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Effect of quality circle in fastener industry in production

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Abstract

In modern times, every organisation works for Quality in their respective products and services. According to expectation of customer, the organisation needs to apply positive changes in production and manufacturing operations. Each organisation needs to update their services and products as the customer provisions.

Fastener industry is basically a combination of production based and profit based industry. In present era, fastener industry is developing slowly but steadily as they are adopting SQC techniques & tools. The Quality Circle Conception is one of the finest techniques for introduction of quality in each & every department of an industry. The fastener industry can enhance the quality in articles like nuts, bolts and screws etc. by superimposing a suitable inspection approach as well as the different kinds of imperfections present in fastener articles should be classified according to their impact and their optimal remedies are also necessary.

Keywords: quality circle, fastener industry, production

Introduction

Quality control circle research methodology

Quality circle definition

According to President of International Association of Quality Circles Dewar "Quality Circle is a way of capturing the creative and innovative power that lies within work force".

Quality Circle is defined as a minor cluster of workforces in the analogous field who willingly meet repeatedly and whose particular task is to classify the complications linked to quality enhancement, articulate optimal explanations and present their consequences to administration along with recommendations for execution.

QC is a slight get-together of 6 to 12 staff members undertaking alike effort who gladly come together on a consistent root for identification and enhancements in their corresponding task zones.

QC characterize an assembly consisted of 3 to 15 employees from internal members of an organization. Basically eight employees are compulsory to make up a QC according to the subject of Statistics when previous data was analysed.

"Quality circle is a small group of employees in the some work area or doing a similar type of work who voluntarily meet regularly for about an hour every week to identify, analyze and resolve work-related problems, leading to improvement in their total performance, and enrichment of their work life".

"Quality circles are a formal, institutionalized mechanism for productive and participative problem-solving interaction among employees".

"Quality control circle is not just a little room adjacent to the factory floor, whose occupants make a nuisance of themselves to everyone else. It is a state of mind and a matter of leadership with everyone from the president to production trainee involved".

"Quality circle is a small group to perform capital quality control activities within the same workshop. This small group carries on continuously as a part of companywide quality control activities self-development and mutual development and improvement within the workshop, utilizing quality control techniques with all members participating.

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Literature survey

Shantanu Kulkarni *et al.* (2013) paper entitled “*Quality Circle to Improve Productivity*” explains the various forms of Quality Circle Approach along with how increments can be done by supporting training of QCC in Chemical organisations. The present research paper also discusses an equivalent debate of distinct appearance of QC Approach, Quality Enhancement Class as well as team of Project/Task Class. A case study of a chemical corporation using the concept of QC is well explained in this research paper which is clearly visible for the performance of QC Perception.

Shpresa SYLA *et al.* (2013) paper entitled “*Quality Circles: What do they mean and how to implement them?*” describes the best plan for solution of different kinds of challenges an industry faces. In modern era, each and every organisation has challenges which are totally contrasting to the challenges in previous times. As the challenge is new, so the plan of its solution should also be new instead of the methodology used in the past times for tackling various kinds of problems. There is a huge divergence between modern challenges and past time challenges. Accordingly, the research methodology used for tackling such challenges also differs a lot. QC reflects the best possible procedure of integration of workers in a research for the challenges in a firm. From the best outcome of QCs in the last decade, each and every firm adopt the QCC. Such things result in the slow and steady progress of QC implementation for each and every incorporate. The present research paper basically explains analysis of QCs along with their benefits for a firm and logical reasoning of effectiveness of QCs implementation. At last, a correlative study of adopting QCs in various states is discussed.

Yang Wang *et al.* (2013) paper entitled “*The role of quality control circles in sustained improvement of medical quality*” describes the latent role of QCs in medical fields. We used quality control circles (QCC) surveyed by the PDCA Deming cycle & analysed the application of QCC to the sustained development of a medical foundation in Zhejiang province. The improvements in these areas were $61.12\% \pm 13.2\%$, $60.47\% \pm 28.91\%$, $34.41\% \pm 22.96\%$, $49.22\% \pm 25.39\%$, and $73.70\% \pm 5.24\%$, respectively. The intangible achievements were reflected as follows: 5% of QCC members showed an activity growth value of 1–2 points, 83% 1–2 points, 12% more than 2 points. As a result, QCC activity presented prominent outcomes in fostering long-lasting enhancement in the quality of medical institutions in terms of both tangible & intangible parameters. In short, QCC can be utilized as an effective tool to enhance medical quality.

