

Total Quality Management (TQM) in Pulp and Paper Industry

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***ABSTRACT :** Total Quality Management refers to the managerial commitment to quality so as to include the quality aspect in every functional area of work, production, marketing, finance and HRD. It also includes behavioural science based techniques like quality circles and zero defect programmes. The management of quality is therefore an extensive area of study.*

Pulp and Paper industry in India has to undergo a radical change to go beyond product quality and produce an impact on the culture of the organisation itself. Newsprint manufacturers are required to adopt TQM philosophy since they have to compete with imported commodity. So paper industry has started realising the need to implement total quality systems. This article enables the readers to appreciate the importance of quality assessment, quality control, and quality assurance.

Perhaps, paper and pulp industries will have to document, as a first step, as to how they run their business. Then, they will have to take a step further by requiring that all members of the organisation show objective evidence of compliance to procedures. Therefore they will have to strive for getting ISO 9000 certification. Then they can pursue the path of continuous improvement - they can adopt TQM philosophy.

INTRODUCTION

The word quality is come across in different contexts. Paper makers look for good quality in pulp. The pulp mill looks for good quality in wood/ bamboo chips. But the term is many times difficult to define. The perception of the end user plays a part. However, the accepted definition of quality is fitness for use. An equally good definition is conformance to requirements. Therefore, if the paper produced has to live up to the expectations of its users, then it has to be of high quality.

Perhaps the term "quality cost" needs elabora-

tion. It is a misnomer. It is the cost to the firm resulting from the lack of quality. This cost is distributed throughout the organisation. Usually, the cost in quality control department is included when traditional methods are adopted. Cost of bad workmanship, wastages, rework etc. are often not included in quality costs. Quality costs should account for prevention, assessment, control costs and costs due to lack of control.

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"Quality is free, but it is not a gift" - effective permanent quality improvement is difficult to achieve, but it more than pays for itself, in increased productivity.

Paper quality is becoming a more significant factor in customer decisions. It is true whether the purchaser is a student, an office goer or a newspaper printer. Therefore, the engineering and management field in paper and pulp industry, that is concerned with product quality, has had and is continuing to have an almost phenomenal growth. It used to be the interest of a few technical personnel. Quality control is today the primary concern of an increasingly large number of managers, engineers and statisticians. There has now emerged a systematic body of principles, practices and technologies today indentified as total quality control to distinguish it from some of the more limited, more fragmentary work of the early beginnings of the field. This article reviews the kinds of engineering activities that must be carried out in the pulp and paper industry for adopting the Total Quality Management Philosophy.

WHAT IS TOTAL QUALITY CONTROL

It is an effective system for integrating the quality development, quality maintenance, and quality improvement efforts of the various groups in the organisation so as to enable production and service at the most economical levels for full customer satisfaction.

The word "Quality" in quality control does not have the popular meaning of "Best" in any absolute sense. It means "Best for certain customer conditions". These conditions invariably are (i) actual use and (ii) the selling price of the product. Product quality cannot be thought apart from the product cost.

The word "Control" in the phrase "Quality Control" is a management tool with four steps. These steps are--

- (a) Setting quality standards.
- (b) Appraising conformance to these standards.
- (c) Acting when these standards are exceeded.
- (d) Planning for improvement in the standards.

The modern approach to quality control is (a) the integration of these often un-coordinated activities into

an overall administrative programme for a pulp and paper mill and (b) the addition to the traditional time tested methods used for the new quality control technologies.

Even in paper industry the approach should be the "Station Control" of product quality during manufacture rather than to correct or reject poor quality after the paper has been manufactured.

Perhaps, introducing terms "Big Q" & "Little q" is appropriate here. "Big Q" is a term used to designate a broad concept of quality in which "Customers" include all who are impacted, "Product" includes goods & services, "Processes" includes business and support processes. "Little q" is the term used to designate a narrow scope of quality, limited to clients, factory goods, and factory processes. Several topics in "Big Q" concept are interesting. Here quality is viewed as a business problem. A customer is one who is impacted - external and internal. The cost of poor quality is all costs which would disappear if everything were perfect and improvement is directed at company performance. Above all the coordination is carried out by a quality council of upper managers and not by quality manager alone as in the traditional way.

COST OF QUALITY

It is also a misnomer. It is actually the cost of poor quality. It is the method to summarize the effect of all deficiencies through a single unit of measure. One way of doing it is to convert the effect of all deficiencies into money.

The terms costs of Quality or Quality costs include--

- (a) Investments required to make product saleable.
- (b) Wastes incurred due to deficiencies.

