

Application of Quality Circle Methodology through Training to Reduce Defects in Small Scale Industries: A Case Study

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Abstract: Quality circle is a small group to perform capital quality control activities and improvement within the workshop, utilizing quality control techniques with all members participating. The Concept of Quality Circle Methodology is introduced in small scale industry in order to reduce the defect rate to zero level through proper training of employee and implementation of work instructions in regional language for better understanding of employees. It provided platform to manpower to give suggestions in improvement in concern areas. From this case study, the methodology found reliable and suitable in regards to reduce the cost of training to new or existing employees by providing permanent data that can be used in repetitive manner to understand training topics. It provided a comprehensive and flexible system for maximizing business success.

Keywords: Quality Circle, Brainstorming, Problem Identification, Work Instructions, Training within Industry.

1. Introduction

Quality as name implies is vital for survival for all kind of industry in this competitive era. To maintain quality every industry has to face many challenges within their premises on daily basis. For this industries are required to adopt new technology, concept & methodology to maintain and improve the quality level. The manpower must be adept enough to learn & adopt the changes which come due to implementation of new technology or methodology. It is most important to train employees in such a way that they do their work more enthusiastically and enjoy doing their work without doing any mistake. This all depends upon the way of training or training team, how they perform and present any methodology to change their psychology toward improvement in quality of industry so that industry can achieve their targets and grow as per industrial plan without fail. There are many quality control tools, control charts and statistical quality control techniques which help to maintain quality level of industry, but now 'Quality Circles' is one of the best quality control techniques which have been widely used by the organizations to achieve good quality and acceptability among the customers.

2. Literature Survey

Michel Wensing PhD, Björn Broge (2004) Rationale, aims and objectives Quality circles comprise small group sessions of doctors and written feedback on their individual practice patterns. Although 50% of German primary care doctors participate in quality circles, their effectiveness has hardly been evaluated in Germany. This study determined the impact of a large-scale programmed of quality circles on quality and costs of prescribing method. A controlled before–after study was performed, in which primary care doctors were allocated to a quality circles group or a control group.

Abo-Alholet et al. (2005) describe about the performance of the quality circle in the both service as well as in manufacturing sector. Author states that quality circle in various countries are first introduced in the manufacturing sector and as the benefits expertise, published and confidence is built they introduced this in other areas and finally in service sector to survey the effectiveness of quality circles in both sectors a questionnaire was designed to examine the level of training received, purpose of quality circle participation, success contributor, suggestion, leadership etc. the questionnaire was send to selected companies. The data collected is analyzed by using bi-variant co relation and one way in ANOVO tools.

Prof. Dinesh P. Chapagain (2008) During the Students' Quality Circle (SQC) activities in academics, students identify, analyze and solve their problems at school and at home by applying various QC tools in a QC team using QC story of systematic problem solving approach. This paper highlights the content analysis of the secondary information compiled from the proceedings of the recent national and international conventions on students' quality circles using KJ method. The result depicts that students have developed several characters deemed necessary to build leadership quality. Students participating in students' Quality Circle activities have developed eleven types of leadership traits, skills and habits like self-confidence, self-discipline, interpersonal relations, boarder vision, creativity, social responsibility, communication skills, scientific and analytical skills, time management skills, empathy, and working habits in a team.

N. K. K. Prasanna Tushar. N. Desai (2011) this paper deals with various aspects of Quality Circle and how improvements can be made by adopting practices of Quality Circle in petrochemical industries. The paper also presents a comparative discussion of various features of Quality Circle, Quality Improvement Group and Work Group/Project Team. The paper describes a case study of QC concept in a petrochemical industry which illustrates the effectiveness of QC approach.

Benazir Bhayana (2011) Groups are formed where members interact to share Information and to make decision within the specific area of responsibility. Teams are different from groups. A team is a cross Functional group of employees with focused objectives and autonomy in achieving them. This study suggest that how a small group of employees voluntarily meet to indentify, analyze, and resolve work related problems not only to improve quality or performance of the organization, but also to enrich the quality of work life of employees.

