

Felts for press section rebuilds specially to suit Indian conditions

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SUMMARY

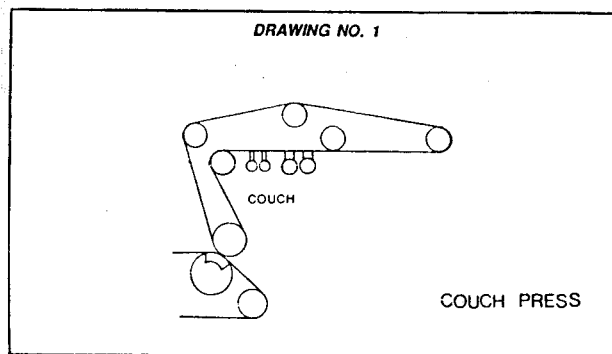
Different designs of press sections are discussed to overcome problems with short fibred furnishes, of sheet strength, picking, sheet dryness and feeding, and for increasing speed and production, together with the corresponding design of felt required for and suitable to each application.

The standard press section on a traditional Indian paper machine consists of open-draw from the fourdrinier with the sheet transferred by hand to a 1st Press felt passing through a suction or plain press, then open-draw to a straight through 2nd Press felt, then again open-draw sometimes to a 3rd plain reverse press position.

The maximum speed in this arrangement running is 380 m, but with a mainly long fibred furnish, with the sheet having good strength properties. However with Indian furnishes becoming more short fibred, with increasing use of waste paper, Bagasse, hardwoods, even agricultural residues, the sheet is weaker, more difficult to feed through the press and problems of fines, picking and poor dewatering often develop.

The first simple step to improve press section efficiency is usually to try to improve sheet dryness off the wire, and to consolidate the fines better in the sheet. Felting the lump breaker roll can help this i.e. the couch felt.

Some machines in India run with a couch felt and it is widely used in Turkey, mainly on fluting and test-liner, with a furnish of waste paper and wheat straw, machine speed around 300 m. on a 130 g. Sheet. Dry-



ness off the wire with only the lump breaker was previously 18-20% improve up to 4% with the couch felt and with the sheet more consolidated, reducing breaks and picking in the press section.

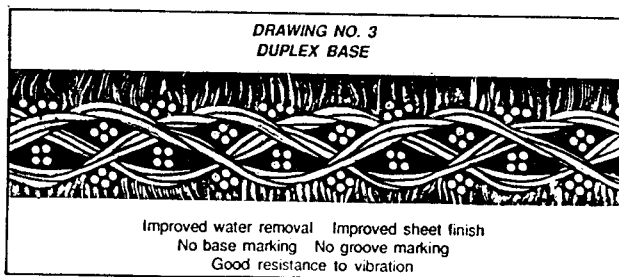
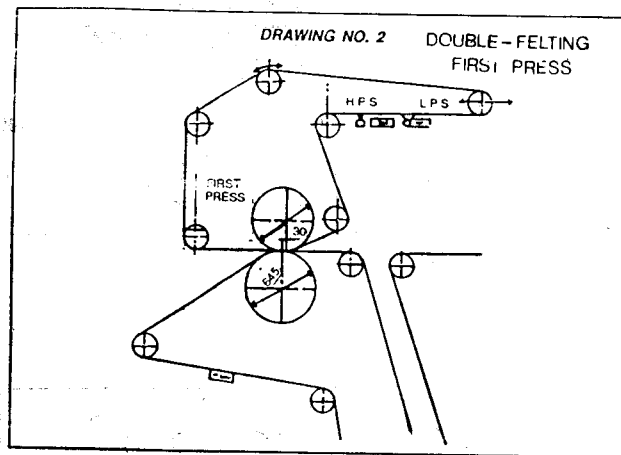
To eliminate the picking on the top of the 1st press, mills have double felted the 1st press.

If the bottom roll is plain, not suction, some mills have changed it to a blind drilled or grooved roll to further reduce the hydraulic pressure in the nip, and increase sheet dryness.

