

Billblade A Tool for Quality Improvements

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ABSTRACT

Replacement of a size press with a BILLBLADE coater can be a key not only to increasing a quality and reducing unit cost of existing grades of paper but also to the production of entirely new higher value added grades. In mills with relatively old slow and narrow machines that are no longer cost competitive in their traditional grade structure, it could be the key to survival and a return to adequate profitability.

Introduction :

The conventional two roll sizepress for many years has been the most common paper machine component for surface treatment ranging from starch to pigmented coating colours. But this device has some inherent limitations related to film split and pond turbulence at high speeds. The problems related to the hydrodynamic pressure can be reduced by using gate rolls but the problems associated with the film split are still present.

The BILLBLADE Coater can easily replace a size press and by that substantially improve the quality of the finished product.

BILLBLADE

The principle of a BILLBLADE coater and surface sizing unit is shown in Figure 1. The paper web runs down through a pond formed by a flexible blade and soft rubber backing roll. The backing roll runs 3%-5% faster than the sheet. The combination of this speed differential and take off angle away from roll provides even sided application and eliminates film splitting.

Space required for installation of a coater is small. Normally a BILLBLADE coater can be installed on the same place as a size press (Fig. 2).

The coater is equipped with a circulating system similar to that of a conventional blade coater. All colour is screened with in line pressure filter before entering the coater (Fig. 3).

All surfaces of the blade holder in contact with the coating colour are water chilled to make them sweat thus reducing cleaning time. At a sheet break an automatic washing sequence cleans the supply pipes and the backing roll. Roll life between grindings is normally 3-4 as long as the sizepress soft roll.

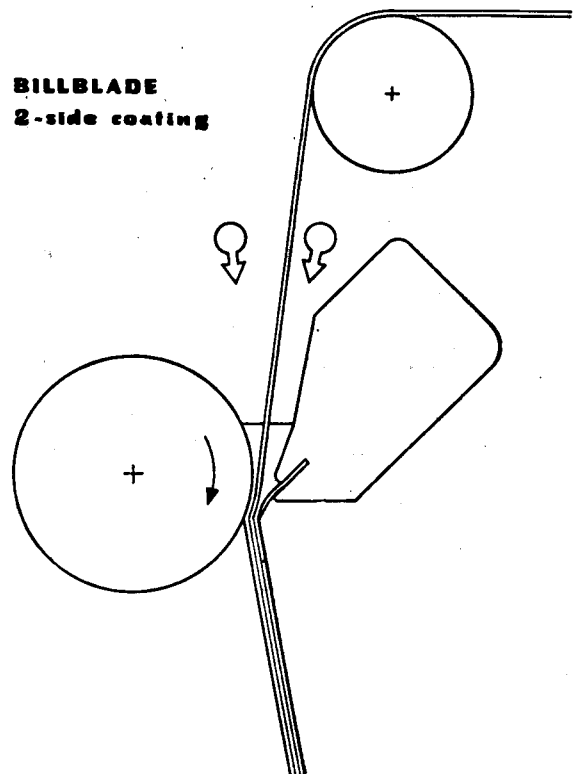


Fig. 1

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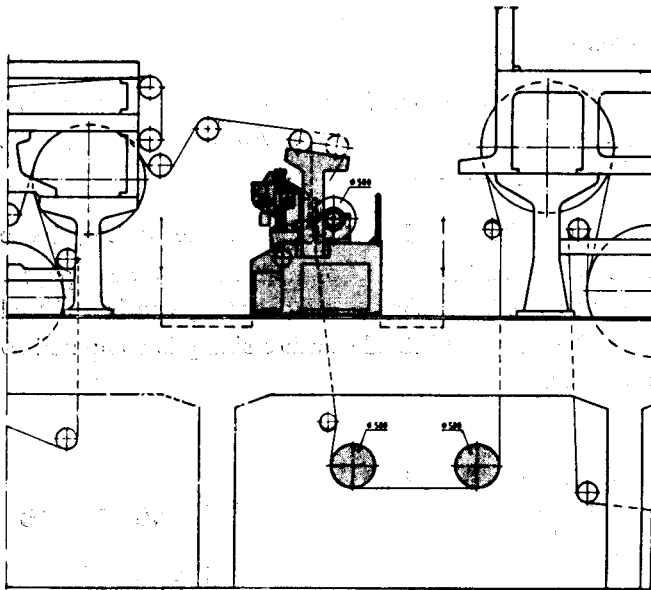


