Case Study - Implementation of "Daily Management of Operations" in the paint shop of acar manufacturing plant

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This case deals with how a renowned car manufacturing company in India implemented its Group Quality Model in the paint shop at one of its plants near Pune.

On a Monday morning in the month of June 2013, Mr. Ravindra Mahajan, the Pune Plant Head of a well-known car manufacturing company in India, called a meeting of all the Department heads at the conference room. He said, "Friends, our plant has recently completed two years of its existence and as per company policy, now we have to start the implementation of our Group Quality Model in our plant. Please note that implementation of this Quality Model is not a very easy task and will require a lot of efforts and dedication from your end. However, this is really going to be a worthwhile exercise as it will ensure Quality in all our processes and products, which will in turn, ensure higher customer satisfaction. I, hence, appeal to you all to implement the Quality Model in your departments in its true spirit. You will be guided by a team of experts from the Corporate Quality Management Team, who will be at our plant at various departments for the next two months."

Mr. Pradeep Patil, the Head of the Paint Shop, decided to take up the challenge and implement the Quality Model in his department with maximum possible effectiveness.(A Paint shop is the area in an automobile manufacturing plant where automobile bodies are painted. The other areas in an automobile manufacturing plant being the Press shop, Weld shop & Assembly Line). It was a golden opportunity to bring down the rejection ratio at the Paint shop which was as high as 1.7% in May 2013 as against the industry standard of 1.1%.The paint shop had the capacity to paint 45 car bodies per hour. In other words,in a two-shift and 25 days working month, it could paint as many as 15,000 car bodies in a month. Hence, a rejection of 1.7% meant approximately 255 car bodies rejected per month due to paint defects. He discussed the same with his senior managers and then, in the next day morning meeting, with shop floor colleagues. The colleagues, who were mostly young and enthusiastic, also gave commitment to support him to the fullest extent in the Quality Model implementation in the paint shop.

In the third week of June 2013, the Corporate Quality Team visited the paint shop and discussed in brief regarding the Quality Model, its important evaluation parameters and the methodology of implementation. The name of this Quality Model is "Business Excellence Model".

Business Excellence Model:

The company, as a part of its business group, has adopted the Business Excellence Model which is being applied across all of its plants & departments therein. The Business Excellence model aims at ensuring continuous improvement & enhancement of effectiveness and efficiencies in operations of the plants of the company and ensures that theyare aligned to its vision and mission. The Business Excellence Model is thus, an approach that extends beyond the quality of the company's products and services and encompasses all functions, processes and people within the organization. The Model is based upon 8 Basic principles:

1.Focus on all stakeholders
2.Quality of processes
3.Quality of results
4.Continuous improvement
5.Prioritization
6.Data based management
7.Long term orientation
8.Total Employee involvement

The Model is built on five pillars namely:

1.Leadership & Strategy
2.Daily Management of Operations (DMO)
3.Overall Quality Improvement
4.Business processes
5.Employee Development.

The Paint Shop Team decided to implement DMOin the first round, in consultation with the Corporate Quality Team.

Implementing Daily Management of Operations (DMO)

In the first round, a few "Critical to Quality" processes were

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selected for DMO implementation.

These processes were classified under PCQDSM (Productivity, Cost, Quality, Delivery, and Safety& Morale).

After doing a detailed study of the Paint shop processes, it was understood that different types of Dirt particles viz. Transparent lint, Multicolour dirt, Primer Miss out dirt, Meltsheet dirt, Chips from fixtures & Spit dirt, stick on the painted automobile bodies and are responsible for as high as 72% rejections. Hence, under Quality, it was decided to attack the major contributor of rejections i.e. Dirt particles.

Bringing down rejection due to dirt particles

The paint shop team brainstormed and came up with the following list of causes that could be responsible for dirt particles sticking to the painted automobile bodies:

Equipment at paint booth not cleaned rigorously

Use of Cotton as the material for cleaning leading to loose fibres

Synthetic material of robot cover losing out fibres

Aluminum foil without coat used in flash off zone leading to meltsheet dirt

Clean room policy not followed strictly.

Corrective & Preventive actions that were initiated immediately were rigorous cleaning of equipment at paint booth; use of polyester material instead of cotton for cleaning car bodies; Robot cover material changed; Aluminum foil with varnish coat started to be used in flash off zone; Strict adherence & monitoring of Clean Room policy initiated and Air blowing & vacuuming started for skids.

Mr. Patil's team was not sure whether their approach was correct, appropriate in their case and effective on a permanent basis. Also, a lot of efforts and costs would be incurred on doing all these actions on a permanent basis. Hence, Mr. Patil was of the opinion that a proper analysis supported by strong data needs to be in place to tackle the issue permanently and cost-effectively.

A special dedicated team under the leadership of Senior Manager, Mr. AmarAbhyankar was constituted. The first step was to count the different types of dirt particles stuck on automobile bodies. For this purpose, a sample of 1000 different automobile bodies painted during different shifts on different working days of the month of July 2013 were studied and dirt particles of each type were counted.This counting was done manually by highly skilled operators. Based on the criterion of rejecting a car body on the surface of which more than 6 dirt particles above a particular thickness value are stuck, 18 painted bodies out of these 1000 sample bodies had to be rejected. Treating each rejected body as a defective unit, number of defective units were 18 and treating each dirt particle stuck as a defect, number of defects in these 18 defectives were 163 i.e. average number of defects were approximately 9 per body.

He gathered data about different dirt particle types and their frequencies among the 163 defects observed in July 2013. The data was as mentioned in table no.1

Mr. Amar Abhyankar had learnt about a concept called "Pareto Analysis" based on the 80/20 Principle, which recommends attacking the causes which are top contributors to the problem in order to solve most of the problem with less efforts. The step-by-step approach to Pareto analysis is as under:

1.Forming an explicit table listing the causes and their frequency as a percentage. Arranging the rows in the decreasing order of importance of the causes (i.e., the most important cause first)

2.Adding a cumulative percentage column to the table

3.Plotting with causes on x- and cumulative percentage on y-axis

4.Joining the above points to form a curve

5.Plot (on the same graph) a bar graph with causes on x- and percent frequency on y-axis.

Pareto Analysis is usually followed by Root Cause Analysis.

Mr. Patil was convinced that with the help of Pareto Analysis, it would become very clear to determine the highest contributors of rejection due to dirt particles and then attacking only those highest contributors would be easier, would require less efforts and would be more cost-effective as compared to attacking all the causes. However, he is now thinking how could the team implement this exercise?

Table No.1

Sr. No.	Dirt Particle Type	Frequency of defect
1 .	Primer miss out dirt	15
2	Multicolour dirt	54
3	Chips from fixture	4
4	Meltsheet dirt	7
5	Transparent lint	79
6	Spit dirt	4
	TOTAL	163

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