Chitra Sharma (2013) conducted case studies have been reported till date on the usage of quality circle in many manufacturing organization for drawing cost saving or quality improvement goals. It has been the utmost goal of enterprises with no surprises to that. But in this paper the author proposes his opinion on applying quality circle in an academic library, a service organization. It argues that the concept encourages employee participation as well as promotes teamwork and motivates people to contribute towards organizational effectiveness through group processes. This paper tries to project a method from the parlance of management for anticipating the relative improvement of quality of services by improving the level of consciousness among all constituents so as to enhance their effectiveness and competence. The study will drive great yield to the practitioners and the users of the quality circle technique.

Abhijit Chakraborty, Ranjan Bhattacharya (2013) focussed on the effect of quality circle when applied in small enterprises. In this competitive world, Process Development as per 'Voice of Customer' is the key word and the result there from is for better productivity and simultaneously cost-curtailment in production sphere of manufacturing. In this paper, effect of application of 'Quality Circle' has taken for finer tuning of process improvement in a small manufacturing enterprise and its impacts for the betterment of cost-effectiveness at the shop floor in various production processes have been analyzed to ascertain- to what extent the Quality Circle tool can be effective in the small enterprises of Indian environment for its betterment & making it competitive in the global market.

Norsiah Aminudin (2013) This paper examines gender attitudes towards employee involvement scheme. Employee involvement (EI) has been the focus of considerable research on the management of people in organizations, particularly on whether EI results in improved employee attitudes and behaviors, and, in turn, company performance. The research found that there were no significant differences in the attitudes of men and women toward EI schemes; nor were there any gender differences in wider work-related attitudes including organizational commitment, job satisfaction and attitudes towards management. There are lessons for the management to learn.

3. Application of Quality Circle Methodology

Methodology adopted for the case study has been shown in Figure 1.

3.1 Data Collection

Final Inspection is one of the best areas where In house rejection and customer rejection is recorded for each product and process. It is the last stage of thoroughly inspection of every product. A record of product received, product inspected and product rejected to scrap (based on sample inspection or 100% inspection) is maintained for the purpose to improve the quality of products. Those products which have high rejection rate can be taken as problem on which the research work can be performed. These rejected products results in increase in quality cost to these small scale industries thus can be taken for problem identification.

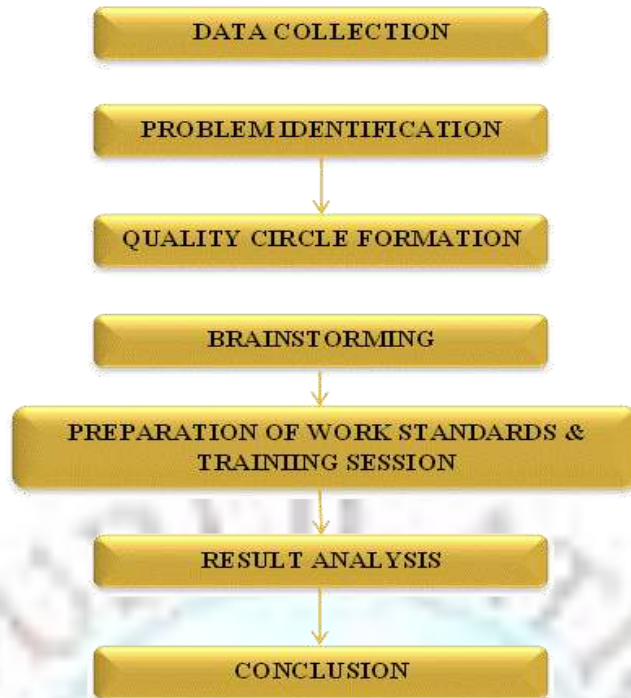


Figure 1: Methodology Adopted

3.2 Problem Identification

The problem is identified on data obtained from Final Inspection Area. Final Inspection is the area where In house rejection and customer rejection is recorded for each product and process. It is the last stage of thoroughly inspection of every product. A record of product inspected and rejected to scrap is maintained to know PPM level. The higher PPM (part of rejected per million of product) of any product mean higher the qualify cost to the manufacturing industry that can be identified as problem. The Product-wise analysis and Defect-wise analysis of Final Inspection Data is done as shown in Table 1. Pareto chart is used for the purpose to identify the most contributed problem among many problems generated in the final inspected area. The Figure 2 shows the contribution of each problem from raw material to finished product.

