GREENERD

INVESTMENT CASTER REDUCES SETUP TIMES, INCREASES OUTPUT, AND IMPROVES QUALITY WITH HYDRAULIC PRESSES

A large New England investment caster found that it could reduce setup times, increase output, improve quality, and increase supervisor productivity by moving straightening jobs which had been done on mechanical presses with heated fixtures to touch screen-controlled hydraulic presses from Greenerd Press & Machine Company.

Distorted Castings Are Straightened on a Press

The investment casting process involves pouring red-hot molten metal into specially prepared molds. Once the metal has cooled and hardened, the molds are broken away by hand and the cast parts undergo a series of processes to remove any ceramic scale and create a final finish. The high temperatures involved in the manufacturing process and minor variations in the mass or shape of the metal can cause castings to distort or warp as they cool. Consequently, investment casters must sometimes straighten castings to meet their exacting specifications. In the past, this company — a large New England caster — used primarily mechanical presses with specially heated fixtures to straighten castings.

Mechanical Press Setups Can Be Difficult and Time-Consuming

Setups and changeovers on mechanical presses are often a slow tedious process of trial-and-error.

Special fixtures must be designed and test parts run and sent to QC for inspection. If parts meet specifications, the job is ready to run. If the parts do not conform to specs, press tonnage and fixtures are adjusted and additional parts are run and inspected.

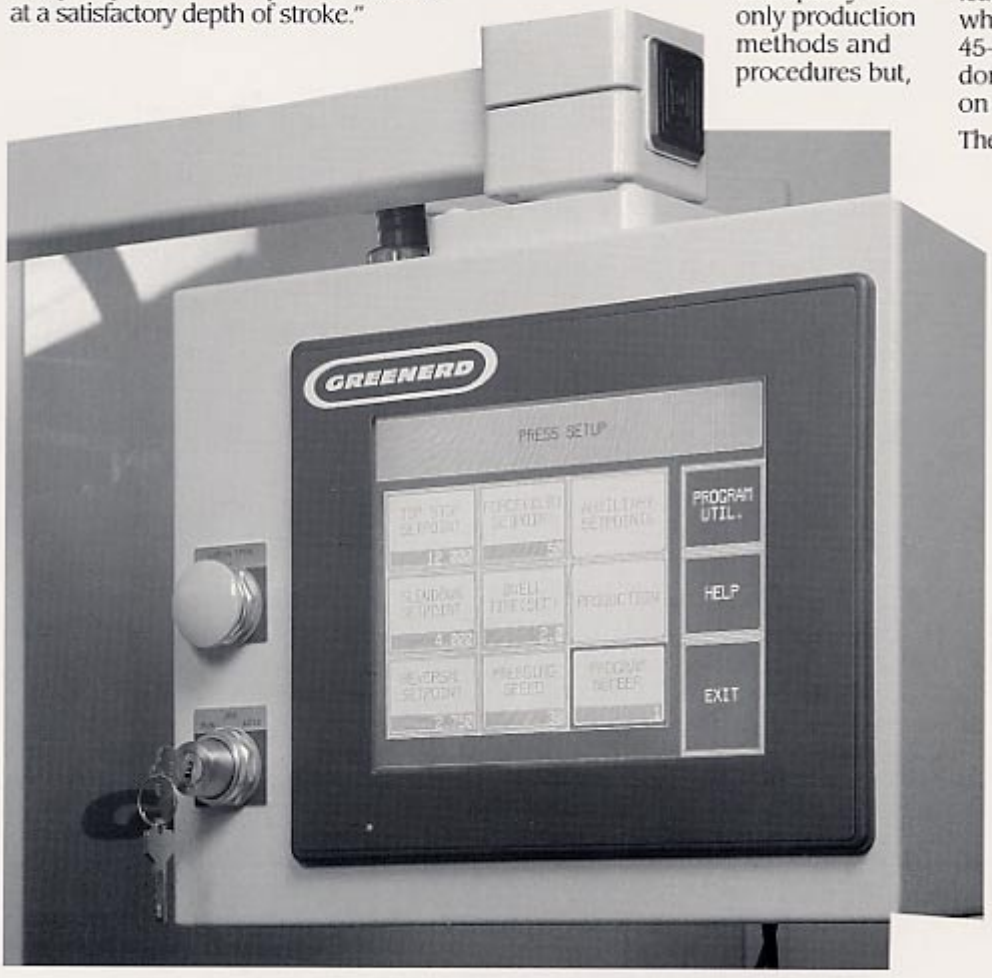
Press and tooling adjustments are made manually and can take as long as 1 to 2 hours per pass. Depending on the complexity of the part and the workload in the QC Department, the inspection process can take anywhere from 15 minutes to several hours. A typical setup on a mechanical press requires 2 to 4 rounds of adjustments and part submissions to QC.

