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A PROJECT REPORT

ON

QUALITY IMPROVEMENT THROUGH IMPLEMENTATION OF KAIZEN TECHNIQUE AT ALLIED ENGINEERING

Submitted to

UNIVERSITY OF MUMBAI

In Partial Fulfilment of the Requirement for the Award of

BACHELOR'S DEGREE IN
MECHANICAL ENGINEERING

BY

KHAN RAHILRAZA	**15ME22**
KHAN MOHD ARBAZ	**15ME20**
KHAN FAISAL ANWAR	**16DME148**
KHAN MUJEEB AHMED	**16DME152**

UNDER THE GUIDANCE OF
PROF. JAVED KAZI

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Anjuman-I-Islam's Kalsekar Technical Campus
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Plot No. 2 & 3, Sector - 16, Near Thana Naka,
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2018-2019

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A PROJECT II REPORT
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CERTIFICATE

This is certify that the project entitled

"QUALITY IMPROVEMENT THROUGH IMPLEMENTATION OF KAIZEN TECHNIQUE AT ALLIED ENGINEERING"

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is a record of bonafide work carried out by them, in the partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering (Mechanical Engineering) at ***Anjuman-I-Islam's Kalsekar Technical Campus, Navi Mumbai*** under the University of MUMBAI. This work is done during year 2018-2019, under our guidance.

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Acknowledgements

I would like to take the opportunity to express my sincere thanks to my guide **Prof.JAVED KAZI**, Assistant Professor, Department of Mechanical Engineering, AIKTC, School of Engineering, Panvel for his invaluable support and guidance throughout my project research work. Without his kind guidance & support this was not possible.

I am grateful to him/her for his timely feedback which helped me track and schedule the process effectively. His/her time, ideas and encouragement that he gave is help me to complete my project efficiently.

We take this opportunity to give sincere thanks to **Mr.ABDULLAH ANSARI** (Managing Director) at ALLIED ENGINEERING PVT. LTD., NAVIMUMBAI, for all the help rendered during the course of this work and their support, motivation, guidance and appreciation

We would like to express deepest appreciation towards **DR. ABDUL RAZAK HONNUTAGI**, Director, AIKTC, Navi Mumbai, **Prof. ZAKIR ANSARI**, Head of Department of Mechanical Engineering and **Prof.RIZWAN SHAIKH**, Project Coordinator whose invaluable guidance supported us in completing this project.

At last we must express our sincere heartfelt gratitude to all the staff members of Mechanical Engineering Department who helped me directly or indirectly during this course of work.

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Project Approval for Bachelor of Engineering

This project entitled ***ÖUALITY IMPROVEMENT THROUGH IMPLEMENTATION OF KAIZEN TECHNIQUE AT ALLIED ENGINEERING¨*** by *KHAN RAHILRAZA, KHAN MOHD ARBAZ, KHAN FAISAL ANWAR, KHAN MUJEEB AHMED* is approved for the degree of ***Bachelor of Engineering in Department of Mechanical Engineering.***

Examiners

1. .....
2. .....

Supervisors

1. .....
2. .....

Chairman

.....

Declaration

I declare that this written submission represents my ideas in my own words and where others ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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ABSTRACT

Thousands of small & medium scale industries are present in India. All are facing certain problems resulting in lack of productivity, greater processing time etc. The basis definition of Kaizen philosophy & a brief review of kaizen concept & its implementation. The purpose is to represent Kaizen, its related terms in a concrete way & its implementation in improving the overall effectiveness of small scale organization situated in India. This illustrate about kaizen implementation in small manufacturing industry & also focuses on the scenario of Indian manufacturing company while implementing Kaizen. This also reviews that it basically focuses on implementation of kaizen technique in small manufacturing companies. For detail justification of project conducted in the small manufacturing company who is dealing with manufacturing of Stainless Steel products. The company is currently facing the problem of increased lead time . In order to solve the faced problem we emphasize on two major alternatives & select Kaizen as a main productivity improvement tool. This implementation is focuses on reducing the lead time of sales order processing by mean of which the productivity of organization will be improved.

Keywords: kaizen, lead time, steel products.

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Chapter 1

Introduction

Kaizen in logistics and transport-how to make the most of opportunities and eliminate errors - Internal logistics, storage, but also transport. The principles of the Kaizen philosophy originating from Japan can be applied in practically every field. Many management systems in the Western world are based on Kaizen. Building an organisation based on this philosophy is a long-term process. Today we are going to answer the question: why all this fuss and why is it so important to prevent errors?