Reza Hosseinabadi *et al.* (2013) paper entitled “The effect of quality circles on job satisfaction and quality of work-life of staff in emergency medical services” concludes that implementation of QCC needs participative management in any sector. QCs, as a participatory management practice, offer one alternate for dealing with frustration & discontent of today’s employees. In this case study, two emergency medical services (EMS) of Hamedan province were nominated & randomly allocated as the experimental & control collections. After the experimental cluster was skilled & QCs were recognized in this group, the levels of

QWL & job satisfaction were measured in the two assemblies. Then, the statistical analyses were done using t-test. This study was conducted to investigate the effect of implementation of QCs on nurse’s QWL & job satisfaction. This study concludes the effectiveness of QCs in enlightening QWL & job satisfaction of nurses working in EMS, and offers their application as a management method that can be used by EMS managers.

Quality circle structure

For the successful implementation of QCs, a fundamental organisational structural framework needs to be built up.

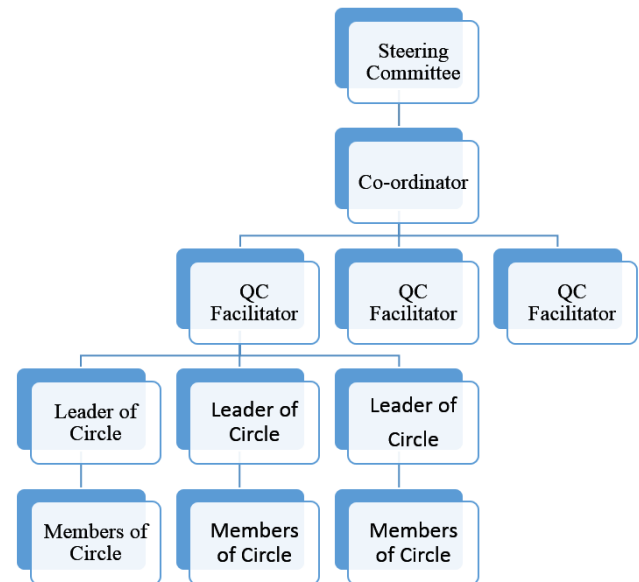


Fig 1: Basic model of quality circle structure

The QCs output will be efficient as well as effective if and only if the optimal organisation structure is built. Though the QC structure may fluctuate from organisation to organisation; but the basic model for framework is very much similar as Fig. 3.1 represents. The main components of a QC for any type of manufacturing industry includes: -

1. A Steering Committee
2. A Co-ordinator
3. Implementer
4. QC Leader
5. QC Members

Data collected before the implementation quality circle and statistical tools

Data collection & data analysis

The different lots are inspected day by day. There is variation in product i.e. especially a lot of types of nuts; bolts and screws are there in fastener industry. So there data collection on daily basis seems to be a tough job to complete. But with the help of Quality circle members and very supportive nature from fastener industry side, the difficult task easily moulded into an easy task.

The data collected for the month of Jan 2019 is represented in Table 1 as shown below.

Table 1: Jan month representation of lot acceptance versus lot rejection

Serial No.	Date	Total Lot Inspected	Total Lot Accepted	Total Lot Rejected
1	01.01.19	0	0	0
2	02.01.19	3	2	1
3	03.01.19	5	4	1
4	04.01.19	4	4	0
5	05.01.19	2	2	0
6	06.01.19	2	2	0
7	07.01.19	3	3	0
8	08.01.19	0	0	0
9	09.01.19	8	8	0
10	10.01.19	3	3	0
11	11.01.19	4	4	0
12	12.01.19	2	2	0
13	13.01.19	2	2	0
14	14.01.19	3	3	0
15	15.01.19	0	0	0
16	16.01.19	3	3	0
19	19.01.19	4	3	1
18	18.01.19	5	5	0
19	19.01.19	0	0	0
20	20.01.19	4	4	0
21	21.01.19	5	5	0
22	22.01.19	0	0	0
23	23.01.19	4	4	0
24	24.01.19	7	7	0
25	25.01.19	4	4	0
26	26.01.19	0	0	0
27	27.01.19	4	3	1
28	28.01.19	3	2	1
29	29.01.19	0	0	0
30	30.01.19	4	2	2
31	31.01.19	0	0	0

Total rejection 7 out of 88
 Rejection Percentage $7/88 \times 100 = 7.95\%$

The data collected for the month of Feb 2019 is represented in Table 2 as shown below.

Table 2: Feb month representation of lot acceptance versus lot rejection

Serial No.	Date	Total Lot Inspected	Total Lot Accepted	Total Lot Rejected
1	01.02.19	4	3	1
2	02.02.19	4	4	0
3	03.02.19	12	4	8
4	04.02.19	5	5	0
5	05.02.19	0	0	0
6	06.02.19	0	0	0
7	07.02.19	4	4	0
8	08.02.19	8	8	0
9	09.02.19	5	4	1
10	10.02.19	5	4	1
11	11.02.19	4	3	1
12	12.02.19	0	0	0
13	13.02.19	5	5	0
14	14.02.19	4	4	0
15	15.02.19	6	5	1
16	16.02.19	4	4	0
19	19.02.19	4	4	0
18	18.02.19	5	5	0
19	19.02.19	0	0	0
20	20.02.19	4	4	0
21	21.02.19	3	3	0
22	22.02.19	4	3	1
23	23.02.19	4	4	0
24	24.02.19	4	4	0
25	25.02.19	5	4	1
26	26.02.19	0	0	0
27	27.02.19	8	8	0
28	28.02.19	4	4	0

Total rejection 15 out of 115
 Rejection Percentage $15/115 \times 100 = 10\%$

Data collected after the implementation of quality circle and statistical tools

The data collected for the month of March 2019 is represented in Table 3 as shown below.

