Research Journal of Engineering Sciences ISSN 2278 – 9472
Vol. **11(1),** 15-21, January **(2022)** *Res. J. Engineering Sci.*

Case Study

Problem solving using kaizen principle - a case study

Saurabh Kumar Sahu[1*], Shiena Shekhar[2] and Ramit Chugh[2]
[1]Production Engineering, Bhilai Institute of Technology, Durg, CG, India
[2]Department of Mechanical Engineering, Bhilai Institute of Technology, Durg, CG, India
saurabh.sahu2904@gmail.com

Available online at: www.isca.in, www.isca.me
Received 24th November 2020, revised 7th July 2021, accepted 30th September 2021

Abstract

This paper provides the basic understanding of Kaizen philosophy. In this paper throws light on purpose of using Kaizen and the processes used and implemented in it are discussed. Research work done by many other researchers is studied and mentioned for the better understanding of Kaizen philosophy. This paper also discuss about the companies who adopt Kaizen for improve their productivity and reputation in market as well, these companies set trends to get success by adopting small but effective steps in continuous manner. There are many advantages of using kaizen some of them are discussed in this paper.

Keywords: PDCA, Continuous improvement, efficiency, down time, incidence, productivity.

Introduction

"To improve is to change; to be perfect is to change often" by Winston Churchill.

Kaizen is a Japanese philosophy for continuous growth. It is made up of two parts i.e. "kai" means change and "zen" means good. Therefore, kaizen means "change for better" or the continual improvement. It is an approach to make improvement involving everyone in the organization for improvement of quality and productivity. i. It is the improvement in various fields of any manufacturing industry for betterment not only for the assets of organization but also for their workers. ii. Improvement from daily management and operations. iii. Participation of employees for improvement. iv. Start with small improvement. v. Humanized approach to workers by - Eliminates hard work, Motivates employees, creating sense of belonging and sense of fulfillment.

History

Kaizen was first used in Japanese organizations after World War II. One of the pioneers in developing Kaizen was Sakichi Toyoda the founder of Toyota industry, he develops widely recognized Toyota production system, although the western world recognize that the Japanese manufacturing companies were more efficient, it was not until 1986 that they were introduced the concept of kaizen.

Kaizen is used in various sectors and if implemented effectively it is fruitful for any organization. Some famous companies who adopt Kaizen for improvement are as follows: i. The famous aerospace industry Lockheed Martin effectively utilize Kaizen philosophy and reduce various costs like fabrication cost, inventory related cost, as well as transportation cost. ii. In 2006 the Ford Motor company was on the verge of insolvency at that time Alan Mulally become the CEO of the company, he implement practices of Kaizen to reduce the waste of the industry and save the operational time. Through this philosophy he saves the company from bankruptcy.

There are so many examples where Kaizen is implemented i.e. famous food industry Nestle, Pixar animation studio, Mayo clinic etc.

Literature survey

Bessant et al.[1] discuss about the various important factors that is required for Kaizen i.e. plan of action, encouraging environment, strong organizational foundation, procedure, tools etc.

Chang[2] provides the result of survey of various organizations after applying quality improvement technique but it is seen that most of them were failed because they apply too many quality improvement initiative in short period of time. Therefore it was suggested to the companies that they take small steps of improvement in quality for successful long run of the business. This paper also provides the critical points for successful Kaizen implementation and also their effect on management of organization, workers confidence, and company's reputation.

Augsdorfer[3] suggests two applicable strategies which is needed for successful implementation of continuous improvement. The first policy is to conduct a training program which encourages the employees for continuous improvement. The second policy is that the employees are capable of applying the strategies they learnt during training in every situation whether it is good or

worse. The author also enlightened that the strategy related to continuous improvement is made for long runoff the company and strategies support the quality management as well as various operations perform in the company.

Nadia Bhuiyan et al.[4] present the case study is to show the methodologies used by an aerospace industry for continuous improvement. This paper describes all aid and approaches required for successful implementation of continuous improvement methods. In competitive environment this methodologies helps to achieve excellence and also take care of customer's requirement.

Gratiela Dana BOCA[6] emphasizes on practical application of kaizen. By using realistic kaizen strategies improving the quality, productivity, efficiency and asset of an organization and also built the customers trust for long run of the company.

