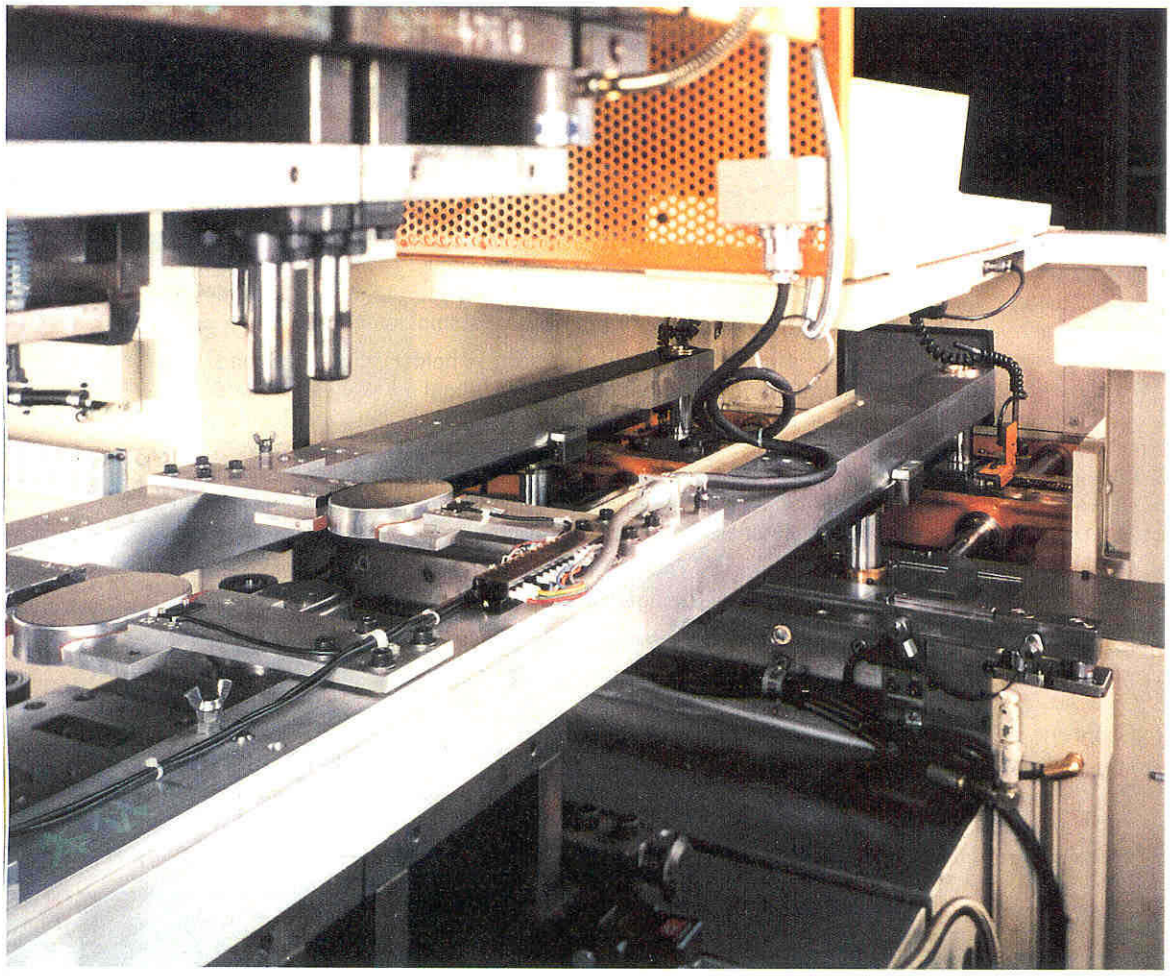

Using gap frame presses for progressive or transfer production

HOW MATERIAL CHOICE AND OTHER FACTORS AFFECT THE OUTCOME

By Dennis Boerger

Many stampings produced in progressive or transfer dies can be run successfully using one or multiple gap frame presses. Many factors are involved in determining if the gap press is a suitable choice for progressive or transfer production.