Fig. 2

COAT WEIGHT
EACH SIDE

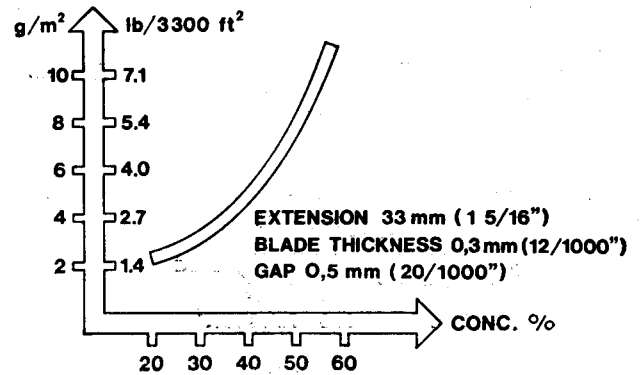


Fig. 4

Surface Sizing :

Data obtained from commercial installations show that the concentration of a starch solution in the BILLBLADE Coater has to be twice as high as that of a size press to achieve the same pick up. It has also been found that of a size press to achieve the same pick up. It has also been found that the starch pick up in the size press is more dependent on the basis weight of the sheet than with the BILLBLADE as shown in Figure 5.

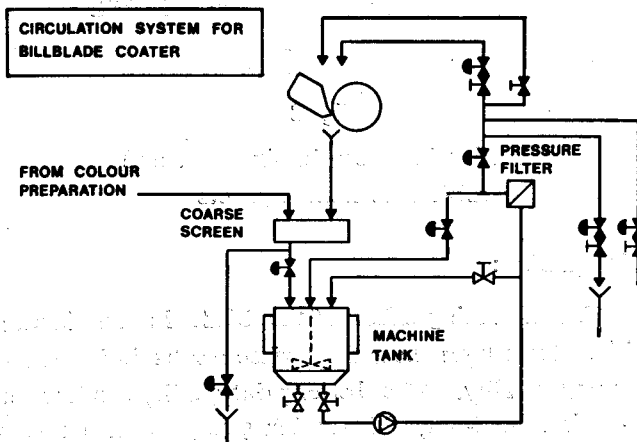


Fig. 3

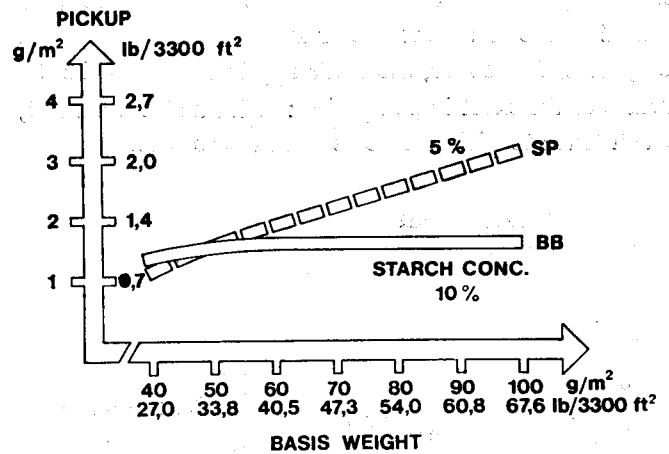


Fig. 5

Coating

Coat weights ranging from 3-11 g/m² can be applied. The fine tuning of the coat weight is done with blade pressure. Coarse setting is done with solids concentration of the coating colour which is ranging from 20-55% depending of coating composition and coat weight (Fig. 4)

Comparative drying costs are shown in Figure 6. At a given machine speed the evaporation cost is about twice as high for size press compared with the BILLBLADE when running 40 g.s.m. base paper and at out 4 times higher when running 100 g.s.m. base paper.

