A Practical Approach to Quality Control in Paper Mills

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SUMMARY

Quality Control can result in better quality of products at optimum cost. This increases the depend in a competitive market. The quality control in paper mills is different from other industries where 100% sampling is possible depending on performance as in case of automobile and machine tool industry. In paper industry 100% sampling can not be done but statistical sampling with rigid control on methods of testing and frequency of sampling can make Quality Control effective.

Practical approach to Successful Quality Control is dependent on consciousness and vigorous support of management.

INTRODUCTION

Eli Whitney was probably the first man to transfer the quality emphasis from an individual to a group of experts possessing sound knowledge of the consumer's need. This step did result in better quality product's at optimum cost. Later on Whitney's concept was reinforced by Ford and Taylor by practicising the concept in the field of production, thereby revolutionising the concept of Quality Control.

In the beginning of the 19th Century, due to impact of fast industrialisation and the growth in demand for goods of sophistication, the emphasis on quality shifted from man to machine but with ever increasing pressure of demand, the concept of quality lost sight of. As change is a certainty in the world, due to emphasis on quality products and a competitive market, the awareness among the consumers started gradually increasing with regard to quality, precision, performance and cost. The movement picked up momentum during the last three decades and today quality control has gained a firm foothold in almost all spheres of production. The industries have realised its importance and are conscious of its manifold advantages.

QUALITY CONTROL IN PAPER MILLS

Quality Control in Paper Mills is definitely unique in its own way. It cannot be compared with industries like automobile, machine tools and electronics etc., because of the following restraints :

1. In the industries mentioned above, the output is subjected to 100 % sampling and inspection and the product quality is arrived at accordingly. But in case of paper, it is impossible to go in for 100% sampling and inspection because then the whole lot will turn into test samples only. Hence, the sampling has to be restricted to minimum and the product quality is determined based on this inspection only. This way of sampling and inspection can give sufficiently good and accurate idea of the lot in case of products like chemicals etc. but similar is not the case with paper for obvious reasons.

2. The variables affecting the paper quality are so many and delicate in nature that in spite of best efforts to keep the variables constant and maximum inspection, the product may behave in an unwarranted manner.

3. The testing methods in, vogue, are not able to predict the quality in an accurate way. For many of the characteristics, even today there is no quantitative assessment and for some of them still we have to depend on individual judgement which may vary from man to man e.g. shade, formation, rattle etc.

4. There are no definite standards for paper for a particular end use. This varies from consumer to consumer and process to process. There are number of variables at the consumer's end. A particular quality may satisfy one consumer but not the other.

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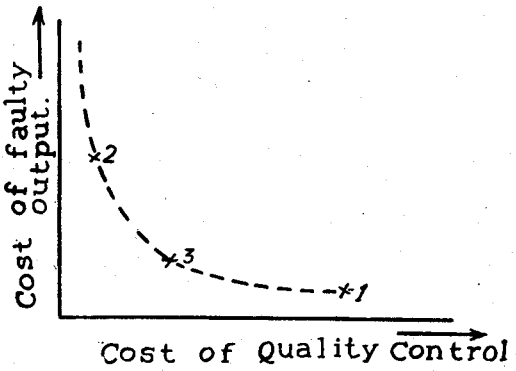
BASIC CONSIDERATION FOR QUALITY MAINTENANCE

The size of a 'Quality Control' unit in the Mill, its functions and responsibilities and the quality levels to be maintained are the subjects which purely depend upon the consciousness of the management towards 'Quality' as this is an important tool of the management. In addition, this is dictated by the availability of the products in the market and also the consciousness of the consumers with regard to quality and cost.

Quality Control activities in a Paper Mill, similar to other industries, is highly affected by cost consideration. Cost of faulty output Vs. cost of Quality Control curve shown below encompasses the two extreme and the compromising points :—



Point-1. Stringent Quality Control measures are applied at every stage of the process to regulate the product strictly as per requirement of the consumer. This will result in a higher service test but rejection by the consumer will be minimum.

Point-2. If no Quality Control measures are applied and fault detection is left to the observations of the Operators in the plant and the complaints of the consumer, the quality control cost will be minimum but rejections by the consumer high.

Point-3. Strikes the balance where the cost of Quality Control is effectively balanced by the cost of faulty output.