Figure 1.1: kaizen

In the Kaizen model, the most important thing is to reduce the time between developing a concept or defining a problem and the implementation of an improvement.Kaizen is not only about ensuring that a product or service meets specific quality requirements.According to this philosophy,quality comes down to a change in

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lifestyle,an endless process of improvement. The basic rule is to involve employees at all levels and to strive for continuous improvement of company and product quality. It consists in integrating the thought process at each stage. Why all this fuss?

Kaizen, through the gradual improvement of all aspects of the company's operations, aims to achieve the following: acceleration of the work process and quality improvement; – technical adjustment of system elements; – creation of evaluation and reward criteria; – cost reduction; – improvement of ergonomics of workstations.

That's easier said than done. The application of Kaizen philosophy from the perspective of work organisation and developing optimum work practices is often supported by principles such as:
kaikadu, – ergonomics, – ergonometry, – economics of simple movements

Two kaizen approaches have been distinguished: Flow kaizen means an improvement of individual workstations and the way employees perform their work. It is related directly to the flow of materials and information and is often identified with the reorganisation of an entire company.

Process kaizen is the improvement of individual workstations. In this model, employees mostly look for small ideas which, if possible, can be implemented on the same day. This is in contrast to traditional models of work improvement, which generally have a long lag between concept development and project implementation.

Poka-yoke is one of the key solutions supporting Kaizen. This is a method of preventing inadvertent errors. The principle is that in manufacturing it is not people, but only processes that should be blamed for errors.

Generally speaking, the way to reduce faults is to create conditions in which the error cannot happen or will be immediately visible. Such solutions can be found for example in almost every car assembly plant.

This involves, for example, collecting a sufficient number of different types of parts necessary on individual assembly lines. For each type of part, various distinctive (matching the shape of a given part) containers are prepared. Both the shape and

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the order in which the containers are positioned accurately represent the assembly process. Once an assembly is finished, all containers for parts should be empty. The risk of making a mistake with such a work organisation is marginal.

The same applies to technical measures, which are increasingly used to eliminate errors, and which are located within production lines. Many of them are equipped with automatic interlocks, activated e.g. when contact with a human being occurs. This means that when an employee enters a designated, electronically protected zone, the line or line element is immediately switched off.

1.1 The waste of motion

Motion is one of the seven wastes of lean manufacturing or the 7 mudas. Waste being a process step that is not value adding, moving is not necessarily working! If you have read the page regarding value add and non value add then you will understand that only a process step that transforms the product in some manner that the customer explicitly wants is a value adding step, moving product does not transform it any way therefore is a waste.

1.2 Purpose

Throughout most companies today, there is a consistent drive to reduce waste and increase quality. The benefits of Kaizen methodology can reach far beyond reducing waste (muda) or increasing quality. Many different quality tools and disciplines can get you that far. Kaizen can take you farther. Properly implemented Kaizen methodology can achieve positive results in various ways at all levels of the organization. The advantages of implementing Kaizen include, but are not limited to:

Utilization of Resources – Kaizen focuses on improving products through utilization of existing resources (your people) to achieve incremental and continuous improvement. Kaizen is centered around making small changes instead of relying on massive changes or expensive equipment investments to gain improvements. Increased Efficiency – Central to Kaizen methodology is the importance of providing a well-planned work area, eliminating unnecessary movement or operations and proper training for all employees. Employee Satisfaction – Kaizen is about creating an atmosphere of teamwork and change, where new ideas are encouraged. Team members are asked to really examine the processes and make suggestions for improvement. Safety Improvements – A safer work environment is another benefit of

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Kaizen. The safety improvements occur when new ideas to clean up and organize the work area are developed and implemented. Kaizen involves everyone in the improvement effort. It does not rely on huge capital investments or attempt to make enormous strides at one time. The roots of Kaizen are in making small, immediate, incremental improvements in the processes and work standards. It is about looking for ways to improve every day. In due course, these small steps can result in giant leaps in quality, safety, efficiency, productivity and a positive impact on the bottom line

1.3 Project Scope

The scope of kaizen is extremely braod.

Here are some areas that may be amenable to continuous improvement Improving work flow by placing materials in easy reach, or adding a ramp to move outputs Improving safety by placing guards or two-hand switches on presses Improving quality with poka-yoke (”foolproof”) methods, such as jigs to ensure parts can only be placed correctly before assembly Designating a five-minute cleanup or maintenance step as the end of each shift at each machine Adding a customer feedback opportunity to each web page, sales contract or telephone script Notice that many of these ideas can save money by saving on labour, rework or machine repairs. Some may involve expenses, such as losing those five minutes of production in return for cleanup or maintenance. Adding a customer feedback loop may well be expensive if someone actually has to review and respond to the customers.

