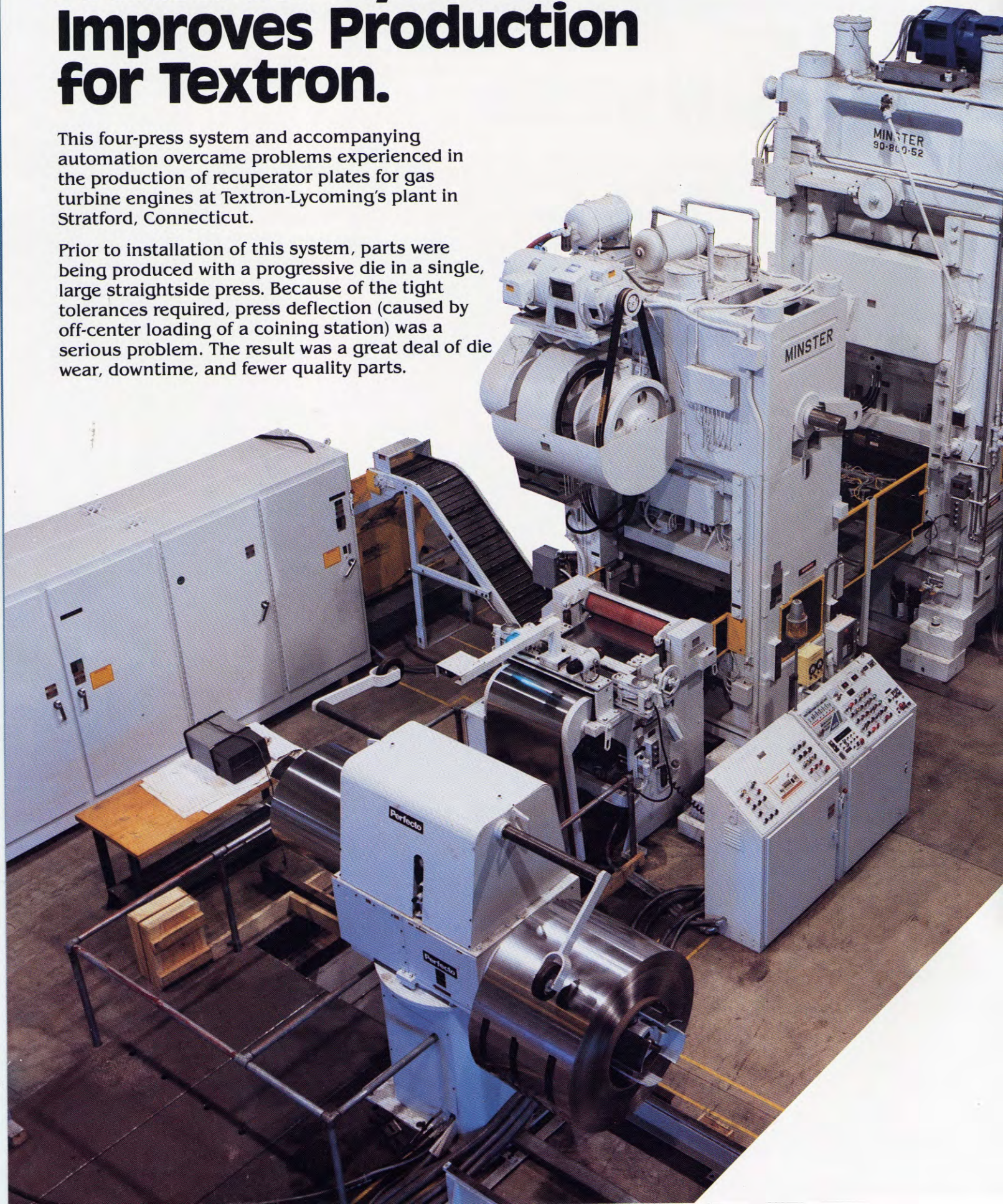
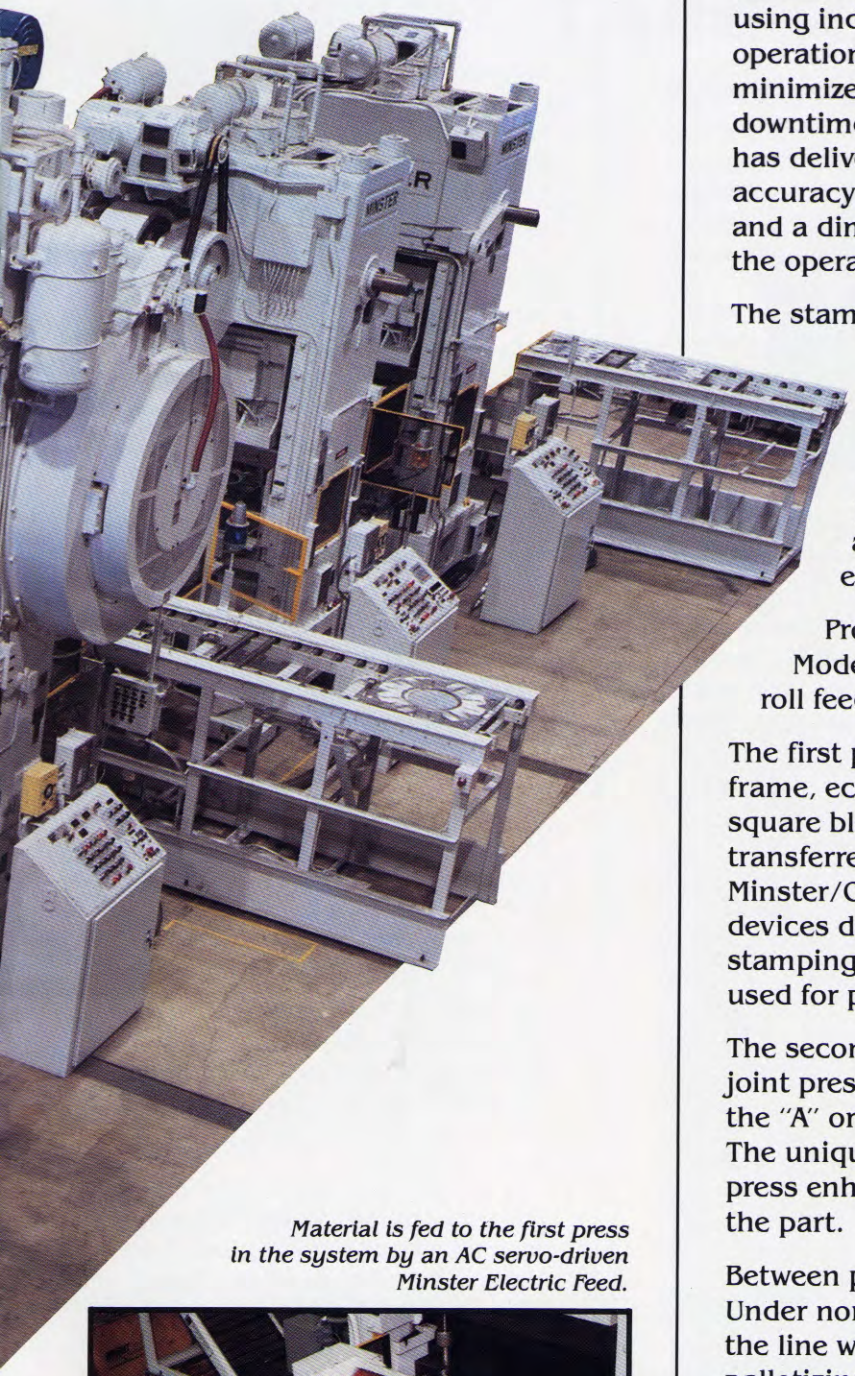
A Minster System Improves Production for Textron.