Jie Ma[7] provides the various relations between management tools and kaizen practices. It also gives the aid to framework for kaizen implementation.

Gupta, S. and Jain, S. K.[8] gives the direction and guidance to improve efficiency and productivity of small scale industries by implementation of some 5S approaches and kaizen implementation. These papers also stressed on safety of employees as well as boost their confidence for increasing the assets of an organization.

Ms. Shubhangi. P. Gurway[11] enlightens the problems faced by small scale industries and the implementation of kaizen on these industries to solve problem and increase profit. The author takes a company for research and implements kaizen philosophy to solve the overall problem and increase the productivity.

Marcin Jakubiec at el.[12] gives the steps of quality improvement of any organization by implementation of kaizen. In this research author divide the article into two parts and by case study formulate the various quality related problems and try to solve these problems faced by company.

Purpose of Kaizen: The main purposes of kaizen implementation are: i. Improve workplace environment. ii. Increase staff efficiency by proper training and enhance their confidence by appraisal. iii. Improve process efficiency of the overall system. iv. Elimination of waste or proper waste management. v. Increasing assets of the manufacturing industry.

Implementation of Kaizen Philosophy

If kaizen is implemented without any direction it may not provide any result. For effective implementation the industries policy and direction is communicated to all. All improvement effort should align with the company policy.

For proper implementation of kaizen the following points to be consider:

Goal setting: i. Goals should be 'SMART' (S- specific, M- measurable, A- actionable, R-realistic, T- timely), ii. Goals should be align with the company's strategic goals, iii. Stretched goals but in a realistic way.

Selection of team: i. Size of the team should is according to areas which needs improvement. ii. A trained facilitator and a team leader for each team. iii. There is some particular reason to choose each team member.

Kaizen team steps: i. Document the current state, ii. Identifies wastes, iii. Make the change, iv. document the improvement, v. Process should be predefined and standardize manner. vi. Present and celebrate the small improvement, vii. The process should repeat and modified if needed.

Key success factor: i. Management should be supportive for long team success. ii. Everyone in team should involve. iii. Complete all works assigned on time.

Key process: Kaizen follows the PDCA ("Plan-Do-Check-Act") cycle for continual improvement. This cycle is also known as Shewhart cycle or Deming cycle.

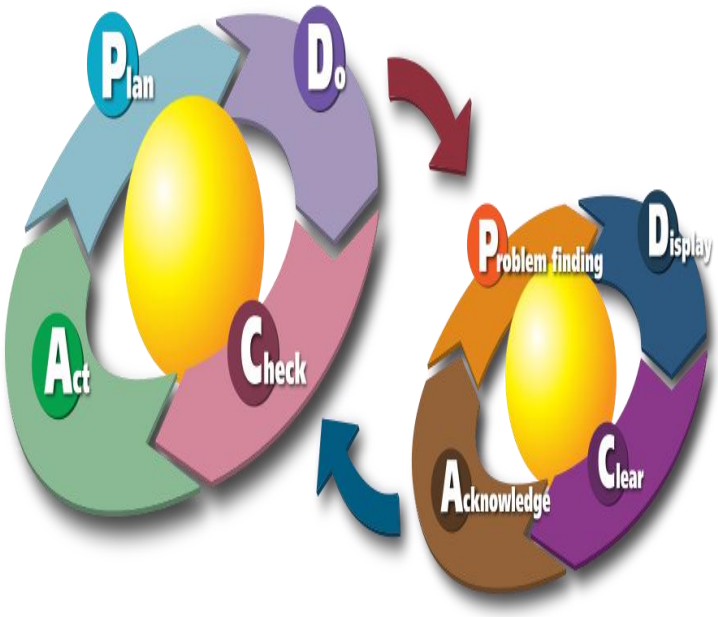


Figure-1: PDCA cycle.

Some other approaches like 5 Whys and kaizen blitz are also used. In 5 whys approach user asks a series of five why questions about the failure that has occurred. And kaizen blitz is an approach to implement kaizen which is rapid improvement and is a focused activity on a particular process or activity. The basic concept is to identify and quickly remove waste.

