



## Choosing the best servo transfer option

*Front-and-back or through-the-window—considerations and situations that should influence choice*

By Doug Knapke

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The need to transfer stamped or formed parts from die station to die station inside a stamping press is not new. However, the options now available in mounting style and operational features may be news to some in the metal forming field.

Today's transfer systems, particularly those employing servo technology, provide flexibility that alternative methods struggle to deliver. Dedicated mechanical in-die transfer, fixed-motion cam, or gear-driven systems worked for many

manufacturers for many years, but as production volumes have dropped and a higher mix of jobs calls for more frequent changeovers, fixed pieces of press automation are unable to meet the challenge.

In the past if a stamper was running a transfer job requiring an 18-inch pitch stroke in the X axis, a 4-in. clamp in the Y axis, and a 2-in. lift in the Z axis, a fixed-motion transfer system, whether in-die or press- or bed-mounted, could do only that job—or ones similar to it. Any other job run in that setup required compromises, such as excessive distance between dies or special tooling to accommodate the dedicated move parameters. Transfer axes were

not adjustable. Presses used for such operations were called *transfer presses* because they were completely dedicated to such an operation, with little to no opportunity to be used for non-transfer requirements, such as blanking or progressive-die work.

With the advent of improved reach and control, robots were and still are sometimes used to transfer parts within a die or press, but for all the advantages they have in articulation, they are not the fastest means of moving the parts from station to station. Additionally, the robot's joints or specialized end-of-arm tooling often can get in the way in the confined spaces typical of in-die work.

In dramatic contrast, full-servo transfer technology provides the flexibility and speed necessary to get the most out of a stamping process. The systems are fully programmable to handle a range of movements, speeds, and timing for literally any job and also can store multiple programs for efficient changeover. They also can be retrofitted onto nearly any type of existing stamping press and typically do not require additional shop floor space. Mounting and arrangement options cater to special needs or system optimization, based on the types of applications a stamper has in mind.

The use of modularly designed, full-servo transfer technology can turn an unused stamping press into a valuable, multipurpose metal forming resource. For example, a servo transfer retrofit can allow the same press to be used not only for new transfer operations, but also for blanking operations or progressive-die work—simply by choosing the servo transfer to be online or offline.

But before looking at those types of applications more closely, it's helpful to understand when a front-and-back-mounted (see **Figure 1**) or a through-the-window-style (see **Figure 2**) transfer system makes the most sense. Stampers probably are more familiar with the through-the-window transfer system,

but that doesn't necessarily make it the best choice for all applications.

### Is the Press Feed Mounted in the Window of the Press Uprights?

A through-the-window-style transfer system typically requires that the transfer hardware be mounted on each end of the press, also known as the *uprights*. That presents a problem for some stampers, particularly those that have been exclusively or predominantly using progressive dies. Their presses likely have press feeds positioned at the press, in or near the window in the press's upright. That press feed location undoubtedly would interfere with the transfer's mounting, as well as the transfer bars and finger tools used to move parts from die to die.

In these instances, if the stamper still wants a through-the-window transfer, the press feed will need to be relocated some distance away from the press, expanding the footprint of the metal forming line. Unfortunately, that's a luxury that many metal formers can't afford. What if the stamper has a coil looping pit in the place where the press feed may have to be relocated? What if the line is wedged in an aisle and a wall and it can't be lengthened? Of course, any of these options will involve expenses related to moving equipment, even if space is available.

That's why the front-and-back transfer style—where the modules mount to the press's front and back side on brackets that span the uprights—makes the most sense. The modules' placement won't interfere with the press feed. This allows the existing press feed line to remain in place for use with the transfer or with other progressive-die work when the transfer modules are moved offline.

### Is Coil Width a Concern?

The coil width requirements for a given application will affect the transfer style choice almost more than any other factor.

In a through-the-window transfer system, the tooling bars travel through the length of the press and occupy a portion of the upright window opening. As a result, those devices eat up real estate in that opening. But it doesn't end there.

The size of the tooling bar is going to be dictated by the left-to-right dimension of the press. The larger that dimension, the larger the finger tooling bar profile needs to be. Both the tooling bar and the fingers occupy space in that upright window opening. Remaining space available for coil width is seriously reduced, which can compromise the range of press capability and any automation combination. The other item that has to be considered is the amount of travel in the Y (clamp) axis.

Once again, front-and-back transfer modules don't occupy space in the upright window. In this type of system, the finger tooling bars do not impinge on this space. They do not travel inside the upright window opening of the press, but rather remain on the exterior of the die opening.

Note, however, even a front-and-back transfer system typically transfers the part out of the last die station and places it into the upright window opening of the press to accommodate finished-part exit. So the maximum width of the part is still influenced by factors such as the finger tooling and the required travel



**Figure 1**

The front-and-back servo transfer style is often the best approach for attaining multi-purpose press line capability.

(clamp motion) of the Y axis.

### Is Easy or Frequent Access to the Die Required?

Die access actually favors a through-the-window transfer system. The transfer drive mechanisms are on both ends of the press and are out of the way. The tooling bars, which may appear to obstruct die access because they run the length of the press bed, can be automatically uncoupled from the transfer drive assemblies and taken out with the die or with the bolster.

Front-and-back transfer systems are positioned in front of or behind the die, usually in a position somewhat higher than die passline. The module can be run and parked in its full-up position for basic access to the die. But when improved or additional access is required, optional longer transfer mounting frames can be supplied, allowing the transfer module to be shifted laterally away from the press bed and parked in an offline position so it is completely out of the way.