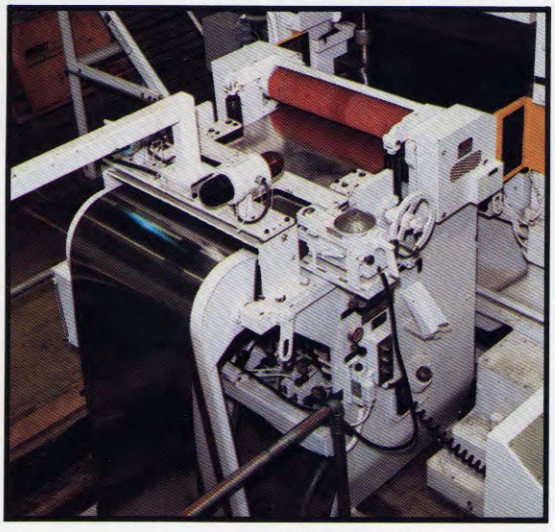
This four-press system and accompanying automation overcame problems experienced in the production of recuperator plates for gas turbine engines at Textron-Lycoming's plant in Stratford, Connecticut.

Prior to installation of this system, parts were being produced with a progressive die in a single, large straightside press. Because of the tight tolerances required, press deflection (caused by off-center loading of a coining station) was a serious problem. The result was a great deal of die wear, downtime, and fewer quality parts.





Material is fed to the first press in the system by an AC servo-driven Minster Electric Feed.



Textron's search for a solution brought them to Minster. After studying production requirements of the job, Minster's Systems Group recommended an approach using individual presses and carbide dies for each of four operations performed on the part. This, it was felt, would minimize deflection, produce a more consistent part, cut downtime, and result in prolonged die life. The system has delivered these benefits to Textron. In fact, the accuracy of the system resulted in a much reduced burr and a dimensionally improved part, actually enhancing the operating efficiency of the recuperator itself.

The stampings involved are made from .008" thick Inconel material and are approximately 27" in diameter.

"A" and "B" parts are produced on the same system and are differentiated by the coining pattern on the part. Stacks of "A" and "B" parts are interleaved to create, essentially, a heat exchanger for gas turbine engines.

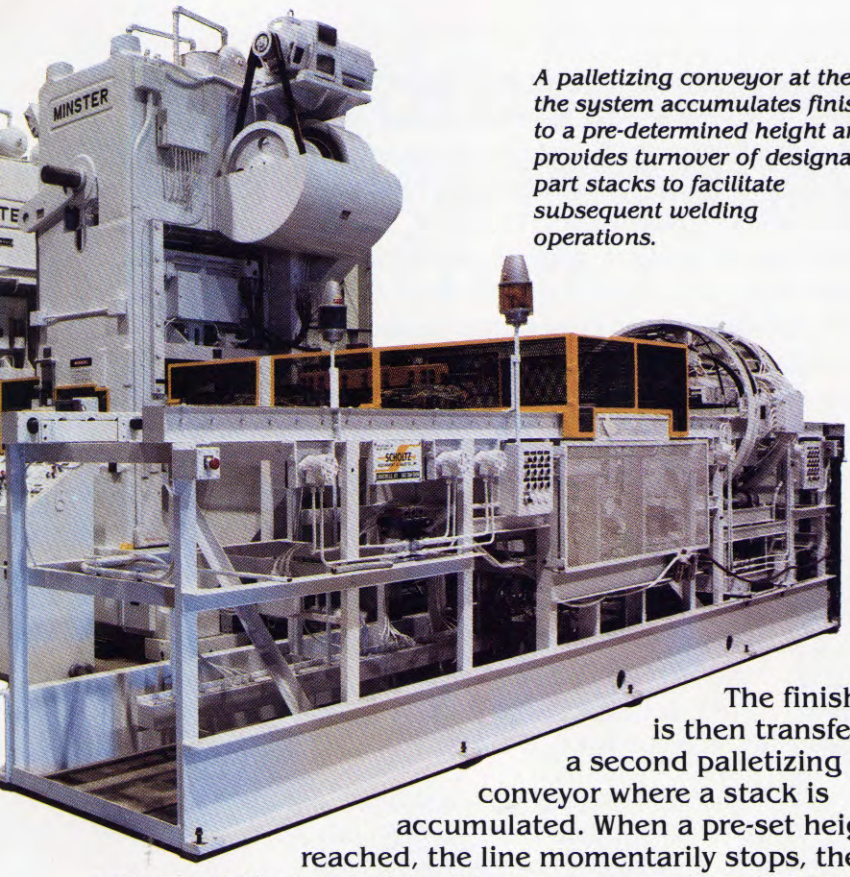
Production begins with a double uncoiler and a Model 6-32 Minster Electric Feed (an AC servo driven roll feed). The feed length is 27.475".

The first press in the system, a Minster P2-200 cast frame, eccentric shaft straightside press, creates a square blank. From this point on, the parts are transferred from one operation to the next by Minster/Orii Robots. These units are two-axis, cam-driven devices designed specifically for the movement of stampings between press operations. Vacuum cups are used for part pick-up.

The second press is a Minster 90 Series, 800-ton knuckle joint press which coins the pattern in the part . . . either the "A" or "B" pattern, depending on the part being run. The unique bottom-of-stroke dwell of the knuckle joint press enhances the forming of a consistent pattern in the part.