In Paper industry, the heavy discounts allowed to sell sub - standard paper can be put under the first category. The leakages of steam and heat loss due to poor insulation of pipe lines is the example of waste due to deficiency.

The total quality control activities can be optimized by looking into certain kind of costs associated with the improvement and control of product quality. Costs for attaining and maintaining a certain level of product quality are brought together

and consolidated with costs resulting from failure to obtain that particular level of quality. Such consolidated costs are known as "Operating quality costs".

For analysis and control, the operating quality costs can be distributed among four different classifications. They are--

- i. Prevention costs which include quality planning, and other costs associated with preventing defects. This is quality control engineering expense. Perhaps providing a micro-processor control for controlling CD and MD characteristics of paper in paper machines could be cited as an example.
- ii. Appraisal costs are the expenditures incurred in evaluating product quality. The expenditure incurred in equipping the laboratory will be the example.
- iii. Internal failure costs are caused by breaks, rejects and spoilage.
- iv. External failure costs are caused by the defective products reaching the customer. The result could be allowing heavy discounts for its use and in-warranty product service costs.

The present day factors affecting pulp and paper industry-particularly the newsprint segment are--

- (a) Increasingly high quality requirements on the part of customers.
- (b) Competitive environment with the imported newsprint being available at lower prices placing the indigenous newsprint mills in an unfavourable competitive position.
- (c) Necessity to upgrade inplant quality control practices and techniques to meet these demands.

These three upward pressures can be met by embarking on a Total Quality Management (TQM) programme. The ISO 9002 accreditation will be a step towards TQM philosophy.

ISO 9000 A BUILDING BLOCK TO TQM

Paper and pulp industry in India is facing an intense competition. More companies will have to look to gain ISO 9000 accreditation to retain customers.

Traditional approach to quality has focussed on the output. This is the police method of quality assurance. The quality policeman's effort are focussed

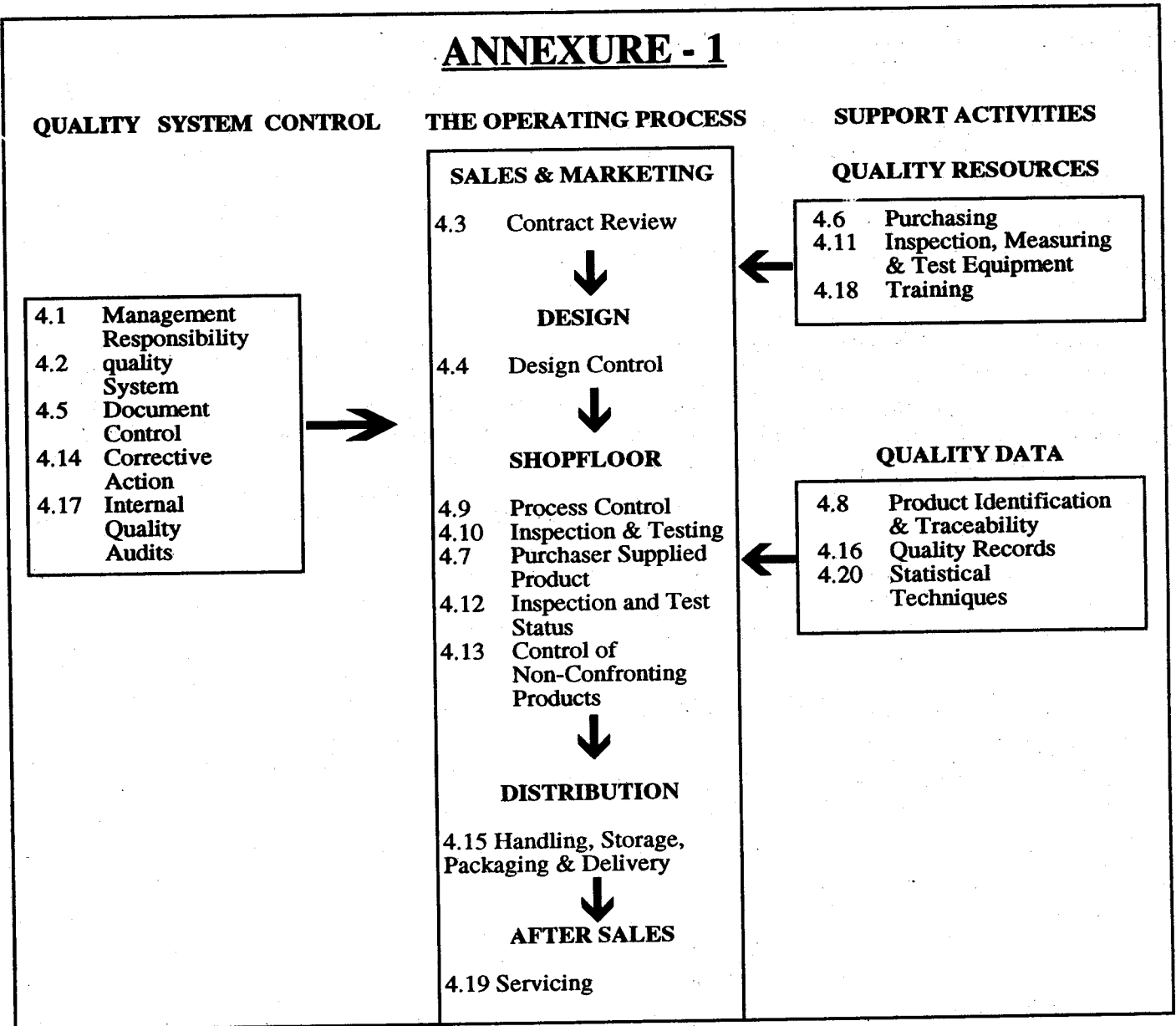
on the paper which leaves the factory. Those which meet the standards go over to customer and those which do not, are sent to the broke chest for recycling. The waste is institutionalized. Sub-standard paper is the quality department's output and it is possible that their employment depends on a suitable level of waste. The feed-back system will usually be absent and the plants will not have an opportunity to learn from its mistakes. Effective quality assurance through post production testing is not possible.

