

▷ bending beams, particularly in the case of steel or hard brass plates. The high pressure necessary to produce sharp bends on this type of plate causes the beams to deflect, resulting in increased radius towards the centre of the plate.

Wear of bearings and mechanism occurs, spoiling the correct relationship of bending beams and table. Frequently the design and engineering quality of bending machines is not up to the standard required for colour printing, leaving many problems for the printer to solve.

Many machines have no guards and a multiplicity of operating handles, providing many opportunities to trap or crush unwary fingers.

Precision bender

A plate-bending machine must be equipped with a rigid retractable pin system, interlocked with the bending beam to prevent accidental damage through operation of the beam without retraction of the pins.

In order to generate the necessary forces to clamp and bend all types of plates, and to ensure uniformity regardless of operator, power operation is desirable. All working parts should be enclosed and the operator protected by an adequate system of guards.

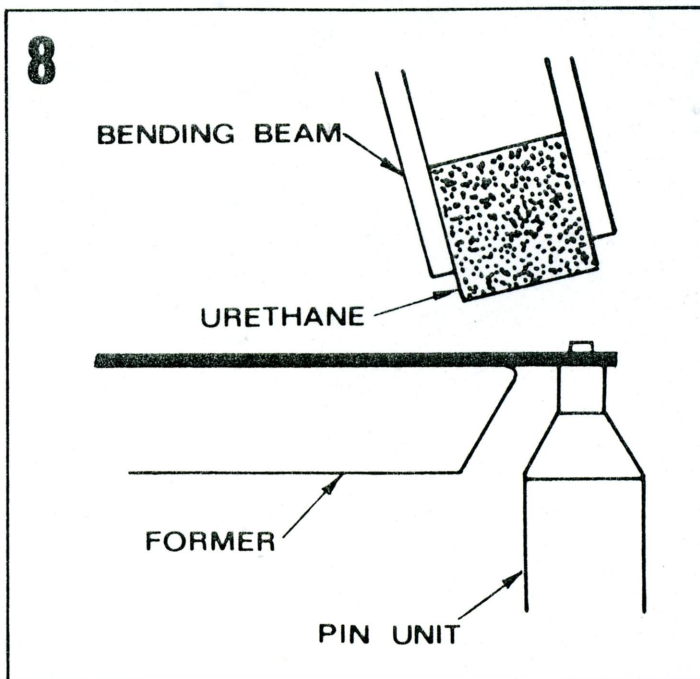
The formers must be accurately ground with hardened surfaces adequately protected against corrosion.

The bending beams and table must be strongly engineered in order to compress the plate into intimate contact with the formers, producing an accurate and consistent bend. The machine should have the ability to cope with a range of plate materials and thicknesses without adjustment.

A significant advance in the technology of plate bending was the method of metal forming introduced and patented by the British company Protocol Engineering Ltd in 1974.

With this technique the conventional metal bending beam is replaced by a beam with a hollow box at its base, containing a strip of urethane approximately 25mm square.

Urethane is a rubber-like material, extremely resilient and possessing the property of returning to its original shape



after being compressed thousands of times. It is also extremely resistant to abrasion.

Its use allows enough pressure to be exerted to force the plate into intimate contact with the former without harming the printing surface. The resilience takes care of any deflections within the machine and produces a consistent bend across the width of the plate.

The single strip of urethane performs the dual function of clamping the plate and forming the bend. The sequence of operation is as follows:—

Fig 8 Plate located to register pins.

Fig 9 Bending Beam lowers clamping plate.

Fig 10 Pins retract.

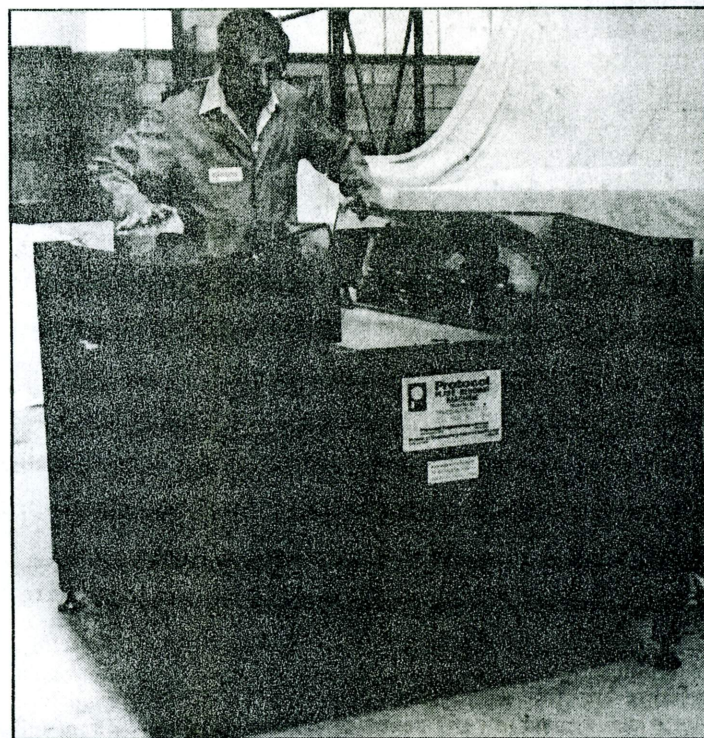
Fig 11 Beam rotates, forming bend.

Fig 12 Beam returns to vertical.

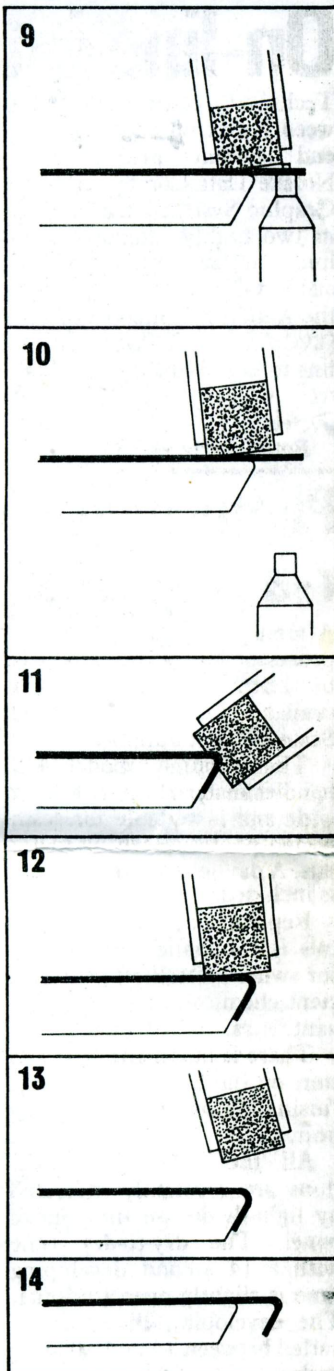
Fig 13 Beam lifts clear of plate.

Fig 14 Former retracts to allow plate removal.

The machine is of enclosed construction and operates automatically, powered by compressed air. After the plate is



Protocol machine meets the required specifications.



located to the register pins both guards must be depressed by the operator to start the automatic sequence. Once the sequence commences, the guards are locked down until the operation is complete.

More elaborate versions of the machine are available, capable of producing the more complicated plate bends used on some modern presses.

Technology of this type is inevitably costly. Almost every machine has to be custom-built owing to the absence of any standardisation among press manufacturers and the variety of cut-offs available even on a standard press.