The point, however, is that kaizen should be applied to every area of a company and for a variety of purposes including efficiency, safety, quality and customer service[**?**]

1.4 Project Goals and Objectives

1.4.1 Goals

Before starting the work we discuss the requirement of company in future and following are the goals of project

1.To improve top managerial personeed productivity

2.The employees of the company need to be involved & concern about organization achievement.

3. Need of reduction in accidental hazards while cutting the required length pipe

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manually.

4. There should not be too much of capital investment in productivity improvement as the company is batch type & small scale.

1.4.2 Objectives

An objective of this project is:

1. To improve the productivity of the organization by applying a Kaizen philosophy.
2. To reduce the sales order processing time & stock out situations.
3. Identify time losses at production area.
4. Identify opportunities for kaizen improvement using a problem solving approach.
5. Describe the effects of the improvement.

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Chapter 2

Literature Survey

2.1 Introduction

This chapter in the thesis discuss about the different literature review and different methods to identify the process for Systematic Plant Layout and 5S system can be implemented.

2.2 Literature Survey:

2.2.1 Title and Author-I

Implementation of Kaizen and 5S in Plastic Pipe-International Journal of Applied Science and Engineering, 6(1): 11-18, June 2018 Manufacturing Unit.
Himanshu M. Shukla and Kanchan D. Ganvir

2.2.2 Abstract

Thousands of small & medium scale industries are present in India. All are facing certain problems resulting in shortage of production and quality issues like productivity, greater lead time, processing time etc. The paper contains basis definition of kaizen philosophy & a brief review of kaizen concept & its implementation. The purpose of this paper is to represent Kaizen, its related terms in a concrete way & its implementation in improving the overall effectiveness of organization. This paper illustrates about kaizen implementation in small manufacturing industry & also focuses on the scenario of Indian manufacturing company while implementing Kaizen. The paper also illustrates the implementation of kaizen technique in a company who is dealing with manufacturing the PVC pipes. The company is currently facing with the problem of increased lead time and backorders. The main objective is to implement kaizen practice in the case company. This implementation is focused on reducing the lead time of sales order processing by mean of which the productivity of organization will be improved. We also suppose to generate case based simulation models which estimate the basic Kaizen implementation process before &

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after implementation. The tools used are Kaizen, 5S, kaizen sheet 5S sheet etc., and monte-carlo simulation method (for analysis).

2.2.3 Title and Author-II

Process Flow Improvement through 5S, Kaizen and Visualization.
Mayank Dev Singh , Swati Singh , Abhishek Chokshi , Harshad Chavan-International Journal of Innovative Research in Science, Engineering and Technology

2.2.4 Abstract

Nowadays, manufacturing industries throughout the world are interested in lean manufacturing philosophy. This project is based on lean manufacturing tools like 5S, Kaizen and Visualization. 5S is tool to ensuring systematic organizational environment, Kaizen is continuous improvement through small steps to obtain economical result of the organization and Visualization is technique of creating images, diagrams or animations of firms activity which are helpful and effective way of communication for all people connected with firm. This project is intended to utilize these tools and come up with integrated approach. Also to reduce abnormality in organization by applying ergonomics for various working positions of employees which improve the productivity, by applying it at pipe manufacturing industry "Sandvik Asia Pvt. Ltd, Mehsana, Gujarat". Owner of firm is also interested to implement this concept; hence as an industrial perspective this project will give us knowledge that how the practical implementations of lean concepts takes place.

2.2.5 Title and Author-III

Implementation of 5S & Kaizen in ABC Industry-IJSRD - International Journal for Scientific Research & Development— Vol. 4, Issue 11, 2016 — ISSN (online): 2321-0613
Mayur L. Mokharkar Dr. A. R. Sahu Dr. Achal Shahare

2.2.6 Abstract

— Manufacturing industry is one of the fastest growing industry today. In the competitive business the manufacturing companies have to pay attention for the improvement in productivity, quality, efficiency, safety and its service. Today, many industries are interested in the improvement of standards and techniques for best performance so they can reign over the present market scenario. Among various important parameters which considered being very important, two most important primary parameters are safety and quality. In this article, we will the study various literatures related to 5S & Kaizen. Data is accumulated from different papers, this

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will help to study success factor of 5S & Kaizen. Primary data will be collected by personal observation and originated by the researchers for specific purpose for addressing research problems. Secondary data collected from various books, material, reports and data which is stored in the organization and provide by the HR people. The next step will be implementation of 5S & Kaizen in ABC Industry by applying PDCA cycle.