Table 1: Product Wise Quality Trend of Case Study (Combined)

SR. NO.	Item name	Qty.	Cumm. Qty.	%age	cumm.%age
1	HALLOW DOWEL (39105006)	3800	3800	75	75
2	NUT (DH101195)	505	4305	10	85
3	HALLOW DOWEL (39105006)	500	4805	10	95
4	BANJO BOLT	150	4955	3	98
5	SHAFT ROCKER ARM.EX(48.2)	99	5054	2.0	100
6	DENT	5	5059	0.1	100
7					
	TOTAL	5059	27978	100	

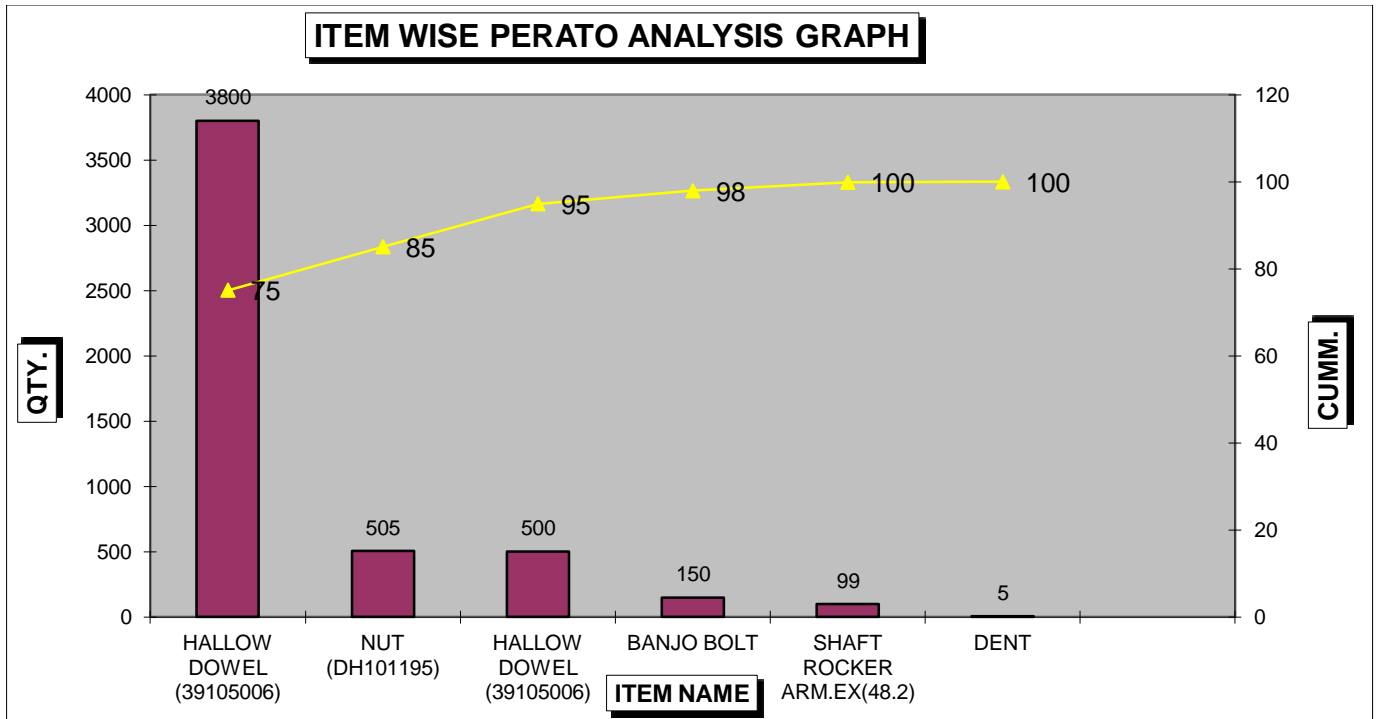


Fig. 2: Product Wise Quality Trend of Case Industries (Combined)