Advantages of Kaizen: i. Kaizen adopt small step by step process for improvement, therefore chances of error is reduced. ii. Kaizen focuses on the customer's requirement, so that the end customers will be satisfied from the product. iii. It involves top management to workers so that the problems will easily identify and due to better communication between top facilitators and workers reduce the chances of ambiguity of goals and reduce error. iv. In kaizen works on their workers training and motivate them for improving their ability continuously (morale boost). v. By using this philosophy improve the environment of the workplace and improve the shop floor management. vi. It encourages problems and solves that problem by the employees itself through brainstorming, which improves the problem solving capability of workers. vii. By using this philosophy short as well as long term goals of the company is fulfilled. viii. It encourages the teamwork.

Case study of metal mixing unit of Bhilai steel plant

There are various processing units in Bhilai Steel Plant. Where one is foundry and pattern shop. In this unit casting of various materials has been take place like casting of cast iron, steel and non ferrous materials. There are various processes involved in manufacturing of a product. These processes are shown in figure no.

For optimum production all the units works effectively and efficiently with low down time. If any unit create problem it affects overall production. Therefore it is needed to find out the problematic area and also need to continuous improvement for this kizen philosophy has been followed.

Along with kizen philosophy the principle of PDCA (Plan-Do-Check-Act) also applied for properly solve the problem.

Problem identification: After proper inspection the problem had been identified i.e. metal mixer area, ladle jamming is the major problem of delay in production and losses.

Reason for selecting the problem: i. To achieve production target. ii. To reduce down time of metal mixer. iii. To reduce ladle jamming.

Analysis of problem

Average monthly target has set by the unit i.e. approximately 5000T but due to ladle jamming and other problems it did not able to reach up to the target. Therefore, after analyze the problem down time had been recorded and total down time in a year was approximately 670 hours. This is the reason of lack of achieving the target. The basic reason behind this is ladle jamming. It had been calculated that loss per ladle due to jamming is approximately 1 lakh rupees.

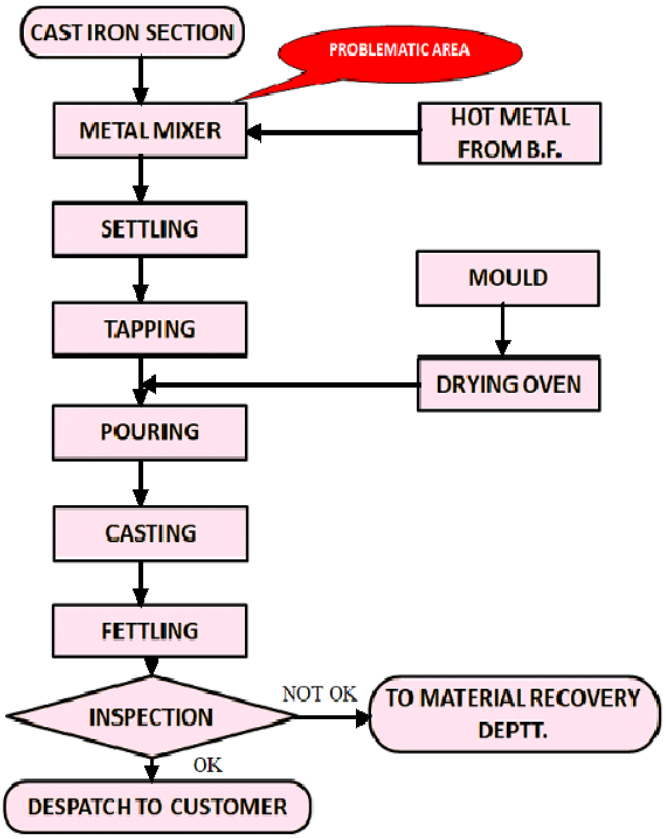


Figure-2: process of manufacturing and identification of problematic area.