Between presses two and three is a palletizing conveyor. Under normal production conditions, all four presses in the line would be operating. However, with the use of this palletizing conveyor, presses one and two can maintain production while presses three and four are down for routine maintenance. Semi-completed parts are banked in the palletizing area. Then, if presses one and two are shut down for maintenance, the balance of the line can draw parts from the palletizing area and continue production.

The third press is another P2-200 which blanks the openings in the part other than the center hole. Press four, again a P2-200, makes the final trim. The scrap from the trim is picked up by the last robot, along with the part. When the part is transferred to a round intermediate table, the scrap falls and is conveyed away.

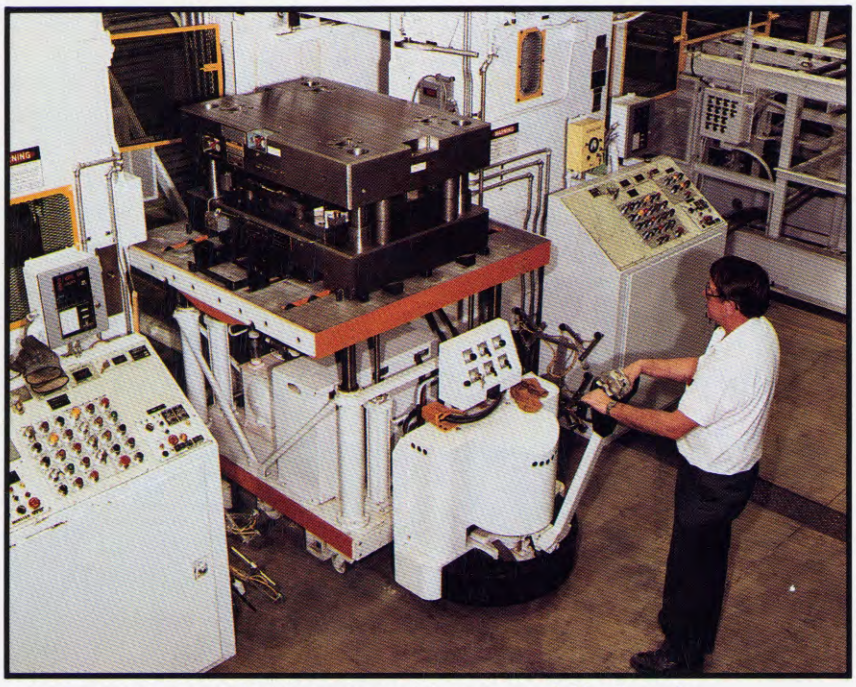


A palletizing conveyor at the end of the system accumulates finished parts to a pre-determined height and also provides turnover of designated part stacks to facilitate subsequent welding operations.

The finished part is then transferred to a second palletizing conveyor where a stack is accumulated. When a pre-set height is reached, the line momentarily stops, the full pallet is shifted out of position and an empty pallet is brought into position.

The system provides quick die change to suit Textron's requirements. Dies in presses one and two are changed from a position between these presses. The same applies for presses three and four.

The Minster/Orii robots between these presses are mounted on rails. When a die change is required, they can be rolled out of the way to facilitate the change.



A self-propelled, mobile die cart provides powered die changing.

All presses in the system incorporate hydraulic die clamping. A specially designed, self-powered die cart was developed for powered die removal and insertion. It can be located between presses one and two, or between presses three and four, as required. Complete die change of a press typically takes 20 minutes.

Controls for the line consist of nine Allen Bradley programmable controllers. Integration of the controls for the various pieces of equipment in the system was performed by Minster.

Set-up and prove-out of the system was performed at a dedicated facility at Minster. Before the system could be shipped, Textron required completion of a preliminary 16-hour production run at a minimum 60% efficiency. Included in this measurement was downtime for coil changes and die change from "A" to "B" parts. Minster completed the run at 78% efficiency. After the parts from this run passed Textron's quality checks, Minster completed a sustained production run that included training for Textron personnel. Over 400,000 parts were produced during this run, at an 82% efficiency.

Minster can offer you single-source responsibility, drawing from a broad experience base. We can provide the press and automation equipment best suited to your production needs, integrate these pieces into a working system and test your system in production at a facility dedicated to this purpose.

For more information on Minster Systems, ask for **Bulletin 113**, or contact your Minster Representative.