CHAPTER - 3

QUALITY CONTROL CIRCLE
Chapter 3

QUALITY CONTROL CIRCLE

Organizations, the world over has been experimenting with the different methods of management to make themselves effective. The process of experimentation for effective transformation has been in existence right from the beginning of organizational history. These attempts in turn lead to a series of organization related researches during the past several decades. Many of these researches emphasise that of the various inputs that go into organizational functioning, the one that stands out as the most significant element, bringing about far reaching consequences on the aspect is the human factor.

Out of their realization came the newly developed behavioral science discipline, which subsequently generates several different human resource management approaches.

However not many behavioral science approaches in the recent past have been able to attract the attention of the organization, managers, workmen and the students of organizational behavior as Quality Circle has done. The concept of Quality Circle has spread to large number of countries — developed & developing, U.S.A., U.K., Norway, Sweden, Brazil, Canada, France, Singapore, Korea, Taiwan, Malaysia, Argentina, and of course in India too.

In Japan, QC has become a part of organizational life, in industries, banks, insurance companies, electric power utilities, superstores, hotels, departmental stores, hospitals, restaurants and even in beauty parlors.

Dr. Kaone Ishikawa is the father of Quality Circle movement in Japan. Ishikawa the architect of quality control movement in Japan, in his most famous quote said, “Quality Control begins with education and ends
with education”. He consciously used term education to emphasise that what was needed was to make workers think and then change their thought patterns through repeated education as opposed to mere sharpening of existing skills which training is intended to do. This is what exactly quality circle movement aims at.

The growth of Quality Circle can be seen from the table given below:

**Table 3.1 Growth of QCC**

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Circles</th>
<th>No. of Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962</td>
<td>23</td>
<td>---</td>
</tr>
<tr>
<td>1965</td>
<td>4930</td>
<td>70920</td>
</tr>
<tr>
<td>1980</td>
<td>15254</td>
<td>1062759</td>
</tr>
</tbody>
</table>

While Dr. Deming taught the Japanese management Statistical Quality Control (SQC), Dr Juran taught them Quality Management (QM) through 3 strategies:

- Upper management leadership
- Massive education on quality
- Annual quality improvement plans and annual cost reduction plans & their implementation

Since 1949, after the establishment of a basic course on Quality Control, the Japanese have endeavoured to promote quality control education across the country. It began with massive education of engineers, which then spread to top & middle management & then to other groups. However they realized that they could not make good quality products unless the line workers are trained & co-operation from them is sought. Thus began the education of workers in intra- departmental groups of 10 or so, seated around the table & hence name Quality Control Circle.
It is necessary to recognize here that Japanese stated QC long after all management had been trained in Quality Control & company wide quality control (CWQC) was put into operation. That is Quality Circle came at the end of the total program. They successfully integrated Quality Circles with CWQC, a philosophy with respect for the human individual as its foundation brought in a new human dimension focusing on developing the people first to work for the organizational and societal goals. This can be said to be the most significant and magnificent contribution to not only QC management but also to Human Resource Development.

After the Second World War Japan is systematically pushing behind other industrial nations in several areas e.g. in consumer electronic area 85% of the video tape records, 57% hi fi calculators & 40% colour T.V. came from Japan. In the area of technology export, Japan has done extremely well in the last decade. This shows the success story of a geographically small country. How did this miracle of transforming a country with a poor quality to a country with a super quality, which has captured a world market happen? The answer is known to all- Quality Control Circle or Quality Circle [QCC/QC].

Quality Circle

Definition:

1. Q.C. Is a small voluntary group of people from the same work area who meet on regular basis for the purpose of identifying, selecting, analyzing and solving quality productivity, cost reduction safety customer service and other work related problems in their work area, leading to the improvement in their work effectiveness and enrichment of their work life.
2. It may be also defined as, "A small group, which meets voluntarily to perform quality control within the workshop to which they belong".

3. Q. C. essentially is participatory management process where the actual improvement of the people at the grassroots level of the organization is effectively applied.
   a. Q.C. is the type of participative management. It is a type of team.
   b. A team is defined as 2 or more people who interact and influence each other towards a common purpose. Today's teams have the characteristics of both, formal & informal.
   c. Q. C. is a kind of team. In a programme called Quality Circle teams meet for an hour weekly or fortnightly to discuss work related problems, investigate the causes, recommend solutions and take corrective actions.
   d. Q. C. basically is a philosophy regarding human resource development and the management of the organization has to give serious to this People Building before they embark on Q.C. programme.

4. According to Masaaki Imai, QC is a small group that voluntarily performs quality control activities within the workplace carrying out its work continuously as part of a company wide programme of quality control, self development, mutual education, flow control & improvement within the workplace.

   The concept of Quality Circle is a departure from the western management approach, which separated the workmen and management into two different blocks.

   This approach was wrong, as it was full of mutual suspicion and distrust and with the result, attainment of organizational goals were not what they should have been. Q.C. is a breezy change from the Taylor
system approach. Following figures are self-explanatory about the change brought about by the concept of Quality Circles.

Traditional Management Approaches  Qc approach to Management

![Barrier Wall](image1)

![Wall of mistrust broken](image2)

![One-way approach](image3)

![Two-way approach through information sharing](image4)
Employees have their own PDCA as well as organizational goals.
Emergence of Z Company with all participating

Philosophy of QC

Quality Circle has to be seen as management philosophy & not as a management technique, as tool or technique can be applied in a mechanical fashion/ manner. But a philosophy cannot be applied blindly in a mechanical manner. A lot of thinking process and preparatory work has to be gone through before this philosophy is put into practice.

A quality circle basically is a philosophy regarding human resource development and the management of the organization has to give a serious thought to this people building philosophy before they embark on Quality Circle programme.

The transformations, which take place in the organization, have direct impact on human expectations. To cope up with this – one way is to approach human resource management with sincerity. This sincerity is reflected only through a genuine concern for developing people. Quality
Circle is essentially a people building philosophy through participatory process. It cannot be applied mechanically but only through the efforts, which come out of genuine & sincere concerns about people.

To sum up we can say that philosophy of Quality Circle activities is to

1. Contribute to the improvement and development of the enterprise.
2. Respect humanity and build a happy bright workshop, where
   a. People are not treated as a part of machinery but as human beings engaged in meaningful jobs and bringing out their full potentials.
   b. People use their wisdom & creativity in the work they are engaged in.
   c. People develop their ability through an opportunity to use their brains.
   d. People are not isolated from each other and can act as a group creating harmonious human relations based on bonds of brotherhood in the workshop.
   e. People mutually educate themselves by sharing the experiences.
   f. People are given due recognition by all.
3. Display human capabilities fully and eventually draw out infinite possibilities.
4. Promote job involvement and participation.

**How does it differ from earlier approaches?**

Different methods to involve people in management have been tried. Although a Quality Circle is a participatory process, it differs from other types.

A. First of all, Quality Circle is self-generating and self-operating activity & not an imposed one. Other participatory form such as work committee, joint management councils, customer service
committees in banks were directed by either government or management where people at the receiving end either reject them or give them a lip service. Quality Circle is voluntary participatory action at the grass root level and there is no force on you to join it. This is the basic distinguishing factor between QC and other earlier approaches.

B. Then top management interest and support are the prime sources from which the Quality Circle members drive a sense of responsibility & recognition.

C. The members are given sufficient training.

Need and Importance

Any people related programme in organization should essentially satisfy two needs for their substance & growth. These needs are first – organization related and second – people related. Unless the programme tries to satisfy the needs of both the categories, it will not be effective. Take any human resource activity e.g. training activity in an organization to be effective, should serve the needs of the organization whereby the people are trained to handle the organizational activities, leading to goal achievement. And on the other hand training should help the person to develop his skill, knowledge and attitudes, which in turn would help him to achieve his personal goals. The same is the case with almost all human resource management programmes such as performance appraisal system, induction grievance administration, etc.

The failure of most human resource management approaches are mainly due to the fact that they do not meet the requirements of both the categories of needs.

Quality Circle satisfies both the needs. From organizational point of view it brings about effectiveness leading to the better achievement of goals. From the people’s point of view it provides satisfaction of most of needs such as recognition, achievement, self-development etc.
Broadly speaking the benefits that can be accrued from Quality Circle for the organization and the individual are classified into 2, namely tangible & intangible. More positive attitude towards work and employee development are intangible gains while certain measurable gains resulting from the problem solutions in quantifiable terms are tangible gains. Both can lead to organizational effectiveness, in the form of better productivity, profitability, customer service, employee satisfaction & increased quality of work life.

It is studied that though primary motives were to improve product quality and lower cost – there are additional benefits to the company. Many executives involved in the study, appreciated more potential in QCC as there are intangible benefits such as better human relations resulting from improved communication and morale. Thus they have given technical and social benefits an equal weightage.

Another study by Rafaeli in an American Electronics Manufacturing Company tested 3 hypothesis and found that-

A) There was a clear relationship between Quality Circle membership and perceptions of influence on the job.

B) There was high level of positive relationship between Quality Circle and task variety, Quality Circle and Autonomy and Quality Circle and interactions with non-members.

C) Although Quality Circle membership did not have a significant effect on job satisfaction, the results were in that direction. According to this study Quality Circle members did report significantly fewer intentions to leave the organization than that of non-members.

Several studies have pointed out that the Quality Circle programme brought both tangible and intangible benefits to the organization & employees.

In India, a research study which was conducted at BHEL, Hyderabad 2 and 1/2 years after starting Quality Circle reported Quality
Circles have brought about several positive intangible benefits to the organization & to the employees in major units of BHEL. In 1985-86, i.e. in Bhopal, Hyderabad, Haridwar & Trichi, QC saved Rs. 90 lakhs, 70 lakhs, 65 lakhs & 55 lakhs respectively.

The intangible benefits come from positive feelings of the employees. The employees feel that they are liberated earlier they were doing what they were told to do, but now they also have freedom to work on areas of their choice & interest.

In Tata Engineering & Locomotive Company, Pune, a canteen employee, a member of Quality Circle stated, "Higher management takes notice of our activities and even a chairman of the company sits along with us which had never taken place before." This Quality Circle had taken the problem of oil wastage & saved Rs. 50000 annually.

Quality Circle of Hindustan Antibiotics Ltd, Pune Quality Circle improved the medicine packing, which resulted in easy handling of the package. The members mentioned, "We are not doing this for money. We enjoy doing this."

The list of these quotable quotes is unending. What we can surely say is that the functioning of Quality Circle has helped the members a lot in improving knowledge, team work, creative thinking capability for analysis. Many problems are solved without much difficulty & the members feel happy & satisfied. Their self-confidence is helping them to take up any such problem in future also. As mentioned by QC members of State Bank Of India, Gwalior branch-" Quality Circle has added to our happiness & team spirit and overall performance of our division has improved. We are now quite comfortable to do the closing & even when we just have 65% of our staff available and rest of the staff is either on deputation or leave."

The above-mentioned facts and other reflections on Quality Circle experiences in India and other countries substance indicate that the
concept of Quality Circle has a substance and it is relevant to the functioning of modern organization.

This is substantiated by the benefits the organizations gain. In the recent convention of the Quality Circle in Nov 2003 at Nashik, it has again been proved. The case studies presented by different organizations once again proved the fact that the employees are taking initiative in solving the problems of the organization even though sometimes they personally are not going to benefit. This urge comes from the fact that no one likes to do work badly, no one likes wastages, breakdowns etc.
The attendance for the meetings of Quality Circle members is also found between 90% and 95%, which shows the interest of the members in doing well for the organization.

In one case study a very common problem faced by many organizations is studied where the lights remain on unnecessarily during daytime at many places and by studying the problem, the Quality Circle of a company saved 68% of its electricity and Rs. 164510. This is just one example. Again intangible gains are immeasurable.

Quality Circle members admit that increase in QC knowledge; confidence, discipline, cooperation etc are results of being Quality Circle members.

What QCCs are not?

Different methods to involve people in management have been tried. Although QC is a participatory process, it differs from other Types.

It is seen many a times that even those who have been exposed to the Quality Circle concept and who profess to have understood it thoroughly continue to have many misconceptions with regards to its philosophy. Quality Circle is not a fad, once formed they exist forever. In
order to implement this philosophy successfully it is necessary to dispel these misconceptions.

1. **Quality Circle is not just for quality problems**-
   It has been experienced in India and abroad that the problems taken up by Quality Circles are diverse and varied. Quality Circle do not only tackle problems of quality alone but any issues affecting productivity, cost reduction, safety, house keeping, etc. in other words quality in totality in the larger sense and of work life itself is involved in Quality Circle activities.

2. **Quality Circle is not a substitute or does not replace**-
   a. Task forces or groups that are formed to tackle the problem in the organization. Quality Circles are performance oriented and aim at improving the working of the area in totality whereas task forces are problem focused and cease to exist once the problem is resolved.
   b. Product committees, which are meant primarily for improving the quality of the product.
   c. Joint plant councils / works committees – The members of such councils do not work voluntarily. Management and unions appoint them. Joint plant committee or works committee can co-exist with the Quality Circles in any organization.
   d. Quality Assurance - the role of which is entirely different than that of Quality Circles.

All the above mentioned groups are constituted officially by the management, on the other hand, it is for the first time that voluntary formation of groups by employees at grassroots takes place in the Quality Circle concept and their recommendations flow from “bottom upwards”. Successful operation of a participative management in real sense is seen in Quality Circle operation. The employees at the grassroots with the active assistance and
cooperation from various levels of management resolve problems for better performance of the organization.

e. Suggestion schemes for soliciting suggestions from employees exist in many organizations, which are different from the concept of Quality Circles. Under suggestion schemes only one individual gets rewarded and the responsibility of implementations is not on the individual who has given the suggestion, whereas recommendation from Quality Circle emerge from the group activities which is healthier for any organization. Moreover Quality Circles do not only point out problems to others but also resolve them and ensure their implementation, seeking the help of other experts or agencies as and when necessary.

3. **Quality Circles do not change the existing organizational structure.** The hierarchical set up in any organization or delegation of powers is not affected due to the formation of Quality Circle.

4. **Quality Circles are not a forum for grievances or a springboard for demands.** Personal grievances or demands to the management do not come under the preview of Quality Circle activities.

5. **Quality Circles are not means for management to unload all their problems.** No doubt wherever circles are formed, it is seen the day to day problems are increasingly and more willingly resolved by the employees themselves affording the executives more free time to attend to their managerial responsibilities.

6. **Quality Circles are not a panacea for all ills.** We emphasize the fact that the Quality Circle philosophy is towards changing the attitudinal change in the organization.
Development of Quality Circles in India

Whenever people have developed a sense of team spirit, whether it is in industries or any other activities, they have met with great success in their endeavours.

Though much has been talked about the tendency of the Indians to pull each others’ legs, over a period of time we have changed a lot & have proved that working in Quality Circles have generated team spirit amongst us which is one of the intangible spin off benefits of participative philosophy, imperative for the future of our national activities.

Belonging to the same continent, being oriental, having similar traditional values such as respect for elders, affinity amongst family members, similar religious background & other common traits, it is easier for people in Japan & India to understand each other. Still then it took 20 years for the concept of Quality Circle to reach India after its birth in Japan in 1962. It is all more surprising because the concept of participative management, embedded in QCC and the consensus approach among the decision makers and those who implement them is not entirely new to us in India.

In India the idea of Quality Circle has spread considerably fast although it had a very simple beginning in the year 1980 at Ramchandrapuram plant at BHEL- engaged in the field of power generation, transmission, distribution and utilization equipment. Until then there was no report of any similar experiment done anywhere else in the country. It was considered that it was prudent to establish the feasibility of the concept in our Indian environment first. The fact that within 3 to 4 months of their launching, the first Quality Circle could make a presentation of the case studies of the problems identified & resolved by them to the top management & the workers in other areas started voluntarily coming forward to start new circles proved that cultural heritage
or industrial background is no barrier to the effective implementation of Quality Circles. With the Chairman & Managing Director of BHEL Sri K. L. Puri expressing his firm support to the implementation of Quality Circles, the movement spread rapidly to other units of BHEL as well.

The first five Quality Circles were formed in Nov 1980 and formally inaugurated on Jan 5, 1981. The word spread about the Quality Circles and the spontaneous enthusiasm started growing and 1981 ended with 33 circles in Hyderabad. In the first 18 months of the operation of Quality Circles, there were 3 presentations of case studies to the top management and the number of circles rose to 51 in Hyderabad. BHEL alone & the areas covered by Quality Circles were diverse from personnel, training, medical and engineering departments.

Table 3.2 THE GROWTH OF QUALITY CIRCLE IN BHEL:

<table>
<thead>
<tr>
<th>The growth of Year</th>
<th>Quality Circle in BHEL (No of Circles)</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981-82</td>
<td>36</td>
<td>315</td>
</tr>
<tr>
<td>1982-83</td>
<td>211</td>
<td>1850</td>
</tr>
<tr>
<td>1983-84</td>
<td>591</td>
<td>5528</td>
</tr>
<tr>
<td>1984-85</td>
<td>1277</td>
<td>12430</td>
</tr>
<tr>
<td>1985-86</td>
<td>1489</td>
<td>12430</td>
</tr>
<tr>
<td>1986-87</td>
<td>1589</td>
<td>15489</td>
</tr>
<tr>
<td>1987-88</td>
<td>1671</td>
<td>16319</td>
</tr>
<tr>
<td>1988-89</td>
<td>1676</td>
<td>16569</td>
</tr>
<tr>
<td>1989-90</td>
<td>1685</td>
<td>16733</td>
</tr>
</tbody>
</table>

The success story of Quality Circle in BHEL started spreading through articles in the press and news reports. Many other organizations, both in public and private sector, started evincing interest in the concept. It
was then that the idea of founding a non-profit National body was mooted for the purpose of propagating the participative philosophy throughout the country. That was how was born the 'Quality Circle Forum of India' in April 1982. Since then QCFI has been joining hands with different professional bodies for organizing the programmes on Quality Circle at different places.

When initially launched Quality Circle had got off a good start, the need was felt for a newsletter to give publicity to the activities of Quality Circles and also to afford recognition to their efforts. Accordingly a Quality Circle forum, a quarterly newsletter commenced publication in January 1982.

Also a talk on Quality Circle Phenomenon was broadcast by Sir Udapa on All India Radio also broadcast a talk on the Quality Circle phenomenon. As a result of this many private as well as public as well as public sector ventured to initiate Quality Circles in their respective areas.

Over 600 companies such as Hyderabad Allwyns, Bajaj Auto, Jyoti, Air India, Telco, NTC, and Crompton Greaves have started operating Quality Circles.

A large no of professional bodies and academic institutions also showed interest in Quality Circles and arranged the lecture meeting for their members on the subject in different centers.

Although India woke up to the imperative need for introduction of the participative philosophy in its organizations much later than other countries it has gained ground rather rapidly since 1980-81. In June 1991 the membership of QCFI has steadily grown to over 2100 with 20 chapters, the number of organizations operating Quality Circles has crossed 600 mark in different sector of our economy and the no of participants in the conventions & workshops organized by QCFI has also been rising.
Before anything is written about Quality Circle in Nashik, it is very much inevitable in the context of Nashik to write about the TQC in Nashik, generally known as Nashik experiment.

The things began to take shape somewhere in the beginning of 1983. C II I Zonal committee, then under the chairmanship of Mr. Janak Mehta was discussing industrial scenario as a part of routine but however things took serious turn.

In the context of the state of our economy the group of industrialists under the able leadership of Mr. Janak Mehta got together to discuss:

A. Whether we need a change?
   The answer was an emphatic 'yes'.
   1. The information about growth rate shows that value of output people employed is very low.
   2. Foreign exchange reserves are depleting.
   3. Resource utilization is becoming poorer i.e. increase in output is not in accordance with increase in capital.
   4. In the last 10 years we have gone down from 10th to 20th position in terms of industrial output. In short we are going bad to worse. So we need to improve Quality. The answer we have seen in most industrially advanced countries and also in well run Indian organization. Improvement in quality has resulted in overall cost reduction. Qualities of product, productivity and cost reduction are synonymous and have common course.

B. Having decided that we need change, the next step is to find out 'what that change should be'.

When we look into 4 main causes namely Material, Machine, Money and Men, we find that root cause behind all causes is the poor quality of the work that people do. In short we have to change the emphasis from Quality of product to the quality of work that people do which is the main cause.

The change we need is attitudinal. Whenever we talk about quality, our thoughts should focus on our own work rather than the product.

With this background on the historic day the 3rd August 1983, unit heads of various industries in Nashik came together. The aspect of quality of work of the people was discussed at length. After detailed discussion it was unanimously agreed to evolve a system known as Total Quality Control [TQC] or Company Wide Quality Control [ CWQC] for improving the quality of work of individuals at all levels leading to optimization of individual capability and contribution for the development of the organization and society.

T.Q.C. is basically Japanese concept and a beauty of the approach for the development of the industrial organization, its employees and other people related to work at Nashik is that the employees from all levels, workmen to the chief executives are participating towards the fulfillment of objectives of T.Q.C. while achieving their self-development.
To implement TQC what is necessary is to apply the fundamentals of TQC, which are:

1. Self development
2. Voluntary activities
3. Group activities
4. Participation by everyone
5. Application of QC techniques
6. QC Circles Activities take root in the workshop
7. Activation & Perpetualization of QC circle activities
8. Mutual development
9. Creativity
10. Quality consciousness, problem consciousness and improvement consciousness

CII Zonal committee decided to introduce these changes at the next level i.e. level of Managers. C.I.I's then Zonal committee formed a TQC panel of Heads of various units to supervise, guide & control these activities. There were 10 study groups, studied basic seven techniques of Statistical Quality Control [SQC] with the help of book by Prof Kaoru Ishikawa ‘Guide to QC’. They then took real life problems, solved them to convince themselves and to demonstrate the strength of this system for the benefit of the organization and the society.

Slowly TQC study groups were introduced to supervisory level. The emphasis remained on Training & Application. Members of managerial group were acting as facilitators at supervisory level and ultimately change was introduced at the level of workmen. The largest group of people is at this level and they must accept it voluntarily.

This part of TQC concept is commonly known in the Quality Control Circles. It was decided to provide administrative and management support for QC Circles. All those, above level of workmen were trained in SQC techniques, philosophy of QC Circles and trained to act as facilitator to QC Circle. Series of workshops were organized on managing of QC Circles of
that the first workshop on management of Q Circles was held at Leslies Sawrey Center from 18.6.84 to 20.6.84. There were 32 participants. Mr. Padhye of Crompton Greaves was present at the inauguration, which was done at the hands of the American Council General.

A second workshop on the same subject was held from 23rd to 25th July 84. Mr. Baluja, the M.D. of H.A.L. inaugurated the workshop.

C.C I., H.A.L., Kirloskar Tractors Ltd, XLO were few of the companies, which took initiative in Quality Circle movement. In its first 2 years there were 23 Quality Circles operating at various shops of the H.A.L. & had gone through 100 recurring problems, whereas Kirloskar Tractor had 27 circles & the range of the topics covered by these 27 circles covered from simple ones – how to improve cleanliness to an intricate technical problem of differentiate of a tractor.

It was also decided to translate the available information and literature in Marathi, the local language of masses. Dr. Kauro Ishikawa’s ‘Guide to Q.C.’ was translated in Marathi, ‘Gunvatta Niyamanchi Saptapadi’ and Q.C. magazines were launched in June 1984.

With this background Quality Circle movement-involving workmen as voluntary participants was launched on 15th Aug 1984.

The first Quality Circle convention was organized on 23rd January 1985 at Saikhedkar Hall. About 16 teams came from various parts of the country and 750 participants were present at this convention.

The 2nd convention took place on 29th January 1986 and the third on 27th January 1987.

The Quality Circle convention has become an extremely popular one.
A seven days training programme coupled with 'poster competition' and 'slogan competition' was organized for the first time on 22nd Dec 1985 & second time in Nov 1987. About 100 workers were benefited from such training programme.

There has been interaction between I.T.I. and C.I.I. members for the introduction of T.Q.C. in the curriculum of the second year of the ITI students. It is essential that these 'Future employees' should know Q.C. Circle concept before they step on the shop floor.

The concept of Q.C. Circle was spread in all Zonal committees in Western Region & then all over the nation. The QC convention of Nashik Zone became regional convention and since 1990 this convention is held at Nashik every year in Jan/ Feb as Western Zone Regional convention and last such convention was held on 21st.2004 at Nashik and was participated by 9 case studies coming from different zones in Western Region. Three finalists of this convention will now take part in National convention to be held in March 2004.

The QC circle movement, which commenced in 1983 in Nashik is now a National movement and continues to strive on.

Structure, Implementation & Institutionalization of Quality Circles

STRUCTURE

Quality Circle operates within certain structure. Similarly the Quality Circle members would also need to know some guidelines and working procedure, which constitutes the process of Quality Circle operation. In the absence of structure, necessary guidelines and the procedure, the Quality Circle members will be groping in the dark and they can get frustrated and Quality Circle activities may end up in confusion. Of course the structure is not designed to bring rigidity but to facilitate the functioning of Quality Circle in smooth manner.
Of course, every organization can make slight changes in the structure depending upon their unique needs.
Every organization has various departments & each one of them has sections, which are further sub-divided into work areas. All homogeneous groups of persons could form Quality Circles in their respective areas of work. The structure of Quality Circle may be shown in a pyramid form.

