

investigate changes produced by bending at the point of peel. The differences in the curves were significant as can be seen from the figures in Table 1 taken from one such set of curves. All of the papers showed similar reductions, in the values listed, for the printed inked regions, although the magnitudes varied. As was predicted from above, the smoother, less air permeable, low basis weight papers printed in the cross-direction gave the greatest change. We consider that the decrease in the values listed, for the printed inked paper compared with the printed uninked paper, are due to stress concentration and bending causing bond breakage and coating fracture. The differences in the values for the unprinted paper and the unprinted sections of the paper that have been through the press could be a consequence of the combined effects of nip compression and shear plus a stress relaxation effect resulting from the tension in the paper during peeling.

TABLE 1—DATA FROM LOAD/ELONGATION CURVES (INSTRON) FOR PRINTED PAPER

<i>Paper 102 g/m², two-sided coated art, printed cross-direction</i>	<i>Un- printed</i>	<i>Printed, uninked back edge</i>	<i>Printed, uninked, grip edge</i>	<i>Printed, inked, back edge</i>	<i>Printed, inked, grip edge</i>
Young's modulus, dyn/cm ² × 10 ¹⁰	2.45	1.97	1.97	1.64	1.64
Percentage decrease	—	20	20	33	33
Work of deforma- tion for 1 per cent extension, erg/cm ² × 10 ⁴	7.5	6.8	7.1	5.6	5.6
Percentage decrease	—	9	5	25	25
Work of deforma- tion to rupture, erg/cm ² × 10 ⁴	97	90	90	72	87
Percentage decrease	—	7	7	26	11

After printing, most of the coated papers suffered from 'baggy centre' in the printing region and 'back edge curl' (Fig. 7) was observed on some of the ciné films. None of the sheets that were tested suffered from coating pick, but some subsequently printed showed the typical 'heart line' coating pick, where picking commenced in the centre of the printed area and developed to the edges of the printed area further along the printed sheet. We consider that curl and 'baggy centre' are caused by the stress concentration and bending of the sheet at the point of peel and that these are contributory factors to coating pick.

We conclude that bending and stress concentration at the point of peel are the most likely causes of picking and delamination, also the forerunners of baggy

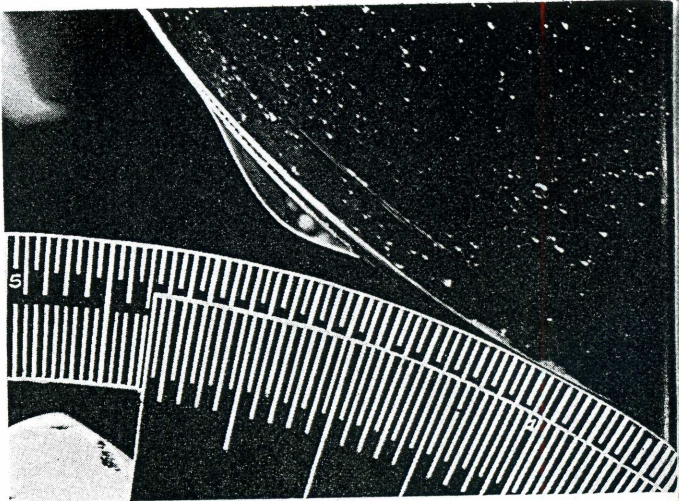


Fig. 7—Back edge curl

centre and curl, which in themselves cause feeding difficulties and creasing during future printings. In addition, misregister between the first and future colours in close register, high quality colour printing on coating paper, especially in web offset, are likely to be the result of the weakening of the paper at the first printing.

Wet pick (that is, picking at the second or subsequent printing that immediately follows the first printing during which no picking has occurred) we also consider to be caused by bending and stress concentration weakening the paper. Previous explanations of wet pick have ascribed it to solubilisation of the coating by the water picked up from the blanket. The water picked up by the paper we found to be of the order of only 0.2 per cent of the weight of the

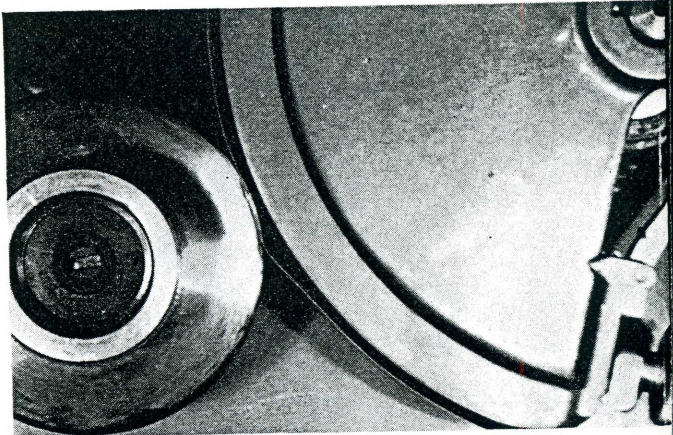


Fig. 8—Peeling on an IGT printability tester during a pick test