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IMPLEMENTATION OF TQM IN A TIER-III INDUSTRY

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Abstract :- TQM is a Quality Man agement process that looks for continuous improvement in any industrial aspect. The TQM Tools procures significant improvement in the overall Productivity of the Company. The work focuses on Implementation of TQM for the improvement of the Bottle manufacturing process in a Tier-III industry which lacks Total Quality Management techniques. The Tools such as FMEA and QFD are utilized to reduce the number of defects in the process. FMEA is used for analysis and QFD is used for quality control. Various Processes in the Manufacturing of the PET bottles are studied and evaluated based on the standard TQM Techniques. Optimistic results are achieved for the proposed implementation of TQM Tools in the Industry

Keywords- FMEA, QFD, RPN, PET Bottle Manufacturing, TQM Tools

1. IMPLEMENTATION OF TQM

The main aim for applying TQM concepts to a Bottle manufacturing process is to reduce defects and variations in the final product. This can be done by studying all the variables in the process and aiming for the least tolerance in every case.

2. FMEA

Failure Mode and Effect Analysis is a TQM tool which can be used to identify defects and later conducting correcting measures. FMEA includes 3 stages-

Severity(S)

Each and every failure should be determined and listed as a technical defect with its cause. Each failure is given a number from 1-9 with ascending severity. A severity of 8 or 9 will include those which might cause injury to the user. Actions are considered to rectify those defects.

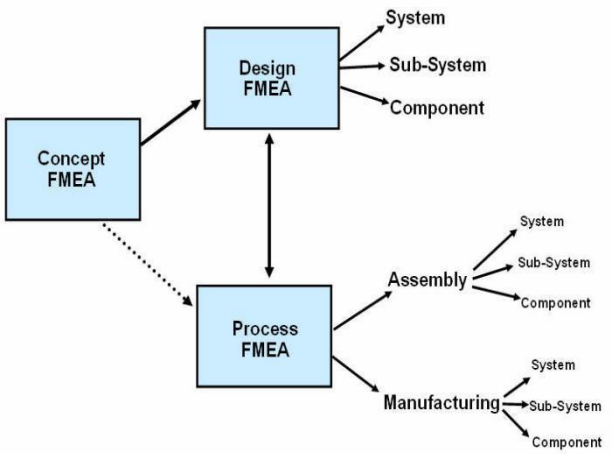
Occurrence (O)

In this step, the frequency of each defect is determined. No process can be completely defect-free but the aim should be to decrease the frequency as much as possible.

Detection (D)

Every product has to go through a testing phase at the end of the manufacturing process. Here design analysis and physical testing is conducted. In addition to detecting failures, the ease of detecting failures is also measured.

Risk Priority Number (RPN)



The RPN is given by-

$$RPN = S \times O \times D$$

The failure with higher RPN is given priority for any corrective action.

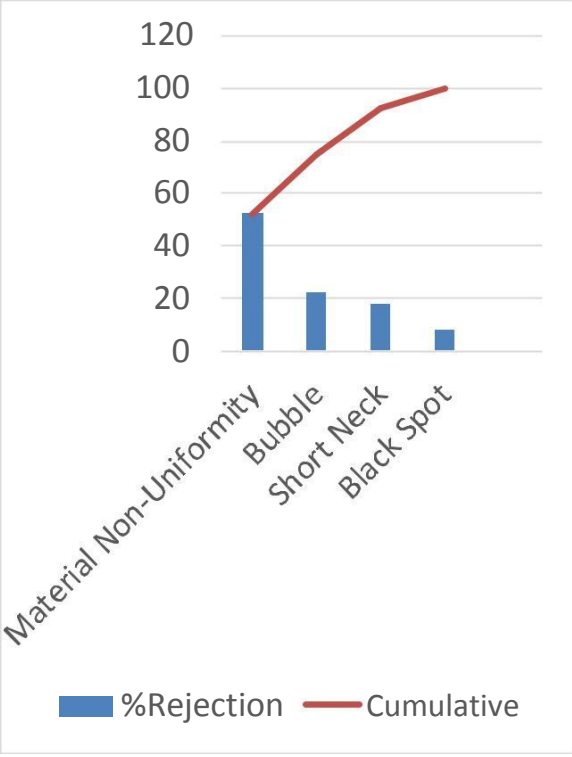
In the first stage for calculating RPN, numerical data regarding the defects is collected. The defects are converted into loss in monetary value. The main causes for each failure model is determined and listed. Each failure model is assigned a Severity, Occurrence and Detection value and the RPN for each defect is calculated.