Unlike the police approach to quality assurance, the focus of a quality system is the production process itself and not the output. ISO 9000 is a standard for such a quality system. It is not concerned with a particular product. It is applicable to any situation where a quality system can be applied. Memory is seldom enough. Important procedures need to be documented and available to all who need them. When procedures change all the manuals in use should show the revision. Precise documentation and control of that documentation is an essential aspect of a quality system and a requirement of ISO 9000.

ISO 9000 defines the standard for and requirements of a quality system. It has 20 elements. The paper industry may adopt ISO 9000 which has 18 elements deleting the Design control and Servicing elements from ISO 9001 stipulation. These elements could be labelled in three major Blocks as shown in Annexure - 1. The central block is the core of the requirements. The clauses in the left and right blocks have a supporting role.

Process control of the central block will be of greater interest to paper industry personnel. Here the work process itself is carried out in a controlled way. This is documenting how the process is to be carried out from chipper plant to stack room. Written instructions for those involved and monitoring what happens during the process. For example, is the chip size appropriate in the mechanical pulp plant to get refined to required freeness with consumption of just the required power? Is the output pulp acceptable in stack preparation plant? Does it require further refining before being fed to the machine? Special mention is made of the requirements of "Special processes", by which is meant that those whose output cannot be adequately tested after manufacture and prior to customer delivery. The paper industry may not have any activity in this category. The clause 4.9 stipulation in ISO 9002 is worth mentioning here. "The company

ANNEXURE - 1



shall implement formal procedures to ensure that all processes are carried out in a controlled manner with adequate documentation and monitoring to ensure that control is exercised at all times".

Three requirements of ISO 9000, i.e. clause 4.6, 4.11 and 4.18 ensure that resources are applied & written procedures are appropriate to quality needs. Purchasing aspect covers setting up procedures to ensure that supplies once brought into the production process, meets requirements. It involves selection and assessment of suppliers, documenting the supply process so that suppliers know precisely what we need & to meet our requirements. It also involves verifying

that, what is supplied is what is required. A large paper mill arranges procurement of many items for operation. On implementing a system, it does not become necessary to minutely scrutinize suppliers we have dealt with perfectly happily for years. The very fact that we have dealt with them should qualify their inclusion in the approved list. To satisfy ourselves that thier supplies are to our requirement, we may decide that we need assurance of thier quality system and ISO 9000 may be most practical means for them to give such assurance.

Clause 4.11 for inspection, measuring and test equipment is the requirement of the standard to meet

the need for carrying out inspection and testing within the production process. It covers the procedures for selecting appropriate equipment for the test, calibrating and checking its accuracy and ensuring that it is kept up to an appropriate standard.

