

Stock Preparation and its Advancement

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It is a matter of common knowledge in the art of paper making that without stuff treatment to impart specific characters, the utmost skill in handling it on the paper machine may be unavailing.

Now this subject being practically inexhaustible a mere attempt to discuss how much our technology has advanced in this domain and how much time and money have been expended on research and developments, bringing in complete renaissance in the art of paper making is of great help to the modern world for making paper per final consumer unit at much less expense.

Before coming to the subject it is better to review the basic concepts of stock preparation, original methods adapted therein and with what ideas, age has been eager to disregard the old school of thoughts in this respect.

Stock treatment mainly comprises of the following achievement by mechanical means :—

- (a) Pulping or slushing of the pulp (Desintegration or Deflaking).
- (b) Hydration or fibrillation of the stock.
- (c) Cutting or control of fibre length.

Those above is accomplished by the older methods still prevalent, with the help of an equipment called Beater by varying the beating time, pressure of the beater roll against the bedplate, type of roll tackle and consistency.

To have proper control of above mentioned functions in beaters much is there to depend on human factors of feeling than to have any control methods based on scientific ideas which is an absurdity. Moreover, the high rate of power consumed in moving the heavy roll for whipping action on the stuff for fibrillation, in over coming the frictional loss of the stuff in cutting and moving the stuff around the beater tub has become too much prohibitive in these days of competition. Besides these, poor mixing lodgement of stuff,

uneven treatment of stuff, necessity for large floor space required specially to handle paper machines of faster speed like 1,000—2,000 f. p. m. have also been considered to enter into developments.

To go more deep in criticizing the beaters, it has been observed to have difficulty in ready control of proportionate blending of stock and maintainance of the exact time lag of mixing chemical additive, resulting in loss of chemicals and higher cost of production.

But inspite of those difficulties, so far we have not been able to produce finer qualities of paper without beaters, as it has got the advantage of beating stock upto the maximum slowness ; and it is more advantageous in running small orders on paper machines—the system being on a batch basis—though to overcome these, age is moving faster to have further developments. Now those difficulties have led us to form a new era of the stock preparation which we call modern stock preparation.

In this system, the pulping or slushing of the pulp is accomplished in the Hydro-pulper which has simply taken the place of breaker beater for slushing or disintegration. Cutting action, fibrillation or hydration or brushing of the fibre for desired quality of the paper is obtained by the help of refiner which running in series have remarkable effect on the fibre characteristics.

The specific fibre length and the freeness of the stock ready for running it on the paper machine is only dependent on the construction of refiners, type of stock being used, consistency, intensity of the plug pressure against the shell, number of passes the stock is cycled and can be readily controlled by methods based on scientific ideas, e.g. stock consistency can be controlled with the help of consistency regulators, the plug pressure can be controlled with the help of power factor of the running motor, and the number of passes through the refiners with the help of outlet valve automatically controlled by the level controlling arrangements in the refined stock chest. Now this type of stock preparation can be divided into two types

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namely, batch and continuous types, and a compromise between the two has been made to suit the mill conditions,. In the batch system extremely close control of the various factors of strength developments can be obtained and mill producing different special varieties of paper off and on, give enough scope to the operator to give exactly the same stock treatment as and when he had prepared it previously. Another advantage of this is flexibility of permitting colours and chemicals.

But these questions do not arise for a mill producing a limited number of grades of paper ; and for a mill established for some particular grades of paper, continuous system will be best suited, as such system enables the operator to control closely on a continuous basis. Once the whole system is properly controlled further adjustment are not at all necessary except that continuous running of the whole system is to be watched.

In the continuous methods of stock preparation, much automatization have been reached with the advent of the developments of instrumentation and the best results of adding chemicals, loading materials, dyes and blending of broke can be controlled with the help flow-control valves and magnetic flow meters included in the ratio control system, which can easily be controlled from the panel board pneumatically.

While discussing the subject of stock preparation system, it will not be out of place to mention that most of the mills face the problems of defibring the knots formed during agitation, etc., in the stock chests, and specially during the preparation of broke for stock blending it is of utmost importance not to change the fibre characters than to break the fibre bundles for which a special type of deflaking arrangement is required for which deflaker have been developed which serves the purpose of deflaking only without increasing the stock wetness.

In the system of modern stock preparation the operational side for its efficient running does not

require to learn the job on the job but the simple technological facts based on science plays the most important role which saves us from the rule of thumb theory ; the best efficiency can be obtained on the ideas of quality control by performing routine tests on freeness, consistency, fibre length screening etc. and if a proper type of log book is maintained to keep records of those including the variation of the stock temperature at different stages, it allows the operator to run the plant very efficiently without having much dependence on human factor.

Besides these, the efficiency of the running of the refiners day to day can also be measured by the simple calculation of the specific power consumption, the unit being KW power required for 100 kgs. of pulp for 1°SR rise and this gives a very good idea of the condition of the refiners and at the same time we can know whether the power consumed for stock preparation is becoming uneconomic.

Over and above, if a control laboratory is set close to the plant to have experiment at regular intervals on the character of stock being used for Beating characters by the help of a similar type of laboratory equipment, physical properties of the final sheet by making laboratory sheets by the sheet-making apparatus and brightness of the raw stock, it gives a very good guide on making suitable type of stock for particular grades of paper to be run on the paper machine.

Lastly here it can be mentioned that today Indian Mills are suffering from a lot of problems in procuring best type of fibrous raw material other than bamboo which is in short supply and so we have got to go in for using different species of raw materials at the same stage of digestion in a haphazard proportion according to availability which causes difficulty in making a uniform, ready stock for the paper machines and reluctantly we have got to bow down and adjust our preparation and blending system very carefully, which of course under proper laboratory control is not difficult.