1. Raw material thickness and width. Dies that produce parts from very thin materials have small punch-to-die clearances. This necessitates using a press with accuracy requirements that are not available in most gap-type machines. Conversely, parts produced using very thick materials will quickly exceed the tonnage capacity of gap frame presses. Material width is limited by the front-to-back area of the gap frame press beds.

2. Part size. Large parts, such as auto body components, appliance skins, etc., cannot be produced on gap presses because their size exceeds the available bed areas.

3. Tonnage required to produce the part. High tonnage blanking operations, or those parts that require only a few operations to produce but have a high tonnage requirement, are not good candidates for gap presses because of the tonnage limitation of an individual machine.

4. Press stroke requirements. Because gap presses have a maximum stroke length of 12 inches, the depth of drawn parts cannot exceed approximately 4 inches. Any part longer than this will eliminate the ability to use automation for part movement.

5. Bed area. Although right-to-left bed areas of 96 inches are available in gap presses, the front-to-back area tends to be narrow. This limits the size of the die that will run in them.

6. Production speed. Volume requirements may well dictate press operating speeds that exceed what is available in gap-frame-type presses.

7. Part accuracy. Tolerance restrictions on the part being produced may be so difficult that gap presses will not be capable of meeting the requirement. As the gap press is a general-purpose machine, the accuracy to which it is manufactured limits its ability to produce parts that have very tight tolerance requirements.

8. Tooling cost. The cost of progressive tooling will be nearly the same whether it is run in a gap or straight-side press. However, tooling for a transfer operation will be substantially less costly for gap presses than it will for a dedicated straight-side transfer press.

9. Financial considerations. When compared to dedicated straight-side transfer or progressive die presses, the gap frame option can reduce initial capital investment by 50 percent.

Progressive Die Operations

Selecting a gap press for progressive die operations is somewhat less complicated than selecting one for transfer die production. Progressive die operations are always performed using a single press (see **Figure 1**), while transfers usually incorporate multiple presses of one- and two-point design and varying tonnage capacities.

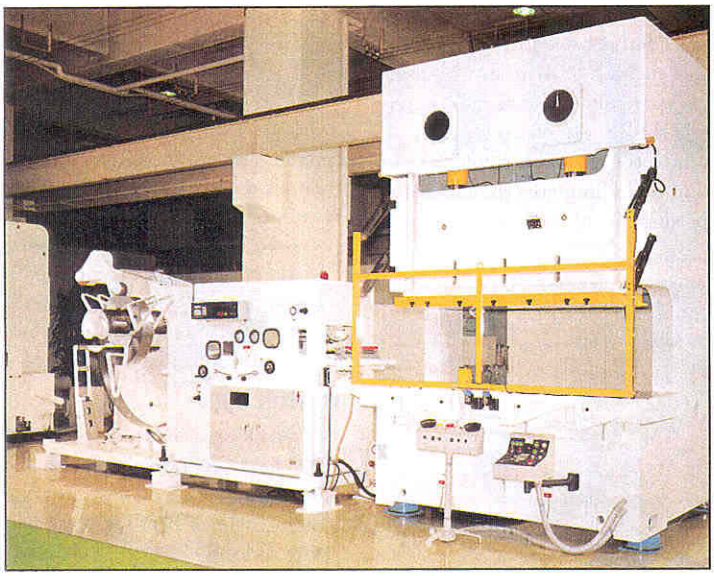

Figure 1
In a single press, like the one pictured here, progressive die operations are used. A transfer operation usually incorporates multiple presses.

The parameters for running a progressive die in a gap press are pretty well defined. The largest machine available has 275-ton capacity. The maximum stroke available is 12 inches, and the widest bed is about 96 inches left to right.