PRACTICAL APPROACH

Quality control in an integrated Paper Mill comprises of 'on-line' and 'off-line' Quality Control. The main pockets of 'on-line' Quality Control are :—

1. Raw materials—fibrous and non-fibrous
2. Pulp
3. Paper

and those of 'off-line' are :—

1. Purchase
2. Sales including after sales service
3. Related Research for quality development and diversification.

A schematic representation has been suggested (Dig – 2) for full scale quality control based on our own experience at JK Paper Mills, where the 'Quality Control' works through its three main wings namely:—

1. Control of process
2. Control of quality of intermediate and final products
3. Process studies-trouble shooting

Naturally, each of the above wings work through the tools like laying of standards, sampling, testing, inspection, interpretation of results, decision and corrective action, all in serial order.

It is to be remembered that implementation of full-scale quality control and its success will depend upon the following:—

(a) Management's consciousness and their constant and vigorous support.

(b) Mutual cooperation amongst the personnel of process as well as quality control department considering the activities to be a joint responsibility.

(c) Independent status of the Quality Control Department.

(d) The personnel of the quality control department must be conscious of the fact that the objective of their activities is to help the process personnel as well as the management to get the product of quality satisfying the needs of the consumer at the optimum cost. They should never be allowed to feel that their function is something like police or Inspector.

A 'Process & Quality Control Unit', in general, has the following responsibilities to shoulder:—

(a) To maintain a consistent quality at the minimum input.

(b) To minimise cost by process studies.

(c) To intensify research for improvement in the existing quality.

(d) To appreciate the problems of suppliers and consumers and to deliver technical expertise to them in order to minimise the same.

(e) To study the market complaints and suggest suitable remedial measures to the production department.

(f) To feel necessary informations and specifications to the Purchase Department enabling them to procure the right quality at right cost.

(g) To deeply involve in the 'costing' to have an insight into the various cost factors involved including cost of rejections.

(h) To keep abreast of the market trend.

(i) To involve actively in process development and product diversification etc.

(j) To keep abreast themselves with detailed and latest technology.

(k) To make the impact of their working felt and create a goodwill for them amongst all concerned.

Various process and quality standards are formulated by consensus of all concerned like production, sales and control personnel taking into account the consumer's requirement, process capability and tolerance limits based on past working. It has necessarily to be mentioned that no standards are static but they have to be revised from time to time in view of experience gained. It is also to be remembered that a very stringent policy beyond capability of production is bound to create frustration among process personnel, hamper the product quality and increase the cost, the standards should provide for the necessary tolerance.

While taking a quality decision, it is of utmost importance to know the cost of quality. During the run of a particular quality, proper records of rejections and process conditions are to be maintained in terms of cost and quick remedial measures, whenever possible, suggested by process control and R & D group to keep the cost at minimum.

Product diversification is dependent on process capability, Company's business policy and the market demand which factors are to be amply considered before a final decision is taken.

ROLE OF STATISTICS

Statistics, a vital organ of the department, is undoubtedly the most efficient tool for implementation of the 'Quality Control Programme' in an Industry. Specifications and limits etc. are to be evolved by the application of the statistics. Briefly it can be said that every step in quality control is statistically designed. However, it should be bourne in mind that statistical analysis may turn out to be devilish unless it is handled by well experienced and trained group of personnel. In the recent years, the 'statistical quality control' has gained great significance and while planning the effective functioning of the activities, its role should not be lost sight of.

COMMUNICATION SYSTEM

Communication plays an important and vital role. In a continuous process like paper making changes are bound to take place now and then. For effective and successful working of the department it is essential to evolve an effective and timely communication system to bring to the notice of all concerned abnormalities so that timely remedial measures are adopted. Some of such tools to be considered are:-

1. Process control charts and graphs and abnormality charts and graphs to be displayed in concerned process sections.
2. Daily, weekly, monthly and annual reports regarding quality, cost and rejections etc.
3. Telephone.
4. Verbal communications.
5. Meetings/group discussions.

The abnormality charts should provide for the remarks of concerned process personnel in order to make the communication system two way traffic.

MANAGEMENT MODELS

Having a very essential role to play, it is utmost essential that the department has got an independent status and is considered at par with the other production departments. No fixed model can be suggested as it is governed by the conditions of individual mills but out of the two general models given in Dig. 1, based on our experience we would opt for the second model.

Organisational set up according to model (1) shrinks the functions of quality control as expertise of this section is never fully exploited and its role is very much limited. On the other hand, in model (2) the functoning is much more effective with a wide scope for their role to play as the three main wing of activities are very much inter-related and the successful working on one depends greatly on the other two. In this model better management and coordtnation will take place. The only snag is that the departmental head is over-loaded with too many of day-to-day routine activities. To be best out of him, it is advisable to have few middle level Incharges.