2.2.7 Title and Author-IV

Applying the Kaizen Method and the 5S Technique in the Activity of Post-Sale Services in the Knowledge-Based Organization
Mihail Aurel Titu, Constantin Oprean and Daniel Grecu

2.2.8 Abstract

The Kaizen management originated in the best Japanese management practices and is dedicated to the improvement of productivity, efficiency, quality and, in general, of business excellence. The KAIZEN methods are internationally acknowledged as methods of continuous improvement, through small steps, of the economical results of companies. The small improvements applied to key processes will generate the major multiplication of the company's profit, while constituting a secure way to obtain the clients' loyalty/fidelity. The KAIZEN management represents a solid, strategic instrument, with a view to reach and surpass the company's objectives. The "5S" technique represents a fundamental technique which allows the enhancement of efficiency and productivity, while ensuring a pleasant organizational climate. The scientific paper presents in a concrete way a study regarding the application of these concepts in a real organization which builds its business success on the phenomenon called KNOWLEDGE.

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2.2.9 Title and Author-V

KAIZEN – A case study-Manjunath Shettar et al. Int. Journal of Engineering Research and Applications www.ijera.com ISSN : 2248-9622, Vol. 5, Issue 5, (Part -2) May 2015, pp.101-103

Manjunath Shettar, Pavan Hiremath

2.2.10 Abstract

The ultimate objective of manufacturing industries is to increase productivity with high quality. At present, many manufacturing companies are facing problems such as high quality rejection, high inventories, high lead time, high costs of production, and inability to cope with customer orders. By implementing and practicing the lean production system many problems can be solved without employing high-tech and high-touch approaches but by involving people on the shop floor in Kaizen activities. Kaizen is one of the powerful tools of lean manufacturing. Kaizen refers to continuous improvement in performance, cost and quality. Kaizen ensures that manufacturing processes become leaner and fitter, but eliminate waste (problem) where value is added. The main objective of this paper is to provide a background on kaizen, present an overview of kaizen concepts that are used to transform a company into a high performing lean enterprise. A case study of implementation of Kaizens has been discussed

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Chapter 3

Methodology

3.1 Strageties of Kaizen Technique

Ten Tips to Help You with Your Kaizen Continuous Improvement Strategy Kaizen Continuous Improvement The Kaizen methodology encourages ongoing efforts to ensure continuous improvement throughout a facility. This improvement can come in many forms including waste elimination, improved efficiency, safer work environments and much more. To simply say that a facility is employing Kaizen strategies, is essentially meaningless if you don't have any concrete action items you are following.

Whether you're just getting started or you are looking for ways to reinvigorate a Kaizen strategy that is not effective, the following ten tips will be very helpful. Each one can give you ideas on what you can do encourage improvement and allow that improvement to grow and expand long into the future.

Figure 3.1: Continuous Improvement Cycle

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3.2 Harness the PDCA Strategy

One of the key concepts used in Kaizen is the "Plan-Do-Check-Act" strategy. This is a quality model that can be used when implementing any type of improvement in the facility. As you might expect, the PDCA strategy is a cycle of ongoing improvement that should never end. The steps are as follows: Plan – This step is where you identify an area where improvement is possible and make an initial strategy on what chance should be made to realize the desired improvements.

Do– Implement the change, but only on a small scale. This may mean having one department make the change in some situations or for larger corporations, having one facility make the update. During this step it is also very important to be gathering as much data regarding the change so it can be properly evaluated.

Check – Review the results of the change including the data that was collected. Looking to see if they had the desired impact or not is critical to know whether you should move forward with rolling the change out to other areas.

Act – IF the data in the check step points to a success, it is time to push the change out on a wider scale. Once the change has been successfully implemented you will go back to the plan step to look for further improvement opportunities. If the data from the check step shows that the change did not work as planned, you go directly to the plan step to either start from scratch or attempt to make the needed adjustments to get the desired results.

3.3 True Safety Improvement

-changing-lightsNothing in a facility is more important than the overall safety of the employees and the facility itself. Unfortunately, accidents and other safety hazards are never going to be completely eliminated. That does not mean, however, that you cannot make an effort to dramatically improve the overall safety of your facility. In fact, safety improvement is an essential Kaizen focus because you can realize ongoing improvements with the right effort.

