"Productivity through selective upgradation of key paper machine components"

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INTRODUCTION :

With most of the Paper Machines in India being decades old and vintage, and exorbitant cost of new paper machines, rebuilding is the key word for every stalwart in the paper industry. In fact, the past few years have seen a number of rebuilds worldwide and especially in the third world.

The period of 80's has been one of acute crisis for the industry as a whole Cost of production increased by leaps and bounds due to continued increased in the Prices of major inputs like raw materials, chemicals coal, power, transporation as well as overall increase in the wages and other fixed overheads without commensurate increase in the selling prices. It was mainly due to financial constraints that most mills could not undertake any major modernization/renovation programme in the recent past.

With the revival of the market and general promise in the future of the industry, most mills are now feeling it essential to rebuild the paper machines. The main objectives of any rebuilding or modernization programme are as under :

- Improving the productivity
- Product diversification to achieve better unit value realization.
- Bring down the cost of production.
- Energy conservation.
- Facilitate use of more short fibred raw material.

Paper machines, being heavy consumer of steam and power, become a vital area where cost reduction measures can be applied. Above objectives can be achieved through selective upgradation of the key paper machine components. The upgradations proposed under the scheme may faciliate manufacture of comparatively better remunerative varieties of paper like light weight surface sized and coated papers, glazed magazine printing papers etc. The scheme may also bring down the cost of production by increasing the machine productivity and competitiveness resulting in better capacity utilization within the existing mill facility.

The upgradation of the key components may be discussed under the following heads :

- Head Box and wire part
- Press part
- Dryer section
- Surface sizing/coating equipment
- Calender stack.

However, before discussing each of the above section, The "Integral Approach" needs to be stressed.

INTEGRAL APPROACH :

Whenever a rebuilding is carried out, it is usually seen that equipments and control systems are brought from different manufacturers, which may number 4 or

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5 at a time. It can be even seen that in the same machine M.D. Basis weight and Moisture control system is supplied by one manufacturer whereas C.D. controls are supplied by other. The point which is being highlighted is that each manufacturer has his own view about technology and often the paper makers have to suffer and fall short of the expectations of modernization programme because of the poor communication or competitiveness between the machine suppliers.

HEAD BOX AND WIRE PART :

The paper market is gradually becoming highly conscious to the quality especially in respect of 2 sidedness, MD and CD property variations together with uniform fibre distribution. Owing to the above, selection of Head Box becomes critical. The following points should be kept in mind while selection of head box ;

- H.B. should give us uniform distribution of fibre as possible resulting in excellent formation.
- Should be able to give uniform caliper over the width and the jet from H.B. should be stable in both machine and cross directions.
- Should be able to de-floculate the stock completely by means of intense turbulence.
- Head box controls should be user friendly so that our operator feels comfortable with the controls, and
- All the surfaces which come in contact with the stock should be easily accessible for cleaning and inspection.
- The existing approach flow system needs greater attention while replacing a head box, in order to achieve the desired results.

Head boxes are available with diffuser pipes which create intense micro turbulence and hence excellent deflocculation even at consistencies higher than that used conventionally. The slice lip is controlled automatically as per the Basis Weight profile scanned near the pope reel.

Old wire parts consisting of table rolls can be suitably modified by a table consisting of hydro and vacu foils. Following benefits may be expected out of such rebuild :

- Reduced 2-sidedness, which is now so much demanded in the market.
- Better retention and improved fines distribution.
- Reduction in C.D. basis weight variation.
- Improved Opacity, formation and reduced pin holes.

This modification can be effected without machine down time but special care should be taken while selecting the foil tops. Though ceramic is considered to be the best, it is very expensive. Foil covers of HD PE give satisfactory results provided they are real High Density all the way down, and not just at the top. Poor selection of foil top covers will result in excessive power consumption by way of more drag on the wire, in addition to reducing the wire life.

PRESS SECTION :

Advantages of having a closed draw at the press part in place of open draw are now very well known, especially when short fibred raw material is used in the furnish. In selection of a press section following point should be kept in mind :

- As streased above, avoiding open draws as far as possible.
- Application of high press loads to get maximum dewatering
- Easy felt changes and roll changes, and finally
- Easy accessibility to various components.