The third class of quality resource included is the human resource and the training aspect. Paper mills are not highly automated plants. The workmen will have to be trained to meet the needs of the job. In some plants of the mill, quality output is almost wholly dependent on the skills of those involved. Quality output is therefore dependent on staff being trained to meet the needs of the job. It not only includes persons directly engaged in quality control work but also those others in the company in other functions whose training affects product quality. Training of employees not directly engaged in quality control in paper industry is focussed at the following--

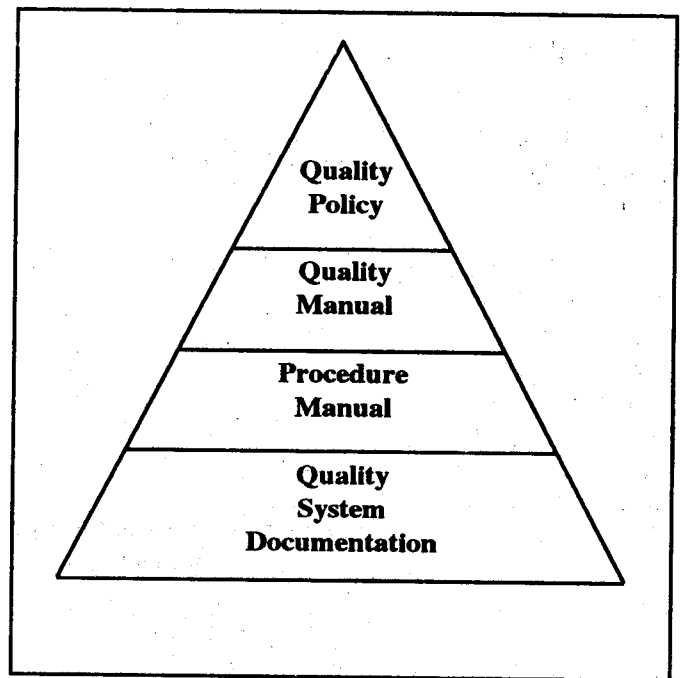
Product know-how, quality control function indoctrination, shop-operation indoctrination in quality control methods, procedures and techniques; management quality control techniques for product design engineers, manufacturing engineers, & buyers and quality mindedness programs, trainee education, vendors and customers. For those connected with control of quality work includes the following basic quality control principles, rotational programmes and personnel performance measurements. Audio-visual cassettes are available and are very useful to educate the employees.

DEVELOPING PROCEDURES

Quality System runs on procedures and developing them accounts for a large part of ISO 9000 project. The more the employees are involved, the fewer the implementation problems.

Procedures show how an organisation's quality policy will be implemented in specific areas and activities. The procedure manual is therefore a practical, how to do it guide for staff. The quality documented pyramid shows the concept.

The four level documentation is the physical embodiment of a quality system and is appropriate for a large paper and pulp industry. The pyramid depicts the concept and the procedure manual is the critical one. The bottom layer of documentation is the records kept of the operations of the system.



Once documented, the system has to be successfully implemented and operated for a period before an external assessment can be considered. An essential part of implementation is internal auditing. When the system is operated for a period before an external assessment, there is simply no possibility that a quality system will work unless its implementation is checked and monitored. Only, through actively seeking out deficiencies can problems be identified and solutions found.

At its simplest, auditing is establishing whether or not the requirements of the formal quality system in every particular area is being followed. auditing focuses on objective evidence of compliance with the quality system. It focuses on objective evidence of compliance with quality system. The auditors are from the same company and a purchase man can be drafted for auditing a pulp plant and vice-versa. The auditors need three characteristics - independence, tact and attention to details. The auditor does not need technical expertise in the area subject to audit. He should only get down to detail. However, the internal auditors must be trained by consultants of internal faculty. The training should be started soon after the new system is put to action. A judgement as to whether the system is working reasonably well or not is possible only through audit work. Every part of the quality system should be audited. Auditors should make note of all their findings and on completion should prepare a written report.

ASSESSMENT

The culmination of a ISO 9000 project is successful assessment. The choice of assessor, bedding - in the system and what assessment involves are worth knowing.

The accredited assessors are rigorously checked and regularly monitored by ISO. The assessment itself falls into two stages, an evaluation of the documented quality system to establish whether it meets the requirements of the standard and an onsite assessment to establish that the system is followed. It does not mean that you are licensed for ever without re-testing. Regular surveillance visits ensures that the company keeps the quality system working effectively. Therefore, the relationship with the assessment body is continuous and long term.

A bedding in period is certainly needed between the date of implementing the quality system and assessment. It is unrealistic to expect the quality system to work perfectly from the first day. Despite all training, the staff will find initial difficulties in following the system. Therefore, a bedding-in period of 3 months or more is thought appropriate. It is not just dead waiting time. It is the period when the system is really made to work and starts to produce some internal benefits. It should last till the company is confident that the quality system is working well. The quality triad - auditing to monitor compliance, corrective action to investigate problems and recommend solutions and management review to decide on and implement change as important. The start of this cycle is the internal audit process.