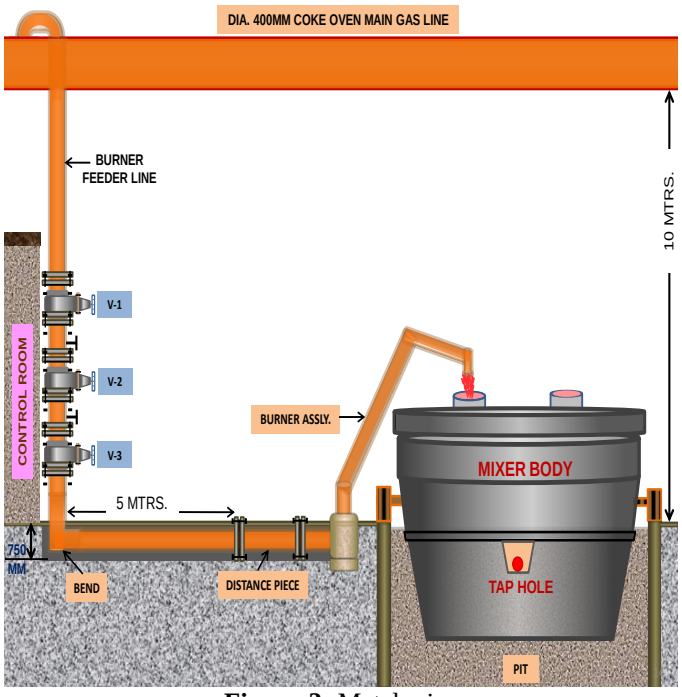


Figure-3: Metal mixer.

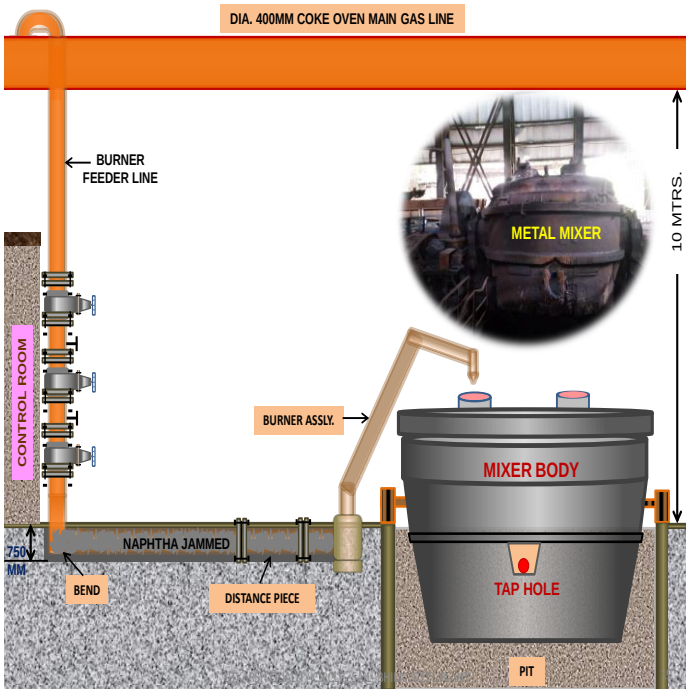


Figure-4: problematic area of metal mixer.

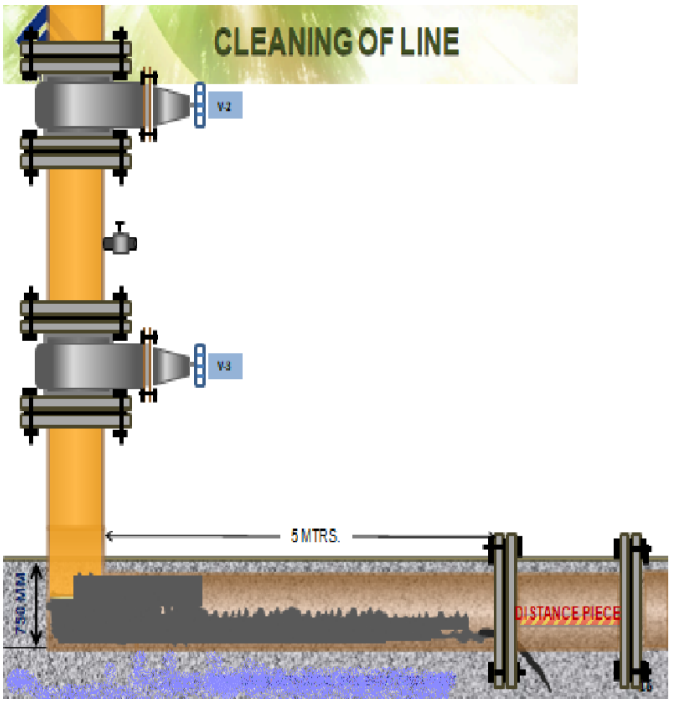


Figure-6: Cleaning of pipe by mechanical action.

