QUALITY CIRCLES  
For Quality Improvement & Sustenance in “Your Foundry”  
Part-2 : Problem Solving Tools & Techniques

A Simple, Silent, Yet Powerful Activity of Shop-Floor People for Quality Improvement & Sustenance

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Prepared based on an enlightening presentation by Shri K B Bharati in a Training programme conducted by Ahmedabad Chapter of IIF on 23rd December 2016 at AMA Campus in Ahmedabad.

– In first part, the concept of “Working of Quality Circles in any Organization” was introduced.
– This is the second part, initiating discussion on “Problem Solving Tools & Techniques”, with specific focus in this part on “Brainstorming”, and first two steps in problem solving.  
– More information will appear in the next and/or subsequent part(s). – Editor

What do we mean by a “Problem” ?
A Problem is any or more of the following:
• Difference between expectations and facts
• Standard not achieved
• Customers’ unfilled needs
• Performance standard not consistently achieved
• Undesirable result of an Act or a Process, or
• Difficulties faced while performing a Task

(The Effect of the Problem should be measurable in standard units, e.g. meters, kilogrammes, hours, frequency etc.. Also, at the end, its effect can be highlighted in terms of Monetary value.)

What are Normal Areas of a Problem?
• Poor Quality of Product(s) / Service(s)
• Increase in Cost due to poor utilization of Resources (e.g. place, machinery, materials, electricity, fuels, water, manpower, time etc.)
• Dissatisfaction of Customers
• Poor performance of the Organisation

Problem Solving Process
It can be highlighted under the following two main areas:
• 12 Steps in problem solving process (please see the box here)
• Use of QC Tools (10 Tools are listed in a box on the next page. There can be other Tools also.)

12 Steps in Problem Solving
1. Identification of Problems*  
2. Selection of a Problem for solving*  
3. Defining the Problem  
4. Analysis of the Problem  
5. Identification of the Causes of the Problem  
6. Finding the Root Causes of the Problem  
7. Data Analysis  
8. Developing the Solution  
9. Foresee probable resistance while implementing the solution  
10. Trial implementation and checking performance  
11. Regular Implementation of the Solution  
12. Follow-up & Review

*Detailed discussion on First Two Steps appears in this part. Discussion on remaining 10 Steps will be covered in subsequent parts.
Ten QC Tools
(These are basically elementary Statistical Methods)

Check Sheet: For data collection to understand the problem, and its magnitude.
Stratification: To understand the process, and locate the problem.
Pareto Chart: For identification/selection of a major problem or area for improvement or control; to differentiate between vital few & trivial many.
Cause & Effect Diagram: To map out all probable causes, and to relate logical linking of the causes
Histogram: To study process variation and to assess process capability
Scatter Diagram: To examine the relation between two variables
Graphs: To present large amount of data in cohesive manner
Control Charts: To maintain running control on a process
Flow Diagram: To understand the process, and locate the problem
Brainstorming: This is the main Tool to generate New Ideas. It also helps in building up “Capabilities of our Shopfloor People”.

Different Steps in Problem Solving

Step-1: Identification of Problems
(Listing ALL Problems. The technique used is Brainstorming among Quality Circle members.)

Brainstorming
- Brainstorming is a Group Technique for generating New and Useful Ideas.
  (Alex Osborn developed this technique in 1950 for solving the problems related to marketing & advertising.)

Brainstorming can be used for
- Identifying the Problem
- Finding out possible Cause(s)
- Arriving at a Solution
- Anticipating possible Resistance
- Finding out Ways to overcome the resistance

Practical Rules for Brainstorming
- Everyone should contribute in turn, and only one idea at a time.
- If one cannot think of an idea at a given point of time, he/she may say “pass”, but will always get another chance in the next round. (At this stage there is no need to explain ideas in detail.)
- In Quality Circle activity we use structured process of Brainstorming, as Development of People is the primary aim of Quality Circles.
- The meeting place is chosen where there is no disturbance.

Select a Leader

[Diagram showing a leader with attributes such as open-minded, amiable, motivating, and control]
Conducting Brainstorming Session
- Brief the Subject to QC members.
  (write the subject on Flipchart / Slide – visible to all)
- Write Every Point as it Emerges, and continue till all
  Points get completed.
- Do not ask for any explanation/clarity of any point
- Encourage Silent Members to participate

Conceptual Rules for Brainstorming
- No criticism or evaluation (of any idea)
- Be unconventional
- Aim for Quantity
- Hitch-hike on Participants’ ideas

Problems Identification
(i.e. a search for Improvement Opportunities)
- Quality (i.e. Conformance to Specification)
- Wastages – Time, Materials, Oils, Electricity etc.
- Low Productivity
- Customer Complaints
- Fatigue to Operators
- Unsafe Working Conditions
- Unhealthy Environment