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For both the couch felt and the top press felt, a high void space inside the felt is desirable to carry the water away from the top side of the sheet, to be subsequently removed by the felt Uhle box or boxes. This is a Duplex based felt of minimum 1200gsm, with a fairly fine face for good surface contact, very open middle and back to hold the water and allow it to be easily removed by the felt vacuum box (Drawing. 3)

On very heavy sheets eg. board or heavier grammage, one may use a Triplex based felt of around 1500 gsm.



The face of the bottom felt is slightly finer than that of the top felt to prevent sheet stealing by the top felt, and a useful additional measure is to fit a scrolled roll (like the stretcher roll) in the lead out roll position of the top felt.

It is essential that the couch and top felt vacuum boxes have satisfactory dewatering capacity otherwise the felt will return to the press too wet, and it may become prematurely filled.

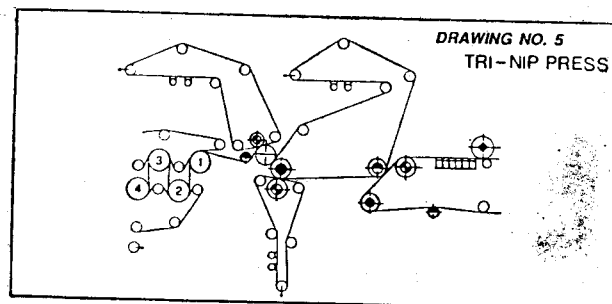
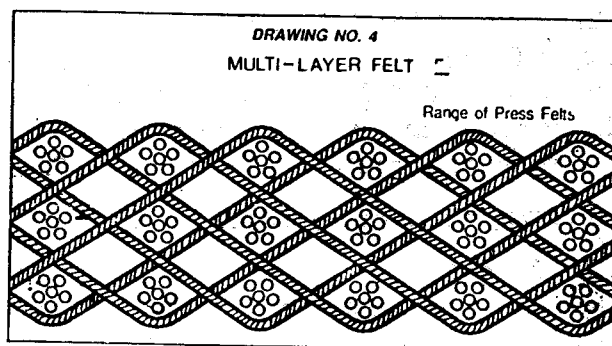
The 2nd press is often made straight through but inverse, both for additional water removal from the top side, to increase overall sheet dryness, and to reduce sheet two sidedness, for example on writing and printing grades.

As a rough guide, these changes will enable a machine to run on a short fibred, low strength furnish at speeds up to about 350 m., and with a reasonably efficient sheet dryness after the 2nd press of 38% maximum 40% dryness.

For faster speeds, a closed draw system with a pick-up felt should be considered. This will give sheet support through the presses, avoid picking problems, improve sheet dryness, and with a separate final press, reduce sheet two sidedness.

The normal tri-nip press configuration today is as shown in Drawing No. 5.

Note the sheet is fed in to the 1st top drying cylinder, for ease of feeding, especially if a no-draw(unirun) single dryer screen system is to be used also to fill up space if the gap left by the previous 2 or even 3 open draw presses is very long.



For the tri-nip press, the pick-up felt must obviously have a smooth surface to the sheet and it must be thin and of medium permeability to avoid carrying excess water. It must be close enough in construction to prevent fines passing through to the inside felt rolls, and it must have good compaction resistance as it has to pass through 2 presses.

For this application the Deltamesh Duplex based design is satisfactory, as shown earlier in drawing no.3. but with the caliper kept low, surface finer, and permeability lower. Grammage is usually maximum 1250 gsm, unless there is a danger of shadow marking, on a high eucalyptus or bagasse based furnish and if suction roll drilling are more than say 300 mm. In these cases one can go to a heavier, stiffer based construction like the Trivent Triplex based design shown in drawing No. 4. or even a double based design shown in drawing No. 6.

With the Triplex or Double Based pick-up felt designs, minimum weight is usually 1500 gsm.