Location of incident: In metal mixer no. 2, to remove the jamming of naphtha in gas line, the mechanics group decided to clear the jam, through flushing operation. While doing the flushing operation, the coke oven gas also travelled down the pipe and reached to burner which was over the red hot metal mixer. This gas came in contact of spark of metal mixer and caught fire with explosion at discharge point in horizontal pipe. Although no casualty happened there, but it might get converted into major incidence with casualties.

Cause of incidence: The delay in closing the valve no. 2 make it possible for gas to enter into the burner pipe and position of the burner was also over the mixer mouth through which sparks were escaping.

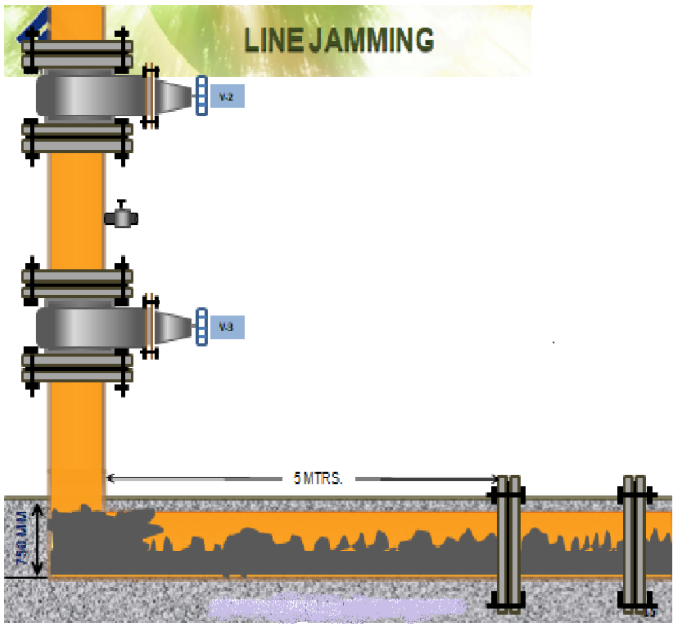


Figure-5: Line jamming due to naphtha.

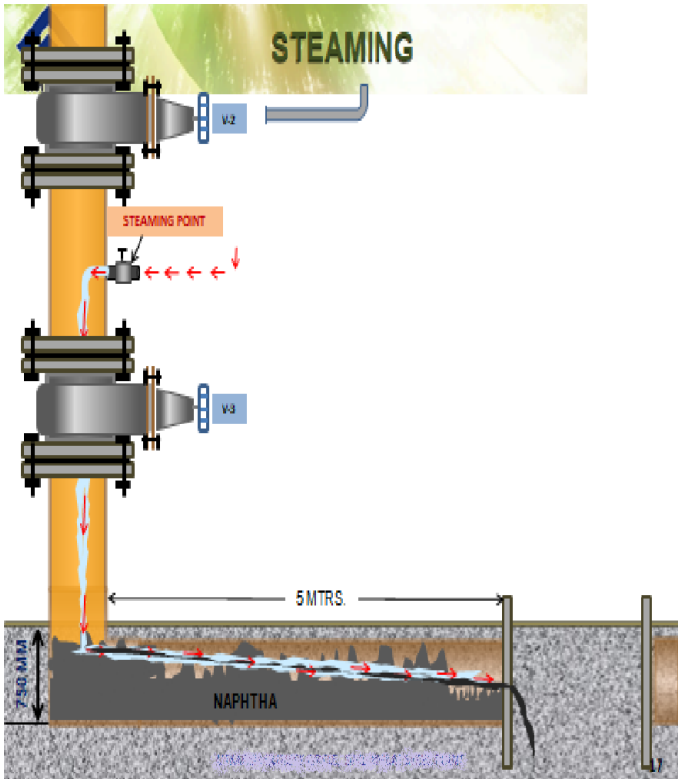


Figure-7: Cleaning of pipe by steaming.