Possible Problem Areas
- Declining Sales
- High attrition rate of People (i.e. employees)
- Poor utilization of Resources
- Higher cycle time for product development
- Customer dissatisfaction
- Increased customer complaints
- More time taken to solve customer complaints
- High absenteeism of employees
- Lost Sales
- Late Deliveries
- Delay in Procurements
- Document errors in dispatches
- Offers being rejected as uncompetitive

Illustrations of Breakthrough Ideas from Different Industries

<table>
<thead>
<tr>
<th>Maruti 800</th>
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<tbody>
<tr>
<td>Indica</td>
</tr>
<tr>
<td>Reliance Mobile</td>
</tr>
<tr>
<td>Nano</td>
</tr>
<tr>
<td>Scorpio</td>
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Step-2 : Selection of a Problem
(from among ALL Problems listed in Brainstorming Session in Step-1)
(Tool used : Stratification)

What is Stratification?
Stratification is the process of separation of Data into
different Categories.
It is normally done for identifying the categories
contributing to the problem being tackled.

Different Methods of Stratification
Some commonly used methods of stratification are:
- ‘A, B, C,’ Analysis
  – A : Team can solve
  – B : Team needs help of other dept
  – C : Outside help, approval from Management
        is required
- Theme-based Analysis
- Rating or Ranking
  – Total of all individual ratings
- Data-based

An Example of Stratification
Failure of Students : Total 50

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<th>Subject</th>
<th>No. of Students</th>
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<tr>
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<td>History</td>
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<td>Geography</td>
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<tr>
<td><strong>TOTAL</strong></td>
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</table>

On which Subjects should the School concentrate
to improve results?

On **Maths** and on **English**
Illustration of (i) ABC Analysis, as also (ii) Theme-based Analysis

ABC Analysis

Problems Identified 65

‘A’ – 22
‘B’ – 20
‘C’ – 23

Quality - 6
Waste - 5
Fatigue - 2
Safety - 7
House keeping - 2

Theme based Analysis
Rating Method
Selecting Single problem
Data Based

An Example of a Rating Method

Considering “cost saving” as the major criterion, we selected following Top 5 Problems:

P-1 Carton Insertion Machine for Lower Type Batteries
P-2 Reduction of Battery Top Cover Scrap due to top cover melting issue
P-3 Utilized more vehicles for 26th batteries dispatch
P-4 Plastic Bail wastage due to improper Jig
P-5 4 Layer for 6V/120Ah

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<th>P1</th>
<th>P2</th>
<th>P3</th>
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TOTAL: 32 36 40 35 31
RANK: 4 2 1 2 5

On the basis of priority rating P3 was selected

Illustrative Format for Rating of Problems

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<th>ASS</th>
<th>SNC</th>
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<td>5</td>
<td>6</td>
<td>31</td>
</tr>
<tr>
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<td>Failure of Brake Air System</td>
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<td>7</td>
<td>8</td>
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<tr>
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<td>Difficult Maintenance of Generator bottom bearing</td>
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<td>6</td>
<td>7</td>
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<td>35</td>
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<tr>
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<td>Page line expansion joint leakage</td>
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<td>6</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>31</td>
</tr>
</tbody>
</table>

Stratification of Wire Breakages at Spooling Machine

Month-based
- March: 33
- April: 31
- May: 35

Machine-based
- Machine: 102
- Machine: 104
- Machine: 111

Reason-based
- Weld: 72
- Wire: 31

Conclusion: Major number of wire breakages generated on Machine 102, due to Weld breakage.

to be continued (from Step-3 onwards).....
POINTS TO PONDER
While Focusing on Quality

1. Who is responsible for Quality?

2. Prevention is Better than Correction!
(Please see the illustration below.)

3. Visible & Hidden Costs of Poor Quality
(Illustrated by a Failure Iceberg)

4. Run Faster, and Faster, and Faster..!
(Story of a Lion & a Gazelle in Africa)

- Every morning in Africa a Gazelle wakes up knowing that he has to run faster than the fastest of the Lions, otherwise a Lion will catch him.

- Every morning in Africa a Lion wakes up knowing that he has to run faster than the slowest of the Gazelles, otherwise he (i.e. the Lion) will remain hungry.

- It does not matter whether you are a Lion or a Gazelle, you have to run faster, and faster, and faster...

In the field of Quality also each organization has to run faster, and faster, and faster... to maintain the leadership!

5. Important Factors for Product & Performance Excellence

- If change is happening on the outside faster than on the inside, the end is in sight.

- Face reality as it is, neither as it was, nor as you wish it to be. – Jack Welch

(Source: Some slides from the PowerPoint presentation by Shn K. B. Bharati (Quality Circle Federation of India)}