Diagram 3.2 Structure of QC in Pyramid Form

1. **Non-members** – Initially it is not expected that all the employees will volunteer to join Quality Circle. However, they are important for the success of whatever solutions the Quality Circles may arrive at for any problems identified & resolved. It would be difficult for them to implement their suggestions without the cooperation of non-members. The non-members should be convinced to enthuse in Quality Circle activities & attend presentation given by Quality Circle from time to time. This may change their attitude & they may decide to join the Quality Circle. Such a natural increase in the numbers of members of Quality Circle has taken place in many cases. But, under no circumstances, should a climate of conflict be created in any work area between members & non-members. When Quality Circles operate healthily, the movement becomes self-
2. **Members** - Members are the basic element of structure of Quality Circles. It should be always remembered that the participative concept was evolved primarily to afford opportunities to those employees who had never been considered capable of using their creativity and whose immense potential was thus lying unharvested. In India some managerial executives become members and at times, even leaders when a better educated person, higher in hierarchy, belonging to management joins a circle, the leadership is automatically taken by him & his very presence may inhibit the freedom of expression and thinking among other members. So executives should give support & guidance to the members when they need.

3. **Leaders & Deputy Leaders** – The leader is chosen by the circle members. If the leader is absent, then deputy leader will carry out the circle activities. In 95% of the cases in India the members themselves choose their hierarchical supervisor as their leader for smooth operation of a Quality Circle. Many times leader & deputy leaders work in rotation. When leader voluntarily steps down, deputy leader becomes a leader and a member becomes a deputy leader. This practice is supportive to the people building aspect of a Quality Circle in which every member has the opportunity of leading the team. Of course it is necessary to ensure that the member is fully trained before he takes over the leadership of the circle.

The leader is responsible for convening meeting regularly, maintaining the record of the meeting, to seek facilitators help or assistance when required, makes sure that every member in Quality Circle gets opportunity to take part in the discussion, maintains high degree of cohesiveness of his team, encourage and
evolves consensus decision making processes so that win-lose situations are obviated.

In short “leader is one who knows the way & shows the way and goes the way”.

4. **Facilitator**- The facilitator is a senior officer of the department where Quality Circles are working. His role is that of parent, caring for his children. Even without Quality Circle, a management’s role is to develop the people working with him and enable them to achieve and give them the pride of achievement. The facilitator plays crucial role in the successful operation of Quality Circle so his selection should be done carefully.

The facilitator can discharge his task effectively, only if the Quality Circle members know him. He should be one who has got authority to take decisions himself without delay on most of the recommendations made by Quality Circles and by virtue of being high in organizational hierarchy, is in a position to ensure that these suggestions are promptly implemented.

The facilitator should be enthusiastic, with positive spirit and people oriented. He is guide. Counselor, teacher and catalyst. He is one who develops confidence in the minds of circle members, ensures necessary facilities for operation of the circle, and makes arrangement for training of members. He is responsible to give resume of the circle activities to steering committee. Periodical analysis of these reports helps categorization of circles as highly effective, moderately effective and ineffective.

5. **Departmental Committees**- These committees work on the lines as the steering committee but at individual departmental levels. The departmental head is the chairman of that committee. The committee takes an overview of the operation of Quality Circles
in respective departments & takes remedial actions wherever necessary. It briefs the steering committee with regard to the operation of Quality Circles in respective departments & gives required assistance to Quality Circles.

6. **Steering Committee** - it comprises heads of major departments as member and the chief executives of organization as chairman. For successful operation of Quality Circles, the Top Management’s support must not only be available but also visible to all. Without accountability, a Quality Circle will be o one’s baby. That is why through periodical & regular reviews, the chairman of the steering committee makes the functional heads accountable for the healthy functioning of Quality Circles in their area.

The steering committee takes decisions on important recommendations of Quality Circles, falling outside the competence of other levels of management, which are reported to the steering committee. It gives major policy guidelines & direction for the healthy propagation of the concept.

7. **Coordinating agency** – is the central information point for Quality Circle activities in the whole organization. The co-coordinating agency may be Quality Assurance or HRD or any department depending on the decision of steering committee. If in the organization there are large number of Quality Circles, like BHEL, TELCO, BAJAJ AUTO, more than one executive is required for coordination work.

The co-coordinating department or a co-coordinator is responsible for propagation of idea, publishing house journals devoted to Quality Circles, training of members of Quality Circles, organizing presentation of circle to top management and overall co-ordination of activities of Quality Circles. It also prepares budget of functioning of Quality Circle & submits it to the steering committee. It organizes
conventions, get-together, conferences etc. In short this department does everything required for the functioning of Quality Circles in the organization and the smooth functioning of the Quality Circles in any organization depends on the efficiency of this department. (Successful working of Quality Circles attributes its success to the efficiency of co-coordinator or co-coordinating agency.)

8. **Top Management** – The top management lays down policies incorporating Quality Circles as an integral part of TQC. though the top management that is the Chairman & Directors of any organization do not fall within the formal structure of Quality Circles. But it has as important role to play to ensure the success of implementation of the concept in the organization. The Top Management forms Quality Council to take overview of Quality Circle activities, preside over its meetings & sanctions necessary funds.

The above-mentioned structure of Quality Circle is suitable to large organization. For a small organization it is not necessary and sometimes it is not even possible to have such elaborate structure. Whatever is the structure of a Quality Circle it should be ensured that the essence of the concept is not diluted & correct methodology is used in the working of Quality Circle.

**Operation / Implementation of Quality Circle**

Quality Circle philosophy is more than 3 decades old. Today its significance & importance are multifold. To meet the challenges of ever changing market conditions, the grassroots level has to play a useful role. Through Quality Circle a grassroots level employees can be taught to work in a group, understand the benefit of working together & get a synergistic effect.
If the functions of Quality Circles are properly channelised, all the benefits of Quality Circle can be acquired. It has a much higher purpose i.e. ‘Problem prevention’. This is more durable & for more rewarding to an organization.

**Diagram 3.3 Functioning of Quality Circles**

- **Problem Identification**
  - Members
  - Suggestions from Mgmt
  - Suggestions from Others

- **Problem Selection**
  - Members

- **Problem Analysis**
  - Members with Specialist Involvement

- **Solutions**
  - Members

- **Presentation of solutions**

- **Management Review and recommendations with a view to take decisions**

- **Implementation of Solution**
  - Members in their own Preview
  - Other Agencies and levels
Problem solving is a method or means to achieve that higher goal. If this clarity is there, rest of the task is not difficult.

The Quality Circle members meet at the appointed place & time & choose their leader & deputy leader. The facilitator provides necessary stationery to circle members. Then the group may give itself a name. The facilitator may make introductory remarks by way of reaffirming the managements’ support & its best wishes for the success of the circle activities. Thereafter he withdraws & leaves the floor to the leader for conducting further proceedings. It is their first meeting where the members get to know each other better in the context of the circle activities. They are informed about the brainstorming session at the second meeting to identify the problems coming in the way of a better quality, productivity and optimum performance of the work area.

1. IDENTIFICATION OF PROBLEMS

The employees know best what the problems hindering quality Productivity and optimum performance are. They would also know, if they applied themselves remedies to such problems. It has been noticed that when Quality Circles start functioning, they are able to identify a large number of issues affecting their work adversely during their first few brainstorming sessions. The management perhaps, may not even be aware of such problem.

From the case studies it has been observed that the members identify the large number of problems in this session session. The following table shows the number of problems identified by various circle members.-
Table 3.3  
No. of Problems identified by Circles

<table>
<thead>
<tr>
<th>Name of the Circle</th>
<th>No. of Problems Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sankalp</td>
<td>5</td>
</tr>
<tr>
<td>Vikas</td>
<td>5</td>
</tr>
<tr>
<td>Navchetana</td>
<td>6</td>
</tr>
<tr>
<td>Kalpataru</td>
<td>7</td>
</tr>
<tr>
<td>Sinhastha</td>
<td>7</td>
</tr>
<tr>
<td>Suryakiran</td>
<td>10</td>
</tr>
<tr>
<td>Manthan</td>
<td>15</td>
</tr>
<tr>
<td>Honest</td>
<td>17</td>
</tr>
<tr>
<td>Zenith</td>
<td>33</td>
</tr>
<tr>
<td>Bachat</td>
<td>50</td>
</tr>
<tr>
<td>Rainbow</td>
<td>50</td>
</tr>
<tr>
<td>Star</td>
<td>54</td>
</tr>
<tr>
<td>Gunjan</td>
<td>54</td>
</tr>
<tr>
<td>Innovator</td>
<td>55</td>
</tr>
</tbody>
</table>

Thus through their own brainstorming efforts & suggestions from other related agencies, the circle members compile a list of the problems that require to be tackled by them one after the other.

It may happen that some or all circle members are exercising their creativity for the first time & therefore may not strike their mind easily. They could be then guided to ask themselves the following questions –

What specific jobs give you the maximum problems? What jobs are causing a lot of rework or checking? What jobs are held up because of delays or are bottlenecks? What jobs or procedures take too long? etc.

The problems identified are then prioritizing using A, B, C analysis.
1. “A” Category Problems where minimum involvement of other departments will require in solving them. These are the problems, which affect their work area, and implementation of their solutions is under the purview of the Quality Circles.

2. “B” Category Problems are those where involvement of other departments is necessary. These are the problems, which affect their work area but have an interface with outside agencies/departments and implementation of the recommendation can only be done with the cooperation of other departments.

3. “C” Category Problems are those problems where management sanction may be needed in implementing the solutions. They are totally outside the purview of Quality Circle.

This first step in the operation of Quality Circle is very important. Quality Circle itself is a learning process and step 1 helps in many ways to the members. When the problems are identified, it is very much necessary to categories them. The members concentrate on ‘A’ category problems. Since they call for actions from only department, analysis will be simple. Simple problems can be solved without much difficulty in 2-3 sittings. This will help the members to gain confidence and will also keep their interest alive. Initially they must concentrate on ‘A’ category problems. Once they exhaust ‘A’ Category problems then they will have to move to ‘B’ Category problems. At this point they will find themselves more confident. ‘B’ category will be having little more difficult problems where they will require the cooperation of other departments, too along with more analysis & more time. Because of their past achievement, other departments will also help them. They will learn some more techniques.

By the time Quality Circle come to ‘C’ Category, the members become seasoned Quality Circle members and know all problem-solving
techniques. Moreover their track record will help them to seek management support quickly.

By hurrying up and selecting major problems in the initial stages, they may be bogged down & eventually QC will lose interest and end up as non-performers.

In selected case studies of very successful & long running QCs, it is seen that when proper categorization & selection of the problems is done, solutions to these problems & recommendations of their solutions have been resulted into a lot of tangible & intangible gains.

(Short-listed) Case studies shown below mention the total number of problems identified, & categorized as per A, B, & C category and successfully implemented the solution to the problems.

<table>
<thead>
<tr>
<th>Name of the Circle</th>
<th>No of Problems Identified</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachat</td>
<td>50</td>
<td>24</td>
<td>23</td>
<td>3</td>
</tr>
<tr>
<td>Manthan</td>
<td>8</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Rainbow</td>
<td>50</td>
<td>16</td>
<td>33</td>
<td>1</td>
</tr>
<tr>
<td>Gunjan</td>
<td>54</td>
<td>6</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>Innovator</td>
<td>55</td>
<td>21</td>
<td>23</td>
<td>11</td>
</tr>
<tr>
<td>Star</td>
<td>54</td>
<td>18</td>
<td>27</td>
<td>9</td>
</tr>
<tr>
<td>Zenith</td>
<td>33</td>
<td>6</td>
<td>-</td>
<td>27</td>
</tr>
</tbody>
</table>

In case study of Zenith, category of the problem is done on the basis of defects under control & outside defect where there is no control.
Similarly, in case study of Gunjan, A B C category is done on the basis of
A - problems related to resource depletion
B - problems related to effect on cost
C - problems related to effect on process or man.

In all the above cases problems only from ‘A’ category are selected & the QC members tried to find out the solutions to these problems successfully.

2. SELECTION OF THE PROBLEM

Problem from ‘A’ category is selected first. It happens that QC members list out number of problems, which fall under ‘A’ category. Then again further selection of the problem is done on the basis of data collected using Pareto Analysis or Rating system.

For e.g. In a case study of ‘Star QC’ in ‘A’, 18 problems were categorized. When data was collected for 4 months, the maximum number
of defects were found in Outer Tube Line Mark. So the problem selected was Outer Tube Line Mark.

When the data was collected, it was found that rejection due to selected problem was 16000 p.p.m. Then the target was set to achieve rejection from 16000 p.p.m. to < 100 p.p.m. & actually rejection is reduced from 16000 p.p.m. to 186 p.p.m. resulted into the cost saving of approx. 7.5 lakhs Rs. per year.

Another method of selecting the problem for QC is rating system where there are number of problems fall under category of A, the circle members give rating to the problems on the scale of 0-10.

Saving from the solution of the problem is also estimated.
In a case study of Sinhastha, circle members rated 7 problems where they used the criteria as ‘Ease’ in solution, saving its importance in day-to-day work & present condition. All the members rated all the problems and the circle selected the problem with maximum rating.

**Graph 3.2 Problem Rating**

![Graph showing problem ratings](image)
Thus problem ‘B’ was selected by Quality Circle.

In ‘A’ category problems they may not have to go through 12 steps but for ‘C’ category it becomes a necessity.

3. **DEFINE THE PROBLEM** - There may be some members who are not aware of entire process. Use of flow diagram will help them in having clarity of the problem. A flow chart helps one to have an armchair journey into a process cycle & to locate the problem.

4. **ANALYSIS OF THE PROBLEM** - Once the problem has been selected, the circle can start analyzing the problem with the help of 2 important statistical tools- Brainstorming and Cause & Effect Diagram also called as Fishbone or Ishikawa Diagram:

   Brainstorming technique helps to get all members involved so that various factors causing the problem can be listed on a sheet. Then the group picks up a major cause for analysis & development of the solution.
If the Quality Circle is in a manufacturing area, they may look for the deficiencies under the four ‘Ms’ on follows –

**Man** - skill, experience, positioning, health, need for training, environment etc.

**Machine** - production capacity, process capability, maintenance, jigs & tools, process layout, etc.

**Materials** - quantity, quality, inventory, material handling, storing etc.

**Method** - sequence of operation, environment, strain on operator, set-up, standard time, etc.

Similarly the problems selected by QC in areas with other diverse types of work like administrative offices, banks etc can all thus be systematically analyzed.

Identification of causes is not only what we think as cause for that situation, but also all the possible causes. What is expected is a total analysis & presentation in the form of cause & effect diagram.
Root cause has to be established with the help of data. If it is not possible to collect data, it may be established with the help of experience. In certain cases even questionnaire has been prepared to identify root causes.
### QUESTIONNAIRE FOR IDENTIFICATION OF ROOT CAUSES

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. WHETHER LIGHTS ARE SUFFICIENT?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ANY POSSIBILITY OF REDUCTION?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. DO THEY SWITCH OFF LIGHTS WHEN NOT REQUIRED?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. LOCAL SWITCHES AVAILABLE?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. LOCAL SWITCHES ACCESSIBLE?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. COMMON CIRCUIT PROBLEM (DAY &amp; NIGHT)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. WHETHER SWITCHES ARE MARKED?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. NATURAL LIGHT LOW?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. AWARENESS IN PEOPLE?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. WHETHER SWITCHES MAINTAINED?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the course of such discussion, the Circle members may also invite specialists to get the benefits of their news on the subjects. In one case study, a Quality Circle in an Assembly Section took up the problem of the long cycle time for an assembly of a product. Their analysis showed that one of the likely factors was the need for changing the tolerances on the Engineering drawings. The concerned designers were invited to participate in the discussion and finally they arrived at a consensus to suitably amend the drawings, so that the cycle time was reduced from seven to two shifts. Different sections of the organizations were brought together to encourage cohesiveness. As a result of joint efforts, the problem of productivity and quality which perhaps existed for a long time was finally resolved.

Using techniques like Line graph, Bar graph, Pie graph, Area graph, Histogram, Stratification, Scatter Diagram, etc would help easy comprehension.

Once again brainstorming is done.
5 DEVELOPING SOLUTION: When the major cause is identified, after brainstorming, the members start proposing solutions. The circle members may make different suggestions to eliminate the cause. As most of the members are facing the problem their suggestions are generally reliable & one of the suggestions may even remedies the problem permanently.

The members normally implement the suggested solutions. If the suggestions are to be implemented by other departments, the circle members interact with other departments' circle members or colleagues. It should be ensured that solutions, which are beneficial to the work area where circles are operating, should not pose fresh problems in other related sections. Members are advised to involve representatives of other areas, which are likely to be affected by the decisions at discussion stage itself. Otherwise there is the likelihood of fresh conflicts between the Quality Circles & others thereby defeating the very objectives of the group activities.

In one case study, the problem was — “Lights remain on unnecessarily during day time (General Shift hours) at many places.”

The circle members found the root cause that local switches were not accessible.

The members found out the solutions-
1. To remove the obstacles.
2. To install switch as per user’s convenience.

While verifying the solution, it was observed that removing obstacles were not possible as big storing racks were kept there and they could not be shifted elsewhere. But installing the switch as per user's convenience was possible and might be proved more effective.
But the circle members foresee probable resistance. There was a possibility that even if switches were provided and identified, concerned area personnel might not take interest in switching off lights when not required. Possibility of such occurrence was in office area as lights in this area were being operated by users & not by electrical dept.

Then members found the solutions:
1. To inculcate awareness among the concerned area personnel by telling them about the tangible and intangible gains.
2. To carry out regular survey to assess the effectiveness & take appropriate action.
3. Display of posters / stickers / charts for awareness.

6. TRIAL IMPLEMENTATION:

Circle members usually try out the validity of their recommendation in their free time, before it is finally adopted. A QC in workshop decided to incorporate a new fixture, in the method of machining but before declaring the solution arrived at in their own free time, the went to scrap yard, collected the necessary material, manufactured a prototype outside the working hours and proved the advantages & feasibility of their suggestions before recommending it for adoption in technological documents.

In a Case Study the problem taken was a case study ‘Light remain on unnecessarily during Day time’. The circle members found out the root causes & electricity consumption.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Causes</th>
<th>Electricity Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Local switches not installed</td>
<td>41 %</td>
</tr>
<tr>
<td>2</td>
<td>Switches Not Identified</td>
<td>31 %</td>
</tr>
<tr>
<td>3</td>
<td>Day, night Circuits not Marked</td>
<td>16 %</td>
</tr>
<tr>
<td>4</td>
<td>Extra lights due to Change in Workplace</td>
<td>10 %</td>
</tr>
<tr>
<td>5</td>
<td>Local switches not accessible</td>
<td>2 %</td>
</tr>
</tbody>
</table>
For Trial Implementation, the circle members selected the sub-area where highest contributing root cause no 1 was applicable. ‘Stores’ was one such area. The circle members suggested solution to root cause 1 as ‘Install switches at local places’.

It was observed that by using one of the existing cables coming from main Distribution Board as main supply cable, switches could be installed locally close to work area. This arrangement will be, more convenient for the user. Cost involvement was also less. This solution was accepted.
Employees were trained. Circle members tried to inculcate awareness among the concerned area personnel.

Survey Check Sheet & Results obtained in stores area.

**Table 3.6**

<table>
<thead>
<tr>
<th>DATE</th>
<th>FITTINGS ON (BEFORE)</th>
<th>FITTINGS ON (AFTER)</th>
<th>TYPE OF FITTING</th>
<th>SAVINGS IN WATTS</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>17/05</td>
<td>24</td>
<td>4</td>
<td>TWIN T/L</td>
<td>1600</td>
<td>OK</td>
</tr>
<tr>
<td>18/05</td>
<td>24</td>
<td>4</td>
<td>TWIN T/L</td>
<td>1600</td>
<td>OK</td>
</tr>
<tr>
<td>19/05</td>
<td>24</td>
<td>5</td>
<td>TWIN T/L</td>
<td>1520</td>
<td>OK</td>
</tr>
<tr>
<td>20/05</td>
<td>24</td>
<td>4</td>
<td>TWIN T/L</td>
<td>1600</td>
<td>OK</td>
</tr>
<tr>
<td>21/05</td>
<td>24</td>
<td>4</td>
<td>TWIN T/L</td>
<td>1600</td>
<td>OK</td>
</tr>
</tbody>
</table>

**Diagram 3.6**

STORES AREA TRIAL IMPLEMENTATION

CONSUMPTION BEFORE IMPLEMENTATION = 1920 WATTS

CONSUMPTION AFTER IMPLEMENTATION = 320 WATTS

SAVING = 1920 W - 320 W = 1600 WATTS
### Table 3.7

**SURVEY CHECKSHEET & RESULTS OBTAINED IN STORES AREA**

<table>
<thead>
<tr>
<th>DATE</th>
<th>FITTINGS ON (Before)</th>
<th>FITTINGS ON (After)</th>
<th>TYPE OF FITTING</th>
<th>SAVING IN WATTS</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>17/05</td>
<td>24</td>
<td>4</td>
<td>TWIN T/L</td>
<td>1600</td>
<td>OK</td>
</tr>
<tr>
<td>18/05</td>
<td>24</td>
<td>4</td>
<td>TWIN T/L</td>
<td>1600</td>
<td>OK</td>
</tr>
<tr>
<td>19/05</td>
<td>24</td>
<td>5</td>
<td>TWIN T/L</td>
<td>1520</td>
<td>OK</td>
</tr>
<tr>
<td>20/05</td>
<td>24</td>
<td>4</td>
<td>TWIN T/L</td>
<td>1600</td>
<td>OK</td>
</tr>
<tr>
<td>21/05</td>
<td>24</td>
<td>4</td>
<td>TWIN T/L</td>
<td>1600</td>
<td>OK</td>
</tr>
</tbody>
</table>

**Operation of QCC**

Trial Implementation was achieved saving in stores sub-area. Hence all suggested solutions were implemented in all remaining sub-areas on priority basis. The other suggestions were

1. Identification of switches, marking to be done.
2. Identification of circuits to be done
3. Remove extra lights with user’s consent.
4. Install switch as per user’s convenience.