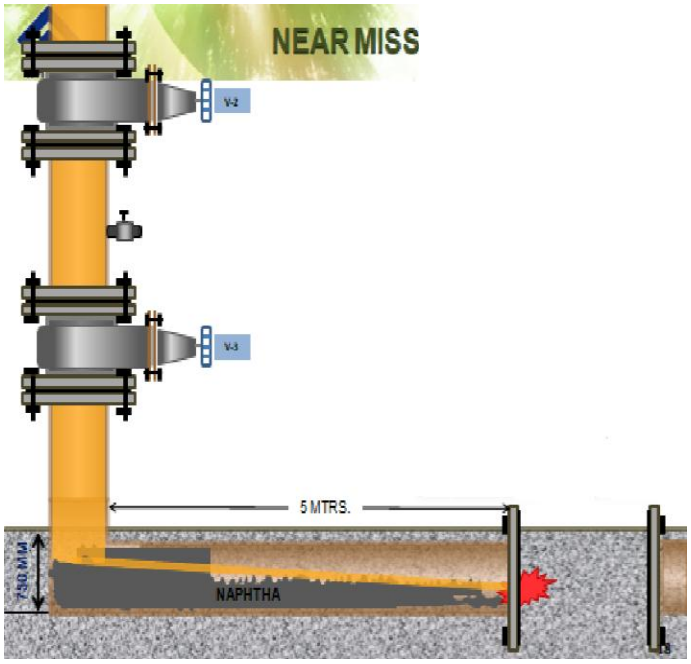


Figure-8: Gas enter into pipe (near miss).

Recommendation to avoid recurrences (planning stage): Some improvement is needed for avoid the incidence and avoid the shutdown of machinery, which increase the overall time of production. Therefore, to avoid such incidence, it was recommended to make use of U-seal to discharge flushing out water, so that no gas would escape to the atmosphere and also keep the burner position away from its mouth.

Figure-9: Planning of using portable U-seal.

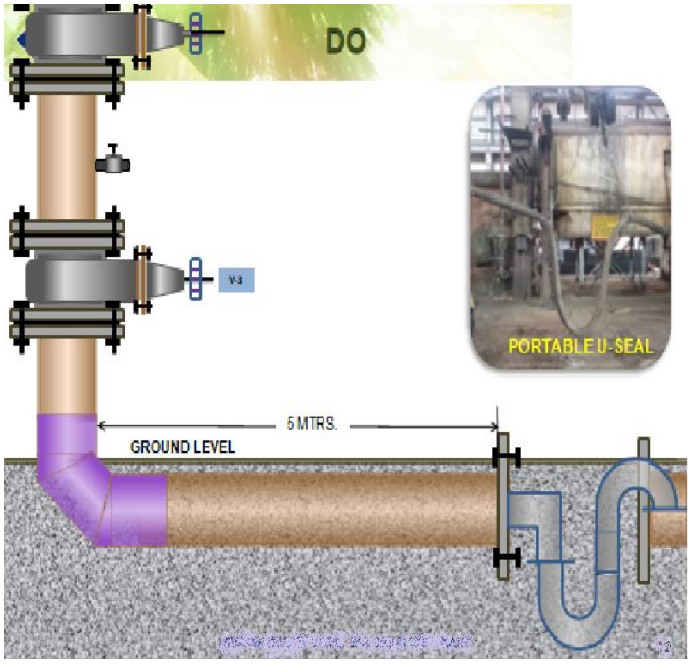


Figure-10: Trial implementation of U-seal.

Action to be taken: These remedial measures are required to be followed by all the concerned people and all the instruction to be displayed at site.

Do- To fix flange on portable U-seal made up of hose pipe.

Check- To concentrate on all possible point of leakages after putting hose.

Act- After inspecting all the system properly, allow the system to run in full pace.

Figure-11: Checking the accuracy of system.