This approach provides full access to the die, even enough for a lift truck to lift a die out of the press bed. The front-and-back transfer module also can be supplied with a mounting scheme that allows the module to be mounted in a way that it can be moved aside in a vertical fashion toward the press crown when full die access is required.

### More Flexibility and More Process Options

In most cases, a stamper does not know exactly what future applications may come its way. For example, part sizes can become smaller than what might be considered ideal for a larger press. In such situations, a stamper may feel it has to use a traditional transfer approach and use two presses to accommodate the number of die stations needed to produce that small finished part. The cost and floor space required can be a daunting problem, which ultimately attacks the stamper's profit.

Full-servo through-the-window and modular front-and-back transfer modules can operate with dual lanes of production, effectively doubling productivity in a smaller, more efficient



**Figure 2**


Through-the-window-style transfers provide good access to dies for setup or maintenance.

footprint—using only one press. Also, because the full-servo transfer drive modules allow for independent control of each axis, they can accommodate the production of left- and right-handed parts and, with the addition of specialized finger bars and related tooling, any special orientation or handling technique that may be needed, such as half-pitch, flip, or radial orientation. Such an arrangement can help the stamper with kitting needs for down-the-line assembly or other postprocess activities.

The use of dual lanes is just one way to eliminate the need for a second press for a particular application. It's also possible with a U-turn configuration in the die. For instance, instead of requiring a press bed that measures 240 in. to accommodate 20 die stations—or worse yet, two presses with 120-in. beds and the additional automation between presses—a U-turn arrangement can accommodate all 20 die stations in one 120-in. press bed. Using either the front-and-back or through-the-window full-servo transfer can allow processing of 10 stations in one lane and 10 additional stations in a second lane, which runs alongside the other lane. This approach uses less equipment and floor space.

How does the U-turn take place? Say a front-and-back transfer module is in place. The transfer assembly on the front side of

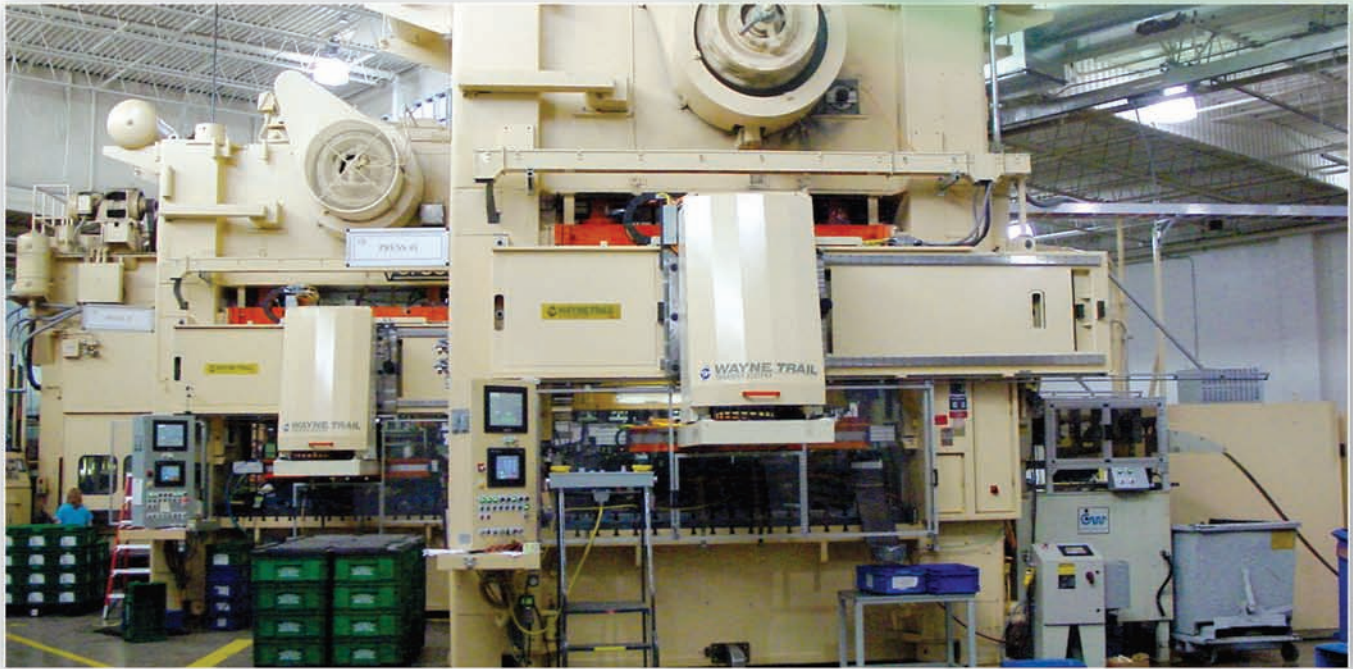
the press uses finger tools to grip the part and to transfer it from station to station in the first lane of dies. At the end of that lane, the part is shifted 90 degrees from die lane A to die lane B by simple automation. The finger tools on the servo-driven transfer module on the back of the press take possession of the part and transfer it from station to station in the second lane of dies, in a direction opposite the first lane. Because the servo-driven transfer assemblies can be independently controlled, each tooling bar can operate differently along its respective X axis, in this case, allowing the transfer bars to move in opposite directions simultaneously. Press loading is balanced and optimized, and more work is done in less space—always an appealing proposition for manufacturing.

In all scenarios, incorporating servo transfer technology into an existing press can be an attractive alternative to purchasing a new or larger press. It's just a matter of knowing what today's servo transfers can do and which of the available designs makes the most sense. 

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