For implementation, material such as switches, cable pieces, switch boxes were salvaged from obsolete stock in stores. After a total implementation of action plan, again a survey was carried out in each sub-area & respective locations to assess the total savings.
### Table 3.8

#### DATA COLLECTION AFTER IMPLEMENTATION (PLANT AREA)

<table>
<thead>
<tr>
<th>SUB AREA</th>
<th>LOCATION</th>
<th>TOTAL NO. OF LAMPS</th>
<th>DAY TIME</th>
<th>TYPE OF LAMP</th>
<th>TOTAL WATT</th>
<th>PROBLEMS</th>
<th>RECTIFIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>22 kv sub station</td>
<td>32</td>
<td>3 SINGLE</td>
<td>TWIN TIL</td>
<td>120</td>
<td>Day/night ckt. not marked</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>22 kv s/s stores room</td>
<td>6</td>
<td>0</td>
<td>TWIN TIL</td>
<td>0</td>
<td>sw. location not accessible</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>UTILITY S/S -2B</td>
<td>24</td>
<td>3</td>
<td>TWIN TIL</td>
<td>240</td>
<td>Day/night ckt. not marked</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>S/S-1</td>
<td>38</td>
<td>4</td>
<td>TWIN TIL</td>
<td>320</td>
<td>Local sw. not installed</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>UPS ROOM</td>
<td>14</td>
<td>2</td>
<td>TWIN TIL</td>
<td>160</td>
<td>Local sw. not installed</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Shift supl.office (passage)</td>
<td>5</td>
<td>4</td>
<td>TWIN TIL</td>
<td>320</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Shift supl.office (tea booth)</td>
<td>1</td>
<td>1</td>
<td>TWIN TIL</td>
<td>80</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>220KV S/S</td>
<td>53</td>
<td>0</td>
<td>TWIN TIL</td>
<td>0</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
</tbody>
</table>

**TOTAL: 1240**

| 2        | PACK OUT | 15 | 0 | 125 Watts | 0 | Local sw. not installed | Y |
| TOILET   | 6  | 5 | TWIN TIL | 400 | Local sw. not installed | Y |

**TOTAL: 400**

| 3        | Utility Control Room | 19 | 7 | TWIN TIL | 560 | Local sw. not installed | Y |
| Locker room | 4  | 2 SINGLE | TWIN TIL | 80 | Switches not identified | Y |
| UCR Toilet. | 4  | 0 | TWIN TIL | 0 | Local sw. not installed | Y |
| Gen. Shed. | 19 | 0 | TWIN TIL | 0 | Switches not identified | Y |
| C E Boiler | 4  | 0 | TWIN TIL | 0 | Local sw. not installed | Y |
| I G PLANT | 18 | 0 | 160 MIL | 0 | Day/night ckt. not marked | Y |
| FIRE PUMP HOUSE | 8  | 2 | TWIN TIL | 160 | Switches not identified | Y |
| FIRE STATION | 3  | 0 | TWIN TIL | 0 | Local sw. not installed | Y |

**TOTAL: 800**

#### SUB-AREA NUMBERING

1 = S/S & UPS  2 = PACKOUT  3 = UTILITIES

CONT'D.
# Table 3.9

## DATA COLLECTION AFTER IMPLEMENTATION (OFFICE AREA)

<table>
<thead>
<tr>
<th>AREA</th>
<th>LOCATION</th>
<th>TOTAL NO. OF LAMPS</th>
<th>LAMPS ON IN DAY TIME</th>
<th>TYPE OF LAMPS</th>
<th>TOTAL WATTS</th>
<th>PROBLEMS</th>
<th>RECIPRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 STORAGE RACK AREA</td>
<td></td>
<td>52</td>
<td>4</td>
<td>TWIN T/L</td>
<td>320</td>
<td>Local sw. not installed</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td>1 STORAGE RACK AREA</td>
<td></td>
<td>10</td>
<td>0</td>
<td>SINGLE T/L</td>
<td>0</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td>PENDAL</td>
<td></td>
<td>4</td>
<td>0</td>
<td>TWIN T/L</td>
<td>0</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>70 WATTS</td>
<td>0</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL</td>
<td>320</td>
</tr>
<tr>
<td>2 INST WORK SHOP</td>
<td></td>
<td>7</td>
<td>0</td>
<td>TWIN T/L</td>
<td>0</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td>INST W/S CABIN</td>
<td></td>
<td>2</td>
<td>2</td>
<td>TWIN T/L</td>
<td>160</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL</td>
<td>160</td>
</tr>
<tr>
<td>3 MEDICAL CENTRE</td>
<td></td>
<td>15</td>
<td>2</td>
<td>TWIN T/L</td>
<td>160</td>
<td>Switch not available</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL</td>
<td>160</td>
</tr>
<tr>
<td>4 ACCOUNTS/ ADMIN.</td>
<td></td>
<td>33</td>
<td>16</td>
<td>TWIN T/L</td>
<td>1280</td>
<td>Change in work place</td>
<td>Y</td>
</tr>
<tr>
<td>MAIN LOCKER ROOM</td>
<td></td>
<td>8</td>
<td>1</td>
<td>TWIN T/L</td>
<td>80</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td>Info. Service Centre</td>
<td></td>
<td>7</td>
<td>5</td>
<td>TWIN T/L</td>
<td>400</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td>ISO Room</td>
<td></td>
<td>4</td>
<td>4</td>
<td>TWIN T/L</td>
<td>320</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td>ADMIN,Toilet</td>
<td></td>
<td>4</td>
<td>0</td>
<td>TWIN T/L</td>
<td>0</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL</td>
<td>2080</td>
</tr>
<tr>
<td>5 LABORATORY(Hall)</td>
<td></td>
<td>21</td>
<td>13</td>
<td>TWIN T/L</td>
<td>1040</td>
<td>Daynight ck. not marked</td>
<td>Y</td>
</tr>
<tr>
<td>GCI INST. Room</td>
<td></td>
<td>4</td>
<td>4</td>
<td>TWIN T/L</td>
<td>320</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td>Canteen booth</td>
<td></td>
<td>2</td>
<td>1</td>
<td>TWIN T/L</td>
<td>80</td>
<td>Switches not identified</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL</td>
<td>1440</td>
</tr>
</tbody>
</table>

**SUB-AREA NUMBERING**

1 = STORES 2 = INSTRU. 3 = OHC 4 = ADMIN. 5 = QC LAB

---

The data was collected and it was found that-

Total power saving was-

\[
\text{Total power saving} = 9.47 + 4.57 = 14.04 \text{ KW.}
\]
There was reduction in power by 68%.

Further analysis was made to find cause wise power consumption in watt before & after.
### Table 3.10

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>WATTS (%) BEFORE</th>
<th>WATTS (%) AFTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. LOCAL SWITCHES NOT INSTALLED.</td>
<td>8435 WATTS (41%)</td>
<td>1920 WATTS (9.3%)</td>
</tr>
<tr>
<td>2. SWITCHES NOT IDENTIFIED.</td>
<td>6370 WATTS (31%)</td>
<td>2000 WATTS (9.7%)</td>
</tr>
<tr>
<td>3. DAY &amp; NIGHT CKTS NOT MARKED.</td>
<td>3280 WATTS (16%)</td>
<td>1400 WATTS (6.6%)</td>
</tr>
<tr>
<td>4. CHANGE IN WORK PLACE.</td>
<td>2080 WATTS (10%)</td>
<td>1280 WATTS (6.2%)</td>
</tr>
<tr>
<td>5. LOCAL SWITCHES NOT ACCESSIBLE</td>
<td>480 WATTS (02%)</td>
<td>0 WATTS (0%)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>20645 WATTS (100%)</td>
<td>6600 WATTS (32%)</td>
</tr>
</tbody>
</table>

Comparison in graphical form shown on next page.

### Graph 3.5

**Cause Wise Power Consumption in Watts**

**Before**

- 1% 1000W
- 72% 4000W
- 88% 6000W
- 98% 9000W

**After**

- 9.7% 1000W
- 14.2% 1200W
- 25.4% 2400W
- 32% 3600W
- 38.2% 5400W
- 51.5% 7200W
- 61% 8400W
- 68.2% 9600W
- 72% 12000W

Percentage savings:**

- 88% 1200W
- 61% 2400W
- 55% 3600W
- 42.8% 4800W
- 35% 6000W
- 28% 7200W
- 21.2% 8400W
- 14.5% 9600W
- 9.7% 12000W

100% conservation.
The circle successfully completed its activities i.e. found the solution to the problem taken.

Diagram 3.7 RESULT-BACHAT

The above case study shows how the members worked hard to collect the data, the selected proper area for Trial Implementation showed the results, made Final Implementation & thereby saved 68% electricity consumption & total savings = Rs.164510.
This is how the Quality Circle operates. But it is not all about! The circle members are expected to do the follow–up and review.

In the above case study, the circle members deputed the members in different areas to do the follow up once in a week & assessment of saving also once in a week. It is thus clear that the total cycle time for a problem to be solved by Quality Circles may vary from about 4 to 12 or more weeks. This depends on complexity of the problem taken up; the ready availability of the necessary data, the depth of the analysis undertaken and the support the circle gets from the management. If the circle resolves 4 to 6 projects in a year, it would be considered as a good performance in the present Indian context.
In one case study in Nashik, QC movement is in good pace & 8 Quality Circles are operating successfully. Number of problems solved by Quality Circles in that company in one year is as follows:

**Table 3.11 Problems solved by Circles in the Company**

<table>
<thead>
<tr>
<th>Name of QC</th>
<th>Area</th>
<th>Problems Solved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lakshya</td>
<td>Production</td>
<td>1</td>
</tr>
<tr>
<td>Abhiyan</td>
<td>Power &amp; Electrical Maintenance</td>
<td>6</td>
</tr>
<tr>
<td>Koshish</td>
<td>Production</td>
<td>---</td>
</tr>
<tr>
<td>Utkarsha</td>
<td>Utility Area</td>
<td>6</td>
</tr>
<tr>
<td>Samadhan</td>
<td>Finishing Area</td>
<td>---</td>
</tr>
<tr>
<td>Sangharsha</td>
<td>TF &amp; HFCL Area</td>
<td>4</td>
</tr>
<tr>
<td>Sankalp</td>
<td>Picking</td>
<td>2</td>
</tr>
<tr>
<td>Pragati</td>
<td>TADL</td>
<td>---</td>
</tr>
</tbody>
</table>

Total savings Rs. 1638243.

We find that the Circles are operating in many departments of the company. ‘Lakshya’ Quality Circle solved one problem but brought tangible benefit in the form of savings Rs. 1346484 in only 3 months. Whereas ‘Sankalp’ solved 2 problems but resulted into many intangible benefits such as utilization of crane was minimized, safety increased and productivity improved due to reduction in delays. (The problems were little complex) and though Pragati Quality Circle did not take any problem in the previous year, in the current year it has already taken up the project with an objective of less consumption of water & effective strip cleaning. What is more important in this case study is that the performance of these Quality Circles has motivated other departments & now five new Quality Circles in PPC, workshop, PRD-2, EMD-2 & Area-1 have been started.
This also proves the involvement of the employees in the improvement of Quality.

Thus the operation cycle for each problem taken up by Qc is completed in the cycle shown below.

Diagram 3.8 Operation of Q.C.

If the Quality Circle operates for a longtime, the members acquire the knowledge of tools and techniques of problem solving and can solve the major problems through Quality Circle by following all the steps systematically.

CASE STUDY – AN IDEAL EXAMPLE OF OPERATION OF QUALITY CIRCLE

The following case study is an ideal example of how QC should operate to solve the problem taken by it.
In a case study of a company manufacturing tyres, a circle is operating for more than 3 years and has completed 4 major projects. The circle members in the said project were meeting every Tuesday between 4.30 pm to 5.30 pm and the normal attendance was 85%. The circle has achieved first position in consecutive 3 years in Quality Circle convention. Apart from that it has achieved excellent category award in International QC convention.

**Identification of problems**
The circle members through ‘Brain Storming’ collected 63 problems of which 8 problems of similar nature were clubbed together. Remaining 55 problems were classified into A, B, C category.

- **A.** Type problems 21
- **B.** Type problems 23
- **C.** Type problems 11

**Selection of problem**

As there were 21 problems in A category, the members decided to do the rating. They set parameters for rating; through ‘Brain Storming’. The parameters were –

1. Scrape generation
2. Break Down
3. Pollution
4. Quality
5. Cost saving
6. Manpower deployments
7. Unsafe working
8. Productivity

Then one of the circle members did sample rating (on the scale 0-5) where problem Number 5 ‘High breakdown and scrap in Aubo Curing presses’ was rated as most serious problem.
Then group rating by 9 potential members was done where the same problem Number 5 with maximum rating point was the most serious problem. So the problem selected was ‘High breakdown in Aubo curing presses’.

Then MILESTONE CHART was prepared for time bound solution. It was decided that the QC problem would be carried out as follows-

Table 3.12  Mile stone Chart

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Job to be carried out</th>
<th>Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Defining the problem</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Analysis of the problem</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Listing of causes</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Root cause analysis</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Data collection &amp; analysis</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Development of Solution</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Foreseeing probable resistance</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Trial Implementation</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Regular Implementation</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Preventive action plan</td>
<td>1</td>
</tr>
</tbody>
</table>

Thus in 25 weeks the QC project was expected to be completed.

Defining the problem – was done. Process flow diagram of tyre manufacturing was prepared to give complete idea of the process to circle members. This helped in removing doubts, if any in the minds of circle members. [Process flow diagram of Tyre Manufacturing - to be zeroxed from Innovator QC – JK Tyres]
Description of the problem is also necessary for avoiding any future confusion in the minds of circle members.

In Tyre Industry, the process of Vulcanization is termed as curing.

This process is carried out in shell type enclosed equipment, called the 'curing press'

There are total 80 Aubo curing presses for curing Tyres.

These presses had repetitive type of engineering breakdowns.

These breakdowns resulted in loss of productivity & generation of high scrap.

This problem 'High breakdown in Aubo Curing Presses' resulted in
1. Low productivity due to high instrumentation breakdown Average 1.4%.
2. Wastage of Instrumentation – 40 Man Hrs / month average manpower.
3. Wastage of material -10 Tyres scrap / month average.
5. Wastage of utilities (Steam & Hot water).

Causing thereby increased cost of production. So the Quality Circle Goal was
'To reduce Instrumentation breakdown in Aubo Curing Presses from 1.4% to 0.4%.'

The circle decided to achieve the goal stepwise i.e.
1. After solution implementation in one press as QC project – from 1.4% to 1%
2. After solution implementation in two presses as standardization – from 1% to 0.6%
3. After implementation in all three presses as Standardisation from 0.6% to 0.4%

Analysis of the problem - Data collection & Analysis
   For analysis, data was collected. The responsibility of data collection was given to different members. Time allotted for data collection was given to different members. Time allotted for data collection was also fixed. Team members collected data on frequency of the problems & impact of problems.

   Then Parato Analysis was done. The data collected by the members showed that frequency of press closing problem was the highest. The number of times the company was facing this problem was 85.
Identification of causes

The circle members through brainstorming found the causes. Almost 34 causes were listed through brainstorming. The circle members prepared Cause & Effect Diagram.

Diagram 3.10

Again data was collected on frequency of the causes and again Pareto Analysis was done.

The root causes found were 10.

Why-why analysis was made.
No home position → Why? → VCL value not matching → Why? → VCL proportional card not functioning properly

**Root Cause 1: VCL proportional card defective**

No hydraulic operation → Why? → Failure of hydraulic components → Why? → No spare available

**Root cause 2: Non availability of hydraulic components spares.(As OEM has closed production)**

Pneumatic booster not operated fully → Why? → Lever defective (non standard pneumatic booster)

No internal valve not operating → Why? → No air/less air at diaphragm valve

Poor heat resistance of PVC tubing → Why? → PVC tubing burst → Why?

**Root Cause 3: Non standard pneumatic booster**

**Root Cause 4: Poor heat resistance of PVC tubing**
Root Cause 5: No provision for timer air gauges

Root cause 6: Recorder mounting not proper

Root cause 7: High ambient temperature
Non Functioning of Press

Why?

No output from PLC

Why?

Moisture in panel

Why?

Steam leakage from nearby condensate drain line

**Root Cause 8:** Steam leakage from condensate drain line near panel.

**Root Cause 9:** PLC output card failure

---

Non Functioning of Press

Why?

LP pump breaker tripped

Why?

Low incoming voltage

**Root Cause 10:** Low incoming voltage for hydraulic pump motor
Table 3.13 Developing Solutions

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Root Cause Description</th>
<th>Suggested solutions</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VCL proportional card defective</td>
<td>Replace proportional valve with on off type valve after fixing tafelone sleeve at VCL</td>
<td>Accepted</td>
</tr>
<tr>
<td>2</td>
<td>Non availability of hydraulic components spares</td>
<td>Standardise hydraulic control</td>
<td>Accepted</td>
</tr>
<tr>
<td>3</td>
<td>Non standard pneumatic booster</td>
<td>Changed pneumatic booster with standard one also relocate its mounting to ease of operator</td>
<td>Accepted</td>
</tr>
<tr>
<td>4</td>
<td>Poor heat resistance of PVC tubing</td>
<td>1. Changed PVC tubing with high heat resistance PVC tubing. 2. Change PVC tubing with copper tubing.</td>
<td>Not accepted Accepted</td>
</tr>
<tr>
<td>5</td>
<td>No provision of timer air gauges</td>
<td>Provide timer air gauges</td>
<td>Accepted</td>
</tr>
<tr>
<td>6</td>
<td>Recorder mounting not proper</td>
<td>Mount recorder in main control panel</td>
<td>Accepted</td>
</tr>
<tr>
<td>7</td>
<td>High ambient temperature at recorder</td>
<td>- Do-</td>
<td>Accepted</td>
</tr>
<tr>
<td>8</td>
<td>Steam leakage from platen condensate drain line near panel</td>
<td>Extend condensate drain line to the trench drain</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>PLC output card failure</td>
<td>Provide solid state relay card to protect main output card</td>
<td>Accepted</td>
</tr>
<tr>
<td>10</td>
<td>Low incoming voltage for hydraulic pump motor</td>
<td>Ask electrical department to increase incoming voltage</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

The members through brainstorming developed solutions to 10 root causes. Out of 10 suggested solutions, 9 were accepted. Following is the Table showing solutions suggested by the circles.

The quality circle members did foresee probable resistance. The first was budgetary constraints. To overcome this problem circle members discussed with department head and got sanction for procurement of material for all developed solutions except one where heavy cost was involved.

The 2nd was the departmental head might have problem in modifying proportional valve due to risk factor involved regarding usefulness of existing valve without card. This problem was discussed with department head and got his permission.
The 3rd was the technical and production may have problem in relocation of recorder & pneumatic booster, which was also solved after a discussion with production people. In fact the production people appreciated the circle members’ idea.

The last probable resistance the circle members thought was the electrical department might raise objections to provide increased incoming voltage for hydraulic hump motor. But the electrical head promised to help QC team by setting transformer tapping for higher voltage.

Thus proper steps were taken by circle members for probable resistance & the road for Trial Implementation was cleared Deming’s Wheel i.e. PDCA was applied for implementation of solutions.

As decided by Circle members, selection of one press for project implementation was made while the group was brainstorming on selection of one press for trail and final implementation, there was a major mechanical breakdown on 8903 press, which required minimum 3 days for idle condition of press. Meeting was held with departmental and functional heads and it was decided to take this press for implementation of the developed solutions.

The work was divided among the circle members & responsibility of that work was also fixed. For Trial Implement, separate sheet was maintained. For each type of work one week was allotted & the total period for Trial Implementation was 6 weeks.
Regular Implementation - The member found that the Trial Implementation of developed solutions on the basis of press performance was found to be 100% effective.

They also ensured that no modification or changes were required in those developed solutions.

Hence the group with consensus and departmental head’s consent declared this trial implementation as final implementation.

The circle had decided the achievement of goal stepwise. In the 2\textsuperscript{nd} step it had decided to implement the solution in 2 presses as standardization. Again the responsibility for each activity (work) was fixed. A separate sheet is maintained which contained the information regarding:

1. Description Work
2. Responsibility of that work given to – Name of the circle member.
3. Expected competition date
4. Remark

This sheet helped the members to do and complete the activity within a stipulated time. If the work (job) is not complement the reason for the work recorded.

The following pictures give correct & complete idea of how solutions were implemented & modified condition of the PLC panel, recorder, drain line, copper tubing, etc
Steam leakage from condensate drain line near panel

Old Drain Line

Extended drain line

New Drain Line
Solid state relay cards for the protection of PLC output cards

*Modified PLC panel*
Old panel and separate recorder

Recorder mounted on main panel

7 nos. timer air gauges provided

New panel with recorder & Timer gauges
Old panel and separate recorder

Recorder mounted on main panel

New panel with recorder &
Timer gauges

7 nos. timer air gauges provided

Table 3.14

Mile Stone Chart (Planned Vs Actual)

[Diagram of Mile Stone Chart]

Note: Project Implementation delayed due to delay in procurement of material and planned shut down on machine.
The circle members then prepared MILESTONE CHART, which states how actually project was completed.

It was planned to complete the project in 25 weeks but actually was completed in 34 weeks. Project Implementation delayed due to delay in procurement of material and planned shut down on machine.

The circle member gave the account of cost of project, which was Rs.39, 400. They gave the particulars of the cost paid. The Circle members were happy to mention Tangible Gains.

1. **Saving PLC output card**
   a. Failure of PLC output card = 02 Average Per Press Per Year
   b. Cost of One Output = Rs. 30,000/-
   c. Saving from the project in a Year = Rs. 60,000/- Per Year Per Press

Pay Back Period:
Cost / (Annual Saving – Interest %)
= 39400/(60000 – 15 % of 39400)
= 0.72 Years (Approx 9 months)
Tangible Gains

2. Reduction in Instrumentation Break Down in Aubo Presses.

Graph 3.8

Tangible Gains

3. Reduction in Scrap in Aubo Curing Presses
• The intangible Gains were –
  1. Internal Customer Satisfaction
  2. Personality Development of all members QC team.
  3. Development of Team Spirit.
  5. Development of Ability to review with different angle.

The circle members did follow up review and decided preventive action plan to avoid repetition of problem.

The circle members used the following Tools and Techniques.
  1. Brainstorming
  2. Data collection
  3. Line Graph / Bar Graph
  4. Pareto Analysis
  5. Cause & Effect Diagram
  6. Flow Diagram
The above case study is an ideal example of how Quality Circle should operate by following the proper steps; using right tools and techniques with sincerity and involvement the circle members can complete the project in stipulated time and achieve the goal.

Management Presentation

A Quality Circle has to make a management presentation after each problem is solved and implemented. It is very important part of Quality Circle activity. This is where Quality Circle gets exhilarated and feels motivated while presenting its achievement to the management. The recommended solution of the selected problem would be more effective and purposeful if the presentation is made in a systematic way. These case studies would also serve as effective tools in future.

The following scheme may be adopted for the management presentation.

1. Introduction of work area, names of members, leaders, deputy leaders, facilitators, frequency & timings of the meetings etc. (period of the project.)

2. List of the problems identified through brainstorming. Classify them theme-wise.

3. Show classification of problems & their frequency of occurrence with Pareto Diagram & illustrate how problem is selected based on vital view, if data are available or through consensus.

4. Describe the problem & state how it affects cost, quality, and productivity in quantifiable terms. State the objective in clear terms.
5 Map all causes on Cause & Effect Diagram and explain logically how the real cause or causes were finally identified as giving rise to the effect.

6 List all the solutions given by members through brainstorming & how they arrived at best solution. Indicate the interaction with specialists.

7 Describe the methodology employed to implement solution.

8 State intangible & tangible benefits accrued by implementation of solutions, impact on organizational culture.

The management presentation would be more effective if more circle members take part in it. The preparation of presentation need not be expensive. All the members should be involved in the preparation of the presentation. Rehearsal of such presentation is advisable.

It has been noted that the standard of presentation improves in every organization with each programme. With the exposure of many of our circles' enthusiasts to the conventions in Japan & else where, the standard of presentation of case studies in some organizations in India can be favorably compared with that of many international companies.

This presentation helps in improving communication between management and employees. It also demonstrates management 's involvement and interest in QC activities. It also affords great motivation through recognition of circle's achievements by the management.

**Role of Management**

When we talk about the management, it is not just the top few who are being referred to, but everyone in the managerial cadre. No matter what activities the Quality Circle engaged in, the management has to give lead and direction to other employees. If the management has realized the need to bring about company wide improvement in quality and productivity, has understood the concept of Quality Circle fully & has developed faith in the participative philosophy,
- is prepared to change to the participative style of management and adopt it as one of the corporate goals,
- earnestly desires to foster initiative & creativity among the employees
- has developed the confidence among the employees at the grassroots to use their creativity,
- is committed to supporting & guiding the circle activities sincerely and being seen doing so,
- want to build the employees as partners for prosperity of both, the organization and the employees,

then one could judge the organization as ripe for initiating Quality Circles. It has to be borne in mind that –

- Managerial effectiveness is enhanced in the areas where Circles are operating effectively and

If circles once started become inactive or dormant, it is not because of the weakness or impracticability of concept but it is due to some act of the management that may have resulted in the frustration & loss of enthusiasm among the circle members.

This is not an assumption, but has been established by many instances that have occurred in quite a few areas in Nashik, India & abroad.

1. In one case study in Nashik, Sahakar Quality Circle was in operation for 3 years. The circle’s objective was to find solutions to certain critical maintenance problems in boiler auxiliaries.

The members admit that their reason for joining Quality Circle was to create better work environment. They did find the change in the management’s approach towards employees. They did feel humanistic approach to work conditions and improvement in work
environment. But they were expecting effective support of top management.

The members mention that one of the reasons for failing of Quality Circle was slow response of top management to Circle's requirement.

2. In another case studying Nashik, **Gurukripa Quality Circle** members started Quality Circle with an objective to apply creative ideas in problem solving.

Management prepared groundwork by providing awareness of Quality Circle procedures to all concerned. The members found changes after Quality Circle was formed like better working environment-increased cooperation & humanistic approach to work conditions. The Gurukrupa Quality Circle was in operation for 3 years & it could solve 52 problems. But it failed partially.

The members felt the insincerity of managers towards purpose as well as change in the management priorities & management philosophy. Also there was lack of management support & involvement. The members were happy about the intangible gains like self improvement, positive changes in approach, increased team spirit, confidence, knowledge, creative thinking capability for analysis etc. They also noticed improvement in better productivity, profitability, customer services etc., but the management was expecting tangible & quantifiable gains and thereby profits. **The above case studies show that lack of management involvement and support results in the failure of Quality Circles even when they were operating successfully in the first few years**

3. On the other hand in a case study of 'Sinhastha Quality Circle' in Nashik, which was started with the objective to identify areas of
improvement and go through PDCA cycle, the members admit that there is improvement in the Manager-worker relationship. Also they have noticed attitudinal change in superiors, which help the members to run the circle for long time. They enjoyed many tangible as well as intangible gains. The organization benefits upto 2 laks per year in various areas.

4. 'Star Quality Circle' in Nashik was formed to achieve 100 PPM. It is in operation from the year 2002. The circle members mention that right from the beginning, they gained sincere response from middle as well as top management. They would sit with the members to discuss the matters and the facilitator's attendance was regular. Further management sent them for seminars and also gave prizes for their performance. The members are satisfied with this management involvement so much so that they don't even expect any financial rewards for working in Quality Circle and solving the problems through circle activities.