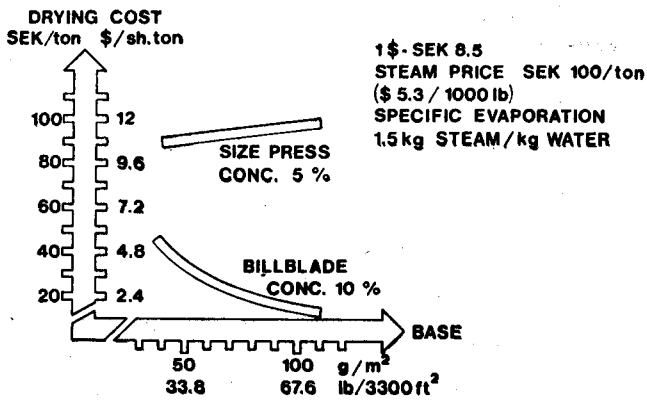


Fig. 6

PAPER PROPERTIES

A switch to BILLBLADE results in cost saving and improvements to numerous paper properties. Following data are example of improvements that can be obtained by surface sizing or coating of woodfree paper grades.

Surface sizing

Roughness/Smoothness

Figures 7 shows the effect of application method on roughness. Surface roughness is related to fiber swelling. Use of higher starch concentrations and a starch layer located close to the surface results in reduced surface roughness. Moreover, the blade application smooths the surface of the sheet in comparison with a size press roll, which tends to pick out fibers from the surface.

SURFACE ROUGHNESS
BENDTSEN ml/min

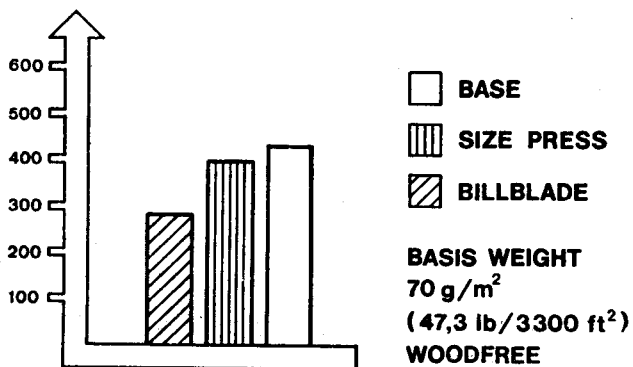


Fig. 7

Difference in roughness between size press and BILLBLADE treated paper

Linting :

Lint on the rubber blanket of an offset press is a major problem for the printer. As shown in Figure 8, surface sizing can reduce linting.

When the starch is located at the surface, loose fibers on the surface will bond well to the base paper. Printing trials have shown that linting can be reduced by one half when Billblade surface sizing is compared to size press.

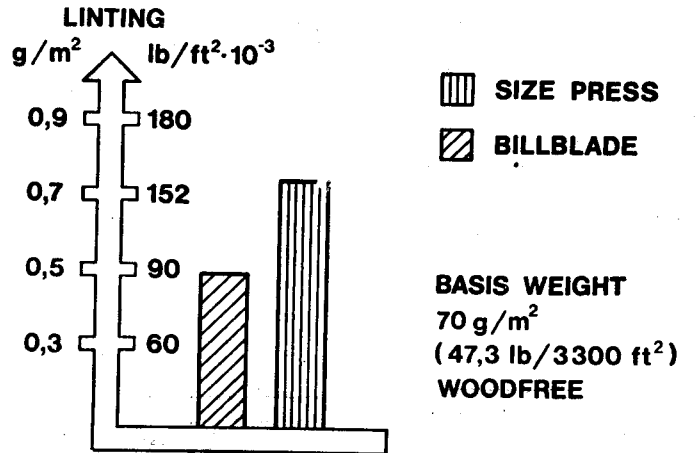


Fig. 8

Linting in off set for size press and BILLBLADE treated papers

Print quality :

The smoothing effect of the blade in combination with a starch layer near the surface results in improved printing quality. The better print quality results from better ink hold-out, higher ink gloss, lower ink consumption and fewer missing halftone dots.