The raw material used to produce the stamping should be at least 0.020 inch thick and no more than 8 to 10 inches wide. This will reduce the effect of gap press angular deflection on the part that is being produced. By staying within these parameters, successful progressive die operations can be achieved on gap presses.

Transfer Operations

Transfer operations can be performed in a singular two-point suspension gap press or in a multiple-press cell (see **Figure 2**) in which one- and two-point suspension machines are grouped to provide additional tonnage (1,000 tons or more) and bed area (20 feet or more).

As with progressive die operations, the raw material thickness and width are important considerations when running gap presses in transfer operations. Again, using raw material that is at least 0.020 inch thick with a maximum width of 8 to 10 inches should allow the production of quality parts.

Part transfers and press-to-press automation have improved enough over the last few years to allow gap presses to achieve cycle speeds similar to those of dedicated transfer presses.

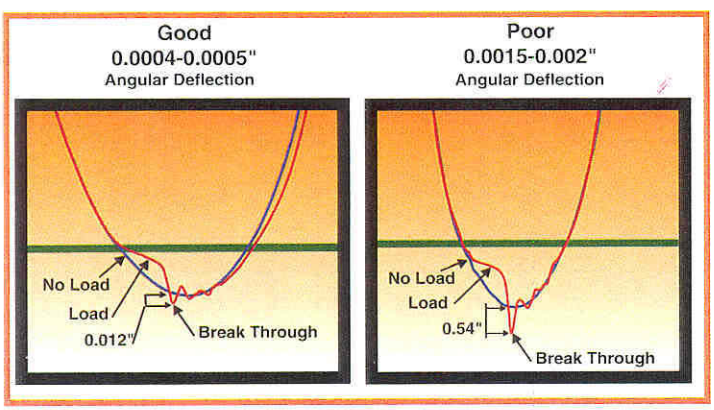

Figure 3
A gap press' angular deflection under full load can be provided by the manufacturer. It is usually given in thousandths of an inch.

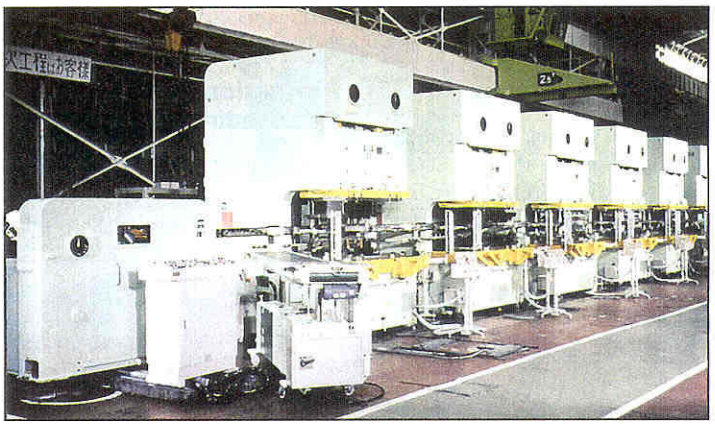

Figure 2
Transfer operations can be performed in a multiple-press cell, like the one pictured here. In this type of cell, one- and two-point suspension machines are grouped to provide additional tonnage and to increase bed area.

Angular Deflection

Angular deflection of the gap press frame (see **Figure 3**) under load is the most common reason that straight-side presses are chosen rather than gap frame presses for progressive and transfer operations. A gap press' angular deflection under full load can be provided by the manufacturer and is typically stated as thousandths of an inch per inch of throat depth.

Angular deflection is a valid consideration and is the reason that raw material thickness and width are so important when using gap presses.

When a gap press frame has low angular deflection and the raw material is 0.020 inch thick or greater, there is little chance for a blanking or perforating punch to clip the die.

