A Properly Spec'd Transfer Press Minimizes Troubleshooting

Specifying a transfer press requires the stamper to look at the equipment not just as a press but as a system that can include the press, transfer mechanism, dies, feed equipment and more.

BY MATT PEKSA

When it comes to transfer presses, properly specifying the system upfront can mean the difference between profit-generating parts production and an inferior operation that drains bottom-line revenues. For stampers, the goal is to efficiently produce good parts.

Understanding how a transfer press and its auxiliary equipment interact is essential to specifying the right system and meeting production objectives. In the end, you'll also significantly minimize the need for troubleshooting once the system is running.

With the evolution of part technologies and base materials, press solutions have become more complex. Most lean stamping operations no longer have the inhouse ability to fully analyze and identify equipment needs. As a result, suppliers must provide the equipment and application-engineering expertise to evaluate all processes required to achieve optimum output and maximum profitability. Gaining a better understanding of the transfer press and the variables that affect its output can help the stamper identify the right supplier and navigate the specification process more effectively.

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What to Look For

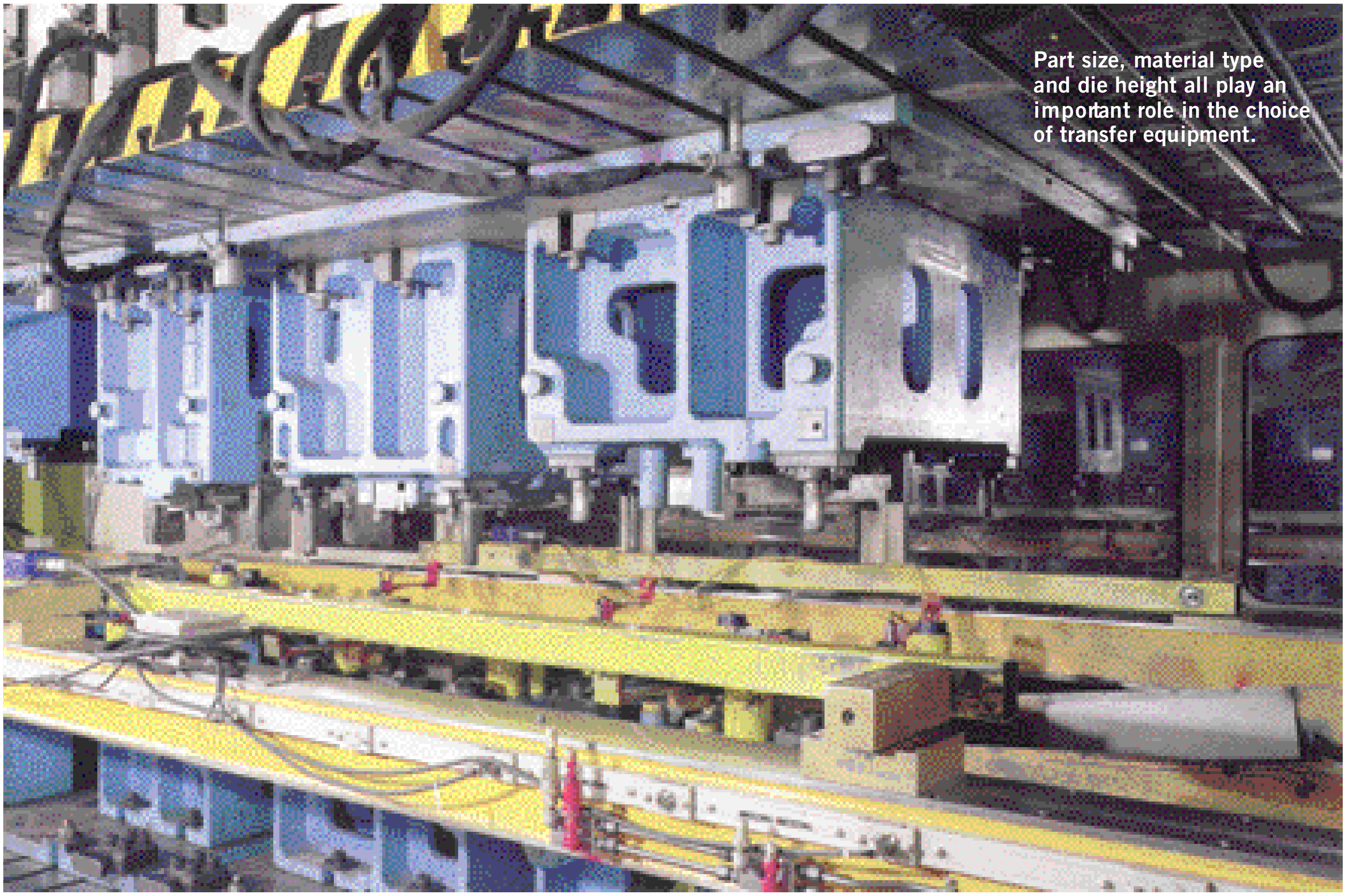
When considering a transfer press, look at the equipment not just as a press but rather as a system, which can include the press, servo-transfer mechanism, dies, blank destacker, coil line or a destacker / coil line combination, blank washing and lubrication, scrap handling and finished part handling.

