

Quality control in pulp & paper mills

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SUMMARY

The authors in this article have highlighted the significance and importance of quality control department. The main points discussed are the aims of quality control and its essentiality, Job requirement, quality at various stages of paper manufacture and quality control vis a vis Research. The authors highlight the job of quality control department and say that the job starts right from raw material evaluation to the end product evaluation by conducting various tests at different stages. This critical evaluation can be an asset for improving the quality of paper at an economical level.

With the advancement of Science and Technology the industries are expanding at a greater pace to bridge the gap between demand and supply. The greater is the demand of the products, the greater will be the impact on the renovation of the technology to fulfil the requirements. Paper industry is one of the industries which is expanding rapidly with our limited raw material resources to meet the ever growing demand of pulp, paper and paper products. At present the per capita consumption of paper in India is 2.0 kg whereas in the advanced countries like America, Japan and United Kingdom the per capita consumption is 268 kg, 143 kg. and 115 kg respectively¹. The per capita consumption of paper and paper products with the advancement and population growth in India will be around 4.5 kg by the end of this century. To achieve these targets with limited resources it is essential to control the quality of inputs and lay the specification and quality of paper to meet the end product use requirement.

AIM OF QUALITY CONTROL IN PAPER INDUSTRY

Quality control is an effective system for co-ordinating the quality maintenance and quality improvement efforts of various groups in an organization so as to enable production at the most economical level. The quality control has the function² (i) Improvement of product quality and quantity (ii) Reduction in operation costs and losses (iii) Reduction in production line bottle-necks (iv) Less spoilage and re-work (v) Elimination of unnecessary variable adjustments in the machine (vi) Over-all Saving in time and money.

WHY QUALITY CONTROL PROGRAMME IS ESSENTIAL?

The mission of quality control department is quality according to specification. Its task is to assure the manufactured products meet customer's quality requirements. This necessitates that standard operating procedures are followed by the production department to achieve the required specification at an economical level of production.

It is important to evaluate the products at different stages of manufacture with this end in view, quality control department find themselves day in and day out obtaining the same samples, doing the same tests with the same equipment at the same frequencies and issuing more or less the same reports³.

So periodic evaluation of all routine testing and inspection needs to be an on going part of any quality control programme,⁴ it is to be totally effective both in terms of results and costs. Such evaluation will point out areas of excessive testing and inspection, changes needed in laboratory and process control procedures and improvement in communications system with the production line and the management. Bringing out such changes is not an easy task. However, failure to do so can result in the loss of competitive position to more aggressive mills.

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JOB OF QUALITY CONTROL PERSONNEL

Quality control department is considered as the best critic of the mill and hence the job quality control persons is an unpopular task⁵. The integrity of quality control persons is needed for enforcing quality standards. His function is to monitor the qualities of production and to compare with the standard requirements. For achieving this, optimum number of quality control checks should be carried out not only in the testing laboratory but also in the plant itself.⁶ After these checks he should be able to communicate both with the management and the production line staff amicably to meet the needs of quality enforcement.

QUALITY CONTROL NEEDED AT VARIOUS STAGES :

The job of quality control personnel starts right from the raw material supply to the end product of the finishing house. Non fibrous raw materials mainly chlorine, Sodium hydroxide Calcium hypochlorite etc for pulp mill (should be tested every four hours); lime, Sodium Sulphate, Caustic lye etc for recovery section (should be tested as early as possible after the receipt of the samples); Rosin Emulsion, Clay should be tested twice in a shift whereas starch, dyes, Sodium Silicate, alum etc should be tested when the new lot is received. The fibrous raw materials viz Bamboo, Hardwoods etc need careful attention (i) Quality of Bamboo, Hardwoods supplied which includes segregation of rotten, hollow, crooked and bark samples of woods (ii) Hard woods which are not suitable for chipping and having high alkali and bleach demand should be segregated in consultation with the raw material department. (iii) Proper stacking of Bamboo and hard woods should be carried out and be used in rotation to avoid the materials affected by bores and insects appreciably. Ideal samples of the raw materials should be collected daily and be evaluated for the pulping characteristics. Uniform chipping and chips quality is essential for smooth running of production and minimum down times required for maintenance. Bulk density, moisture content and chips classification of the composite sample should be carried out once in a day. Abnormal results should be discussed with the concerned department.

