

## Scrap Reduction Techniques

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**Abstract** - This paper investigates causes and effects of scrap in the industry. The production system is assumed to produce some time-varying proportion of defective parts which can be repaired at some unit cost. Two kinds of investments in process improvements are considered: (i) reducing setup costs and (ii) improving process quality. We show that any investment in setup cost reduction will result in a reduction in the scrap produced, and the total amount of scrap can increase or decrease with an investment in quality improvement. Two cost drivers occur in every design, material cost and processing cost. The additional cost due to defect parts is usually seen only as one cost driver; however, it can be broken down towards the cost created by each defect type, based on the likelihood of the occurrence of those defects. By reducing those defect-related costs, a more robust design is achieved.

**Key Words:** scrap<sup>1</sup>, defective parts<sup>2</sup>, process quality<sup>3</sup>, defect related costs<sup>4</sup>, robust design<sup>5</sup>

### 1. INTRODUCTION

As a problem solving methodology or process

Improvement framework, Six Sigma makes use of a series of well-defined steps. This includes definition of the problem (D), measurement (M) of the problem, data analysis (A) to discover the root causes of the problem, improvement (I) of processes to remove the root causes of defects and controlling (C) or monitoring processes to prevent the problem. DMAIC methodology defines lines of strategy and orientation in Six Sigma projects. The DMAIC methodology is a disciplined approach and well-structured, that provides a lot of advantages, which includes the study and analysis of the problem, and the search for the solution.

The Six Sigma methodology was initially implemented in manufacturing industry and in manufacturing processes. The use of the methodology has been extended to non-manufacturing processes and services such as financial services, health, education, logistic, human resources, security, customer's relationship and innovation. For both processes, manufacturing and non-manufacturing, the Six Sigma plays a role in seeking continuous improvement and decreasing the number of defects.

#### 1.1 What is Cost Reduction?

"An amount, that has to be paid or given up in order to get something. In business, cost is usually a monetary valuation of effort, material, resources, time and utilities consumed,

risk incurred, and opportunities for gone in production and delivery of a goods or service".

#### 1.2 What is cost Reduction?

"Cost Reduction is to be understood as the achievement of real and permanent reduction in the unit cost of goods manufacture or services rendered without impairing their suitability for the use intended".

#### 2. What is TPM?

In 1971, Nippon Denso Co., Ltd. first introduced and successfully implemented TPM in Japan. They won the Japan Institute of Plant Maintenance (JIPM) PM Excellent Plant Award for their activities. This was the beginning of TPM in Japan. Since then, TPM has spread progressively throughout the world and established itself as a renowned cultural improvement programmed.

First example of TPM used in Europe to deliver world class performance was by Volvo in Ghent, Belgium, who won the PM prize for their work in the paint shop. This was quickly followed in the early 1990s by other European automotive companies trying to close the productivity and quality gap to their Japanese competitors.

Unilever, Wrigley, Tetra Pak, Heineken and Arcelor Mittal. The Japan Institute of Plant Maintenance (JIPM) approach to TPM the JIPM definition of TPM is: T = Total. Must involve all employees at all levels of the organization. P = Productive. Effective utilization of all resources. M = Maintenance. Keeping the Man-Machine-Material system in optimum condition. JIPM developed an eight pillar approach to TPM focused on achieving:

- Zero Accidents
- Zero Break-downs
- Zero Defects

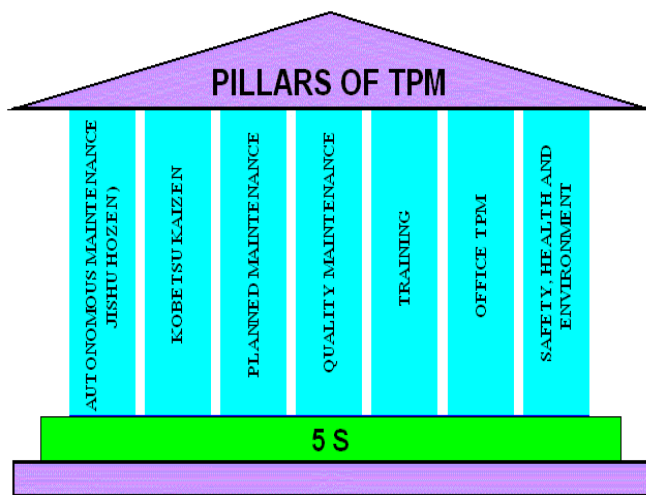


Fig -1: Pillars of TPM

### 2.1 Total Quality Management

Total quality management is a general philosophy of gradually improving the operations of a business. This is done through the application of rigorous process analysis by every involved employee and business partner. TQM is usually applied at the tactical, front-line level, where production, clerical, and low-level managers are deeply involved. There are a number of tools available to assist in a TQM effort, such as:

- Benchmarking
- Failure analysis
- Plan-do-check-act (PCDA) cycle
- Process management
- Product design control
- Statistical process control

### 2.2 Lean Manufacturing

The fundamental philosophy behind Lean Manufacturing is to provide superior quality products for more Customers at a significantly lower price and to contribute to a more prosperous society. It is important to build a Company production system based on this philosophy. Lean Manufacturing has Endeavour to rationalize production by:

- To completely eliminating waste in the production process
- To build quality into the process
- To reduce costs - productivity improvements

- To develop its own unique approach toward corporate management
- To create and develop integrated techniques that will contribute to corporate operation.

### 3. CONCLUSION

TQM attempts to have maximum customer satisfaction through providing quality products and services but uncongenial business environment, high cost of production, increasing prices of products unfair competition in market are the major constraints in using TQM. Once the business is profitable, they can develop quality products and services. Absence of breakeven point decline in demand for products, lack of trained manpower are other limiting factors for such use. We should try to have market research to satisfy our customers as well as managerial efficiency and effectiveness side. We should also develop strategic management techniques to stand in open market economy. Once the strategies are appropriate business can see well and further enhance the wide are of TQM devices towards the customer's goals achievement. Academic research on the holistic approach to TQM is in its primitive stage. So, there is a clear need for more precise measures of quality. Further studies on comparing the degree of performance on quality practices and relationship of these identified practices to quality and business performance can be taken by the academicians and practitioners.

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