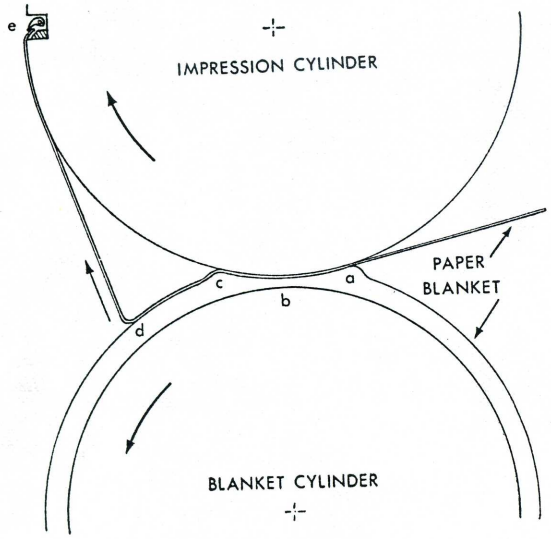

Fig. 2—Schematic diagram of the printing and peeling zone of an offset press

extensibility. Page and Tydeman[5] showed, by the polarised vertical illumination method with specially dyed papers, that 21, 34 and 43 per cent of the surface bonds were broken by one, two or three folds, respectively; Jackson and Truman[16] have recently verified and extended their results.

In the printing of paper by a rotary offset lithographic process, Borchers and Bruno[6] suggested that bending of the paper actually occurred in the printing cycle. They suggested in 1958 that, when paper is printed on an offset press (Fig. 1 and 2), the paper enters the nip and passes between the blanket cylinder and impression cylinder (*a–b*) and there is then a sudden build-up of pressure that compresses ink, paper and blanket. As the paper passes the centre of the nip (*b*), the compression forces are reduced and finally released at the end of the nip (*c*). The paper, however, still clings to the blanket between the points *c* and *d*. Tension forces are then developed in the ink, paper and blanket when the grippers (*e*) pull the paper from the blanket. Borchers and Bruno suggested that the main factors determining the length *c–d* are the ink tack and press speed at which the paper is stripped from the blanket. Other factors include the printing pressure and time of dwell from *a* to *c*.

Truman and Hudson[7] showed that the stresses on paper surfaces during the splitting of ink films were dependent not only on the speed of peeling and the ink viscosity, but also on the smoothness of the paper. The viscosity velocity product (VVP) might not, therefore, be as reliable a guide as had been supposed to the actual forces on the surface of the paper. For angles of peel greater than 25°, stress concentration caused the bend to change from a smooth line to a sharp one, resulting in broken bonds and curl. This might cause a greater tendency to picking in later printing processes.

Experimental work

Our studies have mainly been concerned with the peeling process during offset printing, together with the effects of purely mechanical bending.

We photographed the peeling process, using a high speed ciné camera, through a hole made in the side frame of the press. Measurements of angle of peel (φ) and sheet position were made from the ciné film by fixing a rotating degree scale to the side of the blanket cylinder and a stationary degree scale zeroed on the nip. This was done both by calculation and projection.

A view of the camera and press in the filming position is shown in Fig. 3. The actual peeling process is shown in Fig. 4. A value for the radius of curvature of the bend at the point of peel was found from an 8.5 × actual size enlargement of this photograph shown in Fig. 5 (magnification × 1.7 as printed). The radius was found to be 0.9 mm.

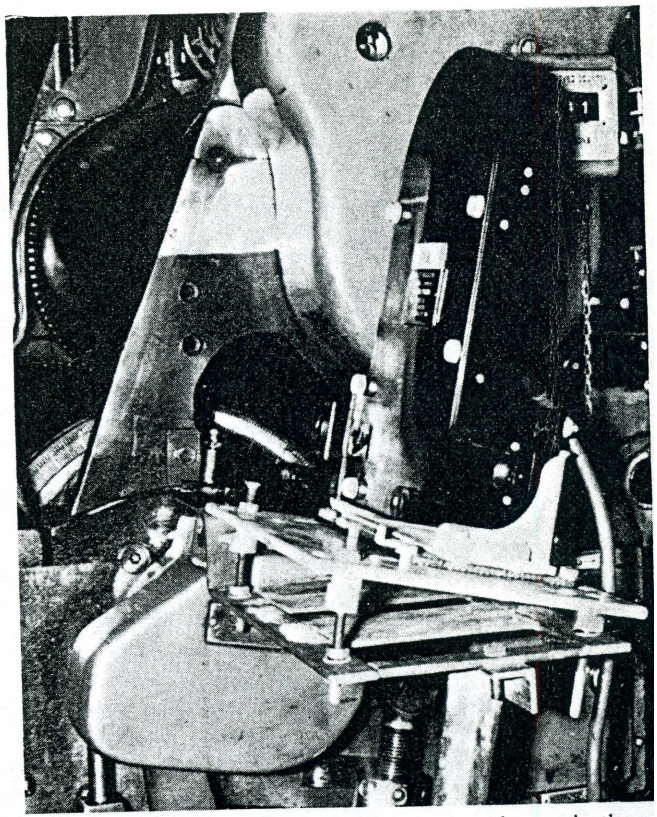

Fig. 3—View of a high-speed ciné camera and press in the filming position