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THE ROLE OF FORMATION ON SOFT NIP AND HARD NIP CALENDERING

Dr. J. Waterhouse, Prepared Contribution

This contribution is based on the work of Eerd Palokangas, a special student at the Institute of Paper Science and Technology. His investigation was concerned with the effects of formation on hard and soft nip calendering.

Four levels of formation were produced namely poor, medium, good and excellent for a 45g/m^2 newsprint furnish. The first three levels were obtained by varying the formation consistency on a pilot plant former, while the sheets with excellent formation were produced on a Formette Dynamique. The same method of wet pressing and drying was used for each set of sheets, however important differences between the web formed sheets and Formette Dynamique sheets were later discovered.

The level of formation or type of calendering did not appear to significantly effect sheet roughness at various levels of sheet densification, as measured by Parker Print Surf. Losses in elastic and strength properties were found, and were higher for hard nip calendering. Interestingly, strength losses were higher for sheets having excellent formation when compared with those having poor formation.

Investigation of this unusual result revealed that the poorly formed sheets produced on the web former, did not have the same initial level of internal stresses (drying stresses) as the sheets with excellent formation. This was determined by rewetting the poorly formed sheets, and drying them under full restraint (as was done with the sheets having excellent formation). The elastic constants were then measured, and found to be in close agreement

with those measured on sheets having excellent formation.

From this limited study we conclude that: the higher the initial level of internal stresses, the greater the reduction of strength properties will be when the sheet is subjected to calendering. Therefore, attention has to be paid to the initial level of internal stress, when strength properties change as a result of calendering are being investigated.

Dr. H. Baumgarten

I was surprised to see the low density figures of the calendered paper in your last diagram which were given in cm^3/g.

Dr. J. Waterhouse

I agree that the density was low but this was due to the mechanical pulp which we used in the sheet.

Mr. A. Komppa FPPRI

In our studies on optical formation, we found that when comparing the grammage and light transmittance variation curves of papers that the blackening is a function of mass formation. To comment on J. Peel and J. Waterhouse's statements, I would say that the mass formation and calender blackening correlate. In extensive calendering the peaks of the paper take most load and when calendering with hard nips they also break.

Dr. H. Baumgarten

I like this comment because I am convinced that if you have a really good mass and moisture formation you should be able to densify your sheet in a hard calendering nip than is reported here - and without loss of paper strength and without blackening.