A major component is the electronic servo transfer. Since the servo-transfer mechanism can change the motion profile in all three axes (pitch, clamp and lift), understanding its capabilities can deliver optimized production speeds and efficiency because all three profiles can be adjusted and timed for each part or each job.

Also understand the limitations of each component that comprises the system. As a rule, consider the following characteristics of the transfer system:

Contact Velocity—Part-production speed can be limited by contact velocity (speed in ft./min.), or the ability of the workpiece material to flow into the shape of the part being formed. This is dictated by the length of the press stroke, type of press drive (eccentric or link) and by the part-forming working stroke. For mild steel, contact velocity falls between 55 and 85 ft./min.

Return Velocity—The downward and upward slide displacements of a conventional eccentric-drive press are symmetrical, therefore contact and return velocity are the same. With link drive, the return velocity also must be considered. Return velocity can be as much as twice that of the contact velocity at a given distance from bottom dead center (BDC). The return veloci-



Part size, material type and die height all play an important role in the choice of transfer equipment.

ty impacts part control as the die opens. This depends on the die design and the type of cushion used, but can range from 105 to 150 ft./min.

Dead Time—From an automation perspective, the time required to form the part is referred to as dead time. This varies with the type of part being formed, working stroke and the type of press drive considered. To calculate dead time requires consideration of finger height and clearance between the finger and upper die during the clamp-unclamp motion. During this dead time, automation can only perform the return motion.

Automation Time—The 360-deg. rotation of the crank minus the dead time provides the amount of automation time the transfer has to accomplish the effective portions of the clamp/unclamp motions, lift/lower motions and the transfer pitch motion.

Also, because the link-drive slide displacement allows for slow contact velocity, the dead time exceeds that of an eccentric-drive press, leaving less time for automation.

Proper Combination of Payload Capacity and Speed

The type of press drive is critical when selecting a servo-transfer mechanism. The key factor in determining servo-transfer capability is its combination of payload and acceleration/deceleration. The acceleration/deceleration speeds of an electronic servo transfer range from 0.7 to 1.4 g.

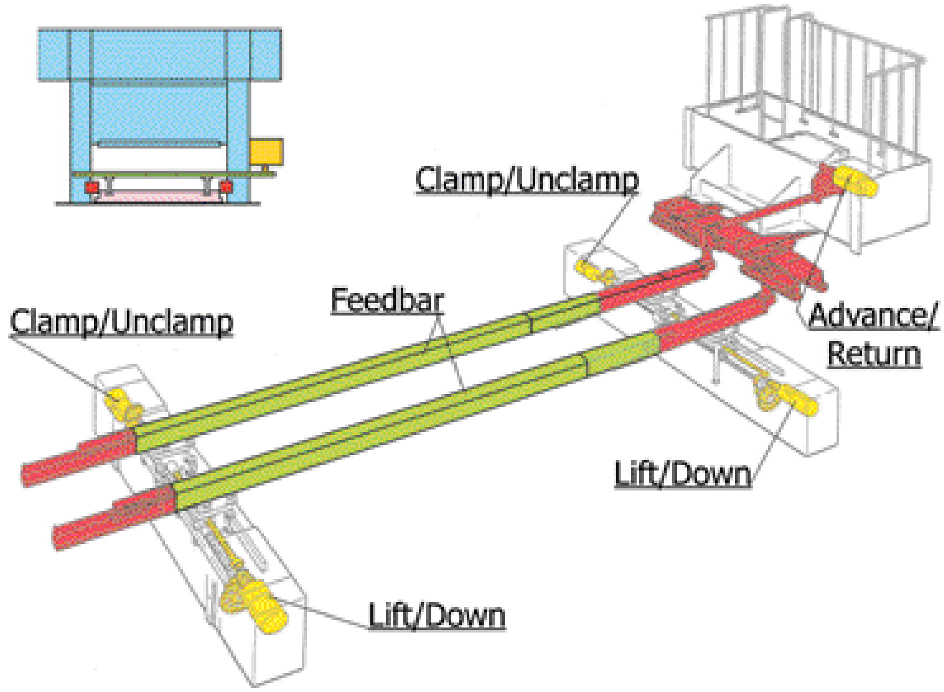
Depending on the working stroke, automation time on a link-drive press varies by as much as 25 deg. of crank rotation. If not accounted for, this variation can result in a production loss of 2 to 3 strokes/min. Be sure to calculate this requirement during the specification process to identify the possible need for a servo-transfer system with high payload and acceleration/deceleration capabilities.

