as production operators detect the defect, they make the first mark with the appropriate additional joint (non-adhesive area, printing defect, blade mark, etc.). Then these problematic parts are cleaned at slitting process.



Fig.4. Joints used inside of reel

The Kaizen study identified why the problems occurred:

1. The joint is not used at right place.
2. Joint made does not properly indicate beginning and end of the problem.
3. Information of how many joints are done is not properly given to next process.
4. The problematic parts are not totally cleaned. (The problem can not be detected, then it is fixed on machine and keeping on production but problematic parts are sent to customer due to not cleaning)

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FIGURES

Figure 2

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<https://images.app.goo.gl/ZpEQ2WEuRmszzfE49>, 2019

Figure 3

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