"ABSOLUTE PRECISION" AT HOLMBERG INC. IS FULFILLED WITH *Piece-Maker.* PRESSES

Dual in line lead frame is typical of high precision. Holmberg designed and built high speed production progressive carbide dies to stamp this strip, including forming, in a single operation. Dies and precision of the Piece-Maker press holds lead location and flatness to exacting specifications. Material is .010" thick.

Integrated Circuit Lead Frame Production is combination of exceptional toolmaking capability and use of precision straight-side presses

Holmberg Inc., Melville, New York, is a manufacturer's manufacturer. A long run, high production stamper, their specialty is close tolerance, custom stampings in miniature and medium sizes from .0005" to 1/8" stock thickness. A 68 year old firm, Holmberg is headed by the third generation of a family brought up in the Swedish tradition of its founder, August W. Holmberg. This company designs and builds some of the finest tools and dies and with them, produces the ultimate in precision parts. Complex electronic parts make up about 60% of their total business volume. Lead frames, the thin, close tolerance metal parts used to package tiny integrated circuits used in computers and other sophisticated electronic systems account for 15% of their volume.

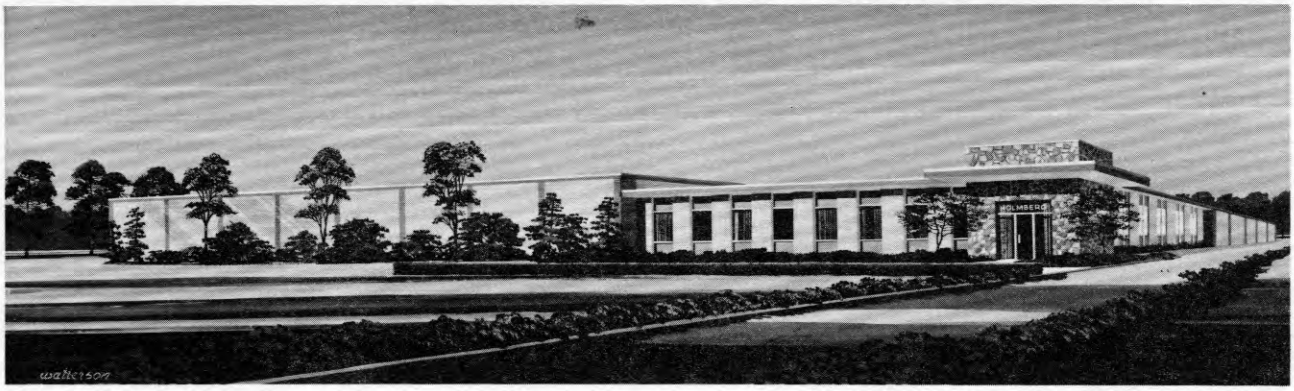
Holmberg Inc. is located on a four acre site on Long Island, an hour's drive from New York City. The beautiful 5 year old shop is equipped with the very latest tool,die-making and stamping equipment. While this firm relies on its own abilities to produce extremely precise, carbide, progressive dies, it relies on Minster P2 Piece-Maker presses to turn out the intricate lead frames at high speeds with exact uniformity and accuracy.

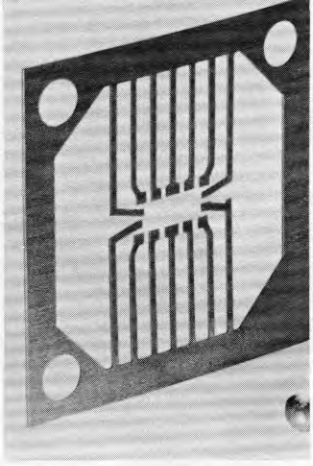
Lead frame production is centered on a P2-60 and two P2-30's because, according to Bud Holmberg, president, the absolute precision required can only be obtained with a Minster P2 press. He cites the features of the Piece-Maker which allow them to do the "impossible" as follows:

1. The precision of the P2 with its extremely close bearing and gib clearances
2. Unequalled slide to bed parallelism due to effective slide guiding design
3. Rigid straight-side construction which eliminates vibration at high speeds
4. Excellence of feed equipment
5. Consistent, day-in, day-out production without maintenance problems
6. Electrical controls and Combination Clutch and Brake

One of Holmberg's P2-30 presses is five years old and it has been down only two days for maintenance since it was installed. Its exceptional success in producing the intricate lead frames and its outstanding die life record, led to the purchase of another P2-30 which was delivered in October 1968.

This second Piece-Maker is identical to the first except for a shut-height meter and the feed. It is equipped with a Littel 3-4 cam driven roll feed mounted on the left





Stacked flat pack lead frame

Integrated circuit lead frames

Atmospherically Controlled Metrology Lab, (held to 69°±1°) houses array of fine quality control instrumentation for rigid checking in millionths of an inch. Optical Comparators such as this one are used in the lab and on the production lines to maintain constant control

end, feeding left to right. It has a timing belt drive. Feed length accuracy. . .a highly important factor in Holmberg's lead frame production, is ± .002" at 1200 ipm and ± .003" at 1500 ipm. (On this type of feed, higher accuracies are obtainable under controlled conditions to ± 0.0005.) Feed length is .945", the length of a single part. With this equipment, feed pitch remains constant as speeds increase.

The Minster P2-30 is operated at speeds from 280 to 300 spm giving Holmberg an average of 120,000 parts per 8 hour day.

Production of lead frames varies. They are produced in continuous coils, in stacks of flat or formed strips with one basic die. These parts are made from expensive glass sealing electronic grade alloys (ASTM F15 and F30) rolled and slit to exacting flatness and camber tolerances.

One look at the parts which Holmberg is making on these Minster Piece-Makers is enough to convince even the greatest skeptic that this press is truly a precision tool.