A lead technician in the company's Finishing Department observes that the design and nature of mechanical presses make them difficult to set up. Stroke depth can only be adjusted within the narrow limits of an adjustment control. In some cases, this range is insufficient, and in other cases, the accuracy is not great enough. He comments "In many cases, we end up using "kiss blocks" to get the accuracy we need. Adjusting the depth of stroke means sending the blocks to the machine shop to be ground or machined. Turnaround ranges from a few hours to a few days depending on how busy they are. Typically, each setup requires several passes to arrive at a satisfactory depth of stroke."

The lead technician also observes that many of the setup parameters on a mechanical press are difficult, if not impossible, to quantify, so the process of making adjustments becomes a guessing game. He quips, "It's difficult to tell exactly how hard we're hitting the work on a mechanical press. It's tough to fine tune tonnage if you're not sure what it is. And, it's almost impossible to duplicate it at a later date with any level of precision. When you factor in subtle variations like the hardness of the metal, it becomes a nightmare." Consequently, every setup is unique and most are very time-consuming.

Empowering Employees to Solve Problems

The company's business philosophy is very apparent on the production floor. Production managers, supervisors, and lead technicians are given a high degree of latitude and authority to solve production problems. This often translates into the freedom to select and specify not only production methods and procedures but, in many cases, production equipment. In fact, most of the tooling, fixtures, and jigs used on the company's production floor were designed and, in some cases, built by supervisory personnel or machine operators.



Expanding the Role of Hydraulic Presses

Frustrated with the difficulty and delays of setting up the mechanical presses, the Finishing Department supervisor and lead technician began experimenting with hydraulic presses and unheated fixtures. The results were very surprising.

The supervisor and lead tech found that, as a result of the adjustability of hydraulic presses, parts came out as good or better on a hydraulic press without using heated fixtures. As a result, the company eliminated the expensive, time-consuming heating process and began moving jobs which had been done on mechanical presses to hydraulic presses. With more experimentation, the supervisor and lead tech even found that several jobs which had previously been done on a 45-ton mechanical press could now be done with the same or better result on a 15-ton hydraulic bench press.

The lead tech comments, "We have a couple of jobs that we had been running on a 45-ton mechanical press that we ended up running at 6 tons on the hydraulics." He suspects that the excessive force of the mechanical press may have actually introduced unnecessary stress into the metal parts, creating the need for additional processing.

Touch Screen Control Allows Faster Setups and Changeovers

In 1993, the company purchased a 10-ton hydraulic bench press from Greenerd Press & Machine Company, Inc. of Nashua, New Hampshire. This press was identical to one the company had purchased several years before, except that it had a touch screen control. Comments the lead tech, "At first we didn't realize what we had here. We liked the idea of the touch screen, but we really didn't understand how easy it would make life."

The touch screen allows the lead tech to set up a job quickly, fine tune press settings for optimum results and maximum speed, and then store the job in the control's memory for future runs. The lead tech comments, "Once we've tweaked the press parameters initially to get them just right, we can set up the same job in seconds, even if its days, weeks, or months later. We can also fine tune the settings in no time to compensate for slight changes in specifications or variations in the hardness of the metal, temperature, etc.

Adjustments Are Precise and Predictable

Unlike those on mechanical presses, adjustments on touch screen control-equipped hydraulic presses are fast, easy, precise, and predictable. The control displays not only stroke settings, including tonnage; top stop; slowdown; reversal points; and dwell time, but all important actual stroke measurements. Armed with precise measurements for actual stroke parameters and the ability to change those parameters at the touch of a finger, an operator can fine tune press setups in minutes.

The Finishing Department supervisor comments, "The touch screen control eliminates 98% of the guesswork you have with the mechanical presses. It gives you values for actual stroke parameters and lets you change stroke settings in seconds."

The lead tech notes that the control's "auto setpoint" feature allows the operator to easily establish noncritical stroke parameters such as top of stroke and slowdown setpoints visually. The operator simply jogs the press to the desired position, selects the setting parameter, and selects auto setpoint. The control then automatically stores the actual position as the setpoint for that parameter, eliminating the need to take measurements.

Setup time for the hydraulic presses is typically 5 minutes versus an hour and a half or longer for the mechanical presses.

100-Program Memory Speeds Repeat Setups

Once an operator or supervisor has perfected a setup, he can save it in the control's 100-program memory for repeat runs of the job. Setups of repeat jobs require only seconds to call up the stored program/settings. Last minute fine tuning adjustments can also be made in seconds and stored for future use in the control's program library.

Notes the lead tech, "The touch screen drastically shortens repeat setups. It is consistent, repeatable, and predictable. Consequently, it reduces the number of parts we need to submit to get QC approval to an absolute minimum and saves us a lot of time and money."

One of the Greenerd bench presses has a precision depth stop which accurately controls depth of stroke to within 0.001", eliminating the need for "kiss blocks" and the time required to machine them.

In many cases, the ability to fine tune stroke settings and the exceptional repeatability of the touch screen control eliminate the need for kiss blocks or other tooling modifications altogether.

Increases Supervisor Productivity

The Finishing Department supervisor also likes the high degree of staffing flexibility the control provides.