Thus the major pre-requisite for the success of Quality Circles is the management's attitudes, sincerity, commitment, faith and support to the participative concept.

It is observed that with the introduction of Quality Circles and their proper implementation, many such chronically troublesome employees change their attitudes and start participating constructively in circle activities. The role of management is therefore, both complex and challenging, calling for patience, fact and perseverance. [write in conclusion]
Training for Quality Circles

The need for updating knowledge and skills of people to equip themselves to meet new situations to enable continued achievement of the objectives of an organization is well realized. Dr Juran, Peter Drucker, Dr Ishikawa, all accord a prime place for training to top management and cross functional personnel in Quality related subjects. Dr Ishikawa has insisted on the importance of education & training in his often quoted statement, "Quality Control starts and ends with education". He further emphasizes that, "To promote Quality Control with participation by all, quality control education must be given to all employees from president to assembly line workers."

For effective implementation of Quality Circles, too, training is basic. The structure of Quality Circle comprises of Top Management, Middle Management, Facilitators, QC leaders and members. Therefore, all these groups need inputs on Quality Circles concepts, methodology for implementation, tools and techniques and management aspects of Quality Circles.

It is observed that, many organizations; in their enthusiasm to launch Quality Circles without delay often skip the training, thereby jeopardizing the success of Quality circles.

The importance of training in any sphere of our work cannot be better emphasized than by quoting what Tom Peters once said, "If things are going well, double your training budget, if they are not going well, quadruple it." The major objectives of importing training for Quality Circles are –

1. For thorough understanding and assimilation of the concept.
2. To translate philosophy of QCC into practice. The methodology that is suited to Indian conditions for launching and institutionalizing has
3. To solve problems systematically through simple techniques.
4. To improve communication capabilities necessary for circle meeting, management presentation etc.
5. To develop leadership qualities and build up individuals. The workers must play the role of leading their colleagues.

With the aforesaid objectives in mind, training programmes have to be organized to all those who are going to be involved directly or indirectly in the activities of Quality Circle. This is better done even before the formal inauguration of the circle.

After studying different Quality Circles projects it is found that Quality Circles performed well where management prepared the groundwork by providing awareness of Quality Circle procedure to all concerned.

The member facilitator of Sinhasta Quality Circle agrees to the fact that because of the proper training imparted to them of Quality Circle techniques and tools, they could solve the problem taken within the stipulated time.

The members of 'Gunjan Quality Circle' specifically mention that before the launching of Quality Circle, they were trained in quality circle tools such as Brainstorming, Fishbone diagram, Data collection, Control charts & Graphs and P.D.C.A.

The members of Sahakar Quality Circle, Gurukripa Quality Circle, Star Quality Circle, all in Nashik, admit that because of proper training Quality Circle was run effectively & smoothly.
It should be again noted that the training should be given to all, the top management, middle management, senior executives, facilitators, deputy leaders and members. Teaching use of simple problem solving techniques is to be made an important part of training.

**Simple problem solving techniques**

Quality Circles commonly use certain basic techniques to identify analysis and resolve the problems. It is found from the case studies that these techniques have helped them to identify the problems through brainstorming, select the problem through rating or classification, finding out the root causes and find out the solutions systematically. The techniques are:

1. Brainstorming
2. Data collection
3. Stratification
4. Pareto analysis
5. Cause & Effect or Ishikawa or Fish bone diagram.
6. Line graph
7. Scatter diagram
8. Histogram to be taken up in the second phase of training
9. Control Chart

The first six techniques are very powerful. It is proved from the table on the next page that states the techniques used by different Quality Circles, which found out the effective solutions to the problems taken by them.

This table clearly shows that almost all Quality Circles while solving their problems used simple but effective tools & techniques. Many times quality circles operate at grass root level. Where workers can easily learn simple Quality Circle technique and use them in problem solving. Only if the problem is complex, Histogram or/and Scatter Diagrams are used.
It is also clear from the this table that whatever is the problem taken by Quality Circle, with the use of these techniques, circle members can come up to the effective solution and succeed in their project. Another chart shows the different techniques normally used by the circle members at different steps on the next page.

**PITFALLS, PROBLEMS AND REACTIVATION**

It must be noted that for the first time the workers at grass root level are dealt with by means of Quality Circle, it is a very sensitive and delicate matter. It is very much necessary to motivate them through satisfaction of the higher needs of self-esteem. Problems in implementation of the concept are to be expected at every step. Once the problems & pitfalls have been identified and necessary actions have been taken, same Quality Circles do get reactivated.

The Quality Circles once launched exist indefinitely provided the management plays its role effectively. From our past experience if we learn what problems to anticipate, we will also learn to be on our guard all the time to identify them in good time so that these circles will sustain for a long time and operate successfully.

Following are the problems:

1. **Lack of faith in and support to Quality Circle activities among management personnel** – Without the top management support and commitment, it is not advisable to launch a Quality Circle in an organization. It may result in early failure of Quality Circle and may also bring a bad name to the movement.

2. **Lack of interest or incompetence of leaders & facilitators** – The right facilitators have to be involved especially in Quality Circles. It
## TOOLS & TECHNIQUES USED BY QUALITY CIRCLE

<table>
<thead>
<tr>
<th>Circle</th>
<th>Problem</th>
<th>Brain Storming</th>
<th>Data Collection Check Sheets</th>
<th>Stratification</th>
<th>Pareto Analysis</th>
<th>Cause &amp; Effect</th>
<th>Line Graph</th>
<th>Any Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. STAR</td>
<td>Outer Tube Line Mark defects</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>5W, 1H</td>
</tr>
<tr>
<td>2. GURUKRUPA</td>
<td>Reduction in expenditure</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>PDCA 5W, 1H History</td>
</tr>
<tr>
<td>3. MANTHAN</td>
<td>Heavy Rejection - 4 Stroke</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>PDCA 5W + 1H</td>
</tr>
<tr>
<td>4. VIKAS</td>
<td>Power saving on Conditioning machine in crust yard.</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5. BACHAT</td>
<td>Lights remain on unnecessarily during day time at many places.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>PDCA 5W, 1H ABC Analysis flow diagram</td>
</tr>
<tr>
<td>6. INNOVATOR</td>
<td>High breakdown in Auto</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>ABC Analysis flow diagram</td>
</tr>
<tr>
<td>7. GUNJAN</td>
<td>High steam consumption</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>Why why, analysis PDCA flow chart ABC analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Flow Chart Regression Analysis, Comparative Analysis.</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>8. KOHINOOR</td>
<td>= To increase ribbon shell OEM Quality production From 85% to 100%.</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>9. HONEST</td>
<td>= Excess Consumption of</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>10. ZENITH</td>
<td>= Blinker continuity missing</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>11. LAGAN</td>
<td>= Convert single track FFs</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12. SURYAKIRAN</td>
<td>= Frequent breakdown of</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>13. NAVCHETANA</td>
<td>= Power saving in 40 Ton Pusher of Blooming mill &amp; proper use of unused instruments.</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>14. SANKALP</td>
<td>= SHOX WIP</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>15. RAINBOW</td>
<td>= Weight variation in salt bags</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
</tbody>
</table>

ABC analysis PDCA Mind mapping chart
Run chart Histogram 5 W, 1 H Process flow Diagram Why why, analysis PDCA 5 W, 1 H PDCA ABC analysis ABC analysis
### Matrix of Problem Solving Steps vs Tools

**Ability of problem solving depends upon the use of the appropriate techniques as and when needed.**

<table>
<thead>
<tr>
<th>No</th>
<th>Suggested steps for problem solving</th>
<th>Flow Diagram</th>
<th>Brainstorming</th>
<th>Data Collection</th>
<th>Pareto Diagram</th>
<th>Cause &amp; Effect Diagram</th>
<th>Stratification</th>
<th>Graphs</th>
<th>Scatter Diagram</th>
<th>Control Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Identification of work related problems</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2</td>
<td>Selection of problem</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3</td>
<td>Define the problem</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4</td>
<td>Analyse the problem</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>5</td>
<td>Identification of causes</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6</td>
<td>Finding out the root causes</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>7</td>
<td>Data Analysis</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>8</td>
<td>Developing solution</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>9</td>
<td>Foreseeing problem of resistance</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>10</td>
<td>Trail implementation &amp; check performance</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>11</td>
<td>Regular implementation</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>12</td>
<td>Follow-up / review</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

- ○ Moderate applicability
- ○ Strong applicability
is found that facilitator is often somebody who can be 'spared' - not the best one who cannot be spared. Often facilitators and their superiors lack an understanding of what job entails.

3. **Apathy, fear and misunderstanding among middle level executives** – it is the most serious pitfall that the Quality Circle faces.

Usually the people who have to accept and act on the ideas generated by the Quality Circle are the middle level managers, many of whom want no role in this program and have little experience either of soliciting or responding to ideas from subordinates. They may be uncomfortable listening to ideas that they should have thought of themselves or that will change their own work activities. They will often feel threatened. Also they may be too busy. In any event, not surprisingly these middle managers often resist new ideas. They either formally reject them or take long time to respond.

As a result of time and resources invested in the programme and because middle managers know that the programmes will lose its momentum, if they don't accept the ideas, the middle managers feel great deal of pressure to accept early suggestions. These are known situations in which top management has ordered middle management to accept all initial suggestions. Such situations heighten bad feelings about the programme. Middle managers then receive ideas less positively. Sometimes they do nothing. If high percentage of middle managers react negatively to suggestions, the Quality Circle programme usually ends. The Circle members get discouraged.

If the middle management is not committed to change, it is invariably the result of senior management, not being committed. It
is not sufficient for management to put the money up front and say ‘get on with it’. Management itself must get on with it.

In order to get fullest cooperation of middle managers, it is necessary to educate them repeatedly on the concept of Quality Circle through publication, lectures, and case study presentations.

In fact, if Quality Circles have to perform well, it would lead to a reduction in the executive’s workload. A manager of a heat treatment shop remarked, "I had to go to the shop floor a number of times earlier to resolve petty problems but since Quality Circles were formed, most of the issues are now being settled by the members themselves, leaving me more free time to attend to my managerial functions."

4. Delay or non implementation of Circles’ recommendations –
Normally Quality Circle selects the problems falling under A category i.e. the problems that can be solved with the solutions falling within their preview. But when some of the solutions they have arrived at can only be implemented with the sanction, cooperation and assistance of higher levels of management or external agencies, delay may arise. So care has to be taken to ensure that no such delay will be there.

5. Irregularity of Quality Circle activities –
Many times executives tend to ask the Quality Circle members to postpone their weekly long hour meeting on the plea of production pressure or some other reasons. This is because the executives do not realize that the one-hour that Quality Circle spends at their meeting is worth a lot to the organization.

Manufacturing, engineering and maintenance employees are often faced with a choice between continuing their normal activities and picking ideas that the circle has suggested. Unless they are willing
to put their regular duties aside whenever necessary, these organization will never implement the ideas.

For the growth of Quality Circle it is important that presentation or steering committee meetings are held once in 2 or 3 months, meeting with leader/ deputy leader is held once in a month and publication of the achievements of Quality Circle is done from time to time.

The case studies show that the circles members were allotted a fixed time for circle meetings, which help them to complete the programme successfully within stipulated time.

6. Non — application of simple techniques for problem solving – Quality Circle philosophy is people building philosophy. But it is possible only when the members are encouraged to identify and resolve the problems analytically. This is possible only if they make use of simple techniques, which are taught, to them during training. Because of low level of education of our workers in India, assistance and guidance may have to be given by the facilitator and other executives in the area to apply the techniques.

In the recent Quality Circle conventions, the member of ‘ Gunjan Quality Circle’ proudly mentioned that before launching of Quality Circle, they were given training of Quality Circle tools & techniques.

7. Lack for non-participation by some members in the circle activities- It is common in any group activity that few people would tend to withdraw and not participate fully in the discussions at the meeting or in subsequent circle activities. In the case studies, it is common to see that average attendance at the circle meeting varies between 85% and 90 %. In a very rare case it is above 95%.
A good leader should not let any member be just an onlooker and should evolve suitable tactics to draw him in and make him take interest in the working of Quality Circle. Sometimes the leader may be very dominating, which may be reason of non-participation of members.

Even after counseling if the leader does not change his style or attitude, the circle member may change their leader. To avoid conflicts, tactful intervention by the facilitator is required.

8. **Circles running out of problems** -- Having initially picked off the easiest problems to solve, some programs even run out of problems. Circle may feel that all the problems of the work area have already been resolved & there is nothing more that they could do. At this point the circle may simply go out of existence or it may take on some other areas.

In one case the circle was in existence for 3 years & members faced this problem. With the help facilitator again brainstorming was done & they were able to find many more problems to keep the circle busy again. Prevention of problems on the basis of past experience could also be the subject for brainstorming by Circles.

9. **Opposition of non-members towards Quality Circle operations**
- Generally there is no threat to the existence of Quality Circles by non-members.

Sometimes initial success of the programme spurs formerly disinterested people to want to get into it. Non-members become jealous of the members. They don't like the idea of members having luxury of meeting during working hours. They also disagree the recognition and status that the circle members receive. Always insider – outsider culture arises, though the approach is intended to be moving towards company wide participation.
10. **Inadequate visibility of management support** –
   Many times failure of Quality Circle has been due to top management not visibly supporting the circle activities.

   It is observed that where the top management attended the circle presentation, the number of circles in that organization has increased. Occasional words of praise and encouragement from top management also go a long way in boosting the morale and enthusiasm of Quality Circle.

11. **Complex problems taken up** - If the circle takes up complex problem requiring cooperation of different departments or agencies in its initial stage, the members may loose confidence & think themselves incompetent to solve the problem at all.

12. **Non-maintenance of Quality Circle record** - If proper records of circle activities are not kept, if register mentioning progress of the problem is not maintained, it would not develop their self confidence.

13. **Too much or too little facilitation** – If there is too much spoon-feeding done by facilitator, the circle members learn a little. They won't get the feeling of achievement and recognition by working in a Quality Circle. They may even lack initiative. On the other hand indifference on the part of the facilitator towards circle activities will result in the failure of a Quality Circle at early stage.

   The facilitator should always be in the background while rendering assistance.

14. **Language difficulty in communication** – There should not be language barrier in QC activities. Facilities for interpretation into commonly understood language may be provided.
15. **Communication gaps between circles & the departmental head should be avoided** - Instances show that where the circle remains in touch with departmental head, smooth working of Quality Circle has been possible. In the absence of such contact with the departmental head, the circle members may not even make necessary changes as recommended to resolve the problem.

16. **Change of management** - It may happen that the top management with whose commitment and support the Quality Circles were started may get transferred or may retire. The new personnel appointed in his place may not have had the opportunity of understanding the concept in his earlier assignment or may not have the necessary faith in it.

If prompt decisions are not taken, the ideas are not converted into actions; programs usually loose their momentum and die.

This problem can be overcome if facilitator or a coordinator organizes a Quality Circle meet & a brief presentation on QC is made. Similar situation may arise even when facilitator or coordinator changes. Such situation is inevitable in the organization. But the progress of the movement does not resolve around one or two individuals but becomes a part of the organizational culture.

17. **Change in Management priority** – It is the most common cause. Sometimes management wants to do it on trial basis. Initially the top management shows interest in the circle activities but gradually loses interest. If this movement is started as ‘fad’, then it won’t exist for a long time.

18. **Resistance from Trade unions** -- When the launching of QC is properly done, no problem from the trade unions are seen. It is
natural that trade unions have fear that Quality Circle would undermine their influence. They may be concerned about sharing the gains of improved productivity through Quality Circles.

It is necessary to remove all such fears and misconceptions from the minds of union officials by tactfully including them in the programmes on Quality Circle and case study presentations along with the other employees.

In many cases it is seen that the trade unions have even joined the circle activities & the office bearers have become the active members of Quality Circles.

In the case studies of Nashik Industries it is found that:

In 90% industries where QC was in operation, trade union was made a part of Quality Circle.
Only in 10% cases, union was not made a part of Quality Circle.
However positive involvement of the union leader was noticed in 100% cases. This resulted in the improvement in the relationship between union & management.

Tangible and intangible impact

The Quality Circle is a voluntary movement and those who become circle members on their own volition should normally be motivated to give their best without having to face competitions from others. But with human nature being what it is, the natural urge to excel oneself over others help in a continuous improvement in the standard of performance. Moreover when the members get the opportunities to witness the performance of others in similar fields, they do realize relative strengths & weaknesses and try to assimilate the beneficial aspects of others' performance.
In Japan, regional, national and international conventions are organized to recognize the best performing organization as well as the best Quality Circle. Further each organization conducts its own mini conventions and the best QCs are deputed for participation in regional conventions. The winner of regional convention is sent to the national convention & finally the winner of national convention represents the country. In India, Quality circle Forum Of India [QCFI] also aims to organize in this way.

While monitoring the work of Quality Circles, in each organization, activity level record of Quality Circles is useful. Activity level Record is maintained by the facilitator & is forwarded to coordinating agency. It mentions the details like, name of the circle, circle number, name of the facilitator, work area of the circle, number of members, date of inauguration, number of meetings held, number of problems resolved, average attendance, number of case study presentation, constraints encountered, suggestions for improvement of circle operation & intangible impact observed.

This record helps the coordinator to exchange views with leaders or deputy leaders. Where there are many Quality Circles in operation, it may be one of the criteria to select the best Quality Circle in the organization.

In order to ensure impartiality of evaluation of Quality Circle, a panel may be nominated in the organization. In a big organization with many divisions, weightage is given to the rate of growth of Quality Circles in the organization as well as to the effectiveness of Quality Circle activities. Weightage is also given to the year long effective working of Quality Circle.

Weightage is also given to the use of logic and problem solving techniques, contribution of the solutions to the organization [in the form of tangible and intangible gains etc.]
When the members are asked to select ‘Good Circle’ in the organization, it is found that they do not give importance to the method of presentation, not at all.

All the members give weightage to the nature of problems handled by Quality Circles and then they give importance to the savings made & cost of the programme. They also think that involvement of the members should be given due consideration while deciding ‘Good Quality Circle’. However the members do not forget to mention that stress should be given on intangible benefits.

When we talk about the evaluation of Quality Circle, a study of tangible as well as intangible gains, the organization is enjoying because of a Quality Circle, is very important.
Diagram 3.11  Tangible Gains
**Tangible & Intangible Gains** – it must be noted that the Quality Circles resolve the problems related to their work area, where tangible gains are not only in the form of saving in cost but also in the form of reduced cycle time, repeat order from customers, environment protection etc. Similarly intangible gains are many, in the form of less fatigue, developed team spirit, sense of belonging, etc.

The existence of a Quality Circle in an organization totally depends on management involvement and commitment. Management shows interest in the working of Quality Circle when through programme or projects of Quality Circle, the organizations enjoys tangible gains. The organization does give importance to the cost saving aspect.
If we study the cases of various Quality Circles we find that each & every Quality Circle has succeeded in cost saving after resolving the problem taken by it. But that is only one aspect of tangible benefits, which the organization enjoys. If we see different case studies, we find that organization enjoys tangible and intangible gains in many ways.

Following are the selected case studies of Quality Circles describing how the Circles were succeeded in their projects-
CASE STUDY 1

The Quality Circle in the case study was new and had completed only one project. The members were given training of QC tools. So they could find out 54 problems through brainstorming. They solved the most serious problem of ‘Outer Line Tube Mark’ step by step and rejection in the line mark was reduced from 16000 ppm to 186 ppm.

- Product of the company: Front Fork
  Shock Absorbers
- Use of product: Every vehicle on Indian roads has Component(s) of this company.
- Name of the circle: STAR
- Department: Front Fork
- Established: 02/08/2002
- No of QC members: 6
- Day of the meeting: Friday
- Time of the meeting: 15.30
- Place of the meeting: training room
- No of meetings: 18
- Duration: 30 min.
- Project completed: 1
- Project in progress: 1

Theme -- To achieve 100 PPM.

The circle members identified 54 problems through brainstorming.

Then the members classified this 54 problems into A, B, C category where

18 problems were under A category
27 problems were under B category
9 problems were under C category
Choice of problem – Problem selected from A. Then data for these problems were collected for 4 months. Data was regarding the defects due to these 18 problems.

It is found that – Cell wise rejection (for 4 months)

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Cell</th>
<th>Production</th>
<th>Rejection</th>
<th>Rejection PPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inner Tube</td>
<td>240000 nos</td>
<td>1440 nos</td>
<td>6000</td>
</tr>
<tr>
<td>2</td>
<td>Outer Tube</td>
<td>75000 nos</td>
<td>1200 nos</td>
<td>16000</td>
</tr>
</tbody>
</table>
Data analysis was done with Pareto Diagram

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Defects</th>
<th>Nos.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Outer Tube Line Marks</td>
<td>1250</td>
<td>82.12</td>
</tr>
<tr>
<td>2</td>
<td>Outer Tube Concentricity</td>
<td>46</td>
<td>85.14</td>
</tr>
<tr>
<td>3</td>
<td>m-8 Tapping shift</td>
<td>43</td>
<td>87.49</td>
</tr>
<tr>
<td>4</td>
<td>Wall thickness</td>
<td>40</td>
<td>90.31</td>
</tr>
<tr>
<td>5</td>
<td>Grooving depth</td>
<td>32</td>
<td>92.41</td>
</tr>
<tr>
<td>6</td>
<td>Drain hole shift</td>
<td>28</td>
<td>94.24</td>
</tr>
<tr>
<td>7</td>
<td>Axle hole variation</td>
<td>21</td>
<td>95.62</td>
</tr>
<tr>
<td>8</td>
<td>Oil seal dia</td>
<td>19</td>
<td>96.86</td>
</tr>
<tr>
<td>9</td>
<td>Height variation</td>
<td>13</td>
<td>97.71</td>
</tr>
<tr>
<td>10</td>
<td>Axle hole shift</td>
<td>11</td>
<td>98.43</td>
</tr>
<tr>
<td>11</td>
<td>Drain hole leakage</td>
<td>11</td>
<td>99.15</td>
</tr>
<tr>
<td>12</td>
<td>Milling</td>
<td>8</td>
<td>100</td>
</tr>
</tbody>
</table>

The problem selected from Pareto Diagram

"Outer tube line mark"

Rejection due to selected problem-- 16000 PPM

Target setting- Reduction in Line Mark rejection from 16000 PPM to < 100 PPM by March 2003
Diagram 3.1.1

PARETO DIAGRAM

<table>
<thead>
<tr>
<th>QTY</th>
<th>CUM. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1250</td>
<td>82.12</td>
</tr>
<tr>
<td>46</td>
<td>85.14</td>
</tr>
<tr>
<td>43</td>
<td>87.49</td>
</tr>
<tr>
<td>40</td>
<td>90.31</td>
</tr>
<tr>
<td>32</td>
<td>92.41</td>
</tr>
<tr>
<td>28</td>
<td>94.24</td>
</tr>
<tr>
<td>21</td>
<td>95.52</td>
</tr>
<tr>
<td>19</td>
<td>96.86</td>
</tr>
<tr>
<td>13</td>
<td>97.71</td>
</tr>
<tr>
<td>11</td>
<td>98.42</td>
</tr>
<tr>
<td>11</td>
<td>99.15</td>
</tr>
<tr>
<td>1</td>
<td>100</td>
</tr>
</tbody>
</table>

120
After brainstorming 8 causes related to man, machine, method were selected for priority rating by 6 QC members.
Table 3.1.1  Rating of Causes

<table>
<thead>
<tr>
<th>NO</th>
<th>The problems</th>
<th>Total of rating</th>
<th>Priority no</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Spindle run out, coolant flow not ok</td>
<td>42</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>Feed not ok</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Clamping pressure not ok</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Bush mark</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Fitment of tool straightness of tube</td>
<td>31</td>
<td>2</td>
</tr>
<tr>
<td>F</td>
<td>Threaded type of BTA tool</td>
<td>26</td>
<td>3</td>
</tr>
<tr>
<td>G</td>
<td>Individual differences</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Knowledge of operating person</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.1.2  Gantt chart

<table>
<thead>
<tr>
<th>No</th>
<th>Action</th>
<th>Start</th>
<th>Finish</th>
<th>Jan 03</th>
<th>Feb 03</th>
<th>Mar 03</th>
<th>Apr 03</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Spindle runout &amp; coolant flow</td>
<td>25</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Feed not ok</td>
<td>25</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Clamping pressure not ok</td>
<td>25</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I.D. costing</td>
<td>6</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Straightening &amp; tightening of BTA tool</td>
<td>5</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Knowledge of operator</td>
<td>1</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Individual differences</td>
<td>1</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 3.1.3 Observations before Trial

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Criteria</th>
<th>Target</th>
<th>Observation</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Surface finish</td>
<td>0.2Ra</td>
<td>0.15Ra</td>
<td>Right</td>
</tr>
<tr>
<td>2</td>
<td>Fitment of BTA tool</td>
<td>Ok</td>
<td>Not ok</td>
<td>Wrong</td>
</tr>
<tr>
<td>3</td>
<td>Straightness of BTA Tube</td>
<td>40 u</td>
<td>100 u</td>
<td>Wrong</td>
</tr>
<tr>
<td>4</td>
<td>Productivity</td>
<td>250nos</td>
<td>218</td>
<td>Wrong</td>
</tr>
<tr>
<td>5</td>
<td>Rejection</td>
<td>100 PPM</td>
<td>16000</td>
<td>Wrong</td>
</tr>
</tbody>
</table>

Decision – not satisfactory
Spindle run out
Coolant flow
5W, 1H – used

Trial 1 was taken on date – 24/1/2003-
1. Spindle run out is checked & adjusted within 10 microns & also feed set at zero.
2. Adjusted clamping pressure up to 5 Bar. coolant flow within 80-90 lit/min.
Data collected from 25th Jan 03 to 31st Jan 03 showed that
Rejection – 13000ppm
Conclusion – Acceptable but not satisfactory.