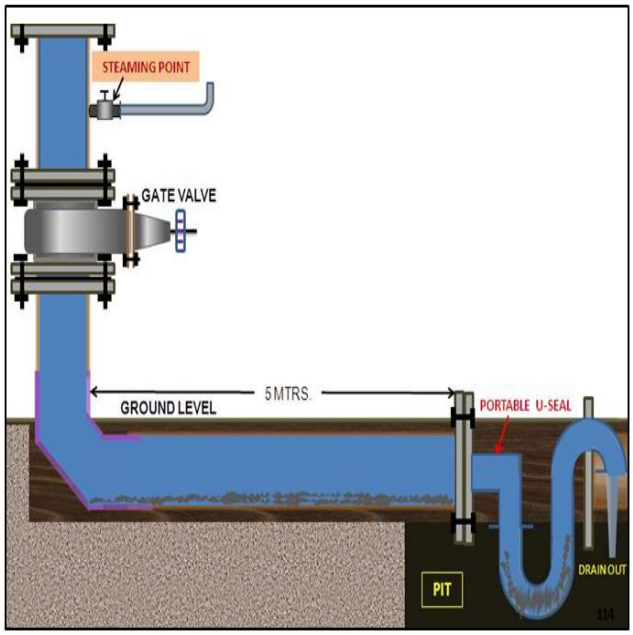


Figure-12: Finally install the system after satisfaction.

Compliance status: The section in charge communicated this incidence in details to all the concerned people and asked them to follow the recommended instructions compulsorily the use of U-seal for the purpose displayed at the working site.

Result of applying Kizen

During trial implementation stage the down time was reduced from 58 hrs. to 26 hrs. After regular implementation the down time was reduced from 255 hrs. to 83 hrs.. Also availability of mixer is increased up to 5.5% and after this quality control implementation the overall production of cast iron casting was improved up to 1.6%.

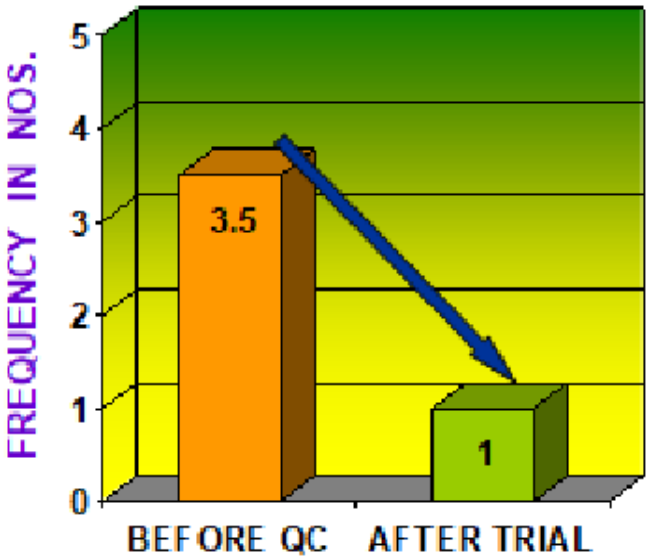
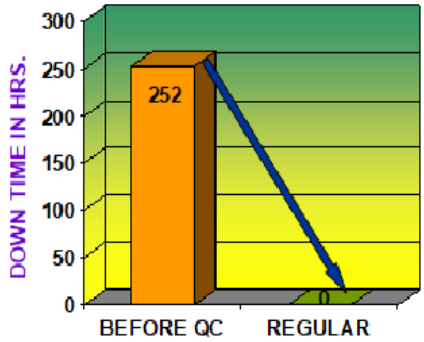


Figure-13: Jammed reduced in trial stage.



NAPHTHA JAMMING HAS ELIMINATED DUE TO FLUSHING OF LINE ONCE IN A MONTH AND SOP REVISED ACCORDINGLY

Figure-14: Jamming before QC Vs Regular implementation.

There are various other benefits of applying this quality improvement: i. Maintenance work simplified. ii. Safe working environment developed. iii. Self and mutual development of working employees. iv. Satisfaction and positive energy developed. v. Better housekeeping. vi. Customer satisfaction. vii. Achieved non dependency on fire brigade. viii. Reduced the idle time of personnel working there.

Conclusion

By analyzing the above illustrated case study, it has been cleared that a small problem in any industry creates huge loss and sometimes cause of damage the important and expensive part of machinery. Therefore, to obtain optimum production with minimum losses continuous inspection and improvement is necessary. Kaizen principle is nothing but a continuous improvement process. This is very essential for smooth functioning of production.

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