Cost Reduction of Hard Disk Drive By Useing Value Analysis Technique

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Abstract- *This research is purposed to reduce the cost in hard drives manufacturing in spindle sleeve hard drive washing process by value engineering technique. The value engineering technique consists of seven steps: General Phase, Information Phase, Function Phase, Creation Phase, Evaluation Phase, Investigation Phase, and Recommendation Phase.*

Keywords- Hard Disk Drive, Spindle Sleeve, Production Improvement, cost reduction, and Value Engineering.

I. INTRODUCTION

This The important part of hard disk drive (HDD) production is a spindle sleeve that is cover and prevents spindle motor in order to turn around indirection or moving into difference position. Not only accuracy position but also keep constant velocity. Due to spindle sleeve and HDD are produced in difference a factory, the spindle sleeve is delivered from another factory to HDD line in a container. It has to be removed piece by piece and put to another container in the washing process, before the spindle sleeve was transferred to production line. Moreover, when transferring the spindle sleeve from a container to another container, the spindle may lose or fall causing damage because it is very difficult and complicated. The industry produce the spindle sleeve by millions units per month and tend to increase according to the market demand. Current production has exchange carrier container to washing container which it is non-value and longtime activity so researchers try to eliminate waste time. This study makes low thread at the washing room by reduce spindle sleeve of transferring process. There are 4 workers per shift or 8 workers per day. The mostly improvement is focused on the worker level of small group activity that the problem can be resolve by worker. Kritchana Kuntanoo present planning concept of HDD production. They consider material of supplier who can increase productivity based on mathematical model and artificial neural network .Forecasting in material productivity to planning production in order to reduce error forecast for 6.78 percentages.

II. METHODOLOGY

Production Improvement for cost reduction in Hard Drive Industry by Value Engineering Technique applied from Arthur E. Mudge [3-9] consists of seven steps: General phase, Information phase, Function phase, Creation Phase, Evaluation phase, Investigation phase, and recommendation phase.

General Phase

We consider in problem of transfer container at washing process. It has to be removed piece by piece and put to another container at the washing process, before the spindle sleeve was transferred to production line. In this process may lose or fall causing spindle sleeves damage because it is very difficult and complicated. We find this activity to be non-value activity and take a longtime.

Information Phase

Before spindle sleeve transfer in to production line ,it is washed by washing machine. Current carry container (200 pieces per tray as shown in Fig. 1.) has restrictions for washing so spindle sleeve remove to washing container.

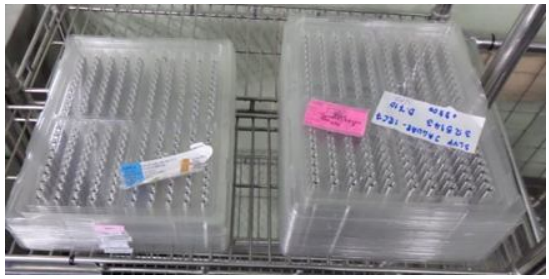

Fig. 1 Container for spindle sleeve transferring with 200 pieces per tray.

Worker pickup a spindle sleeve from supplier which removed a part per time from carry container which can contain 200 pieces per tray to washing container which can contain per 50 pieces per tray that is shown atFig.2

Fig.2 Container of spindle sleeve washing with 50 pieces per tray.

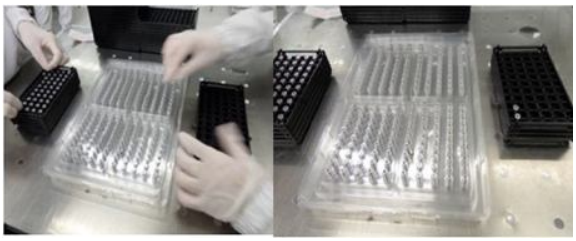

Fig.3 Current working.

Function Phase

A modification tool is simplified to transfer spindle sleeve at complex production as following function and analyze of equipment function is shown in Table 2.

Function 1 to transfer spindle sleeve without defect.
Function 2to identify type and quantity
Function 3 to protect dust

Table 2
Analyze of equipment function.

Function	Part	Advantage	Disadvantage
1	Container	High volume capacity	According to constraint of container size and washing process, it is added transfer container.
2	Tag	Show type and quantity	Easy to find the sourcingbut cannot stand humidity.
3	Container sleeve	Dust-proof	Cause pollution in the environment

Referring to a survey with workers, most of their opinion a grees with eliminates time at the transferring container process because this process is waste time. Researchers are focus on container improvement at this process follow worker opinion.

Creation Phase

Create concept to solve the problem under modified new container. This research focuses on HDD production line improvement to solve the mainly problem by using modified container concept.

Concept 1

Worker can promptly take spindle sleeve from the supplier into washing machine. This improvement can reduce both cost and time from container changing. The worker can move modified container to the watching process directly that is cost reduction at the transferring spindle sleeve process. We estimate cost based on container daily requirement. Maximum capacity is 200,200 units per day and to stock minimum container inventory for 3 days. Investment of modified container cost is 100 baht per unit. Cost will be increased on the inventory and investment container that can see cost as following table3.

Table 3 Modified container cost of concept 1.

Container	Number of Container (Unit)	Container Purchasing Cost (Baht)
Container for production line	4,004	400,400
Container for safety stock (3 days)	12,012	1,201,200
Total	**16,016**	**1,601,600**

As shown in Table 3, the number of container requirement increased to 16,016 units and purchasing cost are 1,601,600 Baht. Not only decrease work of transferring spindle sleeve before washing process but also decrease labor cost in this process. However, container has limited hardness and short life cycle is approximate 4 months and average cost is 5,336.67 baht per day. The constraints are increased area to stock container and higher container price.

Concept 2

We change carry container from 200 pieces per tray to 50 pieces per tray that is same size as container at the washing process in order to eliminate complex production in the process as shown in Fig. 4.

Fig. 4 Modified Container of Concept 2.

The modified containers of concept 2 give result in investment cost of container. Due to maximum capacity are 200,200 units per day, to safety stock container in minimum for 3 days

Evaluation Phase

Researchers are focus comparing cost of container each concept in to eliminate complex process and minimize working time. Referring to non-value of spindle sleeve production, we compare 3 experiments consist of pre-improvement ,improvement of concept 1 ,and improvement of concept 2

Investigation Phase

As per comparison, concept 2 can decrease working time to 55.97 percentages especially time of container changing at washing only 30 second per tray. There is decrease cost at the spindle sleeve washing for 319,839 Baht or 33.32 percentages

Recommendation Phase

This washing spindle sleeve improvement can reduce cost of HDD production under increase labor cost. Even though they have to change the auxiliary equipment at delivery, the process is eliminated complex production for whole working process.

III. CONCLUSION

We find that the research can reduce HDD production cost at spindle sleeve washing based on value engineering technique. The result cost reduction that 319,839 or 33.32 percentages and can reduce working time to 55.95 percentages especially time of container changing at washing only 30 second per unit.

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