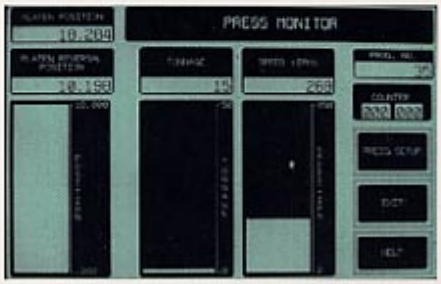
The simple, menu is so easy-to-use that, in many cases, the operator can do his own setup, freeing supervisors or lead technicians to focus on more demanding tasks. "The control lets us do most, if not all, of our setup work during the day shift and gives us the confidence that if a job is run a night, the results will be consistent and predictable."

Faster Setups Mean Greater Productivity

The supervisor and lead tech are now firm believers in the productivity benefits of the touch screen control.

Explains the lead tech, "Most of our workers are paid on a piecework, incentive basis. When they first saw the hydraulic press in action, it seemed somewhat slow compared with the mechanical presses. But when they saw that they could remove their hands from the palm buttons on the upstroke, they realized that they could load parts faster. Plus, we can adjust the top stop significantly on a job-by-job basis to eliminate unnecessary ram travel. This improves cycle times and increases productivity.

The supervisor says that the touch screen control even helps him in establishing fair and accurate piecework standards. It has a built-in counter and timer and automatically calculates cycles per minute. He notes, "This is information that we used to collect manually with a stopwatch and clipboard. Now all we have to do is tap the touch screen and it's there."



Plans to Add More Hydraulic Presses

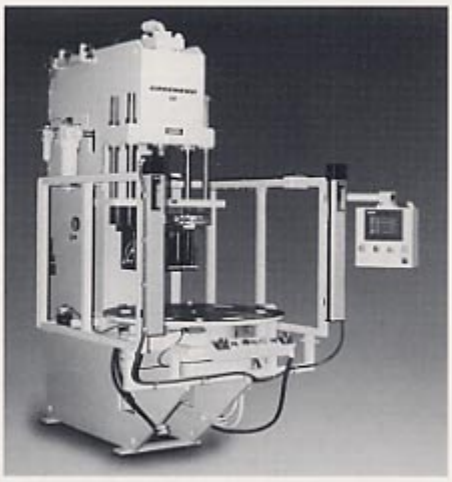
The supervisor, lead tech, and the company's management are enthusiastic about adding more Greenerd presses. "If the presses and touch screen had merely met our expectations, we would have been happy. But it exceeded our expectations on every count," notes the supervisior

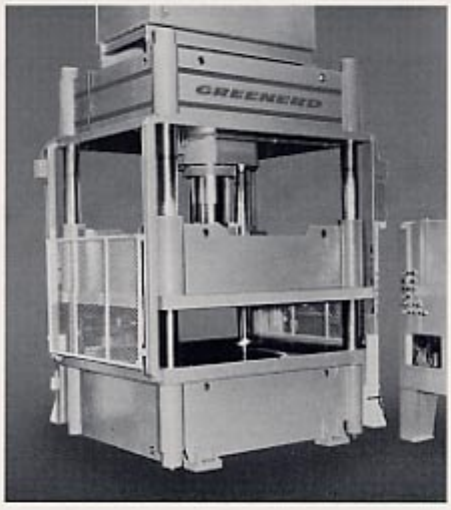
The company plans to replace several older mechanical presses with touch screen-equipped hydraulic presses and to retrofit some newer presses with touch screen controls. The lead tech comments, "We have a long and excellent history with Greenerd presses, and the new presses with touch screen controls have started us thinking about all kinds of opportunities to increase productivity."

The supervisor and lead tech are currently evaluating several options including expanded memory/program storage for the touch screen control, safety options such as light curtains and PSDI, and process automation possibilities such as automatic feeders and rotary tables.

A press equipped with a light curtain and momentary contact is under serious consideration. The press will allow an operator to start the stroke cycle using dual palm buttons and then remove his hands to grab another piece for loading. If anything breaks the light curtain, the press stops immediately. Says the supervisor, "It's a great idea. It meets all our safety requirements and improves productivity."

The company is also considering the purchase of a larger Greenerd press with a precision servo system which will control stroke position to ±0.001".





About Greenerd

Greenerd Press & Machine Company, Inc., has been designing and building the world's finest hydraulic presses for over 60 years.

Greenerd offers a full line of hydraulic presses with bed sizes up to 10 feet wide and capacities to 600 tons, including:

- Bench presses
- OBIs
- C-frame presses
- Straight-side gib-guided presses
- Four-post presses
- Shop air-powered presses
- Specialty presses

Presses can be equipped with a wide range of safety-, productivity-, and accuracy-enhancing options including:

- Touch screen controls
- Precision servo systems
- Precision depth stops
- Light curtains
- PSDI
- Rotary tables
- Automatic cycle
- Dwell timers
- Heated platens.

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Since 1883

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