3.3 Mark the Identified Problem

It is clearly seen from the above Table and Chart that Hollow Dowell, Nut & Benjo Bolt are the major contributor (around 75%) to the overall problems produced to the finished product. Thus the problem is marked as major problem to solve by Quality Circle Methodology. Then the defect wise Pareto diagram is analyzed again for the purpose to marks the actual problem which is sorted out during this research study. The defect Quality Trend of Case study and defect wise Pareto Analysis is shown below in Table 2 and Chart 3 respectively.

Table 2: Defect Wise Quality Trend of Case Study (Combined)

SR. NO.	Defect name	Qty.	Cumm. Qty.	Main contribution of item in related defect
1	RUSTY	3800	3800	LOW DOWOL (39105006) , NUT DRIVE LOCK (DH101195)
2	MIX UP	505	4305	NUT DRIVE LOCK (DH101195)
3	DUST	500	4805	HOLLOW DOWOL (39099906)
4	BURR	150	4955	BANJO BOLT
5	LENGTH O/SIZE	99	5054	SHAFT ROCKER ARM (48.2)
6	O.D O'SIZE	21	5075	SLEEVE (938)
7	DENT	5	5080	
8	CRACK	1	5081	
		5081	17865	

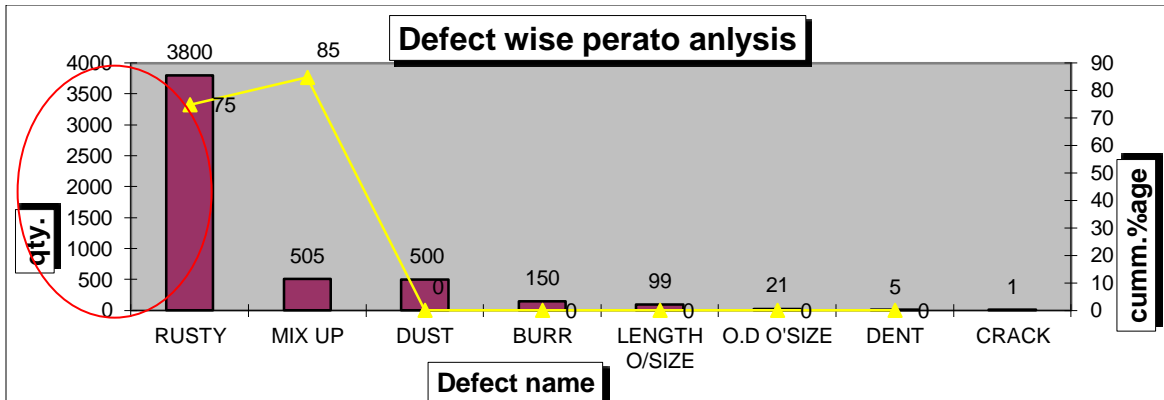


Fig. 3: Product Wise Quality Trend of Case Industries (Combined)

3.4 Quality Circle Formation

Once the problem is identified, then a quality circle is formed to solve these problems by utilizing manpower of small scale industry. This quality circle comprises of 10-12 employees of different departments performing similar types of work works as team to solve such problems which increases the cost of quality. It is basically Steering Committee which is formed for the improvement in products and process of industry. After formation the steering committee, a group leader and a deputy group leader were selected from supervisor of that department. After these selection, the worker are invited to join the quality circle voluntarily who work as quality circle members. After identifying the problems from operator to top level management everyone is the part of quality control system but the main responsibilities are taken by the persons that are selected for quality control from their respective areas. A Quality Circle team is formed to solve the above marked problem.