**So Selected Action – 2**

Improvement in I. D. OF Costing 5W, 1H- method
Trial 2, Costing I. D. should be 26.5 to Material Department.
Trial 2 was taken on 22nd Feb, 03
Data collected from 23rd Feb 03 to 28th Feb 03 showed that
Rejection – 9000 PPM
Conclusion – Acceptable but not satisfactory

**So Selected Action – 3**

Mounting of BTA Tool on BTA Tube use of 5W, 1H.
Trial –3
1. Taper mounting is replaced by threaded mounting.
2. Taper BTA tube is replaced by threaded type. (See the picture)
3. Trial 3 was taken on 22\textsuperscript{nd} mar 03. Data was collected from 23\textsuperscript{rd} mar 03 to 29\textsuperscript{th} mar 03
   Rejection–190ppm
   Conclusion- Acceptance & Satisfactory
   Line Mark Problem Solved.
   Selected Action 4
   Knowledge of operator & individual differences
   Trial no 4 -- 5th April 03
   Arranged the training for operator’s regarding the deep hole boring machines technical parameters.
   Data was collected from 6\textsuperscript{th} April 03 to 12 Th April 03

Table 3.1.4 Data was collected from 6\textsuperscript{th} April 03 to 12\textsuperscript{th} April 03

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Criteria</th>
<th>Target</th>
<th>Before trial</th>
<th>After trial</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Surface finish</td>
<td>0.2Ra</td>
<td>0.15Ra</td>
<td>0.07Ra</td>
<td>Right</td>
</tr>
<tr>
<td>2</td>
<td>Fitment of BTA Tool</td>
<td>Ok</td>
<td>Not ok</td>
<td>Ok</td>
<td>Right</td>
</tr>
<tr>
<td>3</td>
<td>Straightness of BTA Tube</td>
<td>40u</td>
<td>100u</td>
<td>20u</td>
<td>Right</td>
</tr>
<tr>
<td>4</td>
<td>Productivity</td>
<td>250 nos.</td>
<td>218nos</td>
<td>250nos</td>
<td>Right</td>
</tr>
<tr>
<td>5</td>
<td>Rejection</td>
<td>&lt;100ppm</td>
<td>160000ppm</td>
<td>190</td>
<td>Right</td>
</tr>
</tbody>
</table>

Preventive measures to be taken as decided by Circle members.
Table 3.1.5 Action Plan

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Activities</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Check spindle runout</td>
<td>6 month</td>
</tr>
<tr>
<td>2</td>
<td>Check coolant flow</td>
<td>6 months</td>
</tr>
<tr>
<td>3</td>
<td>Inspect BTA Tool</td>
<td>Every shift</td>
</tr>
<tr>
<td>4</td>
<td>Cleaning of filtration system</td>
<td>3 months</td>
</tr>
<tr>
<td>5</td>
<td>Inspect BTA Tube</td>
<td>3 months</td>
</tr>
</tbody>
</table>

Follow up – results
1. Production (April 03 to 15 Th Oct 03) – 112712 nos.
2. Defective parts produced due to selected problem – 21 nos.
3. REJECTION – 186 PPM

Table 3.1.6 Expenditure for Trial

<table>
<thead>
<tr>
<th>Category</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
<th>Trial 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tooling</td>
<td>0</td>
<td>0</td>
<td>31546</td>
<td>0</td>
</tr>
<tr>
<td>Machining</td>
<td>4000</td>
<td>0</td>
<td>3767</td>
<td>0</td>
</tr>
<tr>
<td>Training</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3000</td>
</tr>
<tr>
<td>Total (Rs)</td>
<td>4000</td>
<td>0</td>
<td>35313</td>
<td>3000</td>
</tr>
</tbody>
</table>
Total Expenses for Trial = Rs 42313.

A. Tangible benefits
1. Rejection reduced from 16000ppm to 186ppm
2. Standard cycle time achieved.
3. Step up time reduced
4. Improved Quality
5. Increased tool life
6. Improved surface finish

B. Intangible benefits
1. Less fatigue
2. Customer satisfaction

Cost Savings

Monthly production 18750 nos.
Rejection 186 PPM
Rejection cost / month Rs. 38,000
Total cost saved / year Rs. 24,000.
Total cost saved / year Rs. 7,44,000

Future Plans
The circle decided to achieve 100 PPM in the following areas:
- Customer complaints
- Sales Return
- Final inspection
Diagram 3.1.3  Action Plan of the Project
CASE STUDY 2

In this case study the company was facing certain problems, out of which 6 problems were related to testing rejection. The other problems were not related not under direct control due to outside defects. Six problems due to testing rejection were solved by the circle in the case study in this project. They displayed advanced knowledge of tools and techniques like histogram. The circle members also enjoyed many tangible gains.

- Name of the Quality Circle: Zenith
- No. of Members: 4
- Date of Formation: 2nd April 2003
- Department: Two Wheeler Switches
- Project: 1st
- Time Taken: 12 Weeks
- Attendance: 95%
- Meeting Place: Assembly Meeting Area
- Goal of Quality Circle: To achieve Zero rejection

In a Case Study 2, the company manufactures switches required for Two Wheelers. Function of Switch –

1. Horn knob – a part of Switch – for Horn operation
2. Blinker knob – a part of Switch as a indicator – for Left & Right Turn
3. Lever – for Clutch Operation
4. It is handle bar switch on Left side.
The Circle Members who are assembly operators prepared milestone chart –

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Activity</th>
<th>April</th>
<th>May</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Identification of Problem</td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
</tr>
<tr>
<td>2</td>
<td>Selection of Problem</td>
<td>4th</td>
<td>1st</td>
<td>2nd</td>
</tr>
<tr>
<td>3</td>
<td>Data Collection</td>
<td></td>
<td></td>
<td>3rd</td>
</tr>
<tr>
<td>4</td>
<td>Analysis</td>
<td></td>
<td></td>
<td>4th</td>
</tr>
<tr>
<td>5</td>
<td>Counter Measure Selection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Counter Measure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Implementation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Standardisation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Problems identified through brainstorming 33

**Stratification for Problem Selection** –

1. Problems not under direct control /resulting due to outside defect 27
2. Testing rejection (Result of all activities are undertaken online) 06

Testing Rejection - 6 Problems

* Blinker Movement Sticky
* Blinker Continuity Missing
* Horn Movement Sticky
* Horn Continuity Missing
* Lever Movement Sticky
* Body Short
Data collected for Testing Rejection from March 15, 2003 to April 17, 2003

Run chart for Testing Rejection.

Graph 3.2.1

Run Chart For Testing Rejection

Testing Rejection: The End Result and directly effecting our Customer

PPM per day = 13725

The end result & directly affecting our customer.
Problem Selection

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blinker Continuity Missing</td>
<td>225</td>
<td>71%</td>
<td>71%</td>
</tr>
<tr>
<td>2</td>
<td>Body Short</td>
<td>42</td>
<td>13%</td>
<td>84%</td>
</tr>
<tr>
<td>3</td>
<td>Horn Continuity Missing</td>
<td>20</td>
<td>6%</td>
<td>90%</td>
</tr>
<tr>
<td>4</td>
<td>Blinker Movement Sticky</td>
<td>18</td>
<td>6%</td>
<td>96%</td>
</tr>
<tr>
<td>5</td>
<td>Horn Movement Sticky</td>
<td>10</td>
<td>3%</td>
<td>99%</td>
</tr>
<tr>
<td>6</td>
<td>Lever Movement Sticky</td>
<td>4</td>
<td>1%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Problems selected:
- Blinker Continuity Missing
- Body Short

Pareto Chart for Testing Rejection

Which part did you want us to work on first?
Table 3.2.1

Selected Problem Blinker Continuity Missing

Data Collection For Analysis:

<table>
<thead>
<tr>
<th>Month</th>
<th>Production</th>
<th>Total Rej.</th>
<th>Blinker Rej.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-03</td>
<td>27095</td>
<td>362</td>
<td>257</td>
<td>71%</td>
</tr>
<tr>
<td>Feb-03</td>
<td>14675</td>
<td>200</td>
<td>130</td>
<td>65%</td>
</tr>
<tr>
<td>Mar-03</td>
<td>1725</td>
<td>92</td>
<td>63</td>
<td>68%</td>
</tr>
<tr>
<td>Apr-03</td>
<td>22550</td>
<td>477</td>
<td>376</td>
<td>79%</td>
</tr>
</tbody>
</table>

PPM per day = 13725

Through brain storming all possible reasons for Blinker Continuity Missing were found out.
Brain Storming

....... To Identify All Possible Reasons
For Blinker Continuity Missing.
Diagram 3.2.2

C & E Diagram (Disperation Analysis)

- **Man**
  - Operator Fatigue
  - Soldering (Lack Of Awareness)
  - Any Conducting Material Between Two Pts.
  - Short Circuited
  - More Than Soldering Wire
  - Unequal Mov. Cond. Length

- **Machine**
  - Flooding Not Proper
  - Riveting Fixture
  - Loose Rivets
  - Terminal Bend In Coupler Material In Coupler

- **Material**
  - Wire Interchange
  - Spring Stiffness Less
  - Rivet's Height Variation
  - Wire Interchange

- **Method**
  - Less Crimping Strength
  - Crimping On PVC
  - Welding Harness
  - Terminal /Unlocked Bend

- **Blinker Continuity Missing**
Diagram 3.2.3

Cause & Effect For Root Causes

Man
- Wire Interchanger
- Soldering
- Solder Connection between two points
- Unequal Mov. Cont. Leg
- Moving Contacts

Machine
- Loose Terminals Of Coupler
- Bending of terminal
- Testing Fixture
- Blinker Continuity Missing
- Soldering
- Flux On Rivet

Material

Method
The root cause (1) moving contact Leg height unequal constitutes – 63 %
So the data was collected for Leg height A & B before Tool correction.
Graph 3.2.3

Observation:

Legs
Moving Contact

Spec.: 6.5 ± 0.1
Maximum Leg Height
Difference < 0.2 mm

Histogram

Mov. Cont. Leg Height Diff.

Difference in Leg Height (mm)

It was noted that the difference between the two-leg height is exceeding the permissible Specification limit.

It prompted us to analyze the leg height of each side to understand which leg is contributing to this difference.

For understanding leg height of each side we measured leg heights of each side and plotted frequency distribution.
Table 3.2.2

**Leg height**

<table>
<thead>
<tr>
<th>Side-A</th>
<th>SIDE-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>Maximum</td>
</tr>
<tr>
<td>6.81</td>
<td>6.63</td>
</tr>
<tr>
<td>Minimum</td>
<td>Minimum</td>
</tr>
<tr>
<td>5.58</td>
<td>6.24</td>
</tr>
<tr>
<td>Range</td>
<td>Range</td>
</tr>
<tr>
<td>1.23</td>
<td>0.39</td>
</tr>
<tr>
<td>No. of Int</td>
<td>No. of Int</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Bin Range</td>
<td>Bin Range</td>
</tr>
<tr>
<td>0.123</td>
<td>0.039</td>
</tr>
<tr>
<td>Lc</td>
<td>Lc</td>
</tr>
<tr>
<td>0.005</td>
<td>0.005</td>
</tr>
</tbody>
</table>

| Class | CumF | Freq | Mid Val | | Class | CumF | Freq | Mid Val |
|-------|------|------|---------| |-------|------|------|---------|
| 5.58  | 0    |      |         | |       |      |      |         |
| 5.70  | 1    | 1    | 5.64    | | 6.24  | 0    |      |         |
| 5.82  | 1    | 0    | 5.76    | | 6.32  | 9    | 1    | 6.26    |
| 5.94  | 1    | 0    | 5.88    | | 6.35  | 22   | 13   | 6.34    |
| 6.07  | 1    | 0    | 6.01    | | 6.39  | 39   | 17   | 6.37    |
| 6.19  | 1    | 0    | 6.13    | | 6.43  | 59   | 20   | 6.41    |
| 6.31  | 1    | 0    | 6.25    | | 6.47  | 77   | 18   | 6.45    |
| 6.44  | 2    | 1    | 6.37    | | 6.51  | 89   | 12   | 6.49    |
| 6.56  | 10   | 8    | 6.50    | | 6.56  | 96   | 7    | 6.53    |
| 6.68  | 66   | 56   | 6.62    | | 6.59  | 99   | 3    | 6.57    |
| 6.81  | 99   | 33   | 6.74    | | 6.63  | 99   | 0    | 6.61    |
| 6.98  | 100  | 1    | 6.87    | | 6.67  | 100  | 1    | 6.65    |

**Specification------65±01**

**Target------65**

**USL------66**
Probable Resistance was foreseen by members on account of high production demand leading to less time towards analysis.

For finding Foreseen Resistance, Reverse Brainstorming was done. As a Counter measure Tool Correction was done.
As A Counter Measure - Tool Correction

Tool For M/c

Bending Pin
Cutting Pin

Reduce Clearance Between Bending Punch From 0.05 To 0.02

Before

After
1. Moving Contact be manufactured by Company's press shop and to manufacturing this item tool is used.
2. Tool cavities / slots determine the dimensions of the moving contact.
3. For eliminating the difference in the leg height of the moving contact, tool correction was done.
4. After tool correction dimension of the leg height of 100 numbers was taken & frequency distribution for legs heights for both the sides was plotted.
5. It is seen (as shown above) the heights are well within specification limit.
Table 3.2.3 Data for Leg Height Difference A & B after Tool Correction

<table>
<thead>
<tr>
<th>Class</th>
<th>Cum</th>
<th>Frequency</th>
<th>Mid-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.005</td>
<td>000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>0.016</td>
<td>009</td>
<td>09</td>
<td>0.01</td>
</tr>
<tr>
<td>0.027</td>
<td>024</td>
<td>15</td>
<td>0.02</td>
</tr>
<tr>
<td>0.038</td>
<td>034</td>
<td>10</td>
<td>0.03</td>
</tr>
<tr>
<td>0.048</td>
<td>043</td>
<td>09</td>
<td>0.04</td>
</tr>
<tr>
<td>0.059</td>
<td>060</td>
<td>17</td>
<td>0.05</td>
</tr>
<tr>
<td>0.070</td>
<td>088</td>
<td>28</td>
<td>0.06</td>
</tr>
<tr>
<td>0.081</td>
<td>099</td>
<td>20</td>
<td>0.08</td>
</tr>
<tr>
<td>0.092</td>
<td>116</td>
<td>17</td>
<td>0.09</td>
</tr>
<tr>
<td>0.103</td>
<td>123</td>
<td>17</td>
<td>0.10</td>
</tr>
<tr>
<td>0.113</td>
<td>137</td>
<td>13</td>
<td>0.11</td>
</tr>
<tr>
<td>0.124</td>
<td>140</td>
<td>01</td>
<td>0.12</td>
</tr>
<tr>
<td>0.135</td>
<td>145</td>
<td>00</td>
<td>0.13</td>
</tr>
<tr>
<td>0.146</td>
<td>143</td>
<td>00</td>
<td>0.14</td>
</tr>
</tbody>
</table>
To verify further the corrective action, frequency distribution of the leg height difference was plotted.

It is seen that the difference is within specification limit.

Root Cause 2 - Loosening of fitment in testing coupler contributes 10 %
Root Cause 3 - Bending of terminal in testing coupler contributes 7 %
Root Cause 4 - Wire interchange contributes 17 %
Root Cause 5 - Flux on Rivet 3 %
It was observed that after testing for large no of switches the fitment in coupler gets loose. Further due to handling the terminals gets bend. Normally abnormality of coupler starts after 20 days of usage (testing).

**Counter Measure:**
Frequency of Change for testing coupler is defined. To be changed after 15 days of usage (testing) or 12500 nos whichever is earlier.
Diagram 3.2.4

**Linkage: Causes & processes on Line**

- Blinker Module Process
- Problematic process

Rating System for Process Failure Analysis:

<table>
<thead>
<tr>
<th><strong>Rate of Occurrence (RO)</strong></th>
<th><strong>Rating</strong></th>
<th><strong>Class</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>Very Low Rate of Occurrence</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Medium Rate of Occurrence</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Very High Rate of Occurrence</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Rate of Detection (RD)</strong></th>
<th><strong>Rating</strong></th>
<th><strong>Class</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>Very High Detection Rate</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Medium Detection Rate</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Very Low Detection Rate</td>
</tr>
</tbody>
</table>
Note-

Rate of Occurrence signifies the rate at which problems have occurred in the process while manufacturing the switch.

Rate of Detection signifies the capability of a process control measure to detect the problem and prevent it from proceeding to next process / work station.

Rate of Failure is calculated by multiplying RO x RD.

1) Verification & Counter Measure for high "RF"

Process: Blinker Base Soldering

Mode of Failure: Presence of Soldering Flux on Rivet Contact Surface

<table>
<thead>
<tr>
<th>CAUSES</th>
<th>RO</th>
<th>Current Process Control</th>
<th>RD</th>
<th>RF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.3 Spray of soldering flux on rivet base</td>
<td>3</td>
<td>No control</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>1.1.4 Sticking of soldering flux while handling</td>
<td>2</td>
<td>No control</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

Observation-

It was observed that while soldering flux spray all over the place and has high chance of getting into contact with riveted base kept nearby.

While handling sprayed flux – sticks on heated rivet contact surface.

Foreseen Probable resistance-

Follow up & convincing regarding cost impact for implementation of acrylic guard.
For finding FORESEEN RESISTANCE, 'REVERSE BRAINSTORMING' was done.

**Picture 3.2.3**

**Counter Measure for high “RF”**

**Counter Measure:**
Guard is provided below and around the soldering station which prevented flux from spraying.

- **Open Area**
- **Acrylic Guard**
- **Plate provided to prevent falling of solder metal & flux to table surface**

2) Verification & Counter Measure for High “RF”
Process: Blinker Base Soldering
Mode of Failure: Wire Interchange
Causes-

<table>
<thead>
<tr>
<th>CAUSES</th>
<th>RO</th>
<th>Current Process Control</th>
<th>RD</th>
<th>RF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2.1 Position of locator in opposite direction</td>
<td>3</td>
<td>No control</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>1.2.2 Wire colour confusion</td>
<td>3</td>
<td>No control</td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

**Observation** -

It was observed that operation gets confused during soldering in the selection of wires and rivet contact, which is to be soldered at which point.
Counter Measure for high “RF”

**Counter Measure:***

Grooves were made in locator in which relevant wire color of wiring harness is fixed. Moreover slots is provided in locators with proper dimension for placement of riveted base. Thus preventing wrong placement of riveted base and wire colour confusion.

**Note:**

Grooves Made For Fixing relevant Wire Colours
Graph 3.2.8

Results Achieved After Implementing All Corrective Actions

Before

After

Blinker Continuity Missing Eliminated
Diagram 3.2.5

Impact of 1st Improvement Activity and selection of next problem

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body Short</td>
<td>45</td>
<td>41%</td>
<td>41%</td>
</tr>
<tr>
<td>2</td>
<td>Horn Continuity Missing</td>
<td>22</td>
<td>20%</td>
<td>61%</td>
</tr>
<tr>
<td>3</td>
<td>Blinker Movement Sticky</td>
<td>19</td>
<td>17%</td>
<td>79%</td>
</tr>
<tr>
<td>4</td>
<td>Horn Movement Sticky</td>
<td>16</td>
<td>15%</td>
<td>94%</td>
</tr>
<tr>
<td>5</td>
<td>Lever Movement Sticky</td>
<td>7</td>
<td>6%</td>
<td>100%</td>
</tr>
<tr>
<td>6</td>
<td>Blinker Continuity Missing</td>
<td>0</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Next Problem: Body Short
Diagram 3.2.6

Why – Why Analysis For Body Short

Body Short

- Why
- Incoming Current Touches To Body

- Why
- Internal Current Conducting Parts Touches To Body

- Why
- Absence Of Insulation Between Body & Crt. Conducting Part

- Why
- Insulation Plate Missing

- Why
- Human Error

- Why
- PVC Of Wire Get Damage While Screw Fitment

- Why
- Extra Pressure On Wire While Screw Fitment

- Why
- Less Space In Lower Where Wires Are Fitted
Diagram 3.2.7

Validity Of Root Causes

<table>
<thead>
<tr>
<th>Problem</th>
<th>Date</th>
<th>S.No.</th>
<th>Possible Causes for Rejection</th>
<th>Tally Marks</th>
<th>Sub-Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Short</td>
<td>April-03</td>
<td>1</td>
<td>Hole Missing</td>
<td></td>
<td>89</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cuff and Wiring harness</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td></td>
<td>96</td>
</tr>
</tbody>
</table>
Pie-Chart For Causes

- Missing of Insulation: 7%
- Cutting of Wiring Harness while screwing: 93%
Diagram 3.2.8

Missing Of Insulation Plate Contributes 93%

Ideal Condition Of Carrier Assy.

M/CONTACT

Presence Of Insulation Plate

Figure-A

CARRIER

STEEL BALL

Spring

Carrier Assy. Without Insulation Plate

Missing Of Insulation Plate

Figure-B

M/CONTACT

CARRIER

STEEL BALL

Spring
Diagram 3.2.9

POKA-YOKE Done To Avoid Insulation Plate Missing

- Spring Loaded Connecting Pins
- Submerged contact point
- Insulator
- Point of connection
- Steel Locator
- Steel Ball
- Carrier
- M/Contact
- Spring
Cutting Of Wiring Harness Contributes 7%

Observation
It was observed that while screw fitment wires gets damaged. After careful observation it was found that due to less space in the Lower case the wires get damaged by the Wire Clamp & removes the PVC insulation of wires & hence it get contact with Lower Case which is made of Aluminum.

Compressed Wiring Harness by Wire Clamp

Lower Case (Aluminum Metal)

Foreseen Probable Resistance -
Convincing Design Department regarding grade change of wire as well as regarding approval from our Customer.

For finding FORESEEN RESISTANCE, “REVERSE BRAINSTORMING” was done.
Counter Measure for Cutting Of Wiring Harness

Counter Measure:
AV Grade Wire is replaced with AVSS Grade Wire

Before

AV Grade Wire
Dia. 2.4 ± 0.1

After

AVSS Grade Wire
Dia. 1.8 ± 0.1

Approved By Design Deptt.
After Implementing Corrective Action
Results of Corrective Actions

After Improvement:
Blinker Continuity Missing = 0 ppm
Body Short = 0 ppm

P = Productivity increased by 6.25 %
Q = Overall reduction in Testing Rejection from 13725 PPM to 1150 PPM.
C = Monthly Cost Saving = Rs. 29,040
D = Since this line is high volume line, our delivery is streamlined due to increase in good part out of the total parts produced on line. Now we are able to handle customer requirement within our shift timing only.
S = Flux prevented from spraying on hand and face of the opera
M = Operator morale has increased due to rejection in possibility of passing on defective product to customer & possible Customer complaints & rejection.

Confidence of team members is also much increased.
Calculation Sheet

- Monthly indent of SW – 0681 & SW – 0681 A = 21600 Nos. (PM)
- Testing Rejection before improvement = 1.37 % (13700 PPM)
- Testing Rejection after improvement = 0.115 %
- Reduction in testing rejection (after improvement)
  \[ (1.37 - 0.115) \% = 1.225 \% \]
- Reduction in switch rejection due to testing = 1.225 % of 21600 = 264 Nos. (PM)
- Manufacturing cost of 1 switch = Rs.110.00 (average)
- Monthly Saving = Rs. 110.00 \times 264 = Rs. 29,040.00
  (Calculation based on data available)

Standardization & Horizontal Deployment

- Frequency of Testing Coupler change is defined & provided monitoring sheet for 26 assembly lines.
- Acrylic guards are provided for 35 soldering stations to avoid spraying of flux on soldered object as well as on hands & face of operator.
- Wherever soldering is done (35), locators with fixed relevant wire colours are provided.
- Poke Yoke for Blinker Carrier assembly is being done for SW–0719 series & SW–0721 series
**Tools & Techniques applied**

1. Brainstorming  
2. Stratification  
3. Pareto Chart  
4. Check Sheet  
5. Graphs & Charts  
6. Cause & Effect Diagram  
7. Histogram

**Special features of QC project**

1. Customer praised for eliminating rejection at their end.  
2. Customer appreciated for changing design of wire.  
3. Our company theme is to achieve 100 PPM and we achieve 0 PPM.