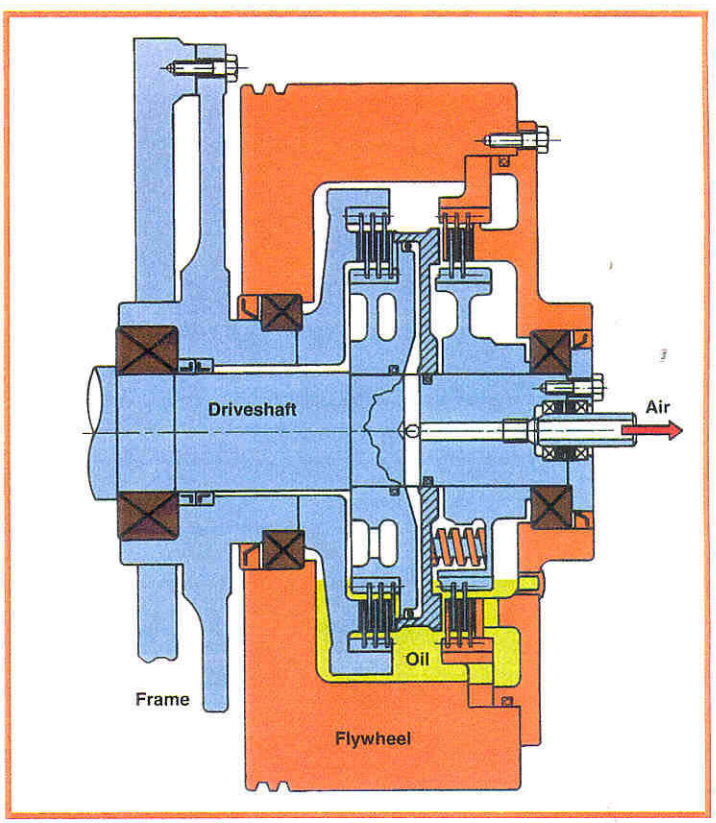

Figure 4
Pictured here is a wet clutch. When a press is used in hand-fed operations or with automation, a wet clutch allows high single stroking rates.

This is because the punch-to-die clearance is greater than the movement of the punch caused by the angular deflection.

Also, in forming and coining operations, limiting the raw material width or width of the part being transferred minimizes dimensional variations caused by the angular deflection.

Protection Against Overloading the Press

Hydraulic overload protection (HOLP) is another important consideration when using gap frame presses. Overloading a gap frame press without overload protection or just sticking on bottom will almost always result in damage to the press and the die. An effective HOLP system activates when a tool gets too dull and eliminates the chance for production of bad parts. Recovery time to reset the overload takes a few seconds, helping to reduce tool setup and downtime.

HOLP systems are usually adjustable to accommodate operators running dies that are considerably less than press capacity. Since most dies are not run at maximum press capacity, some HOLP systems can reduce the trip point to 60 percent of press capacity. The faster the response time, the greater the opportunity for protection of the die and the press.

Clutch Type

Gap presses can be equipped with either an air friction clutch or a wet clutch. In presses with an air friction clutch, friction material and metal come in contact with each other during every start and stop cycle of the press, which creates heat and wear. In high single-stroking operations (eight times per minute or more), extreme heat buildup occurs and the clutch and brake function is negatively affected.

In a wet clutch design, the torque transmission members (clutch and brake discs) operate in a bath of oil and never come in contact during operation. The result is no wear and very little heat generation.

Wet clutches cost a little more than air friction clutches to build, so the resulting price of a press equipped with this feature is higher.

A wet clutch (see **Figure 4**) allows high single stroking rates (20 cycles or more per minute) when the press is used in hand-fed operations or with automation. Typically, a wet clutch uses 50 percent less air with each stroke than does an air friction clutch.

Conclusion

Sometimes, the requirements for progressive or transfer die part setups are beyond the capabilities of a gap frame press, and a straight-side press must be used. However, gap frame presses with the right combination of features and specifications can be considered and are often suitable for these types of applications. ■

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