3.5 Brain Storming Session

Once Quality Circle Team formation is done then next step is to do a brain storming session. It is conducted to find out the views of the quality circle members about the problem they are facing in their daily routine. In the brain storming session each member is free to talk about the problems in the industry which affect the production badly. The problem is discussed among the relevant employee to find the root cause by analyzing probable causes of Man, Material, Method & Machine. The root cause analysis of marked problem is shown in Figure 4.

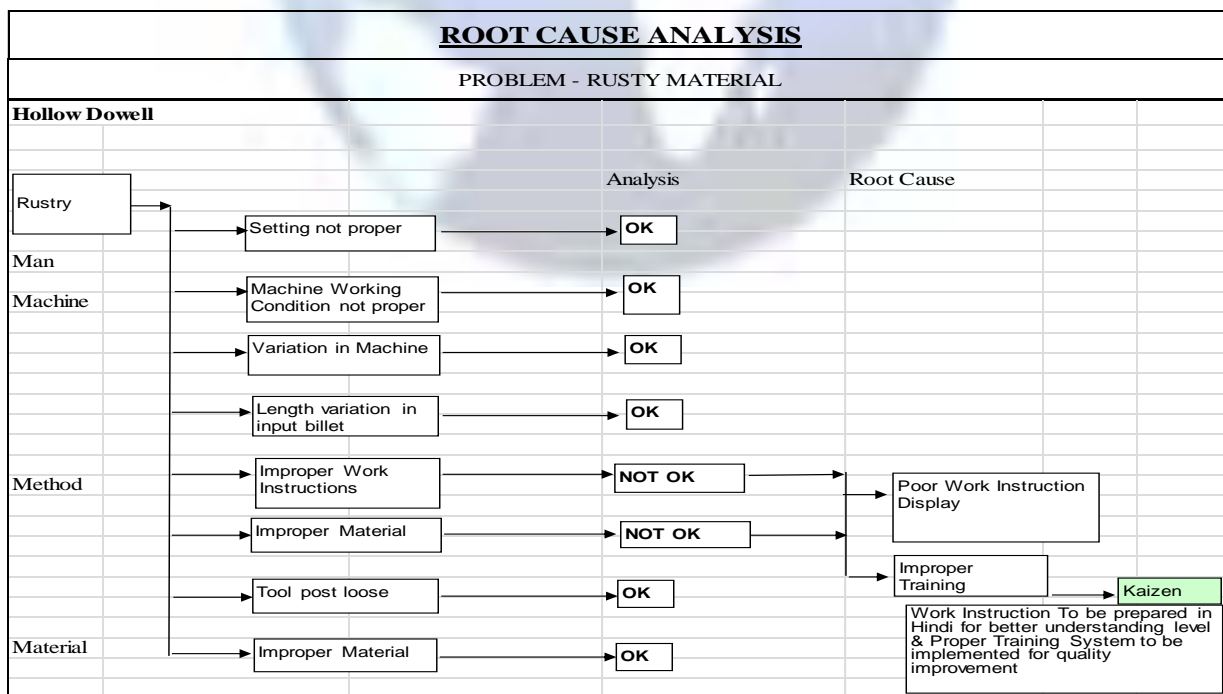


Figure 4: Root Cause Analysis of Marked Problem

3.6 Preparation of Work Standards & Training Session

Implement the feasible ideas to minimize or eliminate the problem which are highly contributed to the total no. of problem. The implementation is done on the basis of Kaizen philosophy. The basic idea to reduce / eliminate any problem is proper training and material provided to the employee/ workers so that they do their work effectively and efficiently. It is one of core steps in which problem solution is made and new work procedures/ work standards are prepared to reduce any problem. The purpose of preparing work standard is to train employee so effectively that they may commit no mistakes. The understanding level of employee may become so high that the problem may be generated in those areas where these work standards implemented. The proper training of employees of 2-5 days is being done for the purpose to follow these new work standards. The prepared work instructions and Training are attached in Appendix I.

