Imporving forming fabric performance

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SUMMARY

This paper deals with some of the common problems associated with operation of Synthetic forming fabrics which stand on the way of optimizing the performance of the same. Some kind of solutions to these problems have also been suggested in a practical way.

By the time this paper is read, a good number of indigenously made synthetic forming fabrics have been installed and run on wide, narrow, slow and fast paper Machines of the country, which have given good experience to the pioneers manufacturers and users of the fabrics.

This paper deals with some of the important factors affecting fabric performance on Fourdrinier in order to give the paper makers a better understanding of these factors so that they may further maximize the performance and get benefitted.

ABRASION

The single most critical item that can damage a Synthetic fabric is localised abrasion. This condition usually exists as a sharp burr or an embeded foreign material on stationery elements such as forming boards, foils, deflectors, suction boxes etc. Sharp edges on the holes of brand new suction couch cells also contribute to localised wear.

For better understanding let us divide the source of abrasion on Synthetic forming fabrics in two groups.

1. From Stationary elements.
2. From differential speed or "Creep"

STATIONARY ABRASION

Stationary abrasion comes from sources already indicated earlier. It is therefore, essential, that the materials used for these elements are compatible with monofilament fabrics.

From various experiments conducted by the developed Paper Making countries, it shows that some material has higher abrasive rate than others towards monofilament fabrics. However, from the experiments made it appears that a compromise in choice of material for stationary elements has to be made considering the abrasive index and co-efficient of friction which effects the drag load. It is felt that this compromise can be found in a highly polished hard material with low co-efficient of friction.

From practical experience it has been seen that surface defects on stationary elements, such as damages, roughness etc., can have dramatic effect on the fabric in the form of localized wear.

ABRASION DUE TO DIFFERENTIAL SPEED

This phenomenon is commonly known as "Creep" and causing from the driving elements of the fourdrinier i.e. the Couch Roll and/or Wire turning roll. The higher the drag load caused by the stationary elements, the higher the driving force required by the Couch and/or Wire turning roll to over-come the same. Since Forming Fabrics are plastic material, they elongate with increased tension. In Fourdriner this elongation is gradual increment from the breast roll to the first driven roll. After power is put to over-come this drag load through Couch and/or Wire turning roll, the fabric relaxes until it reaches the original tension in the return run. It is this relaxation over the surface of the driving roll that causes abrasion. The rate of abrasion will depend upon the material of the driving roll and any irregularity on the surface of the driving roll/s will hasten the effect.

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The following measures can be taken to reduce the Creep abrasion :

a) Reducing the drag load on the fabric by using hard and highly polished suction box tops and other stationary elements and reducing the number of suction boxes (keeping the total vacuum level the same and distributed in a raising schedule from Wet to Dry end).

b) To have the driving roll surfaces thoroughly polished making sure that those are free from any burr etc.

c) Coating the driving Roll/s with hard rubber.

CREASING

No Synthetic forming fabric is as rigid as bronze wire and is more sensitive to misalignment often resulting into creasing and causing tendency to run off the machine.

The alignment checking of the Fourdrinier table should therefore, be done keeping in view of the major points listed below :—

(a) Tape measurements around the entire fabric run front and back of the machine, must be within 2 to 3 mm.

(b) Centre line distance between breast roll and Couch roll are to be measured front and back. Allowable difference is to be kept within 3mm.

(c) Centre line distances are measured between each and the other roll keeping either breast or Couch roll as reference. Difference between front and back should not exceed 3 mm.

(d) Levelness of all rolls is checked with a good spirit level. All rolls with a high degree of warp, such as breast and couch roll must be in level of each other within 0.15 mm/Mtr. of shaft length. Low wrap rolls can be levelled at 0.30 mm./Mtr. of shaft length.

(e) Foils and suction boxes must be squared with breast and couch rolls Again the tolerance is 3 mm. for the measurement along front and back of the machine.

(f) Foils, suction boxes, Table rolls are brought up to level using a piano wire-which is stretched tightly over the breast and couch roll. The contacting points are raised until they lightly touch the piano wire.

Periodical checking of the rolls with a caliper will enable the machine crews to determine any possible unevenness of roll wear before it might cause a fabric wrinkled.

BLEEDING

Bleeding is usually defined as a condition resulting in excessive accumulation of fines and/or filter on the suction boxes or other stationary machine elements. Normally it is felt that the construction of forming fabrics is responsible for this because of the variation in hole sizes of four shaft broken twill designs which is as much as 400% i. e. the largest hole is 4 times the size of the smallest. Where bleeding of such kind is encountered in the first supply of fabric, the problem is definitely solved by adjusting the design to a slightly finer mesh while maintaining the neccessary open area.

Apart from the above, bleeding on fabrics can also be enhanced by machine operting practices. For example, solid table rolls in the early part of the table may be responsible for fibre stapling and bleeding. The condition of jet-to-wire speed ratio and jet delivery angle may also assist bleeding by producing a high percentage of machine direction fibres. This is mainly because of the construction of the fabric where a fibre with machine direction orientation sees primarily long slots in the fabric which permit it to fall below the top plane of the same. Such fibres are susceptible to being partially or wholly pulled through the mesh opening by suction impulses.

The solution to bleeding, therefore, can be as varied as the machine on which the problem occurs. In some cases, the addition of foils in the early part of the table and one or two low vacuum boxes before the flat boxes is sufficient to over-come bleeding. Sometime, however, more extensive table changes are necessary and that fabric mesh specification must be carefully reviewed and revised.

CAREFUL HOUSE AND RECORD KEEPING

While the forming fabrics have a notable degree of resistance to failure from stress fatigue, chemical corrosion etc., they are sensitive to damages by abrasive surfaces, sharp protrusions, grits, metal particles and the like. Before installing new fabrics, the surfaces of the rolls foils, suction box covers etc. should be thoroughly cleaned and any rough surface contacting the fabric should be smoothed. During shut down or maintenance work the installed fabric should be kept well protected from welding sparks, debris and alike injurious items. Foil blades should be routinely cleaned of any accumulated stock or other material by water jets as needed.

Recommendation of supplier of the fabrics should be followed in connection with installations and start-ups of fabrics and with routine control and recording of running tension, fabric caliper measurement, foil blade angles etc. should be done. Other notes can be recorded such as any change to the table or unusual problem encountered. This includes any operating variation. These records not only allow a higher level of quality control and contribute dates for future operating decisions, they also assist the supplier in making design changes whenever necessary.