A coil feed may be used to deliver material to the first tooling station of the system. Again, the type of material used and part size help determine the specs of the coil feed. The first tooling station typically is dedicated to blank and draw operations before the servo-transfer system picks up the part and moves it to the next station. Stampers also can combine transfer and progressive operations: Parts can be coil-fed for two or three stations in a progressive mode before being cut free by the die and picked up and transferred through the remaining stations. This is particularly useful if the stamper needs to manipulate the part—turning it over, for example. This manipulation can't be accomplished in progressive mode, but can occur in transfer mode.

Automation time also plays a role in specifying the capability of the coil line and destacker. In progressive-die applications, parts are formed and then the coil feed advances the material strip in a single-axis mode. Normally, time available to achieve this motion ranges from 180 to 240 deg. of crank rotation.

In a coil line/transfer feed combination, the time available to perform the same function may be limited to as little as 90 deg. of crank rotation, determined by the servo transfer and the part profile.

Low Side-Mount Servo-Transfer System



Using a Blank Destacker

A transfer system also can be fed by a blank destacker, rather than a coil line. Blank size ultimately indicates to the stamper how much time is available to move the blank, which in turn affects the choice of appropriate destacker design. Destackers can range from basic pick-and-place units to fully automated systems with programmable part changeover and automatic double-blank detection with ejection.

Blank-hold devices also can be added, which allow blanks to be held automatically while the next blank stack moves into position, eliminating the need for the operator to stop the press when the supply of blanks runs low. Although higher costs are associated with this type of destacker, productivity is higher—the greater the level of automation, the more time the system will function, making parts.

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With manual destackers, productivity typically is lower. The stamper must find the right balance between investment and productivity.

Press Design

In terms of press features, crank and link-motion options for transfer presses add flexibility by allowing the press to meet unique part-production requirements. A straight crank drive can provide the additional transfer time needed to move parts across the die to the next station. Link motion can improve part quality by reducing punch velocity and maintaining pressure on the workpiece for a longer period of time.

Wider suspension-point spacing of the press increases off-center load-bearing capacity, contributing to flexibility in the design and layout of dies. Resistance to slide tipping—caused by off-center loads—also is increased to help maintain dynamic accuracy during stroking. In addition, an eight-point square slide guide will minimize longitudinal and transverse movement. And, ensuring part quality and accuracy requires high rigidity and low bed deflection. Understanding the variables affecting system output and part quality helps compute timing, and emphasizes the role that part size, material, type and die height play in equipment selection. Analyze your job requirements and perform calculations upfront to ensure you specify the right system.

In addition to proper specification, stampers can further minimize the need to troubleshoot by providing upfront training to system operators. Without training, operators may make decisions that impact overall productivity because they don't understand how to properly set parameters and how the components of the system interact. For example, setting transfer-system acceleration at 1.2 g with the system running at 20 strokes/min. might create interference with the die. To eliminate the interference, the operator may choose to delay the start of the clamp motion by 10 deg. But, that small delay may decrease operating speed by as much as 20 percent, reducing stroke rate to as low as 16 strokes/min.

With proper training, operators should learn how to properly manage time and reconfigure part profiles without impacting operating speeds. As operations become more complex and stampers require more engineering expertise, look for suppliers that act as technology partners. **MF**

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