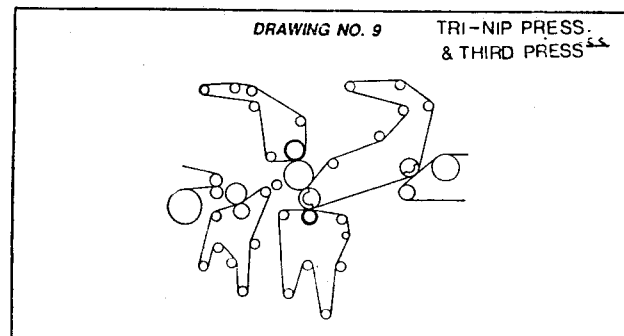
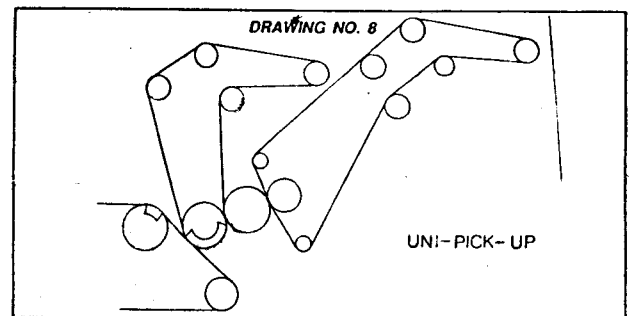
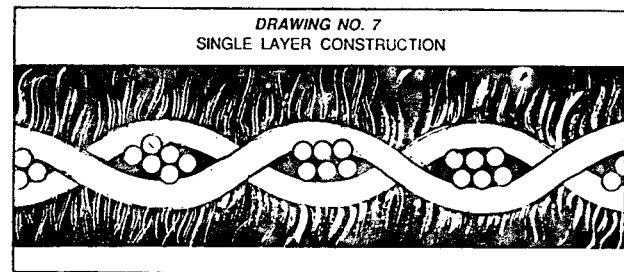
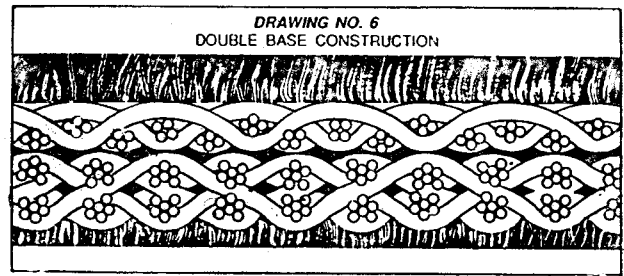
The bottom felt normally passes through a grooved or blind drilled press. In addition to water removal, this press helps to keep the sheet flat, important later in the sorting department for keeping cut size sheets flat, without curling.

This felt must be thin in caliper, lightweight and very open, for rapid drainage through the felt to the grooved or blind drilled bottom roll so that it returns to the press as dry as possible, and to stay clean. Single layer base design is usually as per drawing No. 7.

Felt weight is normally 950-1000 gsm.

The 3rd or top press felt passes through a grooved or blind drilled press, but at much higher nip pressure than on the bottom felt position. So a more compacted resistant felt is needed, with non-marking features, and capable of not only resisting the higher pressure, but also of being able to absorb any vibration generated in the press or framework by this higher pressure.

If the press roll is rubber covered or polyurethane, one can use Deltamesh Duplex based type at about 1400 gsm. as illustrated by drawing No. 3. If the roll is stainless steel, giving a hard, short nip area a Trivent Triplex based felt as shown in drawing No.4, or a double based felt, as shown in drawing No. 6 both minimum 1500gsm can be used. They provide the void



volume and incompressibility in the felt to resist compaction and absorb vibration. Also surface smoothness if necessary, and in the double base design, for example, a special non-marking smooth faced top base is selected to prevent any base cloth marking.

If space in the press section is restricted, or for heavier weight production, the Bi-Nip or Compact type of press section may be preferred.

This has a Uni-Pick-Up arrangement, without any long draw between the pick-up roll and the suction press. This is shown in drawing No. 8.

Because of the long contact area around the suction pick-up, roll, there can be a danger of shadow marking and usually a heavy felt of at least 1500 gsm. is needed, and in at least the Trivent Triplex based construction.