Result Analysis

The result analysis is done on the basis of effectiveness of QCM by reducing PPM Level of all the products from a huge quantity of total 103425 to a minimum quantity of total 12342 which expected to become zero in the next month. The QCM eliminated the major contributor of problems i.e. Dowel, Axle, contribute in form of Rusty, dent and mix up problem which are found in Final Inspection Area. These problems result in increasing the cost of quality to the industry in terms converting the non-conformities to Good Product by sorting, rework and repairing process. The reduction trend of PPM Level of six months (from Nov14 to Apr 15) is displayed as shown in Chart 1.3.

Conclusion

In the present research work, an initiative has been taken to apply Quality Circle Methodology in a small organization manufacturing of automobile industry. The results of the study showed that Quality Circle Methodology empower employee to achieve zero defects in all possible ways and has a lot of potential to pioneer quality system. In manufacturing industry, successful implementation of Quality Circle Methodology has been carried out. Literature review has also not yielded any evidence of successful implementation of Quality Circle Methodology in Production improvement in any sort of industry. In the present study, an attempt has been made to implement Quality Circle Methodology in achieving zero defects in production in a small manufacturing industry.

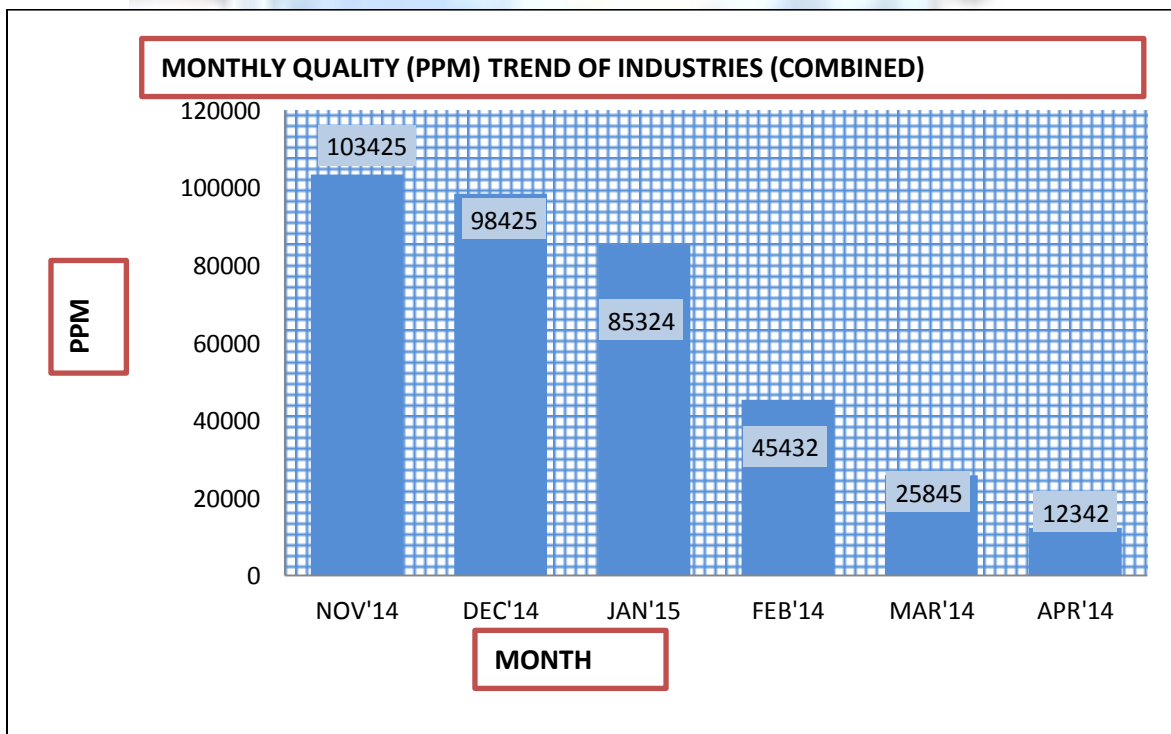


Fig. 5: Reduction Trend of PPM Level from Nov 14 to Apr 15

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