Table 3: March Month Representation of lot acceptance versus lot rejection

Serial No.	Date	Total Lot Inspected	Total Lot Accepted	Total Lot Rejected
1	01.03.19	0	0	0
2	02.03.19	5	5	0
3	03.03.19	3	3	0
4	04.03.19	4	4	0
5	05.03.19	0	0	0
6	06.03.19	3	3	0
7	07.03.19	3	3	0
8	08.03.19	4	4	0
9	09.03.19	4	4	0
10	10.03.19	0	0	0
11	11.03.19	4	4	0
12	12.03.19	0	0	0
13	13.03.19	0	0	0
14	14.03.19	3	3	0
15	15.03.19	1	1	1
16	16.03.19	2	2	0
19	19.03.19	2	2	0
18	18.03.19	3	3	0
19	19.03.19	0	0	0
20	20.03.19	2	1	1
21	21.03.19	0	0	0
22	22.03.19	0	0	0
23	23.03.19	2	2	0
24	24.03.19	5	3	0
25	25.03.19	6	4	2
26	26.03.19	0	0	0

27	27.03.19	5	5	0
28	28.03.19	4	4	0
29	29.03.19	5	5	0
30	30.03.19	4	2	0
31	31.03.19	4	2	0

Total rejection 4 out of 78
 Rejection Percentage $4/78 \times 100 = 5\%$

All the lots inspected, accepted and rejected are plotted so that month wise progress can be easily visualized on vertical bars of different heights. A colour variation is used to represent fastener lot that is inspected (Red colour bars), the

green colour bars depicts lots of accepted fasteners and purple colour bars represent lot's that are rejected for fasteners.