Kaizen Guide: Better your business with continuous improvement To be successful, you can't make an improvement once and forget about it. Effective lean businesses use kaizen, which means "continuous improvement". In kaizen, everyone looks for ways to improve processes on a daily basis. This Kaizen Guide explains the kaizen mindset, basic kaizen concepts including the PDCA cycle, and real-world examples.

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Looking at every accident or even near-miss event as an opportunity to learn what went wrong and take steps to prevent it in the future is an excellent strategy. Many facilities first look to place blame on someone or something for an accident, but that is actually counter-productive. Instead, look for the root cause of any issue and see what can be done to fix it.

3.4 Think Small

Many companies today are only looking for the, "BIG WINS" when it comes to improvements. While big wins are always nice, they really aren't going to be able to happen very often. A company that identifies small areas of improvement and implements them frequently is going to make much more progress over time than one that ignores the small things and only focuses on bigger issues.

3.5 Empower Employees

Free Kaizen GuideGood managers are an invaluable part of having a facility that engages in continuous improvement. This is because good managers know that it is often going to be the employees who come up with the next great improvement idea. Employees perform their jobs all day everyday so it is no surprise that they will be the ones to find problems and hopefully the solutions to them.

Empowering employees to take steps toward improvement can be very helpful. Having a process by which they go through the PDCA cycle with as little interference from management as possible can be very helpful. Of course, for some changes manager involvement and approval will be necessary, but putting as few obstacles in the way as possible will result in much more improvement.

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3.6 Recognize Successes

When a change is made that results in improvement in the facility it should always be recognized. This recognition could be something as simple as a thank you from the department manager or as large as corporate recognition with a bonus or other reward. To the extent possible, all recognition of improvements made should be done as publically as possible to help motivate others to work towards improvements.

If someone has an idea that doesn't work out as planned, it can still be a good idea to recognize that even though it didn't work out, it was still a good thing that they made the attempt. As the saying goes, you miss 100 percent of the shots you don't take. Even when ideas are unsuccessful it is still a learning opportunity and it may trigger ideas about the next great improvement in the facility. Never punish people for making an attempt at improving the facility.

3.7 Engage the Full Team to Find Improvement Opportunities

Engage the Full Team to Find Improvement Opportunities Continuous improvement in a facility is almost never going to be made by a single person. This is why you need to have the entire team involved. This starts with the CEO and leadership team and goes all the way to the front line employees. By creating a teamwork environment where everyone is working together to ensure ongoing improvement you will be much more successful in the long run.

Even when employees propose an unrealistic idea it should still be seen as a positive step. Taking all ideas seriously and trying to find ways to implement them if practical can allow employees to have the confidence in the management team that they need to want to bring new ideas up to the team.

3.8 Use 5S (and other) Strategies

5s-station-afterOne thing many facilities do when trying to make improvements is select one methodology and use it exclusively. Kaizen continuous improvement, however, can benefit from a variety of other methodologies that are used in most industries. For example, when attempting to eliminate waste you can look to the 5S, Lean or Six Sigma strategies to learn more about how to successfully accomplish this.

When looking for safety improvements, consider the 6S strategies and others. The point is, you don't need to reinvent the wheel every time you are trying to make

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improvements in a specific area. Look to successful strategies that are already out there and take advantage of them whenever possible.

3.9 Implement Hoshin Planning

Hoshin Planning is a concept where all employees are looked at as the experts in their specific jobs that they are. Since they are seen as experts, they will be held accountable for achieving the desired successes, including continuous improvement. This is different than empowering employees because it not only gives them the ability to identify changes, but actually puts them in the decision making position.

In addition to helping ensure employees are contributing to the continuous successes desired, you are also empowering them with more trust and responsibility. It has been shown that this type of strategy can improve job satisfaction and company results.

3.10 Know Your Processes

You can't make improvements on something if you don't really know what is going on with it. This is why you should have a clear understanding of everything that is happening in the facility. A great strategy for this is to employ value stream mapping. This will help you pinpoint where all the value for your products is added so that you can eliminate any waste that is involved.

Keeping your value stream and process maps updated and accurate is important. Every time a change is made to an area, for example, make sure you know how it is impacting the value add to that area. This will ensure you are always evaluating an accurate portrayal of your facility so you can make the needed improvements on an ongoing basis.

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3.11 Never Give Up

Whenever thinking about Kaizen continuous improvement you need to recognize that the 'continuous' part of the strategy is extremely important. This is a strategy that should be implemented as soon as possible and then continued indefinitely into the future. As soon as one improvement is made, it is time to start looking at what the next improvement opportunity .