Selection of configuration and rolls depend upon individual needs. Trinip configuration with high press loading may be very efficient from runnability and dewatering points of view, but they tend to reduce the bulk and induce 2-sidedness. Reduction in bulk may not be desired in certain grades of paper and hence may not be well accepted in the market.

The average dryness leaving a trinip press is normally in range of 44-45% as against 36-40% in conventional press section. This reduces steam demand and enables increasing production in dryer limited machines.

DRYER SECTION :

To minimize the sheet breaks and fluttering, the recent machines incorporate 'uni-run' arrangement. This arrangement also helps reducing fluff problem to certain extent.

A suitable cascade system to have maximum utilization of flash steam and recover the heat should be incorporated, if one is already not in use.

The break detectors installed in the dsyer section should have very fast response in order to minimize the time lost during paper breaks. Owing to the comparatively more number of paper breaks due to use of short fibred furnish, the conventional paper machines in India, have open hood system. A closed hood paper machine in addition to energy savings, also helps improving the productivity in conjunction with proper pocket ventilation system. Insulation of end covers of the dryer cylinde s also lead to considerable energy saving and may be considered in the paper machine rebuilding programmes.

SURFACE SIZING/COATING EQUIPMENT :

To facilitate on-machine production of surfaced sized and on-machine coated papers, surface sizing-cum coating equipments are now available from different reputed manufacturers like Beloit, Voith, BTG Inventing AB.

While the Inventing Combi-coater has 2 size press rolls and one coating blade unit, the designs of Beloit or Voith use a blade matering or rod matering device. The new system consists of a conventional 2-roll size press with two important difference as below :

— It meters the film of starch/pigment on to the size of press rolls, and
— The film is then transferred to the sheet at the nip without forming any pond.

The above differcences lead to the following advantages :

— Ability of the unit to run at higher solid content,
— No pond turbulence at the nip in absence of the pond,
— Pick-up canbe controlled
— C.D. profile can be controlled in a better way.

The installation of above equipment in conjunction with the Soft Compact Calender' will faeilitate on-machine production of value added paper varieties like coated papers, glazed maplitho printing etc., which are in good demand in the market.

CALENDER STACK :

Installation of soft compact calender should be considered in a paper machine rebuilding programme depending upon availability of funds. A soft calender in which conventional multiple 'hard nip' stack is broken into individual elastic nips, may be considered as an 'on-machine' alternative to 'off-machine' super calender. It can produce a wide range of calendering effects on coated as well as uncoated papers owing to its ability to control nip pressure and temperature individually in elastic single nips. One of the rolls in a soft calender is of chiled cast iron and the other one has a resilient synthetic cover. This type of calenders are manufactured by a number of reputed manufacturers like Kusters, Hunt & Moscrop, Escher Wyss and others. The best configuration of the calender can be selected based on individual needs.

Mottling or blackening of the sheet is prevented by consistent bulk thus preventing densification over the full width of the web. In brief the advantages are as follows :

— Better ink receptivity for printing grades.
— More uniform and level sheet finishes with even density.
— Improved opacity and elimination of 'marbelling' effect as found in hard-nip finishes even with poor sheet formation.
— Improved bulk retention due to lower specific nip pressures.
— A wide range of finishes possible on one machine from matt to semigloss.
— Flexibility allows a wider range of products to be finished.
— Elimination of secondary processes such as super calenders or other off-machine equipment, so reducing productson costs and down time.

— Reduction in broke losses and paper deterioration normally associated with off-machine processes.

CONCLUSIONS:

Necessity of rebuilding of paper machines has become inevitable with most of the paper machines in India being decades old and cost of new 'equipments being exorbitant. A very careful study of the existing machines and equipments is necessary and selective up-gradation has to be carried out to make the products more remunerative. An integral approach is must and the profitability needs to be evaluated of mills as a whole.

REFERENCES :

1 IPPTA—Convention Issue, 1983, P—126

2 IPPTA—Vol. 22 September 1985, P—5

3 IPPTA—Vol. 25 June, 1988—P-54

4 IPPTA—September, 1988—P-65

5 IPPTA—Silver Jubilee Issue, 1989

6 Technical Information Sheets from—

Escher Wyss, West Germany
Hunt & Moscrop, U.K
Kusters, West Germany
Beloit, U.K.
Voith, West Germany.