**Intangible benefits**

- Increased Morale  
- Increased Communication Skill  
- Knowledge about Problem identification  
- Awareness of 7 QC Tools & their applications  
- Increase Confidence level  
- Improved Presentation Skill
CASE STUDY 3

The Quality Circle not only solves the problems but also makes innovations In the following case study the project undertaken by circle was very complex. They required 42 weeks to complete the project. The members innovated in house Twin Track M/c and succeeded in the saving of a huge amount of Rs. 2.25 crores.

- **Product**: Soaps & Powders
- **Circle Name**: Gagan
- **Day of the Meeting**: Every Saturday
- **No. of meetings**: 42
- **Circle Area**: Powder packing Hall
- **Circle Members**: 7
- **Project Title**: Twin Track FFS M/c innovation

**Mission Statement** – Increase the output through innovation & reduce the cost of production with minimal investment Theme... Convert Single track FFS M/c into Twin Track FFS M/c.
**Diagram 3.3.1**

**PROCESS FLOW DIAGRAM POWDER PLANT**

[Diagram showing process flow with various equipment and flow paths such as Ploughshare Mixer, Hopper, Grinder, Enzyme dozing room, and specific locations for perfume, speckles, concrete mixer, side wall bell conveyor, and vibrofeeders connected with different materials and processes like Hypo Chlorite + Water, Silica, Tinopal, Silicate, LABS, Stick SCMC, Nicrome 1, Nicrome 2, Nicrome 3, Nicrome 4, and 600 Kg bags filling.]

---

**What is a FFS Machine??**

It is a packing machine used for packing detergent powder in the pouches, by forming the pouches, filling & sealing the pouches.

**Single Track M/C:** The M/C which does forming, filling & sealing of pouches on single track at a time, that kind of M/C is called single track M/C (one pouch at a time).

**Twin Track M/C:** The M/C which does forming, filling & sealing of pouches on two track at a time, that kind of M/C is called twin track M/C (two pouch at a time).
Reason for selection of the problem –
“Constant productivity for last 2 years productivity Trend of FFS M/c for 50 gm pack.
Graph 3.3.1

Brainstorming
Productivity Improvement

Options
1. Procure New M/c
2. Speed increase of M/c
3. Adopt new Technology
4. Innovate in house twin track M/c

Option Selected Criteria
<table>
<thead>
<tr>
<th>Option</th>
<th>Merit</th>
<th>Demerit</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Produce New M/c</td>
<td>Output of the plant can be increased.</td>
<td>Capital Investment cost, additional asset, additional maintenance cost, energy, manpower, layout constraint</td>
<td>Option not feasible. Not in Policy.</td>
</tr>
<tr>
<td></td>
<td>Already trained people.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Speed increase of M/c</td>
<td>Output of plant can be increased.</td>
<td>Quality defects excessive wear &amp; tear, design constraint</td>
<td>Option not feasible.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Forming &amp; sealing can not happen at high speed because there is delay required while Clamping &amp; Sealing the porch.</td>
</tr>
<tr>
<td>3. Adopt new Technology</td>
<td>Output of plant can be increased.</td>
<td>Technology not available in India.</td>
<td>Option ruled out.</td>
</tr>
<tr>
<td>4. Innovate in house Twin track M/c</td>
<td>Output double, reduced manpower, reduced energy, reduced maintenance cost, no space constraint</td>
<td>Packing Constraint.</td>
<td>Option Selected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Execute Job.</td>
</tr>
</tbody>
</table>
Aims: To double the output of Nichrome M/c (FFS) by converting the M/c to twin track M/c

Goals: 5W, 1H Approach

<table>
<thead>
<tr>
<th>Guide Words</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>What</td>
<td>Twin tract FFS M/c</td>
</tr>
<tr>
<td>Where</td>
<td>Nichrome M/c No.4</td>
</tr>
<tr>
<td>Why</td>
<td>To double the Productivity</td>
</tr>
<tr>
<td>When</td>
<td>1\textsuperscript{st} October to 2\textsuperscript{nd} March 2002</td>
</tr>
<tr>
<td>Who</td>
<td>Task Force</td>
</tr>
<tr>
<td>How</td>
<td>Design Change</td>
</tr>
</tbody>
</table>
Table 3.3.2 Milestone Chart

<table>
<thead>
<tr>
<th>No</th>
<th>Action</th>
<th>1-Oct</th>
<th>1-Nov</th>
<th>1-Dec</th>
<th>2-Jan</th>
<th>2-Feb</th>
<th>2 Mar</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Design the logic of M/c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Design the M/c part</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Procurement of Material</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Machining of part</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dismenting &amp; assembling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Trial &amp; Commissioning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Innovation Start Date - 1<sup>st</sup> October 2001
Innovation End Date - 2<sup>nd</sup> March 2002

Diagram 3.3.2
Picture 3.3.2

Power Transmission System Modified

Before

After

Power Transmission Gears Fitted, & Four Universal Shaft Fitted

Picture 3.3.3

Pouch Forming Assembly Modified

Before

After

Two Forming Tubes & Collar Fitted
Picture 3.3.6

Laminate slitting
Arrangement Installed

Rotary cutter fitted on the rare side for parting the laminate & arrangement for mounting Combi rool.

BEFORE

AFTER

Picture 3.3.7

Cup Filler
Assembly Modification

Two flaps joined together with a lever to drop two cups together.

BEFORE

AFTER

173
Electrical Work:

- Installed additional heaters
- Installed VVFD?
- Modified Electrical Circuitry

Graph 3.3.2

SPEED INCREASE TREND

40% Increase in speed

Single Track Twin Track

Good
Graph 3.3.3

PRODUCTIVITY INCREASE TREND

46% Increase In Productivity

- Defect Free product
- Minimum Wastages
- Improved Morale

Investment 2 Lakhs

Other Benefits
- Reduced Inventory
- Reduced Man Power
- Reduced Energy
- Reduced Maint. Cost

SAVING OF Rs 15 L/Year (1.5 MILLIONS/Year)

NO NEED OF PROCURING NEW M/C.

FOR 15 MACHINE, 2.25 CRORE AT A INVESTMENT OF 30 L
CASE STUDY 4

It has been found that the circle members have not only solved the problems related to their work area but also the problems in the surroundings. In this case study the circle members solved the problem of ‘Light repairing’, which was resulted in, reduced inventory of lights by 50%.

- **Product of the Company:**
  1. Propeller shaft Assembly
  2. Universal Joint Assembly
  3. Universal Joint & Spare parts of propeller shaft
  4. Connecting rod

- **Use of the product:**
  Speed of engine to the rear wheels is supplied by propeller shaft

- **Name of the Circle:** Sinhastha
- **Circle Number:** 6
- **Department:** General
- **Frequency of Meeting:** Fortnightly
- **Attendance:** 90%
- **Goal:** Saving of plant lighting repairing by 40% to 50%

The part, which joins four-wheeler engine and differential part is called propeller shaft.

**Tools and Techniques used**
1. PDCA Cycle.
2. 5 W, 1 H.
3. 7 QC Tools Pareto, Histogram, Check sheets, Cause & effect etc.

**Identification of problem**
1. House keeping improvement.
2. Stopping Oil Leakage.
3. Controlling & checking the usage of cutting oil & coolant.
5. Avoiding the misuse of cotton duster and washing powder.
6. Reducing belt replacement on various machines.
7. Avoiding misuse of water.

**Norms of Rating**
1. Easy remedies.
2. Cutting down on expenditure.
3. Its importance in daily core / work.

**Table 3.4.1 The Rating of the problems by Group members:**

<table>
<thead>
<tr>
<th>Problem</th>
<th>SNY</th>
<th>VRS</th>
<th>DVS</th>
<th>VRC</th>
<th>RMP</th>
<th>Total</th>
<th>Anticipated Annual Saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>A House keeping improvement</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>22</td>
<td>7000</td>
</tr>
<tr>
<td>B Stopping oil leakage</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>22</td>
<td>5400</td>
</tr>
<tr>
<td>C Controlling / checking the usage of coolant and cutting oil</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>16</td>
<td>10800</td>
</tr>
<tr>
<td>D Saving on plant lighting repairing</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>35</td>
<td>28500</td>
</tr>
<tr>
<td>E Avoiding misuse of cotton duster &amp; washing powder</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>14</td>
<td>8000</td>
</tr>
<tr>
<td>F Reducing belt replacement on various machines</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>24</td>
<td>22500</td>
</tr>
<tr>
<td>G Avoiding misuse of water</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>18</td>
<td>18600</td>
</tr>
</tbody>
</table>
Graph 3.4.1

[Bar chart showing ratings for problems A to G]

Graph 3.4.2

[Bar chart showing estimated annual saving for problems A to G]

As shown above was observed that problem 'D' (saving on plant light repairs) holds highest weightage as per rating matrix.
Moreover we can possibly save more on annual expenses here. So this problem ‘D’ was selected.

Circle No. 6 General Quality Circle is actively working in the company. Maintenance Department of the company studies various facilities provided and the saving on the expenditure on the repairs of there facilities.

Different Types of lights used in Company
1. Fluorescent Tubes 364
2. Mercury Lamps 71
3. Sodium Vapour Lamp 13
4. Filament Lamp 12
5. Halogen Lamp 04

Table 3.4.2 Collection of data for 6 months

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fluorescent Tube (40 W)</td>
<td>28</td>
<td>18</td>
<td>11</td>
<td>27</td>
<td>9</td>
<td>21</td>
<td>114</td>
</tr>
<tr>
<td>2</td>
<td>Filament Lamp (500 W)</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Mercury Lamp (250 W)</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>11</td>
<td>13</td>
<td>48</td>
</tr>
<tr>
<td>4</td>
<td>Sodium Vapour (150 W)</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Halogen Lamp (150 W)</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>38</td>
<td>27</td>
<td>21</td>
<td>35</td>
<td>24</td>
<td>39</td>
<td>184</td>
</tr>
</tbody>
</table>

Data collected for repairing on different grounds for 6 months.
1. Changing Lights 184
2. Changing Choke 14
3. Changing Starter 23
4. Changing Switch 10
5. Changing Holder 16
6. Changing Wiring 01
To know the reason for repairing & changing numbers were given to each type of lights. For e.g.

- Tube = T1, T2, T3, .................
- Mercury Lamp = M1, M2, M3, .................
- Sodium Lamp = S1, S2, S3, .................
- Filament Lamp = F1, F2, F3, .................
- Halogen Lamp = H1, H2, H3, .................

According to the numbers given data collected for next 3 months for change of lights.

Check Sheet 1

<table>
<thead>
<tr>
<th>Type of Lamp</th>
<th>Feb. 02</th>
<th>Mar. 02</th>
<th>Apr. 02</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescent Tube</td>
<td>T171, T100, T171, T9, T17, T9, T130, T120, T17, T120, T7, T71, --</td>
<td>T71, T10, T171, T111, T9, T114, T120, T120, T7, ----</td>
<td>T1, T4, T171, T20, T69, T58, T55, T26, -----</td>
<td>57</td>
</tr>
<tr>
<td>Mercury Lamp</td>
<td>M12, M40, M2, M61, M79, M19, ----</td>
<td>M19, M5, M19, M16, M4, M12, --</td>
<td>M19, M40, M12, M19, M4, M12, --</td>
<td>28</td>
</tr>
<tr>
<td>Sodium Lamp</td>
<td>S7, S7, S10</td>
<td>S9</td>
<td>S9</td>
<td>5</td>
</tr>
<tr>
<td>Halogen Lamp</td>
<td>-</td>
<td>H4, H1</td>
<td>H4</td>
<td>3</td>
</tr>
<tr>
<td>Filament Lamp</td>
<td>F2,</td>
<td>F10, F1</td>
<td>F2</td>
<td>4</td>
</tr>
</tbody>
</table>

Total 97

With the help of check sheet, the lights which are changed for 2 or more than 2 times in 3 months were recorded separately.
Check Sheet 2

<table>
<thead>
<tr>
<th>Type of Light</th>
<th>No. of Lights Changed</th>
<th>Type of Light</th>
<th>No. of Lights Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>T 71</td>
<td>2</td>
<td>M 12</td>
<td>4</td>
</tr>
<tr>
<td>T 7</td>
<td>2</td>
<td>M 40</td>
<td>2</td>
</tr>
<tr>
<td>T 171</td>
<td>4</td>
<td>M 19</td>
<td>5</td>
</tr>
<tr>
<td>T 9</td>
<td>3</td>
<td>S 7</td>
<td>2</td>
</tr>
<tr>
<td>T 17</td>
<td>2</td>
<td>S 9</td>
<td>2</td>
</tr>
<tr>
<td>T 120</td>
<td>5</td>
<td>H 4</td>
<td>2</td>
</tr>
<tr>
<td>F 2</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To record the repairing work, checklist was used to check electrical spare parts.

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>What to Check</th>
<th>Yes / No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Switch</td>
<td>Working</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non - working</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Choke</td>
<td>Fused</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Continuity</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Earthing</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Starter</td>
<td>Fitment</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fused</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Wiring</td>
<td>Continuity</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Insulation Open</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broken</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heated</td>
<td></td>
</tr>
</tbody>
</table>

From the Check sheet it was observed that at a specific places specific number of the lights have been changed. So it was decided to check completely lights of these numbers.
Brainstorming was done & following suggestions & decisions were as follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Suggestions</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Changing Lights</td>
<td>Not accepted – no reason given</td>
</tr>
<tr>
<td>2</td>
<td>Changing Fixture</td>
<td>Not accepted – Increase in expenditure</td>
</tr>
<tr>
<td>3</td>
<td>Checking of spare parts &amp; making changes on time</td>
<td>Accepted</td>
</tr>
<tr>
<td>4</td>
<td>Changing the type of light</td>
<td>Not accepted – as improper light arrangement</td>
</tr>
<tr>
<td>5</td>
<td>Rearrangement of Lights</td>
<td>Not accepted – very time consuming</td>
</tr>
</tbody>
</table>

So, it was decided to check & change the spare parts of lights & to record these changes. For e.g. choke of M12 was found weak & because of this reason in last 3 months lamps at that place had to be changed 4 times.

So at the places where chokes were weak & faulty which was the root cause (of change of lights frequently) were changed.

This type of action was implemented at all the places where lights had to be changed frequently. This implementation of action was completed in July 2002.
Data on corrective action July 02:

<table>
<thead>
<tr>
<th>Type of Light</th>
<th>Changeof Light</th>
<th>Choke</th>
<th>Starter</th>
<th>Switch</th>
<th>Holder</th>
<th>Wiring</th>
</tr>
</thead>
<tbody>
<tr>
<td>T 71</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T 7</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T 171</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T 9</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T 17</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T 120</td>
<td>✓ ✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ ✓</td>
<td>✓ ✓</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>M 12</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓ ✓</td>
<td>✓ ✓</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>M 40</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓ ✓</td>
</tr>
<tr>
<td>M 19</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓ ✓</td>
</tr>
<tr>
<td>S 7</td>
<td></td>
<td></td>
<td></td>
<td>✓ ✓</td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td>S 9</td>
<td></td>
<td></td>
<td></td>
<td>✓ ✓</td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td>H 4</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓ ✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓ ✓</td>
</tr>
</tbody>
</table>

4 6 3 4 5 4

Data collected on the total lights changed [Aug’02 to Oct’02]

<table>
<thead>
<tr>
<th>No</th>
<th>Type of light</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fluorescent Tube</td>
<td>18</td>
<td>8</td>
<td>10</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>Mercury Lamp</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Sodium Lamp</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Halogen Lamp</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Filament Lamp</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

21 12 12 1
Graph 3.4.3

Table 3.4.3  Gains (Quarterly)

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of Light</th>
<th>Before</th>
<th>After</th>
<th>Saving</th>
<th>Cost/pc</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tube</td>
<td>57</td>
<td>36</td>
<td>21</td>
<td>44</td>
<td>924</td>
</tr>
<tr>
<td>2</td>
<td>Mercury</td>
<td>28</td>
<td>8</td>
<td>20</td>
<td>125</td>
<td>2500</td>
</tr>
<tr>
<td>3</td>
<td>Sodium</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>760</td>
<td>3040</td>
</tr>
<tr>
<td>4</td>
<td>Halogen</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>260</td>
<td>780</td>
</tr>
<tr>
<td>5</td>
<td>Filament</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>85</td>
<td>255</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>97</td>
<td>46</td>
<td>51</td>
<td></td>
<td>7499</td>
</tr>
</tbody>
</table>

Goal was to save on plant lighting repairing by 40% to 50%.

Gain Quarterly – Rs.7, 499/-
Gain Annually – Rs.30, 000/-
Inventory of lights Reduced- 50% lights.

Final implementation was done at all places. All the staff was got involved in the final implementation of corrective action by convincing them of importance of this action. So everyone in the company co-operated.

**Table 3.4.4 Effective monitoring – Data corrected for checking of spare parts of lights quarterly.**

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of Light</th>
<th>Nov.'02</th>
<th>Dec.'02</th>
<th>Jan.'03</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fluorescent Tube</td>
<td>14</td>
<td>13</td>
<td>18</td>
<td>45</td>
</tr>
<tr>
<td>2</td>
<td>Mercury Lamp</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Sodium Lamp</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Halogen Lamp</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Filament Lamp</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>18</td>
<td>14</td>
<td>18</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of Light</th>
<th>Feb.'03</th>
<th>Mar.'03</th>
<th>Apr.'03</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fluorescent Tube</td>
<td>19</td>
<td>9</td>
<td>15</td>
<td>43</td>
</tr>
<tr>
<td>2</td>
<td>Mercury Lamp</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Sodium Lamp</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Halogen Lamp</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Filament Lamp</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>20</td>
<td>12</td>
<td>16</td>
<td>48</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of Light</th>
<th>May'03</th>
<th>June'03</th>
<th>July'03</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fluorescent Tube</td>
<td>9</td>
<td>12</td>
<td>13</td>
<td>34</td>
</tr>
<tr>
<td>2</td>
<td>Mercury Lamp</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Sodium Lamp</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Halogen Lamp</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Filament Lamp</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>42</td>
</tr>
</tbody>
</table>
Intangible Gains:
1. Increased team spirit.
2. Increased self-confidence & work satisfaction.
3. Enrichment of quality,
5. People felt motivated resulted in increased enthusiasm.
CASE STUDY 5

It is proved from the following case study that Quality Circle system of Quality Management can be successfully applied in the field of education. The problem of ‘poor proficiency in English language skill’ was handled by the circle members.

- Name of the Quality Circle: Success Quality Circle
- Date of formation: 13th August 2003
- No. of Members: 6
- Meeting periodicity: Every Saturday 4.30 to 5.30 p.m.
- Venue: Supervisor’s Cabin
- Total Meetings: 16
- Average attendance for the Meeting: 95%
- Goal: To improve general proficiency in English Language Skills of Listening, Speaking, Reading, Writing & Communication

The members are experienced teachers who found that the general proficiency in English of their students is poor. So the problem selected:
“Poor Proficiency in English Language Skills.”

Root causes –

1. Bad academic record – less percentage of marks
2. Vernacular medium
3. Poor listening skill due to poor exposure
4. Lack of personal attention, personal support
5. Poor attendance
6. Heterogeneous levels of Students
7. Lack of group discussion
8. Fear Complex of students

Table 3.5.1 Rating by members

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>PSC</th>
<th>SVI</th>
<th>SC</th>
<th>SB</th>
<th>MJ</th>
<th>IS</th>
<th>VJ</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>39</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>
Main root Cause –

“Poor listening skill due to poor exposure.”

**Solution** through Brainstorming.

To improve listening exposure in order to improve the skill of listening, speaking, reading, writing, thereby improving general proficiency in English.

**Plan of Action**

Taking into account their poor listening exposure, a series of remedial activities will be introduced in the class by different circle members who are English Teachers.
**Actions**

**Action 1**

Step 1 – The teacher made her students conservant with the pre-requisites of listening through one play card, which would be displayed all through the remedial activities.

Step 2 – To enable the students to listen to remember and listen with purpose following activities were conducted:

Time slot = 25 to 35 minutes

I. The teacher divided the students of the class into a group of 10 students each.

II. A group leader was selected by the teacher.

III. The teacher supplied each group leader with a simple whispered message, each leader with different sentences. Such as ‘A fat Cat sat on a mat that ate a rat on the mat.’

IV. The teacher whispered this message to the next student, the next student passed on the same till it reached the last boy / girl in the group.

V. The last student was made to repeat the message and teacher tallied it with the original and found out the lapses in the listening.

VI. Thus the listening performance of the students was evaluated. The group that reproduced the correct message as it was declared as a winner.

**Action 2**

The members gave a dictation of difficult words in English alongwith a proper stress marks and accurate pronunciations.

Time slot = 20 minutes

This activity was repeated on alternate day.

**Action 3**

Listening to long sentences to understand.

Time slot = 20 minutes
The Teacher member read loud long sentences with varied intonations. Such as —

1) She sells seashells at the sea share.
2) Student's collected funds to be given to families of Kargil Victims.
3) Indian Cricketers play good cricket but not consistently.
4) The Englishmen eat for living whereas the French live for eating.
5) Roses in December are a rare in the Western Countries but not a wonder in India.

The students listened to them carefully and wrote them accurately. This activity was repeated on alternate day.

**Action 4**

Listening for specific information / comprehension.

Time slot = 20 minutes

- **Activity I** The member teacher read aloud a passage to her students with correct pronunciation, proper stress and intonation & pauses and asked them to listen.

- **Activity II** The teacher asked them questions to test the listening comprehension.

- **Activity III** The students were asked to write down the answers which were discussed orally.

This activity was repeated on alternate day.

**Action 5** Close listening

Time slot = 25 minutes

- **Activity I** The member teacher read aloud a passage and asked the students to listen carefully.

- **Activity II** A worksheet on the same passage with blanks in it was distributed. Students with all words correctly filled in were declared as the best listeners.

This activity was repeated frequently in the class.
Action 6  **Focussed Listening**

Time slot = 30 to 40 minutes

To enable the students to speak what they listen activities were conducted –

**Activity I**  The teacher member talked to the students about herself – her home town – her family members – her brothers – sisters – her children – where she lived now – her interests – likes & dislikes – profession – ambition in life – Ideals etc.

**Activity II**  After that the teacher asked them to listen carefully & fill in the information correctly in the sheet given –

1. Name
2. Home town
3. Brothers / Sisters
4. Children
5. Likes & dislikes

**Activity III**  Based on this model, one of the students was asked to speak on himself and the other students were asked the answers of the following –

1. Where was he born?
2. Where did he do his schooling?
3. Does he like music more than sports?
4. What does he say about the bicycle, the countryside and the holidays?

**Activity IV**  This activity was used as the basis of Self-Introduction that one could give at gathering.

---

Action 7  **Listening for fun & rhythm**

Time slot = 25 minutes

**Activity I**  Teacher recited a poem with correct pronunciation & pauses and asked the students to listen to it carefully and enjoy the fun of rhyming words.
Activity II  The teacher then asked one of the students to narrate the same poem in the form of a story.

Action 8  Listening for summarising
Time slot = 30 minutes
To take the students to an advance stage of listening skill – listening to understand & then summarise, following activities were done –

Activity I  The teacher member read aloud a passage and asked the students to listen carefully.

Activity II  Then the teacher gave the list of keywords in the passage on the black board.

Activity III  Using the keywords the students developed a summary giving a suitable title.

Activity IV  Teacher member then gave the model summary for the same passage.

Action 9  Listening for Communication
Times slot = 30 to 35 minutes
To lead the students to the skill of speaking & then communicating through listening following activities were carried out –

Activity I  The Teacher gave some questions – asked the students to make sentences and asked questions to their partner about his / her daily routine.

e.g.

<table>
<thead>
<tr>
<th>Get-up</th>
<th>Breakfast</th>
<th>College</th>
<th>Lunch</th>
<th>Evening</th>
<th>Go out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Play Music</td>
<td>Read</td>
<td>Play</td>
<td>Watch TV</td>
<td>Sleep</td>
<td>?</td>
</tr>
</tbody>
</table>

Activity II  The students were made to exchange the information – developing it into conversation.
Activity III  The teacher gave them a model piece of conversation and asked them to write a dialogue on their own.

Action 10  Listening to a speech by an outside speaker for the pleasure of language
Time slot = 30 minutes
To introduce them to free listening – activities were carried out –

Activity I  The actual speech & listening of it
Activity II  Then the students were asked to discuss & debate over the speech & to express their views one by one – Did I like it? If Yes – Why I liked it – If No – Why I did not like it?

Results after there actions -

1. Improvement in attendance of the students from 80% to 95%
2. Improvement in oral participation of students from 10% to 55%
3. Improvement in the class test performance –
   a. 16% students - above 70%
   b. 38% students - above 60%
   c. 32% students - above 50%
   d. 8% students - between 35% to 50%
3. 6% students - failures that was less than earlier 14% failure
4. Marked improvement in students attempting to speak English.