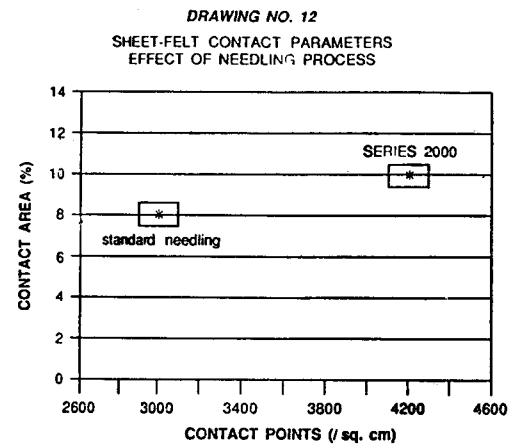
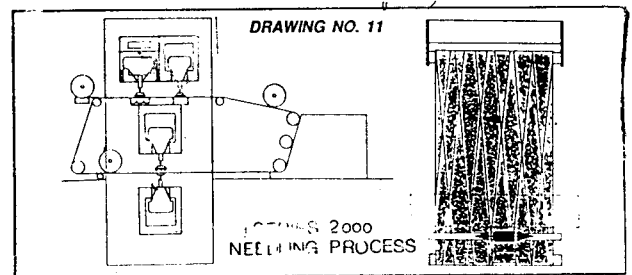
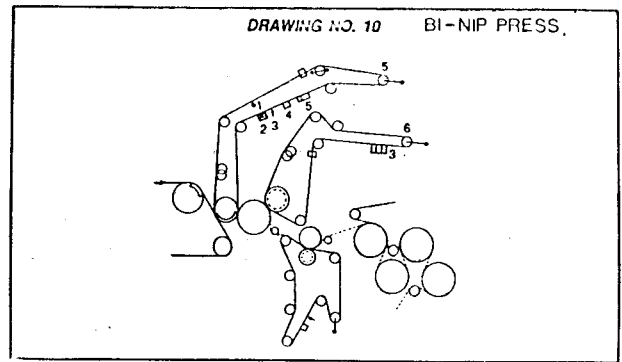
Both the tri-nip and the bi-nip press configurations have the disadvantage that only one side of the sheet is in contact with a smooth roll, and they have limited effect in reducing sheet two sidedness. For more effective results, it is necessary to have open-draw to a separate straight through final press arrangement. This enables the opposite side of the sheet to also contact a smooth press roll, whilst, of course, serving to increase water removal. This is shown in drawing No. 9 on a Tri-nip press arrangement.

Drawing No. 10. shows a Bi-nip or Compact press arrangement.

For both these final presses, the essential feature of this felt, whether in Duplex, Triplex or Double Based design according to nip pressure and roll hardness, is the smoothest possible surface. And for this one can use the new needling process, which consists of orientating in the machine direction, rather than the cross machine direction, the surface batt fibres in the final stages of the needling process. This is a very recent needling technique and provides a smoother finer felt surface, and therefore increased contact area with the sheet (Drawing No. 11).

Additional benefits have been found to be easier installation, faster start-up, improved water removal, less press vibration and longer lifetime.

Drawing No. 12 gives a comparison between the sheet contact characteristics of 2 similar felts, one with



standard needling in the normal cross-machine direction and one with the new Series 2000 process.

It can be seen that the sheet contact area is increased from 8-10%, and the actual contact point from approx 3000 to over 4200 points per square centimetre.

Throughout this paper, reference has been made to improving water removal and increasing sheet dryness out of the presses, by modification of the press section design and using the correct type and construction of felt. These improvements, of course, will lead to considerable gains in production and quality, and to significant savings in steam consumption in the dryer section. A drier, firmer sheet will be more easily fed through the dryers with less dust or fluff on the early cylinders. and consequently improved heat transfer and less sheet breaks.

It is known that for every 1% increase in sheet dryness after the section, a corresponding 4% saving in steam consumption in the dryer section can be achieved.

To summarise, press design can be modified specially for Indian conditions, to suit the difficult furnishes which the mills are being obliged to use more and more. Together with the correct design of press felt, problems of sheet picking, fines loss, sheet dryness limitations and sheet feeding etc. can also be eliminated or reduced sufficiently to enable faster speeds and production.