It is also important to remember that there will be failures along the way. Some ideas will be tried and found to not produce the results that are needed. When this happens make sure you and your team don't get discouraged or give up. Instead, start the process of finding and implementing improvements over and you'll soon achieve the results you were hoping for.

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Chapter 4

Problem Definations

Quality is a very important part of an organization. While dealing with any organisation we firstly check the quality of their product within the required/critical time.Every organization wish to improve their quality to the most efficient level.The quality improvement help in smooth running of an organization and step ups the organization to a different level. Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skillful execution; it represents the wise choice of many alternatives.

4.1 Prevention of Thread Failure

The Thread is an important fitting part of product in oil and gas industry.So it is must to prevent it from any deformation.

4.1.1 PROBLEM STATEMENT:

In many cases the thread of the product worn out during the delivery of the order or due to any external load on it which lead to complaint and product rejection by dealers.

4.1.2 SOLUTION:

So to prevent thread failure the thread cap is introduced to the threaded part.

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Figure 4.1: Without Thread Cap

Figure 4.2: After Thread Cap

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4.2 Optimization of space by Scrap Stand

4.2.1 PROBLEM STATEMENT:

The scrap removed during the machining operations of product were not properly placed which leads difficulty for the worker to put the scrap in scrap bag.

4.2.2 SOLUTION

So stand is provided to attach plastic bag on it also it is easy for the worker to pour the scrap in it and after that it is easy to remove bag and pack it for industrial scrap disposal. Optimizing space in an organisation so that space can be used for another purpose and the infrastructure of organisations is maintained.

Figure 4.3: Scrap Stand

4.3 Labour Fatigue

4.3.1 PROBLEM STATEMENT:

For a particular product there are various operations to be performed at different machines so after finishing one operation the product is transferred to another machine for another operation.

4.3.2 SOLUTION:

So here in industry a worker is kept to transfer the product for another operation. He is pulling a plastic tray with a rod. It requires more efforts. Therefore to reduce effort the trolley is provided to him.

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Figure 4.4: Use Of trolleys

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4.4 Optimization of time while product clamping

4.4.1 PROBLEM STATEMENT

The clamping of product by using fastners like Small size nut and washers was done manually which lead to worn out and forgetting of product due to falling down of product while clamping it.

4.4.2 SOLUTION:

Using rod for clamping the product which help them to overcome the problem.

Figure 4.5: Clamping Technique

4.5 APPLYING COOLANT MANUALLY

4.5.1 Problem Statement

In lathe machine the coolant where applied manually which may lead to motion defect means unnecessary motion can increase the product time.

4.5.2 Solution

Fix An Automatic Coolant instead of applying Coolant Manually.