Internal bond :

In some cases, especially on base sheet containing large amounts of broke or secondary fibers, an addition of 0.3—1.0% cationic starch in the wet end may be necessary to obtain sufficient internal bond.

If both normal printing grades and technical grades where high internal bond is of great importance are to be made on the same machine, consideration should be given to installation of a BILLBLADE Combi Coater, which can be run in either Billblade or inclined size press mode.

Double sided coating (C2S) :

When a BILLBLADE replaces a size press for the production of coated paper, a complete new range of grades can be made. C2S papers with 10–12 g/m² coating per side can be made. Coating colours with solid of 56–63% and viscosities up to 800 cps (Brookfield 100 rpm) can be used. Both matte finish grades using 100% calcium carbonate colours, and high gloss papers are produced with BILLBLADE on machine coaters in the speed range of 150–900 m/min (500 to 2000 fpm).

Experiences has shown that nearly all paper properties will improve when exchanging a sizepress with a BILLBLADE coater. The greatest improvements have been noticed in smoothness, gloss, opacity and printability (Fig. 9).

Smoothness :

The absence of film at both side of the sheet results in an excellent smoothness. Testing has shown that fiber coverage also will be improved thanks to the higher solids that can be used.

Gloss :

Experience has shown that a BILLBLADE coated sheet needs less calendering to achieve a certain gloss value can in this way be kept at a higher level.

Opacity :

Penetration of colour is less when using a higher solid concentration. The dwell time in the nip which for BILLBLADE is significant shorter than in a size press also plays an important role for the penetration and opacity of the sheet.

Printability :

A more surface localized coating layer will improve ink gloss which in its turn results in an improved printability and appearance of the printed product.

Higher solids concentrations can be used without risk for orange peel patterning thus achieving a better drying economy.

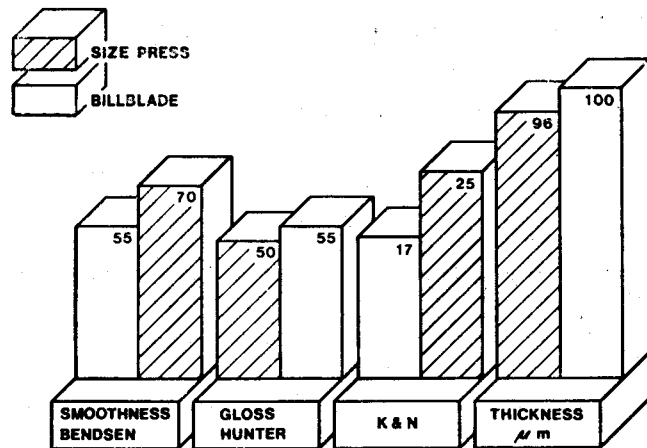


Fig. 9

Single sided coating (C1S) :

Single sided coating with back side treatment can be produced using the BILLBLADE Differential coater shown in Figure 10. The combination of BILLBLADE coater and metering rolls for back side and starch, water or coating colour on the opposite side for curl control or as a functional coating. Typical differential coater applications include label papers, CF carbonless, grease resistant coated bag papers, other packing specialities and technical papers such as differential conductivity papers.

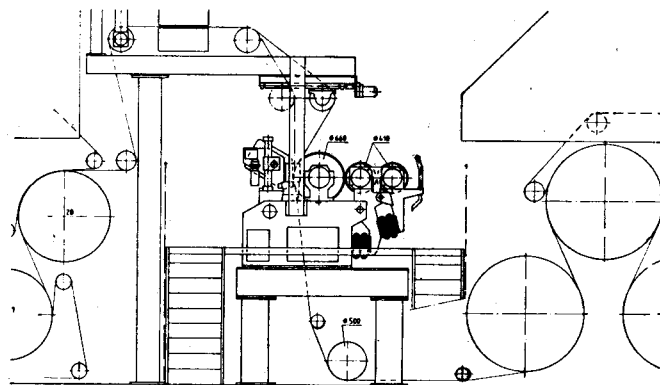


Fig. 10