TRAINING

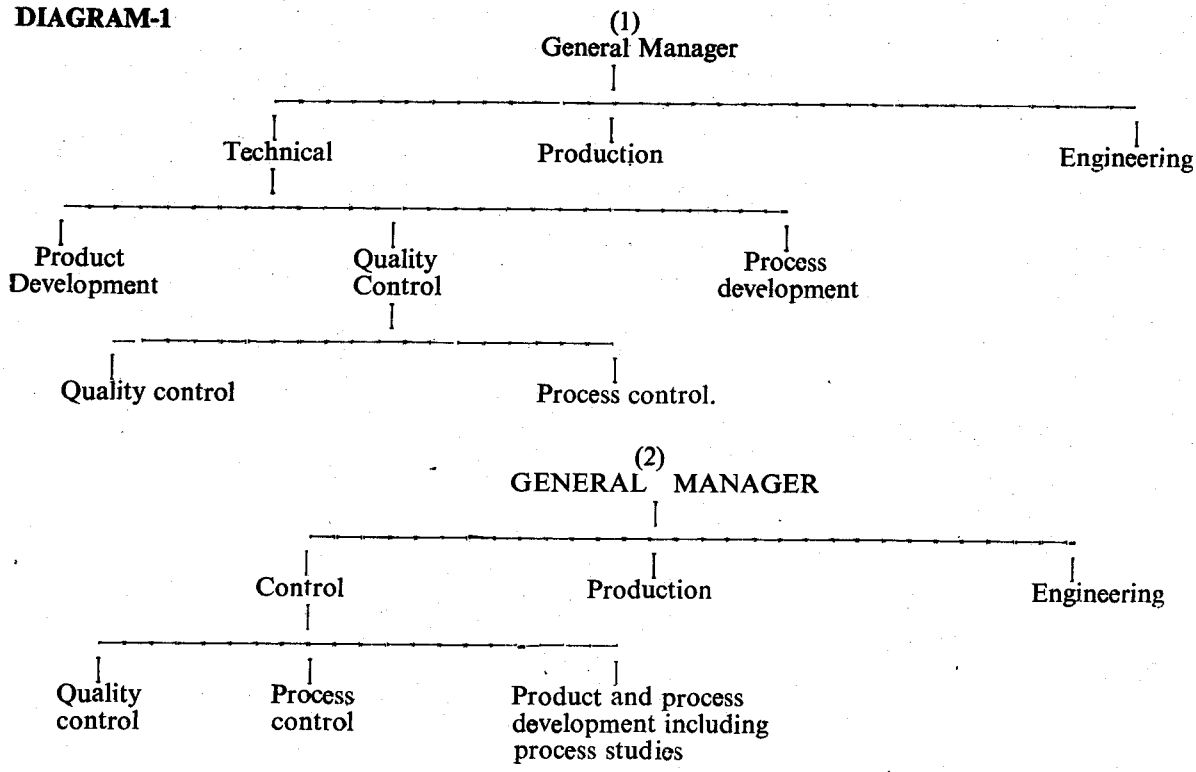
One of the most important aspects of launching a 'Quality Control Programme' in a paper mill is to impart proper training to the personnel concerned. Selection has to be very judicious. They should be broadminded, tactful, soft spoken and man of proven integrity and ability. The relationship between production and quality control personnel some times runs into rough weather and 'humour' has been found to be the best catalyst to ease up such a situation. The Quality Control head besides having statistical knowledge, should also have the knowledge of engineering, economics and human relations and should possess the qualities of a good technocrat and leader.

The fresh entrants after intensive training in various sections of the Mill, have necessarily to be imparted training as per the proposed scheme given in Table-I.

The following tools of training could be used to the extent possible for getting better results.