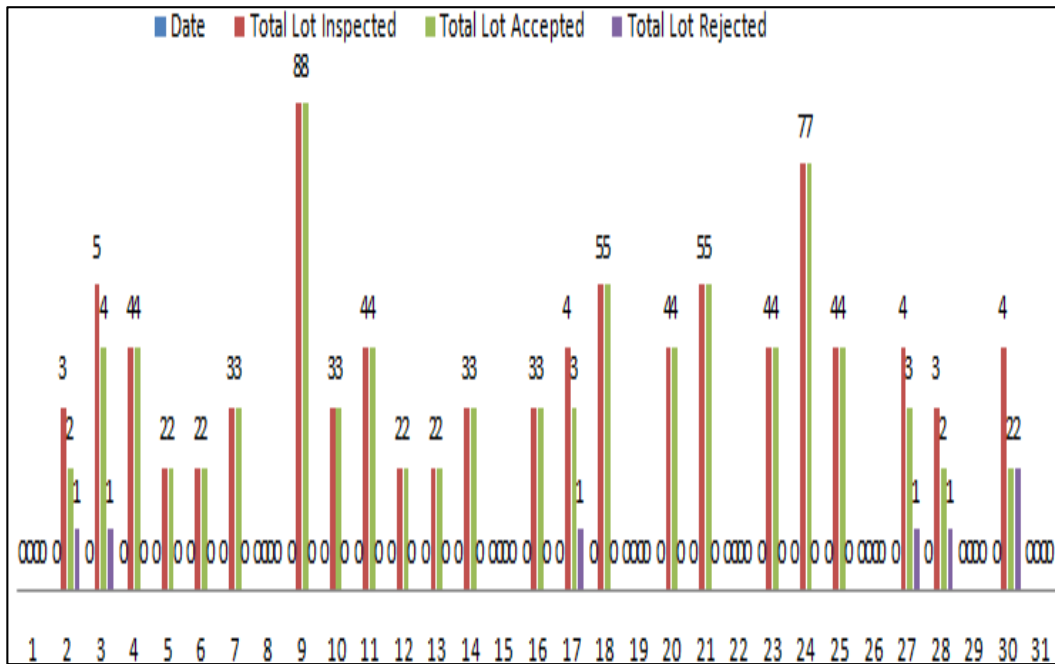


Fig 2: Different aspects of Batch/Lot for Jan Month

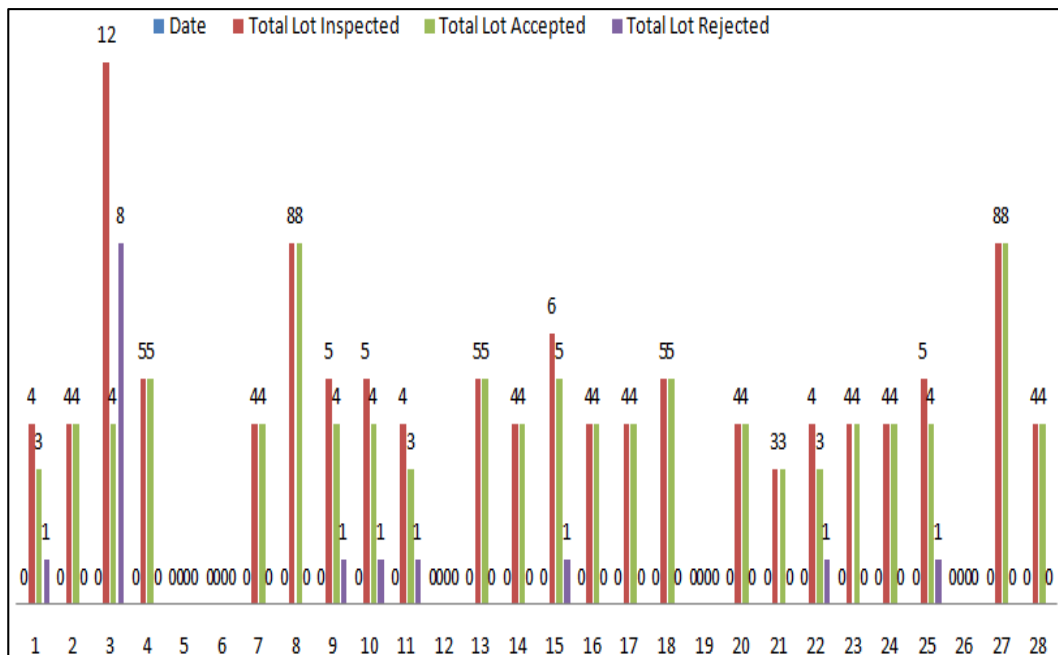


Fig 3: Different aspects of Batch/Lot for Feb Month

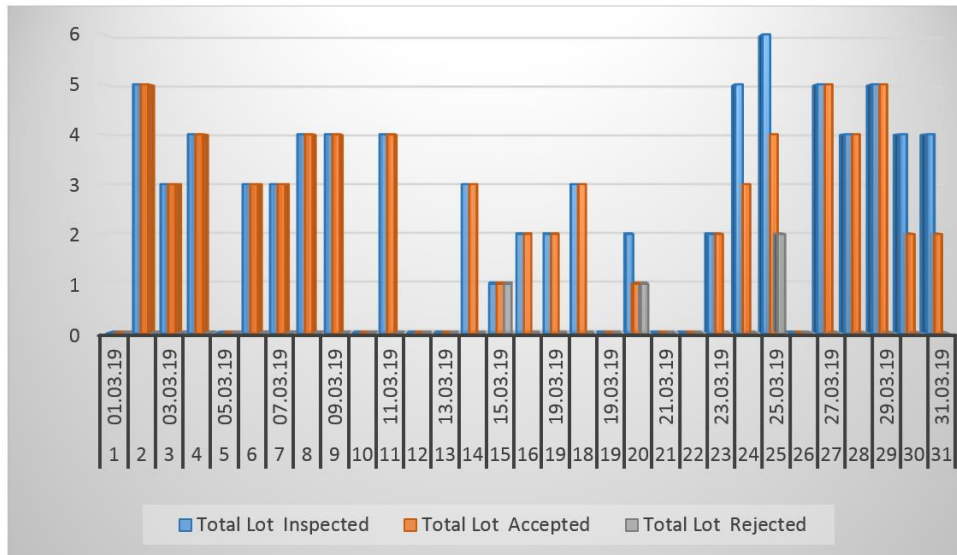


Fig 4: Different aspects of Batch/Lot for March Month

Conclusion & scope for future work

Conclusion of research work

The present research case study for a Fastener Industry is designated for enhancement of Quality in fasteners by introducing qualitative work instead of quantitative work. The fastener industries are developing day by day because joining of two parts with help of fastener provides a kind of flexibility in assembling parts of vehicles, machines etc. The final outcomes of the case study are as follow:-

- There is steady decrease in lot rejection along with a positive linear increase in lot acceptance when lot wise inspection is done during time span of four months.
- Carton wise Lot Inspection increase number of shifts increase from 2 to 3 (each of 8 hours). So a huge amount of time is saved because it is not feasible to inspect each & every fastener.
- Different plots are plotted with the help of Minitab 2019 software which provides accurate and precise results.

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