The assessment has to take place in two stages. The first is whether the documented quality system meets the requirements of the standard. The later question is as to whether the system is actually followed. The first stage is referred to as "desk investigation" and the second is the on site assessment. The assessor will first seek the paper mill to provide copies of quality and procedure manuals. The outcome could be that either the documented quality system is budgeted to meet the requirements of the standard, or it is not.

The purpose of the on - site assessment is to establish whether the company is following its own quality system. The procedure is exactly the same as an internal audit. The staff at all levels should be told to answer assessor's questions as best they can,

succinctly and no more till the next one is asked. Major deficiencies require re-assessment. The finding will be passed on to the authorities formally. The company is expected to take effective steps to put matters right before the next visit of assessors - whether a re-assessment or surveillance. After obtaining accreditation, the surveillance visits will be repeated at the intervals agreed with the assessors. Neglect to adhere to quality system will result in ISO 9000 registration being withdrawn. The negative benefits of this withdrawal will exceed any initial benefits.

ISO 9000 accreditation as a step towards TQM can offer enormous opportunities to pulp and paper industries in India. It can be a cross to bear. But paper mills will have to live up to their commitment to quality and promises are a start in any business dealings. But, they soon become very thin if performance does not matchup. The customers must experience the enhanced quality as well. Marketing activity can then communicate what has actually been achieved. Quality also has to extend to the marketing activity itself.

A WORD ABOUT QUALITY CIRCLE

This concept may not be strange to paper industry. Quality Circle concept has a history. This war ravaged Japan in the forties was limping with economy. Their products were of poor quality. American consultant, Prof. Jurau was brought to Japan. The Japan Government earnestly, gave its support as they realised that quality of their products have to meet that of the Western world if they are to survive. They realised that it is the shop floor level which is the key to improve quality. The culture and loyalty of the people were congenial to the new idea and thus was born the quality circles. The achievement of quality circles has spread to other countries.

It is just the voluntary groups of likeminded employees of the same discipline. Sometimes inter related disciplines may also combine. The group can contain any number of employees. But a small number of 6 to 8 members can well generate enough ideas in a paper industry.

The group has to select the leader. The management is to provide a felicitator. There will be a co-ordinator also from the side of the management who monitors the work of the quality circles. A departmental committee should over view the progress

of the work of the group wherever required. The steering committee to comprise of top executives who give necessary decisions for implementation of the recommended solution of quality circles operating throughout the organisation.

In the nutshell, the quality circles which may not be a familiar setup for all paper industries could be useful to the industry in the following ways--

- (a) to improve quality and productivity.
- (b) to reduce wastages.
- (c) to improve employee motivation.
- (d) to inspire more effective team work.
- (e) to develop a healthy superior - subordinate relationship.
- (f) to improve communications within the organisation.
- (g) to promote quality, safety, cost and work consciousness and
- (h) to develop a complete coherent problem solving methodology within the organisation.

The basic elements which constitute the structure of quality circles are as follows--

- (a) Top Management.
- (b) Steering Committee.
- (c) Co-ordinator.
- (d) Facilitators.
- (e) Leaders.

The paper industries interested in introducing quality circles in its organisation shall in the first instance commit itself to concept of Company Wide Quality Control (CWQC) or Total Quality Control (TQC) involving development of management attitudes

and practices oriented towards defect free operation in the organisation. Perhaps a sequence of steps need be followed--

- (a) Detailed discussions among the top and middle management personnel.
- (b) Training programmes for making aware of the concepts.
- (c) Once the response is positive, form a steering committee.
- (d) Selection and training of co-ordinator.
- (e) Launching of pilot circles in the potential departments.
- (f) After the pilot circles work successfully extend the concept to other departments.

A FINAL WORD ABOUT TQM

It should be realised by Paper mills that quality improvement is a cycle. It is never ending. It is related to the product and services. The need is therefore for implementing a quality system in the industry - ISO 9002 accreditation will serve as a first step towards TQM. TQM is a means of achieving a strong competitive position. It is to be seen on a wider socio economic prospective. It is simple and based on fundamental principle of concern for others, a concern for planning and a motivation to succeed, achieve and do better. The future holds many fears and opportunities for paper industry. The industry should have the foresight and opportunity to mould our future the way we think fit. The industry should take what it has and find ways to think better. We should encourage and motivate others to do the same. A passion for quality is not enough. Rigorous systems must complement the enthusiasm for TQM.

ANNEXURE - 2

The elements in the series and the extent of coverage in each standard are depicted below:

