# Know Thy Hydraulic Press, and Thy Customer

**Here are tips for metalformers looking to invest in a hydraulic press, and for those seeking advice on how to keep their hydraulic presses running in tip-top shape.**

BY BRAD F. KUVIN, EDITOR

Healthy hydraulic presses run cool, have no leaks and get up to pressure quickly, according to advice offered by representatives from press builder Greenerd Press & Machine Co., Inc., Nashua, NH. For example, it's a good sign if it takes ½ to 1 sec. to build up the maximum required pressure, and if it takes more than 2 to 3 sec., you're likely looking at a problem with the pump, relief valve or motor.

Preventive-maintenance features, as well as remote diagnostics, scored high on the checklist designed for hydraulic-press users provided by officials from another press builder, Neff Press, St. Louis, MO. They often recommend that metalformers outfit hydraulic presses with sensors that can warn of tool wear, or trigger other preventive-maintenance tasks. For example, sensors can measure draw tonnage at a particular stroke length, and if tonnage readings exceed what's expected, tools may need sharpening.

Measuring draw tonnage also can alert the user to variations in raw-material properties—strength or thickness—and allow adjustments to be made before unacceptable parts are formed. With this type of feedback, the metalformer can perform quality assurance on the part while it's in the die and eliminate downstream QA. Neff sees these features being included on some 20 percent of the new presses it builds, and expects continued growth to where at least half of all new presses will carry quality-assurance accessories.

## Know Thy Customer

Other key recommendations for metalformers running hydraulic presses include gaining a full appreciation and understanding of the customers' business plans for the future, to ensure selecting the right press design and functionality; and investing in a tool runoff on the press suppliers' floor before shipping the press.

Understanding how the press will be used, and the types of work it will be required to perform, helps ensure that the metalformer specifies and receives the best press for the job. Presses can be dedicated, designed to run perhaps just one or two tools, or more versatile. Neff officials report seeing a lot of metalformers replacing their aging full-revolution mechanical presses with hydraulic presses, 40 tons and below that can run at speeds to 100 strokes/min. Why? Primarily due to added flexibility gained from having full tonnage available anywhere in the stroke of a hydraulic press.

If metalformers run a variety of tools, or believe that their customers will someday require them to, then a hydraulic press offers that capability. As an example, consider short-run stampers that use die stops over multiple die sets. With a mechanical press, if the shop sets the shut height improperly, the press can stick, or trip the hydraulic overload. But with a hydraulic press, there's no need to adjust shut height. Rather, the process relies on stops in the die, and ram reversal when a specific tonnage is reached.

It's also critical to try to predict the likelihood of off-center-loading applications, and to then properly specify the press design to prepare for those conditions. Here, press frames and slide guides can be modified to ensure robustness.

## Prepare for Assembly and other In-Press Jobs

Besides metalforming functions, many hydraulic-press users eye their presses for assembly. This requires careful press-frame specification to ensure enough area and volume inside the press to do the work. This might seem obvious, but if you don't carefully look at your business model and consider the types of jobs you expect to go after, you can easily under-specify a press in terms of versatility and functionality.

In addition to the physical dimensions of the press—daylight, throat and


Regularly scheduled preventive maintenance on hydraulic presses should include (top to bottom) checking for loose wiring, inspecting the air filter and greasing the guide rods.

stroke—metalformers must also account for control functionality. Here, it's critical to know your employees and their skill level. The primary function that Neff officials see confusion on is shut-height control. People expect that the ram of a hydraulic press will reverse at a fixed point, as does a mechanical press. But that is rarely true—instead, the press can be set up for a tonnage reversal or reversal triggered by the use of stop blocks, often the simplest and most reliable procedure.

Reversing on tonnage is the way to go when performing in-die staking, because the combined thickness of the assembly will vary due to tolerance stackup. Therefore, to ensure consistent quality it's best to allow resistance to trigger the ram return. The same principle applies to in-die assembly.

Mechanical stops to trigger ram reversal get the call for stamping, drawing and punching work. In punching operations, metalformers should set die stops slightly below where the tool punches through, to prevent the ram from lunging after it pierces.

For stampers performing short-run drawing operations, particularly at relatively high speeds, and not reversing on blocks, hydraulic-press builders recommend the use of servo-hydraulic presses. These systems offer enhanced control of tonnage and blankholder force, and can even vary blankholder force based on ram position. To illustrate the benefits of improved control of blankholder force, Neff says that servo-hydraulic systems can control the force to within 2 percent or so, compared to a traditional hydraulic system that allows perhaps four to five times that much variation in force. That improved control can make the difference between tearing a wall or successfully forming a part. And, more accurate control of blank-holding force may allow the stamper to perform a deeper draw in one setup, rather than running through multiple reductions in a series of die stations.

## Key Maintenance Issues: Oil & Electrical

Carl Jean, service manager at Greenerd Press & Machine, suggests keeping press oil in new condition—a relatively simple task for extending the life of a press. Low oil levels or dirty oil will reduce press life.

Oil temperature can be maintained at or near 120 F by air or water coolers. Probes are inserted into the oil reservoir and temperature is maintained by the use of a thermostat. Air coolers use a radiator to separate the heat with the use of an electric fan moving the air through the cooler. Keep the radiator clean, as it tends to collect dirt and dust in the vanes, preventing optimum airflow. Use a filter, such those installed on HVAC units, on the heat exchanger to keep the unit clean.

Water coolers work similarly, except that water travels through the vanes. Running city water through an exchanger could be expensive and will tend to rust the inside of the exchanger. Also, many municipalities discourage the use of city water in such applications.

Perform inspections yearly. Rooftop-mounted units tend to collect dust and dirt, which can clog the exchanger

and cause rusting. Again, inspect this equipment yearly. Placing a filter in line helps remove any fine particles. Water chillers are the best means of dissipating heat because the inlet temperature can be adjusted; antirusting agents also can be added to the water.

The next step in good maintenance is oil sampling on at least a yearly basis. Results can indicate when to change filters. From this sample users can tell how many particles of different sizes are in the oil, if the oil has water in it, as well as the lubricity. In most cases stampers need not change the oil, and instead can mix in specific additives.

Oil sampling can help determine if the oil filters are being changed at proper intervals. Operators also can tell from the results if the correct micron level of filtration is being used. This step is particularly critical when operating servo-hydraulic presses, as any degradation in oil quality can shorten the life of the servo-system components. Servo-hydraulic systems require a filtration setup notably higher in quality than that of a standard hydraulic press. While simple hydraulic systems only require code 10 filters, which result in a cleanliness level of 20/18/15, systems with proportional or servo valves require code 03 filters, with a cleanliness level of 16/14/12.

## How to Care for your Press

Carl Jean, service manager at Greenerd Press & Machine, offers the following daily maintenance checklist to help metalformers keep their presses at the top of their game.

- ✔ Check for oil leaks. Tighten any loose fitting and wipe clean any spilled oil. Keeping a press clean will assist operators in locating any new leaks that might develop.
- ✔ Check the oil level. If necessary, top it off. Determine the type of oil needed by referring to the oil tag affixed to most machines.
- ✔ Check for loose bolts. Look around the tooling area because some dies can cause vibration and shock that can loosen bolts.
- ✔ Check lubrication on guided platens. Some bushings have fittings that should be greased to keep a small film of lubrication over the rod. Avoid over-greasing, as this allows dirt to accumulate and cause premature bearing wear. Other bushings have a check-valve-type fitting, with graphite impregnated into the bronze. These bushings require very little maintenance. The use of Mobil Viscolite or similar is best, but only a small amount is needed to spread the graphite onto the rod, coating the rod black and somewhat dry. Never put grease into this type of bearing.
- ✔ After the machine has had time to warm to operating temperature, check the oil temperature (ideal temperature is 120 F).
- ✔ Check the press ram to ensure it is moist but not dripping oil.
- ✔ If applicable, check the light curtains. Simply break the beam while the ram travels down–the press should stop immediately. Breaking the beam on the upstroke may not stop the press–always refer to the owner's manual for proper function.
- ✔ Maintain a clean work area.

Electronics present another critical area for maintenance. Coils located on valves typically have a life cycle of three million strokes; relays typically live for one million strokes. Replacing them before failure can eliminate hours of troubleshooting and downtime. Do so by installing an hour meter and non-resettable cycle counter to help with the scheduling of maintenance. Also, shops should inspect control wiring annually, checking for tight connections and looking for wiring in poor condition. Place loose wiring in wire ways or tie it with wire ties; cap or remove all spares or unused wires; remove any dust or dirt from enclosures.

Neff officials add that maintaining a supply of long-lead-time spare parts avoids costly downtime for maintenance. They recommend that press customers set aside a spare-parts budget equal to 10 percent of the investment made in the press, particularly for shops that cannot afford to have the press down for extended periods.

## In With the New

Knowing when to replace a press also helps to ensure accurate and consistent part production, according to Greenerd's applications manager Tom Lavoie. Despite following good maintenance practices that will undoubtedly prolong the life of a hydraulic press, some signs indicate that a replacement is in order.

Indicators that may signal the need for a new press:

• The press can no longer build up pressure. Key areas to look into are the pump, press motor and valves—replacing the pump often proves a sensible method for prolonging press life.

• Cracks in the frame. These fractures can be subtle or obvious. As a temporary fix, the shop can weld-repair the frame, but ultimately the press must be replaced.

• Critical hydraulic or electrical problems.

Ignoring any of these warning signs and running the press while compromised can result in several performance sacrifices. When dealing with a pressure delay, cycle times increase and downtime rises. Additionally, part accuracy likely will be adversely affected, since varying pressure can cause inconsistently formed parts or parts that may not even be able to be punched out.

Lavoie recalls one recent customer that ran into a significant pressure problem on its press.

"A customer was running parts on a press with irregular results," he says. "The bearing outside diameter was oversized and sleeve inside diameter was undersized, so the bearing would not seat properly on some assemblies. Upon reviewing the problem, we ran the parts on a new press with consistent results. This helped us to determine that the customer's existing press was not achieving the same pressure from stroke to stroke." **MF**

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*Representatives from Greenerd Press & Machine Co., Inc., contributing to this article: Tom Lavoie, applications manager, and Carl Jean, service manager. Photos Courtesy of Greenerd Press & Machine.*