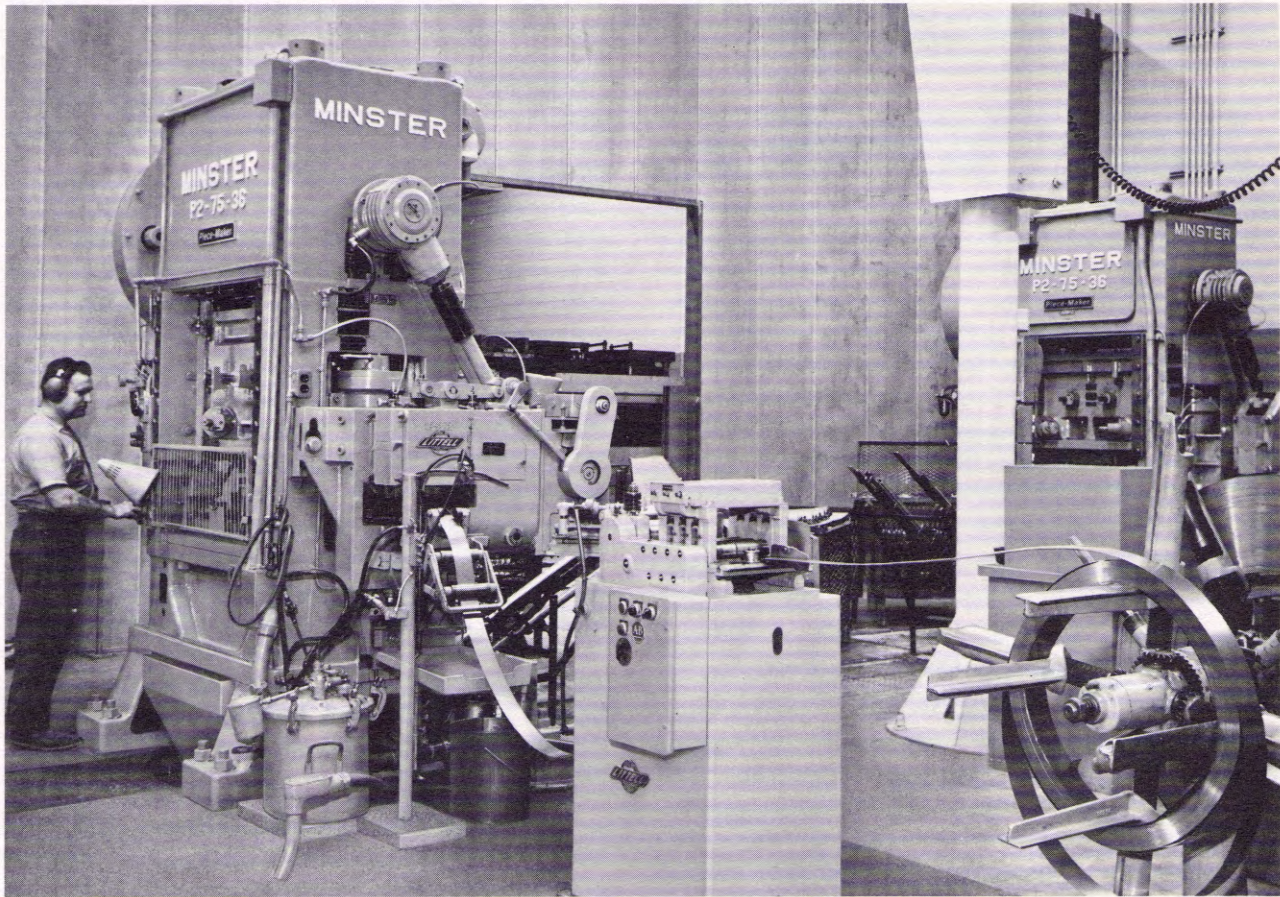


# Hoover Company doubled their motor lamination production speed with *Piece-Maker* lamination presses



Two P2-75-36 Piece-Maker Lamination presses are producing stator-rotor lamination sets at Hoover Company, North Canton, Ohio. The parts are used in electric motors that power several of the famous Hoover appliances. The first machine went into operation in April 1965. Its profitable production record led to the installation of a duplicate press in October 1968. Hoover more than doubled their production speed with these high precision machines and in the bargain gained greater parts accuracy and a whopping 1200% increase in parts per die grind!

## PREVIOUS OPERATION

Before they selected the first Piece-Maker Lamination press, Hoover manufacturing personnel were making stator-rotor lamination sets for electric motors on conventional automatic production presses equipped with roll feeds.

Dies were high carbon -- high chrome. Production speed on Hoover's "universal lamination" was limited to 215 spm by this type of press and feed and it was difficult to get more than about 80,000 sets per die grind. The precision and rigidity of these presses were not adequate for consideration of economical use of carbide dies.

