Transition from metal to synthetic

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The conversion from Bronze to Forming fabrics on Indian paper Machines has been gaining momentum during the last two years-ever since SHALIMAR introduced SWIL-Fab technology in the history of the country's wire making in an effort to achieve longer life, reduced machine down time and lower clothing cost.

However, wide variation in fabric performaance, even among very similar paper machines has been observed..

The commonest difficulties which obstruct smooth run of fabrics are discussed below.

TENDENCY TO CARRY MORE FINES.

TENDENCY TO INCREASE HORSE POWER REQUIREMENTS.

One reason that these are common to many fabrics is the bending moment of the synthetic yarn is much less than the bronze wire which it replaces. This in turn makes more deflection in certain high vacuum situations. Take for example the deflection over the drainage nip of a high speed Table Roll as shown in the figure below-

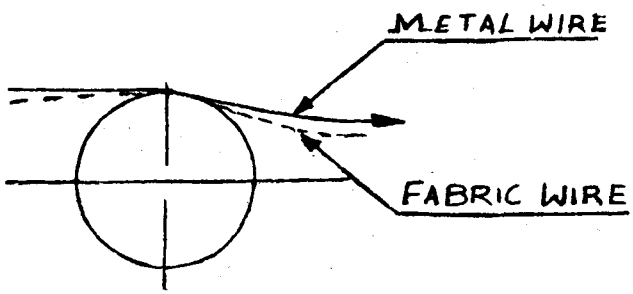

Fig. 1

It can be noted from the figure how the drainage nip is reduced with a synthetic fabric. Yet the same amount of water has to be removed. Since the water must be removed in less space, the drainage velocity must be higher. We have found that all other things being equal, the higher the drainage velocity through a synthetic fabric the greater is the tendency to carry fines. One way to reduce the drainage velocity is to replace the table rolls with foils which has much longer drainage nip.

The lower bending moment of synthetics (as opposed to Bronze) can also be used to explain the tendency to increase horse power requirements From the above figure you will note the surface contact between the table roll and fabric as opposed to table roll and wire. Hence all other things being equal, one would expect more drag from a synthetic fabric.

During various studies made, in some cases, it shows that there is little relationship between increased power consumption and the composition of some machine running surfaces i. e. Foils, Table rolls and deflectors etc. But over the flat boxes very large difference in the drag load of a fabric compared to a metal wire has been observd. It has also been noticed that reduction in load can be achieved by reducing the number of vacuum boxes, keeping the same vacuum and graduating vacuum upwards from wet to Dry end.

While the flat boxes have been identifled as a possible source of high load of fabrics, there may be other reasons for load increase. We have noticed from our experience that a fabric with low effective open area or permiability may result with higher load than a more 'oepn' fabric. The fabric weave the and the knock up number of the fabric which forms actual binding and crossing pints giving support to the sheet may also give affect loads if they are incompatible with machine drainage and stock conditions. In reality than the question of Power Consumption with fabrics is a complex subject, potentially involving the variables of fabric design stock characteristics and fourdrinier table lay out.

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BLEEDING

"Bleeding" from a fabric is usually known as build up of fibres at the suction boxes. On some machines, however, the fibres do not deposit on the suction boxes, but on the rolls on the return run. We have collected many samples of fibres involved in bleeding and noticed that in most of the cases they are long fibres rather than fines.

"Bleeding" with the most common design of synthetic fabrics can be explained by referring the following figurs.

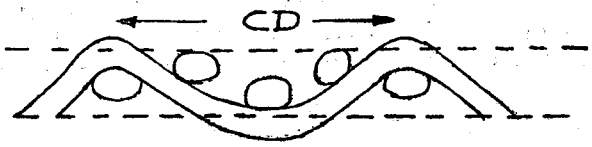

Fig. 2

The above figure has the view of the fabric along the machine direction. Any fibre with machine direction orientation shall primarily lay on the long slots in the fabric and makes the same liable to fall below the top plane of the same. These fibres are very much prone to being pulled through the mesh-opening either partially or fully when suction impulse generates.

The high suction pulses of table rolls at high speeds are also liable to pull these stapled fibres through the mesh opening and discharge them on the suction box tops under high vacuum. We have further experienced that the fabric faces bleeding problem usually gives problem to sheet release and draw problem on open draw paper machines.

On some machines which has solid table rolls at the early part of the table has been seen giving bleeding problems.

In order to overcome bleeding it is always not possible to alter the above conditions, primarily because of sheet formation requirements.

The solution to "bleeding" therefore can be different for different machines and the paper makers may take trial by altering the operating condition and make changes on the table condition. The Fabric designer, on the other hand, can change the design to suit the particular working condition by altering the mesh and weave specifications until a compromisable design is established.

KEEPING A SYNTHETIC FABRIC CLEAN :

This is a very sensitive area of synthetic forming fabric as a dirty fabric will have contribution to—

a) Reduced de-watering which can contribute to increased vacuum in suction boxes.

b) Increased vacuum will lead to an increase wear to the Fabric Strands. Further, necessary power to drive the fabric shall increase. Due to excess wear to the fabric strands, a fibrillation at the worn out surface of the strands will take place which again will contribute to plugging of the mesh opening.

c) Frequency of cleaning the fabric will increase leading to a possible risk of damage and general weakening of the fabric.

d) Unclean fabric and efforts to keep the same clean may produce a negative effect on productivity by number of machine shuts and paper breaks.

The above problems are to some extent the reason why metal wires are still used. Metal wires has less tendency to become dirty and so the cleaning problem is less when a metal wire is used. However, the choice of metal or synthetic is a consideration from economic point of view and judged whether shorter wire life or cleaning problem to be considered for better economy.

The problem of keeping a fabric clean can be best tackled by using a good shower with 15/20 kgs/cm² pressure installed at the return run between the suction couch roll and first return roll as shown under—

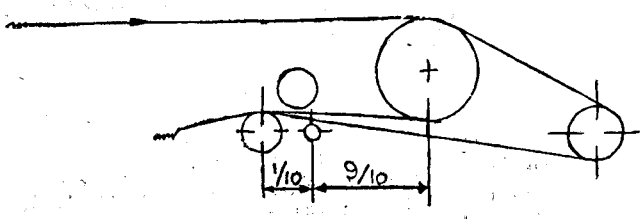

Fig. 3

The shower should be of Oscillating needled jet type. It is not necessary to keep the above type shower operating all the time. From our experience we have seen that it is quite sufficient if each mesh opening is cleaned thoroughly with the water jet passing through it at least once in every 8 hours. The operating time of shower to achieve the above effect can be calculated from the speed of the machine, Nozzle diameter, Nozzle spacing and stroke length of oscillation of the shower.