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Figure 4.6: Manual Cooling

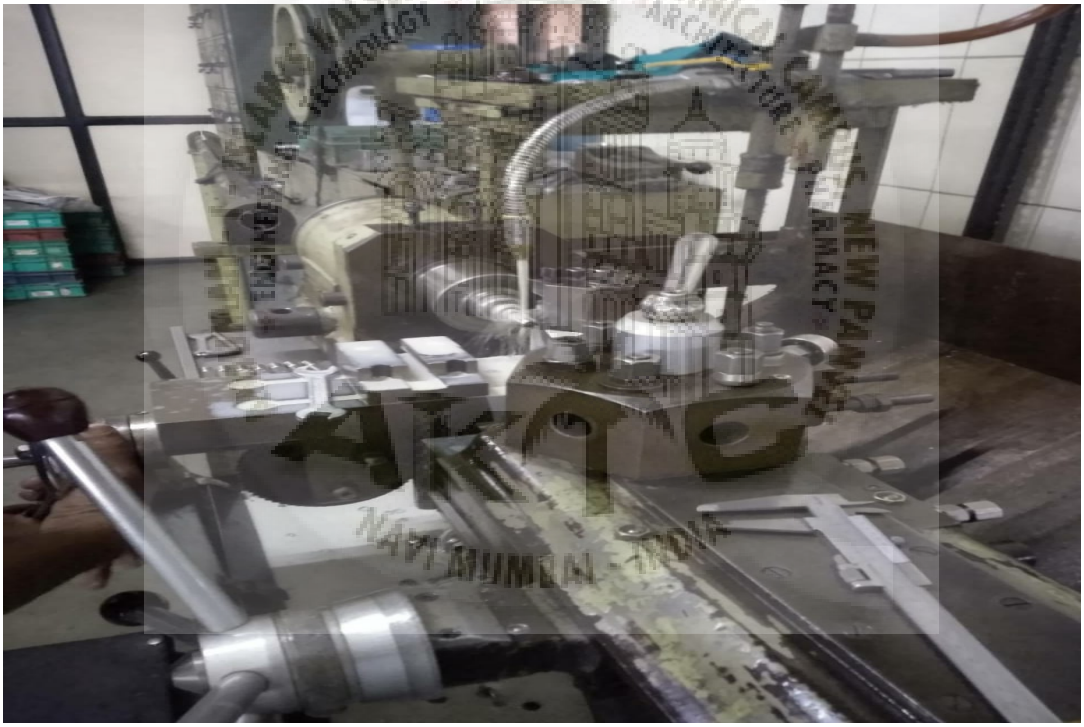

Figure 4.7: Automatic Cooling

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4.6 POLISHING AND PACKAGING DEPARTMENT ARE HELD FAR FROM EACH OTHER

4.6.1 Problem Statement

Placing of polishing and pakaging department far from each other may lead to waiting which increased the time critical or lead time of product manufactured.

4.6.2 Solution

This can be overcome by arranging packaging area near to the Polishing area so it could save timing of process.

Figure 4.8: Polishing Area

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Figure 4.9: Packaging Area

4.7 DEFECT IN AIR COMPRESSOR

4.7.1 Problem Statement

The fluctuation in drive wheel is more which lead to reduction in efficiency and power of compressor.

4.7.2 Solution

By keeping the Belt Tight and inserting a key made the fluctuation negligible and work of compressor was succesfully improved

Figure 4.10: Drive Fluctuation

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4.8 OVERPRODUCTION OF PRODUCT WHICH LEADS TO STOCK HOLD.

4.8.1 Problem statement

The production of more product leads to stock holding which needs more space and increases inventory cost.

4.8.2 Solution

Planning and manufacturing of Product in proper proportion and as per demand can be the best way to over come the problem.

Figure 4.11: Inventory

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Chapter 5

Implementation

5.1 Implementation of Plastic cap for preventing thread deformation

A threaded container cap with locking means incorporated as part of the threads. One of the threads is provided with a small protrusion or lug which falls into a detent provided in the other thread. Or, the lower extremity of one thread is modified to pass through an opening in the other where it is locked by jamming action.

Figure 5.1: Inventory

This invention relates to the structure of threads on bottles and their accompanying caps, in order to incorporate locking means therein.

The problems of tightly fastening a bottle cap to render removal sufiiciently difficult for children, or to retain the tightness of the cap during shipment or subsequent hantiling, have not been met in a simple, easily manufactured construction.

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In the past, bottles have been provided with lugs protruding in the area below the threads which are engaged by structure extending from the cap. Some employ a lug and pawl structure exclusive of the thread and still others employ spring-actuated fasteners operative upon the cap when it reaches the desired closed position.

The object of the instant invention is to incorporate a positive lock in a basic thread structure.

A further object of the invention is to provide said positive lock through a simple modification of the thread structure which can be easily accomplished under existing methods of manufacture.

A further object of the invention is to enable the incorporation of said locking features at a minimum cost by accomplishing its objective without the addition of substantial structure in excess of that which comprises the ordinary thread.

Figure 5.2: Inventory

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5.2 Implementation of Trolley for material Handling

Material handling equipment is mechanical equipment used for the movement, storage, control and protection of materials, goods and products throughout the process of manufacturing, distribution, consumption and disposal.[1] The different types of handling equipment can be classified into four major categories:[2] transport equipment, positioning equipment, unit load formation equipment, and storage equipment.

Transport equipment is used to move material from one location to another (e.g., between workplaces, between a loading dock and a storage area, etc.), while positioning equipment is used to manipulate material at a single location.[3] The major subcategories of transport equipment are conveyors, cranes, and industrial trucks. Material can also be transported manually using no equipment.

Figure 5.3: TROLLEY

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5.3 Implementation of Auto Lubrication system

An automatic lubrication system (ALS), often referred to as a centralized lubrication system, is a system that delivers controlled amounts of lubricant to multiple locations on a machine while the machine is operating. Even though these systems are usually fully automated, a system that requires a manual pump or button activation is still identified as a centralized lubrication system. The system can be classified into two different categories that can share a lot of the same components.