Intangible gains –

1. Teacher members as well as students received extra reinforcement that motivated them to continue with the interaction method.
2. Other teachers were convinced that for improving general proficiency, listening should be improved.
3. Members became more resourceful & creative started making learning an interesting activity.
4. Confidence – increased – of teachers as well as students.
Case Study 6

This case study also dealt with educational problem resulting in improved performance of the students in Commerce subjects at the Board Examination.

<table>
<thead>
<tr>
<th>Case study</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Quality Circle</td>
<td>&quot;Tally&quot;</td>
</tr>
<tr>
<td>Department</td>
<td>Commerce</td>
</tr>
<tr>
<td>No. of members</td>
<td>8</td>
</tr>
<tr>
<td>Date of formation</td>
<td>06-08-2003</td>
</tr>
<tr>
<td>No. of meetings</td>
<td>15</td>
</tr>
<tr>
<td>Meeting periodicity</td>
<td>Every Saturday (4.30 to 5.30 PM)</td>
</tr>
<tr>
<td>Venue</td>
<td>Vice Principal's Cabin</td>
</tr>
<tr>
<td>Average attendance for the meeting</td>
<td>99%</td>
</tr>
<tr>
<td>Goal</td>
<td>To improve the quality of education and the performance of XIth Commerce. Students in Commerce Subjects. (O.C, S, P, B. K.)</td>
</tr>
</tbody>
</table>

Booking and accountancy [B.K.]
Organization of commerce [OC.]
Secretarial Practice [S.P.]
Table 3.6.1 Gantt Chart

<table>
<thead>
<tr>
<th></th>
<th>Aug. 03</th>
<th>Sept. 03</th>
<th>Oct. 03</th>
<th>Nov. 03</th>
<th>Dec. 03</th>
<th>Jan. 03</th>
<th>Feb. 03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem selection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finding out root causes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of solution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreseeing probable resistance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial implementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check Results</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular implementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow of review</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All the members being very experienced teachers knew that the Clientele of the college had the history of poor academic performance.

So the problem Selected__

“Poor performance of XIth Commence Students in Commerce Subject in the 1st Unit Test.”
Case Study 9: Cause and Effect Diagram

- 'Excess' extracurricular activities conducted by different committees.
- Lack of concentration
- Changed priorities of students
- Less span of lecture time
- Only lecture method.
- Lack of demonstrations, group discussions, projects
- Less time to solve difficulties
- Poor performance of students in Commerce subjects OC/SP/BK in 1st test.

- Illiteracy of parents
- Lack of motivation
- Uninteresting methods of teaching
- Lack of practical exposure
- Inability to understand due to lack of continuity
- Poor Attendance
- Excess no. of students
- Lack of concentration

- Poverty
- Lack of attendance
- Less time to study

Impact of coaching classes
Developing solutions by Brainstorming.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Potential Solutions</th>
<th>Analysis / Observations</th>
<th>Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Parents’ meeting to be called.</td>
<td>Through meetings importance of college coaching can be stressed. Parents meeting with teachers may put moral pressure on the students which may result in improving attendance of the students.</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Attendance at every lecture to be taken</td>
<td>Regular attendance if taken and data is maintained defaulters can be found out and action can be taken against them. This will help to improve attendance.</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Students can be taken to factory, banks, stock exchange.</td>
<td>Practical experience will help them to understand the topics in OC and SP</td>
<td>Good but not selected due to excess no. of students.</td>
</tr>
<tr>
<td>4</td>
<td>Periodical tests to be taken.</td>
<td>Practice of writing the papers will help the students to reduce the no of mistakes</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>Big auditorium to be constructed.</td>
<td>This will help teachers to accommodate the maximum of students for demonstration, lectures by experts.</td>
<td>No. Very expensive. Presently not possible.</td>
</tr>
<tr>
<td>6</td>
<td>Extra lectures to be engaged.</td>
<td>This will help academically poor students to have extra coaching.</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Foreseeing probable Resistance.

1. If attendance is taken at every lecture teachers may grumble, as it will reduce the time of teaching. Further it is tiring to call out 130 roll numbers at every lecture.
2. Periodical tests will again reduce the time of teaching. It will be extra burden on teachers to assess a large number of answer papers.

Solutions.

1. To convince the teaching staff for taking attendance of the students at every lecture as a sort of reward/punishment method at least for first one month without fail.
2. For the periodical tests, only 200 students to be selected for Trial implementation.

Trial implementation.

1. Meeting of all the parents of XIth Commerce was called. It was made Compulsory. So the attendance was above 90%.

It really put moral pressure on the students. Due to interaction between parents and teachers parents were happy and satisfied for the hard work being taken by the teachers for their wards Teachers Suggested the parents to Check the notebook of their wards as notes are given regularly by the teacher_ as a proof of attendance of their wards at the lectures. The parents liked this Suggestion So much that even some of the parents were illiterate they promised the teachers that they will check the notebooks regularly.
2. Teachers started taking attendance at every lecture. They also told the students that regular students will be given extra coaching whereas defaulters’ XIth H S C Examination forms will be withheld.

Because of the above steps, attendance improved.

**Graph 3.6.1 Attendance Curve**

3. Extra lectures were taken by the teachers for some difficult topics such as,

   I. Insolvency of a partner in dissolution of a partnership firm. (B.K.)
   II. Capital adjustment of admission of a partner. (B.K.)
   III. Formats of documents in foreign Trade. (O.C.)
   IV. Report Writing. (S.P.)

4. For periodical tests, 200 students were selected under random sampling method.

In September 2003, 2 periodical tests of each Subject __ O.C. __ S.P. and B.K. were conducted.
Before periodical test

<table>
<thead>
<tr>
<th>% of Marks</th>
<th>No. of students before periodical tests</th>
<th>No. of students after periodical tests.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 25</td>
<td>110</td>
<td>100</td>
</tr>
<tr>
<td>26 - 34</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>35 - 50</td>
<td>24</td>
<td>28</td>
</tr>
<tr>
<td>51 - 60</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>61 - 70</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>71 - 85</td>
<td>-</td>
<td>02</td>
</tr>
<tr>
<td>86 - 100</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The teachers themselves were convinced from the results of Trial implementation and decided to do Final implement.
Final implementation.

1. Throughout October 03, periodical tests were conducted for all the 700 students. This really helped them in the Terminal exam, which was conducted in the 4th week of October.

2. Extra lectures for O.C., S.P., B.K., were engaged in Diwali Vacation.

3. Again periodical tests were conducted in November and in December.

4. In X-mas vacation extra lectures were engaged.

5. In January 1 prelim was conducted.

Graph 3.6.3  The results __

BEFORE

AFTER

52%  48%  76%  24%

Passed  Failed  Passed  Failed
Table 3.6.3 Performance of Students

<table>
<thead>
<tr>
<th>% of Marks</th>
<th>At Terminal examination % of students</th>
<th>At Preliminary examination % of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 25</td>
<td>38</td>
<td>14</td>
</tr>
<tr>
<td>26 – 34</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>35 – 50</td>
<td>22</td>
<td>35</td>
</tr>
<tr>
<td>51 – 60</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>61 – 70</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>71 – 85</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>86 – 100</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

Follow up and review.

The teachers were very happy with the performance of the students. They were sure that in the Board exam February 2004 further improvement would be definitely seen.
Throughout Feb 2004 1st week the students were called batch wise with their assessed Prelim answer papers and the correct answers for the mistakes made by them were given.

Graph 3.6.4 The results of the Board exam
Table 3.6.4 Performance of Students at Board

<table>
<thead>
<tr>
<th>Marks %</th>
<th>No. of Students %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 25</td>
<td>8</td>
</tr>
<tr>
<td>26 - 32</td>
<td>2</td>
</tr>
<tr>
<td>35 - 50</td>
<td>39</td>
</tr>
<tr>
<td>51 - 60</td>
<td>31</td>
</tr>
<tr>
<td>61 - 70</td>
<td>13</td>
</tr>
<tr>
<td>71 - 85</td>
<td>5</td>
</tr>
<tr>
<td>86 - 100</td>
<td>2</td>
</tr>
</tbody>
</table>

In Book-keeping and accountancy 9 students scored above 90 % whereas 1 students scored 99 / 100.

**Tangible gains.**
1. Improved overall passing from 86 % to 90 %
2. Improved performance of Commerce Subject from 82 % to 90 %
3. Appreciation from management members and the Principal received .
4. As the parents were happy reputation of the college improved as for the institutions like colleges Schools etc mouth publicity does matter .

As experienced in June 2004 XIth admissions __ the college had better Clientele)

**Intangible gains**
1. Increased team spirit and motivation.
2. Increased quality of leadership
3. Increased ability to take decisions faster.
4. Increased ability to analyze the problem.
5. Increased a level of confidence
6. Increased ability to motivate the Students
7. Increased Capacity to work hard.
Case study No 7

Operation Clear Encoding Quality Circle dealt with the problems faced by the Bank again asserted the successful application of Quality Circle in the service industry.

Name of the Quality Circle - ‘Operation Clear Encoding QC’
Service Bank
Duration of Project 12 months.
Project- “Accumulation of long outstanding entries
Under Sundry Assets (SA) / Sundry Liabilities / BARs / IBAs”
Meeting Periodicity Fortnightly Saturday
Date of communication 4th April 2002
Date of Completion 31st March 2003

The Circle members Conducted-Brianstorming session to find out the list of problems faced by the Section. The Circle members listed out 99 problems in this session.

The problems were further classified into 3 groups by using ABC Analysis.
They are classified as
A Category : 34 problems
B Category : 33 problems.
C Category : 32 problems.

The Circle members short-listed the problems from B Category (where involvement of other departments is necessary.)
The members prepared a Matrix Diagram during brainstorming session to shortlist the problems on the basis of increasing Profitability, Efficiency, Productivity and Customer service.

Table 3.7.1 Matrix Diagram for Problem Rating

<table>
<thead>
<tr>
<th>PROBLEMS</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Staff arrangement</td>
<td>▲</td>
<td>■</td>
<td>▲</td>
<td>▲</td>
<td>25</td>
</tr>
<tr>
<td>2 Arrangement of cup boards</td>
<td>•</td>
<td>▲</td>
<td>•</td>
<td>•</td>
<td>5</td>
</tr>
<tr>
<td>3 No discussion on problems</td>
<td>▲</td>
<td>▲</td>
<td>•</td>
<td>•</td>
<td>10</td>
</tr>
<tr>
<td>4 Slip bundles are not properly kept</td>
<td>•</td>
<td>■</td>
<td>•</td>
<td>▲</td>
<td>15</td>
</tr>
<tr>
<td>5 No places for keeping slip bundles</td>
<td>•</td>
<td>■</td>
<td>•</td>
<td>•</td>
<td>10</td>
</tr>
<tr>
<td>6 No follow of pending BARs</td>
<td>*</td>
<td>■</td>
<td>□</td>
<td>•</td>
<td>45</td>
</tr>
<tr>
<td>7 No space for keeping stationary</td>
<td>•</td>
<td>■</td>
<td>•</td>
<td>•</td>
<td>10</td>
</tr>
<tr>
<td>8 Rectification of long outstanding SA/SL entries</td>
<td>□</td>
<td>•</td>
<td>□</td>
<td>•</td>
<td>55</td>
</tr>
<tr>
<td>9 Rejection rate in MICR presentation is higher than the accepted level</td>
<td>■</td>
<td>•</td>
<td>□</td>
<td>•</td>
<td>60</td>
</tr>
<tr>
<td>10 Cheques are not properly arranged by the branches</td>
<td>•</td>
<td>▲</td>
<td>•</td>
<td>▲</td>
<td>10</td>
</tr>
<tr>
<td>11 Unawareness regarding different systems of RBI</td>
<td>■</td>
<td>•</td>
<td>▲</td>
<td>•</td>
<td>45</td>
</tr>
<tr>
<td>12 Disposal of old records</td>
<td>■</td>
<td>□</td>
<td>▲</td>
<td>▲</td>
<td>40</td>
</tr>
<tr>
<td>13 Mixing of different clearings</td>
<td>■</td>
<td>□</td>
<td>•</td>
<td>□</td>
<td>20</td>
</tr>
<tr>
<td>14 No co-operation between branches and Clearing section</td>
<td>•</td>
<td>□</td>
<td>•</td>
<td>•</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Facing problems of clearing differences</td>
<td>▲</td>
<td>▲</td>
<td>▲</td>
<td>▲</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>15</td>
<td>No regular follow up of circulars issued by Clearing section by the branches</td>
<td>▲</td>
<td>▲</td>
<td>▲</td>
<td>▲</td>
</tr>
<tr>
<td>16</td>
<td>MICR clearing boxes are less in Clearing Section</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>17</td>
<td>Follow up of clearing differences is slow</td>
<td>▲</td>
<td>▲</td>
<td>▲</td>
<td>●</td>
</tr>
<tr>
<td>18</td>
<td>Branches do not put patties on branches</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>19</td>
<td>Un cleanliness in toilets</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>20</td>
<td>Cheques not handled properly</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>▲</td>
</tr>
<tr>
<td>21</td>
<td>No cash counter available</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>▲</td>
</tr>
<tr>
<td>22</td>
<td>No proper cleaning of premises</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>23</td>
<td>No sufficient number of printers</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>24</td>
<td>Regular servicing of printers not done properly</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>25</td>
<td>Lack of coordination between various departments of Clearing Section</td>
<td>▲</td>
<td>▲</td>
<td>▲</td>
<td>●</td>
</tr>
<tr>
<td>26</td>
<td>Entry of outside people to canteen as well as toilets</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>27</td>
<td>Service contracts with agencies are not followed up properly</td>
<td>▲</td>
<td>▲</td>
<td>▲</td>
<td>●</td>
</tr>
<tr>
<td>28</td>
<td>No job rotation of staff</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>29</td>
<td>No control over entry of unauthorized persons</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>30</td>
<td>Specimen signature, Signing power of cards not available</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
32  No timely repairing of AC, water cooler, chairs etc  
   
33  Unawareness of the Clearing Section Staff regarding new packages introduced in the section

CRITERIA USED  MARKS GIVEN TO THE SYMBOLS

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Symbol</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. PROFITABILITY</td>
<td>a. • 0.00</td>
<td></td>
</tr>
<tr>
<td>b. EFFICIENCY</td>
<td>b. ▲ 0.05</td>
<td></td>
</tr>
<tr>
<td>c. PRODUCTIVITY</td>
<td>c. ■ 0.10</td>
<td></td>
</tr>
<tr>
<td>d. CUSTOMER SERVICE</td>
<td>d. * 0.15</td>
<td></td>
</tr>
<tr>
<td>e. □ 0.20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CUTOFF POINT : - 50 % AND ABOVE

The following problems were short listed through brainstorming session.

1. Accumulation of large number of long pending entries under Sundry assets accounts.
2. No follow up of pending BARs and IBAs.
3. Non disposal of old records.
4. Lack of awareness of clearing sections staff regarding new packages introduced in the clearing section.
5. Rejection rate of MICR clearing of Bank is higher than accepted level of RBI (Completed by QCC in 2001 – 2002)
6. Lack of awareness of new systems of clearing such as EFT, ECS etc started by RBI.

The problem selected was

‘Accumulation of large number of long pending entries under Sundry Assets / Sundry Liabilities Accounts.’
During the brainstorming session it was felt that the problem - ' no follow up of pending BARs and IBAS are interlinked so QCC decided to tackle both the problems
Accumulation of large number of long pending entries under sundry Assets / Sundry Liabilities / BARs/ IBAs ' 

Definition of the problem-
1 Sundry Assets (SA) - SA is one of the heads of accounts in Day Book and Trial Balance. As the heading implies, these are the assets receivable by the bank. All the miscellaneous assets, which are not accounted for in the other heads of accounts, are grouped together under this head.
SA is the interim arrangement eventually to be finalised for the purpose of accounting, which has to be eventually absorbed under capital and revenue expenditure.

2 Sundry Liabilities (SL) it is one of the heads of accounts in Day Book and Trial Balance. These are the liabilities payable by the bank, which are not accounted for in the other heads of accounts.
Sundry assets and sundry liabilities accounts are vulnerable to frauds requiring utmost attention.

3 Branch Advice Requisition (BAR) BAR is the inter branch interim arrangement eventually to be finalised for the purpose of accounting which has to be eventually absorbed under capital or revenue expenditure.
The transactions are in the nature of inter branch adjustments.

4 Inter Branch Advice (IBA) IBA is the inter branch adjustment eventually to be finalised for the purpose of accounting which has to be eventually absorbed under capital or revenue expenditure. The transactions are in the nature of inter branch adjustments.
Clearing section has to settle the amount with RBI on daily basis. In turn, we have to settle the amount with its different branches also. During this process, if RBI gives excess credit to bank this amount is kept under sundry liabilities as an interim arrangement. Like wise if RBI gives less credit to the bank debit is given to sundry assets.

These entries must be rectified in a day or two (within the shortest possible time). Nowadays almost all the transactions are technology based; they can be settled within the shortest time. But during the early years, In many branches of the Bank transactions were done manually. So difference under SA / SL/ BARs/ IBA s on account of various reasons could not be located and were not settled for a long period. The bank many such long outstanding items pertaining to the years 1997 onwards

The outstanding entries under SA/SL had a bad effect on Bank's profitability, Productivity and efficiency. Bank had to make 100% provision for items outstanding under sundry assets in the balanced sheet. Hence it does not give a true and fair picture of the statement of affairs. It also affects profitability of bank, as exact net profit cannot be shown in the balance sheet. If entries under SL are written back within the shortest period, it increases Bank's profitability.

Under SA and SL head, entries can be settled with other banks and the branches of the said Bank but in case of BARs and IBRs, entries can be settled with only the branches of the said Bank.

(See the Flow Chart and the Chart on how entries get accumulated on the next page.)
The circle members planned the activity as follows-
1 Data collection and analysis of the problem-April 2002 to July 2002.
2 Identification of causes - August 2002
3 Finding out the root causes - September 2002
4 Developing solutions and trial implementation - October 2002
5 Implementation - November 2002 to February 2003
6 Follow up and review - March 2003

Analysis of the problem

Sundry assets
The sundry Assets under clearing differences arise out of short claim in respect of instruments presented by any branch / clearing section of the Bank on other Banks, or due to excess claim made by other Banks on any of our branches/ Clearing Section. As soon as the difference is located and the differential amount is received from the concerned bank by cheque / pay order, the same should be credited to the above head, to wipe off the corresponding debit entry.

e.g.: Clearing Date is 28.01.2002. Accounting Date is 29.01.2002.
For this date settlement is as follows:

Claimed amount to RBI = Rs.1,00,000
Settled amount by RBI = Rs. 90,000

For this accounting date there is a difference of Rs.10,000. Bank has received less credit from RBI. So we have to locate this difference. But, before that we have to settle the account with RBI. For this purpose, Rs 10000 has to be accounted under some head, which can be reconciled afterwards. Hence, the amount of Rs 10000 is kept under the head of Sundry Assets, (this amount will be received by us)
SUNDARY LIABILITIES (SL)

The Sundry Liabilities under clearing differences arise out of excess claim in respect of instruments presented by any branch/ clearing section of the Bank on other Banks, or due to short claim made by other Banks on any of our branches / Clearing Section. As soon as the difference is located and the differential amount is paid to the concerned bank by cheque / pay order, the same should be debited to the above head, to wipe off the corresponding credit entry.

e.g.: Clearing Date is 28.01 . 2002. Accounting Date is 29.01.2002.
For this date settlement is as follows:
Claimed amount to RBI = Rs.1, 00,000
Settled amount by RBI = Rs. 1,10,000
For this accounting date, there is a difference of Rs.10, 000. The Bank has received excess credit from RBI. It has to locate this difference. But before that it has to settle the account with RBI. For this purpose Rs. 10,000 has to be accounted under some head, which can be reconciled afterwards. Hence the amount of Rs. 10,000 is kept under the head of Sundry Liabilities (this amount has to be paid to others).

BRANCH ADVICE REQUISITION (BAR)
e.g.: Clearing Date is 28.01 . 2002. Accounting Date is 29.01.2002.
For this date settlement is as follows:
Claimed amount to our section = Rs.1, 00,000
Settled amount by our branch = Rs. 90,000
For this accounting date, there is a difference of Rs.10, 000 between Bank and its branch. We had received less credit of Rs. 10000 from the branch.
The bank has to settle the account with the branch. For this purpose Rs ten thousand has to be claimed by the Bank. For this purpose Branch Advice Requisition form is sent to the branch claiming the differential amount.

INTER BRANCH ADVICE (IBA)
e.g.: Clearing Date is 28.01.2002. Accounting Date is 29.01.2002.
For this date settlement is as follows:
Claimed amount by Bank Rs.90,000
Settled amount by its branch Rs 1,00,000
For this accounting date, there is a difference of RS. 10000 between Bank and its branch.
Bank has received excess credit of Rs. 10000 from the branch. it has settled the account with the branch. For this purpose, Rs 10000 has to be recredited to the branch. For this purpose IBA is sent to the branch settling the differential amount.
These entries must be rectified with the shortage possible time. The outstanding entries have a bad effect on bank's profitability Etc.

FOLLOWING TABLE SHOWS THE AMOUNT OUTSTANDING UNDER VARIOUS HEADS

<table>
<thead>
<tr>
<th>ACCOUNT HEADS</th>
<th>MAR.2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA</td>
<td>55,72,765</td>
</tr>
<tr>
<td>SL</td>
<td>1,53,98,292</td>
</tr>
<tr>
<td>BARS</td>
<td>114 CRORES</td>
</tr>
</tbody>
</table>

The outstanding under SA attracts 100% risk weightage for Capital Adequacy Ratio calculations, which is taken into consideration for many purposes by RBI and Government of India. It also affects Bank's profitability.
Finding out root causes
In order to find out the probably causes responsible for the problem, the members conducted Brainstorming Session. After detailed discussion, the members listed the following probably causes.

1. Lack of awareness of systems and procedures.
2. Lack of knowledge
3. Introduction of computer environment
4. Defect in the posting of entries by the employees
5. No data available at the branch level
6. No proper maintenance of records at the branch level
7. Particulars furnished by the customers are not adequate
8 Lack of co-ordination between branches and Clearing Section
9 Lack of co-ordination between other Banks and Canara Bank
10 No proper follow up by Controlling Offices
11 No centralized clearing differences
12 Inward Clearing Department and Outward Clearing Department
   (Differences locating sections) are situated at two different premises due
   to which it is difficult to reconcile on the spot clearing differences.
13 Branches / sections do not take efforts to locate difference immediately
14 Branches / sections debit difference to Sundry Assets as a matter of
   routine.
15 No proper follow up of outstanding entries by the branches / sections.
16 Sometimes, even when the difference is located, they fail to wipe off the
   entries.
17 At times, even after location of clearing differences, outstanding items
   Remain outstanding for want to payment from the bank/ branches
Concerned. Actually, this amount has to be transferred to a separate head
" Sundry Assets _ Located clearing differences account " and followed up
with the concerned bank/ branch. But it does not happen some times.
18 Differences arising out of wrong sorting of the cheques.
19 Proper narration of the clearing differences is not written on the day book
   slips.
19 Even if the differences are payable by us, Banks/ branches are not
   claiming from us.

MOST RELEVANT AND MOST FREQUENT CRITERIA

In the Brain storming session all we decided to shortlist the probably causes
By using the above criteria. I.e. we considered all the probably causes, how it
Is relevant to the problem? And how it frequently occurs

SHORTLISTED CAUSES ARE AS FOLLOWS:
With the help of Check Sheet, members analysed the outstanding entries and Responsible Cause for the individual entry and it was found that 845 of the problems are due to first 5 causes.

**Table 3.7.2 Root Causes**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Causes</th>
<th>%</th>
<th>No. of entries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lack of knowledge and systems and procedures</td>
<td>25</td>
<td>259</td>
</tr>
<tr>
<td>2</td>
<td>Non-availability of records</td>
<td>21</td>
<td>218</td>
</tr>
<tr>
<td>3</td>
<td>Introduction of computer environment</td>
<td>17</td>
<td>177</td>
</tr>
<tr>
<td>4</td>
<td>No initiative, delay</td>
<td>11</td>
<td>113</td>
</tr>
<tr>
<td>5</td>
<td>Lack of co-ordination</td>
<td>10</td>
<td>104</td>
</tr>
<tr>
<td>6</td>
<td>Wrong sorting of cheques and delay in providing records by RBI</td>
<td>8</td>
<td>83</td>
</tr>
<tr>
<td>7</td>
<td>Delay in follow up</td>
<td>8</td>
<td>82</td>
</tr>
</tbody>
</table>

**Table 3.7.3 Developing solutions**

<table>
<thead>
<tr>
<th>Root causes</th>
<th>Suggested solutions</th>
<th>Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of knowledge of system and procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• At clearing Section</td>
<td>Posting of slips by trained / experienced staff only.</td>
<td>INVALID</td>
</tr>
<tr>
<td></td>
<td>Due to shift system and heavy work load</td>
<td></td>
</tr>
<tr>
<td>• At Branches</td>
<td>Imparting Training</td>
<td>VALID</td>
</tr>
<tr>
<td></td>
<td>Imparting Training to all branches.</td>
<td>INVALID</td>
</tr>
<tr>
<td></td>
<td>It is difficult to train employees of all the branches.</td>
<td></td>
</tr>
<tr>
<td>Issue</td>
<td>Description</td>
<td>Validity</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Non-availability of records</td>
<td>Requesting the branches to depute their staff to the old records section at Kurla and provide us the required data. QC members will go to old records section, search and bring out the required details.</td>
<td>INVALID</td>
</tr>
<tr>
<td></td>
<td>Due to heavy pressure at branches and depleted staff strength, it is difficult for them to depute the staff.</td>
<td>VALID</td>
</tr>
<tr>
<td>Introduction of computer environment</td>
<td>Requesting the branches to furnish and help in finding out the required details available in the manual slips. QC members will visit the branches and help out in finding out the required details.</td>
<td>INVALID</td>
</tr>
<tr>
<td></td>
<td>Due to heavy pressure of work at record section and no ready availability of old records, it is difficult for the branches to find out the details.</td>
<td>VALID</td>
</tr>
<tr>
<td>No Initiative</td>
<td>Advising the staff about the gravity / importance of the problem.</td>
<td>VALID</td>
</tr>
</tbody>
</table>
Lack of co-ordination

1. Q.C members will visit the branches, other banks and RBI and assure them all the possible help they need and requesting their co-operation.