Due to the short supply of Bamboo most of the Indian Paper Mills use Mixed hard woods along with Bamboo. The percentage of heterogeneous raw material like Bamboo and mixed hard woods should remain same as far as practicable in the mixed cooking. White liquor analysis should be

carried out before charging the digester. Proper loading and uniform cooking cycle should be maintained for getting a uniform pulp quality. R.A.A., T.T.A. and °Tw of the black liquor should be tested once in a shift whereas pulp samples of each digestion should be tested for Kappa No. Chemical loss from B.S.W. should be tested once in a shift. The mat and wet consistency at B.S.W. should be checked once in a shift. Strict control should be kept on dilution factor. Rejects like Johnson screen and Dunbar knotter should be checked once in a day. The pH, of decker pulp should be determined every two hours whereas its viscosity should be determined once in a day.

Careful examination is also needed in the bleaching stages namely chlorination, alkali extraction and the hypochlorite. Temperature, pH, and residual chlorine in the chlorination and hypochlorite stages should be checked at an interval of every two hours. Brightness of the pulp after hypochlorite stage should also be checked every two hours.

In the Soda Recovery Section, lime quality should be examined as per the truck or wagon load received. Composite samples of lime should be tested from each wagon or truck as early as possible. The settling rate of white liquor should also be checked daily. Green liquor and white liquor analysis should be carried out every four hours. Hypochlorite supplied to pulp mill should also be analysed every four hours. Filter cake and grit samples should be completely analysed once in a day to determine alkali losses with them. Alkali losses should be strictly controlled from the drains and a composite sample should be tested every day.

Beating or refining load applied at the refiners or beaters should be checked at regular intervals. pH, freeness consistency, brightness should be tested every two hours before and after addition of stock chemicals viz Talcum powder, Starch, Alum, Rosin dyes etc to the pulp. Proper record should be maintained for the pulp run on the paper machine viz tray water consistency, pH, Suspended solids, moisture (%) at different presses and the steam consumption at the dryers. The information collected need critical examination for better performance of the paper machine. Physical and chemical tests should be carried out for every finished reel namely Basis wt, physical strength properties, ash (%), opacity, sizing, Cobb Value, porosity, smoothness etc. Reels at the winder should be checked for specific size, Basis wt, Caliper and the defects like pinholes, protruding, crease, wedge mark, telescopic, water marks etc. Every reel should be marked lot No/g.s.m. and the date of manufacture. If the defects in the reels are

minor and the sales department agrees they should be sent to Cutter Section for sheet order supply. In case the defects can be nullified by cutting smaller size of reels they should not be repulped. Major defective reels should be repulped. Sheet and reel size should be checked in the cutter Section. Paper wastages at the Paper machine, winder, cutter and finishing house should be checked by quality control personnel.

QUALITY CONTROL IN RELATION TO RESEARCH AND PROCESS DEVELOPMENT ACTIVITIES

Quality control has the function to help in economizing the production and to maintain the quality of paper. Number of trouble shooting problems crops up in the daily working in the plant itself which need prompt attention. Some problems can be handled and solved with proper co-ordination between quality control and the research wing like the evolution of the test methods and their standardisation besides laying down the guide lines for the process for developing and improving the product. The research projects are no doubt time bound programmes but if proper guidelines are chosen. Research and Development can help in solving some of the problems like improvement in Pulp and paper quality, reduction in lossess at various stages. utilization of waste by-products, maximum recycling of waste water and to develop new technology which may be adaptable in Indian Paper Mills.

CONCLUSION :

It can be concluded that the quality control personnel and the quality control department can be of great asset to a pulp and paper mill if proper co-ordination, co-operation and encouragement is given from the departments and management.

Better process and quality control programme at various stages of the process of manufacture can help to produce paper economically and may reduce the financial burden on the Pulp and Paper Industry in the present paper shortages.

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