Then a solution for each problem is devised and implemented. New data is collected and the decrease in product rejection is noted. With the new information, an updated RPN is calculated. The difference between the 2 RPN gives the improvement in the process.

Sr. No	Defects	Quantity Rejected	Cost (In Rupees)
1	Material Non-Uniformity	1540	9240
2	Bubble	1312	7872
3	Short Neck	956	5736
4	Black Spot	609	3654
		Total	26502

These are the major defects that occur on a regular basis. The causes for each defect is found out and listed.

Now that the major causes are found out, a solution for each failure is devised and applied to the process while maintaining it at optimum condition.



SI. No	Defects	Cause
1	Material Non-Uniformity	High Barrel Temperature.
2	Bubble	Low Drier Temperature
3	Short Neck	Low Injection speed.
4	Black spot	Low Mould Temperature Control

The solutions are the new process parameters like change in temperature or cycle time variation. After these new conditions have been applied, the rejection data is once again collected and the decrease in rejected products is found out.

Sr. No	Defects	Quantity Rejected	Cost (In Rupees)
1	Material Non-Uniformity	827	5962
2	Bubble	653	3918
3	Short Neck	338	1014
4	Black Spot	162	972
	Total	11866	

With the new data collected after implementing FMEA, a new RPN is calculated and then compared with the old RPN. This gives the decrease in rejected products and its cost in rupees.

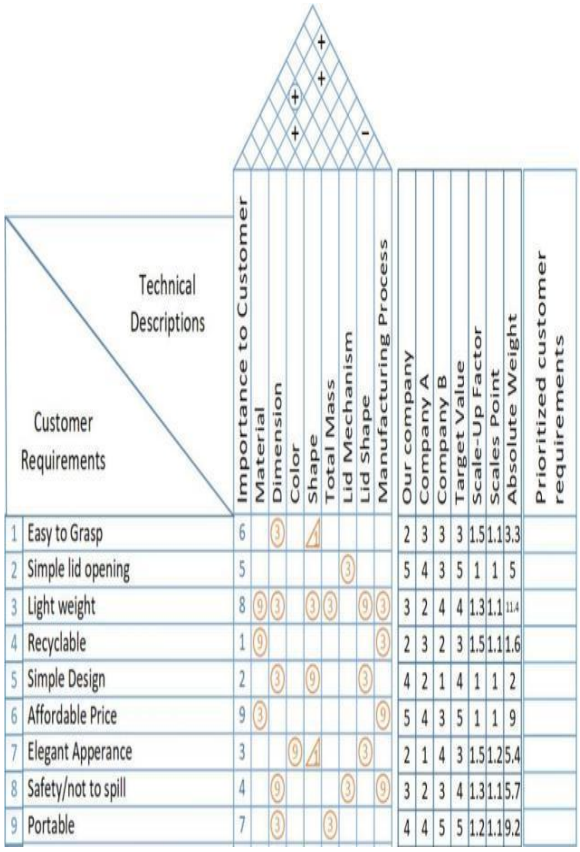
3. QFD

Quality Function Deployment is a Quality control tool in TQM where design requirements are given priority. These include technical requirements and customer-based requirements.

The basic steps for creating the House of Quality include-

1. Customer Requirements
2. Prioritising Customer Requirements
3. Technical Descriptors
4. Relationship Matrix
5. Trade-off Matrix
6. Prioritising Technical Descriptors

The customer requirements and the technical requirements are included, every technical requirement needed for each customer requirement is marked.



The entire House of Quality has been constructed, it helps to determine the most suitable material to use and what design parameters can be applied.

Conclusion

TQM is usually adopted in Tier-II and above industries. The lesser and more local ones have a misconception about its cost of implementation. This paper shows that if TQM techniques are adopted by these industries in their processes, then it will cover a significant part of their losses.

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