2. Sending payable/receivable statement to other banks & assuring settlement of clearing differences.

<table>
<thead>
<tr>
<th>PLAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>✤ Impart training</td>
</tr>
<tr>
<td>✤ Visit branches</td>
</tr>
<tr>
<td>✤ Visit old record section</td>
</tr>
<tr>
<td>✤ Visit other banks</td>
</tr>
<tr>
<td>✤ Prepare statements</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DO</th>
</tr>
</thead>
<tbody>
<tr>
<td>✤ Trial Implementation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHECK</th>
</tr>
</thead>
<tbody>
<tr>
<td>✤ Data collection</td>
</tr>
<tr>
<td>✤ Check the results</td>
</tr>
<tr>
<td>✤ Forseeing probable resistance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular implementation</td>
</tr>
</tbody>
</table>

After giving training to the staff members of the Bank’s section, all came to about the gravity of the problem and we decided to rectify the entries pending at the Bank. So the entries were reconciled immediately.
From the data, the Circle members that some branches of the Bank had maximum number of pending entries under BARs and IBAs. The Circle members visited those branches and guided the staff on how to reconcile those entries. Following table shows the number of entries rectified.

**Table 3.7.4 Number of Entries Rectified Branch wise**

<table>
<thead>
<tr>
<th>Branch Number</th>
<th>Entries pending</th>
<th>Entries Rectified</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>09</td>
</tr>
</tbody>
</table>

**Table 3.7.5 Entries Rectified after Trial Implementation**

<table>
<thead>
<tr>
<th>Account Head</th>
<th>Number of entries</th>
<th>Entries rectified after Trial Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sundry Assets</td>
<td>198</td>
<td>40</td>
</tr>
<tr>
<td>Sundry Liabilities</td>
<td>263</td>
<td>60</td>
</tr>
<tr>
<td>BARs</td>
<td>471</td>
<td>95</td>
</tr>
<tr>
<td>IBAs</td>
<td>114</td>
<td>30</td>
</tr>
</tbody>
</table>

**FORSEEING PROBABLE RESISTANCE**

Brainstorming session was conducted to find out the probable resistance and way to overcome that.
1. **Resistance for sparing staff for training** The Circle members requested our Section heads to instruct the staff to attend the training without fail.

2. **Communication may not be honoured.** Had circular been sent by the members it might not be honoured. So the members requested our Circle office to forward out circulars from their end, so that will be more effective.

3. **No initiative at branches** The members requested its circle office to insist the branches for proper follow up of long pending entries and early rectification.

4. **No response from other Banks** Many times other Banks and RBI do not co-operate with the Bank. This may be due to non co-operation from Bank’s side. Hence QC members requested all the staff to attend to the queries of other Banks and RBI and reply them on priority basis by means of which the Bank will also get the same response from them.

### REGULAR IMPLEMENTATION

**Table 3.7.6 5W 1H TECHNIQUE**

<table>
<thead>
<tr>
<th>SL No.</th>
<th>What Solution</th>
<th>Who Role</th>
<th>Where Location</th>
<th>Why Object</th>
<th>How method</th>
<th>When Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Training at clg sec.</td>
<td>S&amp;R Clg Sec</td>
<td>Clg Sec</td>
<td>To improve knowledge of systems</td>
<td>On job training</td>
<td>Oct 02</td>
</tr>
<tr>
<td></td>
<td>At branches</td>
<td>T.M.K Branches</td>
<td>--do---</td>
<td>-do-</td>
<td>Oct 02</td>
<td></td>
</tr>
</tbody>
</table>
The following steps were taken

1 Training to staff was given.

2 Reconciliation of entries was done where details were available.

3 Information of pending entries at branches was sought.
4 Circular was issued to the branches regarding gravity of problem.

5 Visit to some branches was given by circle members and information was collected.

6 Visit to old record section to collect information.

7 Pay orders/DD were brought from different banks where entries were located.

8 The entries pending & unclaimed since 1994 were sent for write off and write back as pr procedure.

9 The statements containing the entries under located head were sent to the Banks and branches to settle as early as possible.

**Tangible Gains**

**Benefits derived**

1 Entries wiped off during the year—BAR-394
   
   SL-- 203
   
   SA-185
   
   IBA-75

2 The massage of importance of rectification of outstanding entries under SA/SL/BAR/IBA was spread among all the branches.

3 Clearing differences SA/SL accounts were reduced.

4 Chances of committing fraud were reduced.
Improved total performance.

6 The complaints from customers, branches and other Banks were reduced.

7 Improved total performance.

Following table shows the amount wise entries rectified

**Table 3.7.7 Amount wise Entries Rectified**

<table>
<thead>
<tr>
<th></th>
<th>Mar2002</th>
<th>Mar 2003</th>
<th>Amount Rectified</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA</td>
<td>55,72,765=21</td>
<td>11,24,063=07</td>
<td>44,48,702=14</td>
</tr>
<tr>
<td>SL</td>
<td>1,53,98,292=12</td>
<td>93,20,746=63</td>
<td>60,77,546=41</td>
</tr>
<tr>
<td>BARs</td>
<td>114 Crores</td>
<td>18 Crores</td>
<td>96 Crores</td>
</tr>
</tbody>
</table>

**INTANGIBLE BENEFITS**

- Management has appreciated our efforts and congratulated the team members.
- Develop problem-solving capabilities.
- Inspire effective teamwork.
- Developed leadership qualities in members.
- Developed a sense of belonging.
- Developed public speaking capabilities.
- Set an example by positive mental attitude, motivation and will to produce superior things.
- Importance and knowledge regarding Sundry and Suspense Accounts amongst the employees at Clearing Section and branches.
- Getting the satisfaction of teaching good things to the branches.
- Learnt how to use MS-Word and Power point presentation.
• Our Bank’s image got improved in the eyes of RBI and other Banks.
• Developed good relations with other Banks and our branches.
• Got recognition from top executives of the Bank and other colleagues.
• Learnt more about QC techniques and tools.

FOLLOW UP AND REVIEW
Brainstorming is done every Saturday and the rejection rate is reviewed. Bank has also taken the following steps for regular follow up.

• Bank has also requested the Section heads do not allow any untrained staff to posting the slips under SA and SL.
• Bank has also requested Section Heads to sign the slips only when full narration is available on the slips.
• All the entries debiting or crediting under SA or SL must be located and debited under clearing difference located head for further follow up.
• Banks is following up with the branches for responding BARs and IBAs immediately. The entry cannot be pending by branch for more than one month.
• From 1st April, 2003 onwards all the differences are centralized and branches need not keep any amount under SA/SL head at their end pertaining to clearing differences.
• Due to job rotation and transfers, employees will be reshuffled. New employees will be unaware of systems and procedures. In the new centralized clearing difference locations at Bank’s section, there will be need for the branches to locate the differences at their end. The entries will be located and nullified at Bank’s end only.
Conclusion

The above case studies clearly prove the importance of Quality Control Circle (QCC) in the journey of quality improvement. The movement of QCC is expected to start at the grass root level and in almost all case studies it is proved that the workers in the plant are running QCC very successfully over a long time. One may think that the problems solved by the workers may be petty, simple and so negligible. But it is not true. The petty or small problems [may be] solved by the workers might turn into the serious ones if not solved in time. Further they may be many in number. A manager of a heat treatment shop remarked, "I had to go to the shop floor a number of times earlier to resolve petty problems but since Quality Circles were formed, most of the issues are now being settled, by the members themselves, leaving me more free time to attend to my managerial functions." This proves the importance of this movement starting many times at grass root level.

1. For the success of any quality program, support of top management is necessary. Top management may expect the result in quantitative terms. For any quality program to sustain over a longer period, the cost saving aspect is the most important aspect. Most of the Circles have succeeded in saving cost and thereby increasing profit at the end of the program and it is found that these QCCs are working successfully in the respective organizations for quite a long period. The following table showing the cost saving made by different QCCs is enough explanatory.
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the Circle</th>
<th>Cost Savings (in Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Star</td>
<td>744,000 per year</td>
</tr>
<tr>
<td>2</td>
<td>Zenith</td>
<td>29,040 per month</td>
</tr>
<tr>
<td>3</td>
<td>Gunjan</td>
<td>662,000 per month</td>
</tr>
<tr>
<td>4</td>
<td>Kohinoor</td>
<td>54,00,000 per year</td>
</tr>
<tr>
<td>5</td>
<td>Sinhastha</td>
<td>30,000 per year</td>
</tr>
<tr>
<td>6</td>
<td>Sanskalp</td>
<td>20,000 per year</td>
</tr>
<tr>
<td>7</td>
<td>Innovator (Ideal Case study)</td>
<td>60,000 per year</td>
</tr>
<tr>
<td>8</td>
<td>Bachat</td>
<td>164,000 per year</td>
</tr>
<tr>
<td>9</td>
<td>Gagan</td>
<td>15,00,000 on one machine</td>
</tr>
</tbody>
</table>

But it should also be noted that the cost saving is not all about it. QCC is much more than this.

2. As stated in the case studies the circle members have not only solved the problem. But have also made innovations in the production process Gagan. This has resulted into.
   a. Reduction in breakdown
   b. Reduction in scrap.
   c. Reduction in maintenance cost.
   d. Reduction in inventory.
   e. Reduction in manpower.
   f. Reduction in overtime

In one Case Study, the Company has saved interest Rs. 2 lakh due to lesser inventory.
3. Reduction in breakdown, scrap, maintenance cost, inventory, manpower automatically results in increasing production speed. For e.g. in Zenith Case Study, productivity increased by 6.25% whereas in Gagan case, we find that there is a rise of 46% in the production and 40% increase in speed.

4. No business can survive without customers’ satisfaction and appreciation. If the quality of the product is improved, defects and rejections are reduced at the initial stages; defect free products can be supplied to the customers. In return, company can enjoy customers’ confidence. Many QCC projects have ended with a good note from the customers in the form of appreciation. In Zenith Case Study, the customer praised for eliminating rejection at their end. They appreciated the changed design of wire.

In star case study, rejection was reduced from 16000 ppm to 186 ppm. Imagine the colossal wastage the company would have suffered in the absence of quality Circle.

In Zenith case study, company theme was to achieve 100 ppm and the Circle achieved 0 ppm.

5. The Companies have enjoyed many other gains because of QQC such as,

   a. Standard cycle time is achieved.
   b. Set up time is reduced.
   c. Increased tool life.
   d. Improved surface finish.
   e. Space Saving, electricity saving, etc.
6. QCC, though working at grass root level, has even succeeded in developing a new product line in which every company is interested.

7. Quality Circles are functioning well not only in manufacturing industries but also in service industries. Case study Bank is enough supportive enough to this statement. In a bank, this QCC is functioning so well that as a sort of appreciation, the QCC members were recently sent to Bangkok to participate in International Convention. In these 2 case studies, the bank enjoyed many benefits such as large number of entries are rectified and thereby amount of Rs. 97 crores is rectified. It also helped in reducing clearing differences i.e. SA (Sundry Assets) and Sundry Liabilities (SL) accounts also reduced. The chances of committing fraud also reduced. This is particularly important from the account holders’ point of view, as recently 2 Banks in Nashik had to be closed down causing a lot of problems to the depositors.

8. From the case study it is observed that the QCC members have solved the problems not only related to their work area, but also related to other areas of the company where they work. In Sinhashtha case study, the members noticed extra consumption of lights. In Bachat Case Study, the members noticed extra consumption of lights during the day in the company premises and solved that problem.

9. It is also seen that many problems that are around us get focused when we start thinking and improving the working standard. In case study Bank QCC members consulted even the sub-staff to point out the problems. Surely in the days to come, these problems will be attended as QCC in this service sector is working very efficiently.

10. Working in QCC develops the habit of noticing the problems and thinking of solving them. It changes the approach of the persons, ‘What
am I to do about the problems?. This definitely results in healthy work environment. Also when the problem was taken for project, the members develop the ability to review the problem with different angle.

11. QCC is a voluntary movement having a bottom up approach the members put extra efforts and time to solve the problems. As they solve the problem it not only helps the organizations but also helps the QCC members in many ways. There are many intangible gains the QCC members enjoy.

Intangible gains are more important as they permanently influence your personality, which results in organizational gains where you work. The QCC members themselves have admitted that working in Quality Circle, they have enjoyed many intangible gains.

Increase in self-confidence has resulted in better performance. It gives them job satisfaction. It has also helped to improve their morale. They are voluntarily solving the problems and thereby improving their work standard. This has developed among them a sense of belonging and ownership. Having a sense of ownership is surely advantageous as it is human tendency to care for all what is owned.

While solving the problems the knowledge of QC Tools is necessary. Many members accept that it is a valuable knowledge they gain while working in Quality Circle.

When they do the ‘brainstorming’ they notice many problems which otherwise would have been ignored. Further they state that many of the problems are noticed in time, which the organization would have had to pay attention to in case of actual problems. As the members
meet regularly there is better communication among the workers or employees resulting in healthy atmosphere in work area.

QCC is required to give presentation to the management for which the members take efforts seriously. Appreciation by Top and Senior Management is immensely valuable. The QCC members do accept it. A young member of bank very happily and proudly states that by working in QCC he is known to all working in all branches of bank and to the Top Management in the few years of his service in the bank. He has visited the Head Office of the Bank and met the Top management and was appreciated, which has not been possible even to those who are at the age of retirement. He thinks this as a great achievement and takes it as his asset, which will encourage him throughout his life to work for the betterment of the bank.

When you like the workplace and the work you do, you experience less fatigue. QCC members of many Circles have accepted that they experience less fatigue while working.

Problems Solving through QCC is collective effort, which requires team spirit. At organizational level quality improvement cannot be done single handedly. Many QCC members admit that they have developed team spirit working in quality circle. They also state that working in QCC helps in their personality development.

12. Case study of Success and Tally proves that Quality Circle plays an important role in education field. In fact it is more required in education as the teachers deal with human factor. Case study 5 and 6 state the results of Quality Circles where the results of performance of the students showed a great improvement. In case study 5, problem of communication skill was tackled by the teachers. In the present era,
this skill is required to be focused, as many graduates are unable to write correctly even an application for a job and to face confidently an interview because of poor communication skill. It does not have only examination relevance. Its practical usage is more important. As the teachers deal with the students, the human beings, every time 100% accuracy is not expected. So we can say they have solved the problem to some extent.

13. From the Case Studies, we find that time factor is very important to take note of. The Quality Circles have taken very less time to solve the problems, which have resulted into tangible and intangible gains to the organizations. The following table shows the time taken by QCC to solve the problems and gains in brief.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of QCC</th>
<th>Outline of main problem.</th>
<th>Time taken</th>
<th>Savings (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Star</td>
<td>Outer line tube mark.</td>
<td>18 weeks</td>
<td>7,44,000/-</td>
</tr>
<tr>
<td>2</td>
<td>Zenith</td>
<td>To achieve zero rejection.</td>
<td>12 weeks</td>
<td>29,040/-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>productivity increased by 6.25%</td>
</tr>
<tr>
<td>3</td>
<td>Gunjan</td>
<td>High stream consumption in cell area.</td>
<td>60 weeks</td>
<td>Savings of Rs.6,62,000/- of Furnace Oil.</td>
</tr>
<tr>
<td>4</td>
<td>Gagan</td>
<td>Convert single tracks FFS m/c into Twin tracks m/c.</td>
<td>42 weeks</td>
<td>Rs. 15 Lakhs per month.40% speed increased 46% increase in production..</td>
</tr>
<tr>
<td>5</td>
<td>Kohinoor</td>
<td>To increase ribbon shell OEM quality procedure from 85% to 100%.</td>
<td>1.4 weeks 168 work hours</td>
<td>Rs. 54,00,000/- p.a.</td>
</tr>
<tr>
<td>---</td>
<td>---------</td>
<td>-------------------------------------------------</td>
<td>-----------------</td>
<td>------------------</td>
</tr>
</tbody>
</table>
| 6 | Sinhastha | Savings on plant lighting repairing | 12 weeks | Rs. 30,000/- per year. Inventory of lighting reduced by 50%.
<p>| 7 | Sankalp | Shop WIP accumulation bush failure | 6 weeks | Rs. 3,30,000/- p.a. including savings in interest due to Inventory reduction. Reduced warranty due to bush failures. Rust prevention. Reduced paint work. Reduction in overtime. |
| 8 | Success | To improve general proficiency in English language skill of listening, speaking, reading, writing and communications. | 16 weeks | Improvement in the class test performance of the students. Marked improvement in students attempting to |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Project</th>
<th>Description</th>
<th>Duration</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Tally</td>
<td>To improve performance of students in Commerce subjects.</td>
<td>15 weeks</td>
<td>Improved performance up to 90%</td>
</tr>
<tr>
<td>10</td>
<td>Operation Clear Encoding QC</td>
<td>Accumulation of long pending entries sundry Assets / Liabilities / BAR's / IBM's</td>
<td>52 weeks</td>
<td>Total 860 entries rectified under all heads. Amount rectified approx. Rs. 98 Crores.</td>
</tr>
<tr>
<td>11</td>
<td>Operation Clear Encoding QC</td>
<td>Inadequate popularization of new clearing such as AWB, ECS, EFT.</td>
<td>24 weeks</td>
<td>Rs. 6 to 8 Lakhs</td>
</tr>
<tr>
<td>12</td>
<td>Innovator</td>
<td>High breakdown in Aubo curing presses.</td>
<td>11 months</td>
<td>Rs. 60,000/- per year. Reduction in scrap. Reduction in breakdown.</td>
</tr>
<tr>
<td>13</td>
<td>Bachat</td>
<td>Lights remain 'on' unnecessarily during the day.</td>
<td>6 months</td>
<td>Rs. 64,510/-</td>
</tr>
</tbody>
</table>
Relating to time, one more aspect is necessary to be mentioned. Many QCC have mentioned about it, **pay back period**.

Pay back period is calculated after accounting the cost / expenses incurred by QCC to solve the problem and saving enjoyed by the organization because of the problem solved.

\[
\text{Expenses incurred by QCC}
\]

\[
\text{Pay back period} = \frac{\text{Annual savings made by organization due to the problem solved}}{\text{Expenses incurred by QCC}}
\]

It also considers the interest on the amount, which is spent to solve the problem.

For e.g.

1. **Innovator case study**

   - Annual saving : Rs. 60,000/-
   - Expenses incurred by QCC : Rs. 39,400/-
   - Interest on Rs. 3,94,000 at 15% : Rs. 5910/-
   - Net saving = Rs. 60,000-5,910 : Rs.54,090/-

\[
\text{Pay back period} = \frac{\text{Rs. 39,400 (Expenses)}}{\text{Rs. 54,090 (Net Savings)}}
\]

\[
= 0.72 \text{ years (Approximately 9 months)}
\]

236
II. Gunjan case study

❖ Cost of implementation: Rs. 90,000/-
❖ Net saving per month : Rs. 66,269/-

Rs. 90,000/- (Cost of Implementation)
Pay back period = ........................................................
Rs. 6,62,691 * 4,090 (Net Savings per year)
= 4 days.

So we can say that cost incurred for solving the problem and gains or benefits achieved are in the inverse proportion. Further the Company is going to enjoy these benefits every year.

14. Environment protection (Bachat):

QCC project have not only resulted into tangible gains to the organization or workers it has also resulted into environment protection. Nowadays everyone talks about environment protection but very few think seriously about it. QCC Bachat while taking the problem ‘Lights remain on during the day’ thought of environment protection too. Along with the saving of Rs.164510, it reduced the inventory of tube lights. Consumption of tube lights reduced which resulted into environment protection. Tube lights are coated from inside with phosphor. They contain small amount of mercury, which is harmful to environment.

Also Gunjan QCC and Sankalp QCC members proudly mention of environment protection because of their projects.
It is not however claimed here that the QCC is a Panacea, which will solve all organizational difficulties. It is one of the approaches that the organization may adopt. Further it is not claimed that quality circle will always be successful in solving all the problems in an organization, though there are quite a few experiences of failure of quality circles.

It is necessary to recognize here that Japanese started QCC long after all management had been trained in quality control and company wide quality control [CWQC] that is quality circle claimed at the end of the total programme which is very important reason why it is self-sustaining in Japan. Against this, some organizations in India attempted starting Quality Circle without practicing CWQC and hence failed. Further in the companies where Total Quality Management Programme [TQM] was being followed, QCC's were not made a part of it in the first few years. So we find a slow pace of this movement in those years.

It is true that in many companies in Nashik quality circle movement was in full swing till 1998-1999. Then in later 2-3 years we find that in many organizations priority was given to another quality programme because of ISO Certification. These QCCs stopped functioning in these organizations. But almost all the members of Quality Circles during their interview admitted that this movement in their respective organizations has not ‘failed’. They stated that due to ISO certification or any other quality system implemented by their companies, the form of QCC has been changed. Sometimes the members are slightly deviated from the normal procedure of Quality Circle they used to follow. This fact is acceptable as in companies where quality circles at present do not exist, there are TPM Circles (in case of Total productive Maintenance, Small Group Activities (S G A )/ kaizens where ISO 9000, 9001 Certificate is obtained) or even in case of six sigma there are Six Sigma ‘Teams’ though working at upper level. All these groups are working for the improvement though they are not called Quality Circles.
Again, in spite of the obvious declining of QCC movement in the recent past, it must be noted that all the members did stress that absence of monetary incentive was never the cause of slowing down this movement.

We all know that QCC is a voluntary movement having a bottom of approach. While in India it is strongly felt that introduction of monetary incentives to QCC activities would dilute the very philosophy and perhaps create more problems than it would solve. Ungrudging recognition in every other way in appreciation of the efforts of quality circle will boost up the impetus of the movement. The wider the audience witnessing the recognition, the more it would help in further motivating the members.

It is supported by the fact that in all quality circle presentation members had made an announcement of their next project.

For e.g. in case of Star quality circle, after solving the problem outer Tube line mark the member's next plan was to achieve 100 ppm. In the areas of customer complaints, sells return and final inspection.

In case of Gunjan QCC after solving the problem of 'High stream Consumption in cell area', the members decided to solve the problem 'Water consumption in Finishing area'.

In case of Sinhastha QCC the members decided to take the project that was on the second rating that i.e. 'reduced belt replacement on different machines'. In service industry QCC also, we find that the members are at present busy in the next project.
In education field where QCCs are working the members have decided to follow the same schedule to improve the performance of the students in the next academic year, too.

In all these cases members are working for the betterment of organizations, products and work area, irrespective of any special monitory benefit.

In his famous book The Third Wave, Allwin Toffler has warned that in the years to come, workers all over the world are not going to remain satisfied with only monitory incentives. Their aspirations are ever on the rise and they will soon be demanding the satisfaction of the higher human needs like a sense of achievement, enhanced self esteem and having a say in the decisions affecting them. If we are not enlightened enough in preparing ourselves to face such eventuality in future, we have only ourselves to blame.

Only through sincere implementations of QCC, can we be ready to motivate and draw out the immense potential of our employees at the grass root level.

As such the relevance or the feasibility of the concept of QCC to India is now beyond dispute. It has once again been proved in the recent International Convention on QCC at Bangkok in December 2004, where QCCs from every field----- industries, health care, technology, maintenance, service and support did the presentations on their QCC projects. What remains to be seen is with what seriousness and sincerity of purpose we adapt the philosophy while keeping it in tune with our culture and conditions.

No doubt that the tangible and intangible benefits from the effective implementation of the concept does result in the transformation of the culture, conducive to satisfying the prerequisites for excellence, as stated above.
It is appropriate to explore another myth that with the rapid development of technology, the human element can be overlooked. One can compensate for bad technology. But peak performance or excellence can never be achieved without peaks in both the domains——‘Human’ and ‘Technology’ and here lies the utmost need of Quality Circles.