1. Lectures
2. Demonstrations
3. Participation in discussions
4. Seminars

DIAGRAM-1



TABLE—I

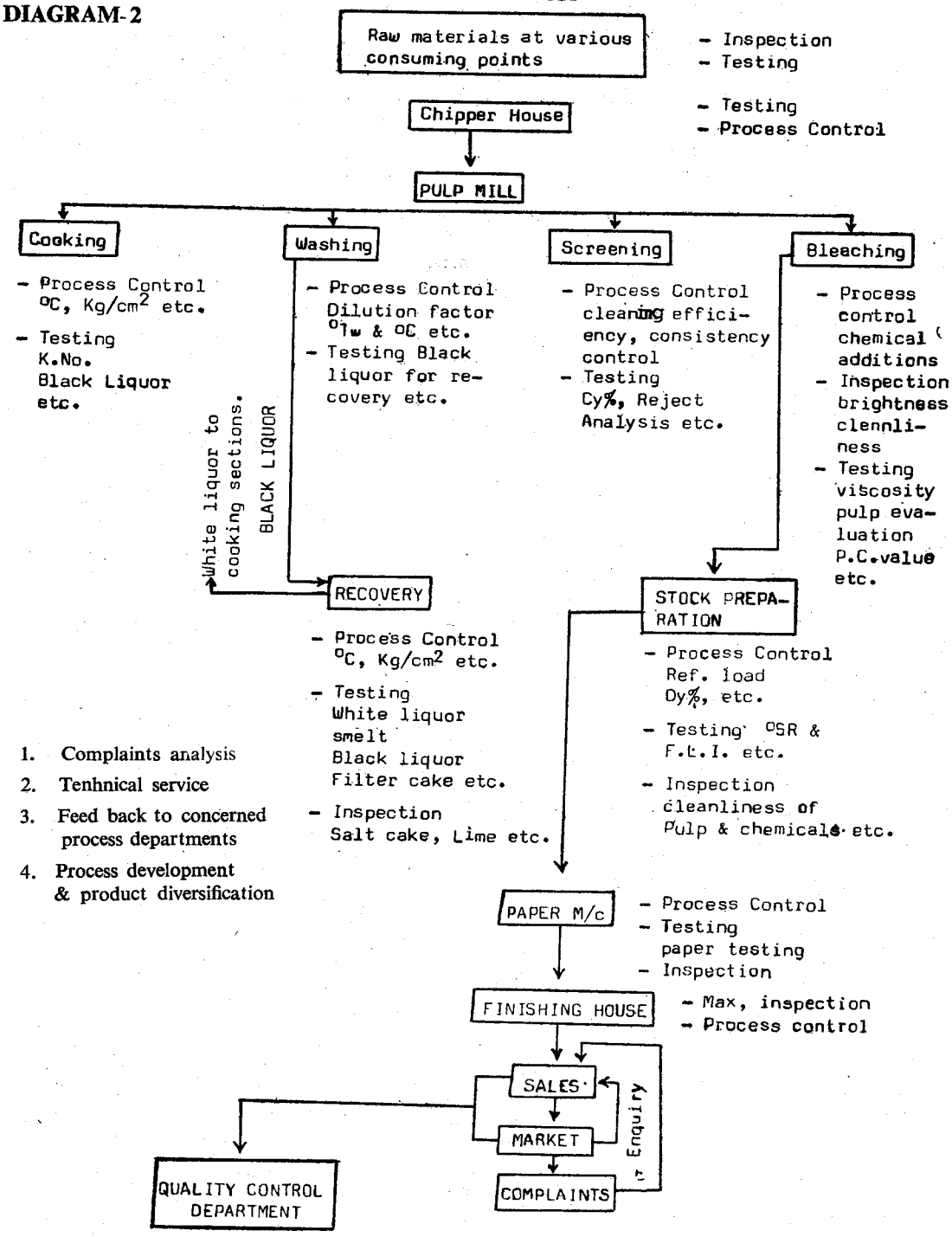
Sl. No.	Particulars	Contents	Duration
1.	Introduction	Origin, development, aim, organisation set up and functioning of the department.	=1 week
2.	Testing	Chemical & physical tests.	=3 weeks
3.	Statistics	Statistical methods of quality control	=1 week
4.	Fundamentals of Engineering.	Theory and practical demonstration of process control system.	=2 weeks
5.	Familiarisation with quality control and process control techniques practised in the Mills.	In all process sections	=3 weeks
6.	On job training	—	=2 weeks
7.	Economics, human relations and elementary costing etc.	—	=2 weeks
		Total:	14 weeks

The trainees should have periodical assessment in a systematic manner to follow constantly their progress.

To conclude, it can be said that Quality Control is one of the few effective tools of scientific management. In India, especially in Paper Industry, this method of management has still to gain considerable importance and each days the consciousness in Indian Industry including ours in growing up. The authors can happily say that at their Mills they have a moderately well-equipped and effective Quality Control Programme. Needless to say that the programme does give many tangible savings besides intangible one thus, offsetting the additional cost involved considerably. A systematic Quality Control programme actively supported by management and run by a capable group can lead to a consistent and uniform quality, meeting the requirements of the consumer, better productivity at optimum cost and goodwill among all concerned especially the consumers - this all lead to overall economy which is the demand of the day especially for a developing country like ours.

DIAGRAM-2

SCHEMATIC REPRESENTATION OF PROCESS & QUALITY CONTROL IN A PAPER MILL



NB :— Water Services - Treatment & Clarification, Boiler House, Effluent Treatment & Disposal are not included above.

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