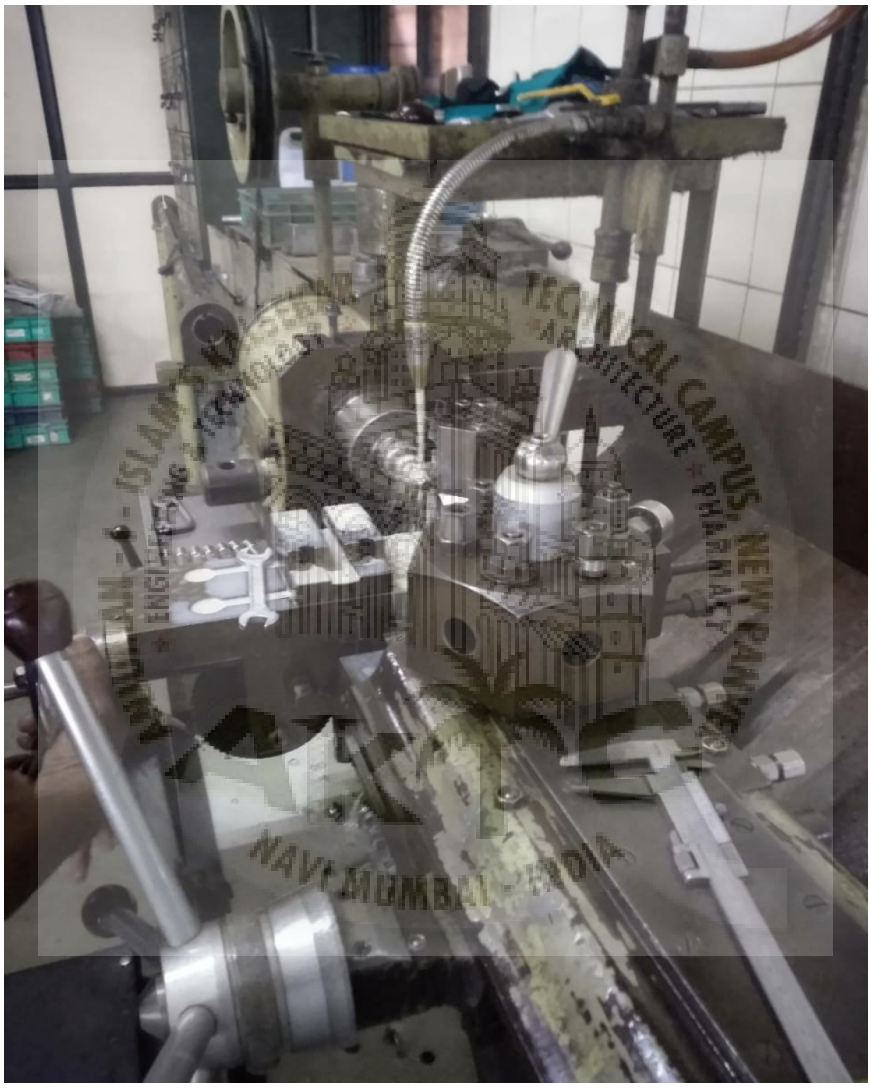

Figure 5.4: TROLLEY

5.3.1 Reason for an automatic lubrication system

Automatic lubrication system is designed to apply lubricant in small, measured amounts over short, frequent time intervals. Time and human resource constraints and sometimes the physical location on machine often makes it impractical to manually lubricate the points. As a result, production cycles, machine availability, and manpower availability dictate the intervals at which machinery is lubricated which

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is not optimal for the point requiring lubrication.

5.3.2 Benefits

1. All critical components are lubricated, regardless of location or ease of access
2. Lubrication occurs while the machinery is in operation causing the lubricant to be equally distributed within the bearing and increasing the machine's availability.
3. Proper lubrication of critical components ensures safe operation of the machinery.
4. Less wear on the components means extended component life, fewer breakdowns, reduced downtime, reduced replacement costs and reduced maintenance costs.
5. Measured lubrication amounts means no wasted
6. lubricant Safety - no climbing around machinery or inaccessible areas (gases, exhaust, confined spaces, etc.)
7. Lower energy consumption due to less friction
8. Increased overall productivity resulting from increase in machine availability and reduction in downtime due to breakdowns or general maintenance
9. In this system lubrication the engine parts are lubricated under pressure feed

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Chapter 6

Conclusion and Future Scope

6.1 Conclusion

From all the literature reviews we come to the conclusion that the Kaizen practices can also be effectively used in small manufacturing industry as a productivity improvement tool. Successful implementation of Kaizen and 5S process There will also a future scope of study & research work on Implementation of Kaizen as a part of computer aided manufacturing.

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6.2 Future Scope

In Small Manufaturing Industry.

- In future we suppose to develop the real time simulation model for the analysis
- Estimation of stock out situation for improvement of productivity in computerized manufacturing era.

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