## "MAKE OR BUY" STUDY

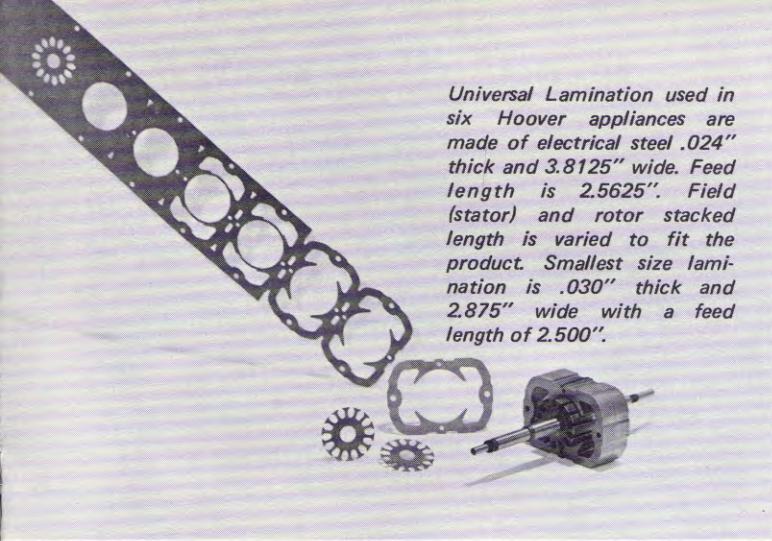
The purchase of new and better press equipment was essential to gaining more profitable production. There was, of course, a chance that laminations could be purchased from an outside source at a lower overall cost than purchase of new presses and dies for in-plant production. Hoover's policy is to conduct a "Make or Buy" study to see which route to take.

The "make" not "buy" decision required a press that had excellent rigidity and above average precision. It would have to be a machine constructed to hold up under constant high speed operation. The feed had to be exceptionally accurate and capable of matching the press speed. The planned use of high precision carbide progressive dies called for a press that would provide very good die life.

## MINSTER P2 SELECTED

In this case, it was found that making these parts on a Minster P2-75 Piece-Maker Lamination press would be the most profitable thing to do. Results of the study showed that this method should actually pay for the machine within a reasonably short pre-established pay-off period. Other values, such as inventory and quality control and scheduling freedom, contributed to the profitability factor of in-plant production.





Universal Lamination used in six Hoover appliances are made of electrical steel .024" thick and 3.8125" wide. Feed length is 2.5625". Field (stator) and rotor stacked length is varied to fit the product. Smallest size lamination is .030" thick and 2.875" wide with a feed length of 2.500".

Hoover Dial-A-Matic Upright Cleaner and Liquamatic Blender are typical of appliance products using these laminations in their electric motors.



### PRODUCTION SPEED DOUBLED

Today, the two Piece-Makers at Hoover Company are normally running at 450 spm on most laminations. Part accuracy is better. All dies are close tolerance, scrapless type. Full width of the electrical steel strip is used with one rotor and one stator lamination produced per stroke. The increase in parts per die grind provided by the new machine and tooling is exceptional. Instead of 80,000 sets, they now get over 1,000,000 sets between grinds. . . .12 times as many.

### PIECE-MAKER'S DESIGNED FOR LAMINATION PRODUCTION

To provide the increased accuracy needed for high speed, precision progressive die blanking and punching jobs such as electrical laminations, Minster builds P2 presses with even closer tolerances than standard Piece-Makers. The extremely close fits of bearing and guiding surfaces plus the slide to bed alignment provided by the Piece-Maker design makes high speeds possible.

These presses have slides which are equipped with a double adjusting Screw Lock-Up Arrangement which allows the ultimate in reduced clearances. Secondary combination worm gear-nuts are used to pull and lock all thread clearances out of the connection screws.

### ROLLER CAM FEED WITH FIXED FEED LENGTH

Another design feature that makes the Piece-Maker Lamination press the best buy is the fixed feed length feed. A roller cam feed, it has complete rotary motion and a positive, single roll feed drive. There are no reciprocating parts, no over-running clutch or roll brake device. It holds feed length accuracy to  $\pm .001$ " while feeding at a rate up to 1800" per minute. The lengths of the feed is absolutely fixed and will not change as speed is increased. The feed length is fixed by the roll diameter. Changing rolls for the next job takes only fifteen minutes.

*At Hoover Company both Minster presses face the same direction. Chutes for both stators and rotors come up from under the rear of the press at left and the front of press on the right. Coil is stacked on a roller conveyor and lifted to the double reels by a gib crane in the center.*

*Material passes through seven roll straighteners. All scrap goes through dies to an under floor belt conveyor running under both presses. It passes out of the room to an elevating conveyor which carries it out of the building to dump truck tubs.*

