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METAL STAMPING & FORMING EQUIPMENT

Mechanical vs. Servo vs. Hydraulic Presses

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Which press is right for you? The answer is... it depends. There are many variables that can affect your decision, but the following rules generally apply:

- The traditional mechanical press can achieve the highest production speeds...
- The hydraulic press offers versatility...
- The mechanical servo press offers versatility and higher production speeds...

Traditional Mechanical Press

The traditional mechanical press can achieve the greatest production speeds, especially when running relatively flat parts with simpler, shallower forming requirements. These parts are typically processed from coil stock through a progressive or transfer die. Many automotive, appliance, and hardware parts fall into this category. Characteristics of a traditional mechanical press:

- fixed stroke length (although variable stroke length presses are available from some press manufacturers)
- special slide motions (i.e. link motions) are available, specific to a particular press
- variable slide velocity, although slide velocity profile within a single cycle of the press is fixed
- working energy is dependent on flywheel mass and speed
- full press capacity near bottom dead center of stroke
- simplicity of set up and operation
- in general, the highest stroking speeds
- high accuracy and repeatability
- relatively low initial cost

Hydraulic Press

The hydraulic press does not generally achieve the high cycling speeds of a similar-sized mechanical press, but it does offer greater versatility with its variable stroke length, die space, and pressure. The hydraulic press is often the best choice when producing parts with deep, complex forms that require a lot of material flow and are not dependent on production speed.

Parts such as tanks, cylinders, and bowl shapes, as well as parts that require a “dwell” at the bottom of the stroke (including plastics), are often run on hydraulic presses. Characteristics of a typical hydraulic press:

- variable stroke length
- slide motion and position control throughout the range of the stroke length
- variable slide velocity, even within a single cycle of the press (typically configured as fast approach, slow press, fast return)
- full working energy at any speed
- full press capacity at any point in the stroke
- adjustability of all the above
- in general, slower than a mechanical or servo press
- in general, lower accuracy and repeatability than a mechanical or servo press
- relatively low initial cost

Mechanical Servo Press

The mechanical servo press offers much of the versatility of the hydraulic press, at production speeds often approaching traditional mechanical presses. The stroke, slide motion, slide position, and speed are programmable to allow many different combinations that can work with a wide variety of dies, part types, and production speeds. Characteristics of a mechanical servo press (flywheel, clutch & brake are replaced by high-capacity motors):

- variable stroke profiles
- precise slide motion and position control throughout the range of the stroke length
- variable, precise slide velocity control, even within a single cycle of the press stroke.
- full working energy at any speed
- programmability of all the above
- full press capacity near bottom dead center of stroke
- in general, greater cycle speeds than a hydraulic press, in many cases approaching the speeds of a traditional mechanical press
- high accuracy and repeatability
- relatively high initial cost

Examples of stroke profiles and parts that can be achieved with a servo press.

The two types of current servo press drive technologies:

Link-assisted

The link-assisted type of drive system is a cost-effective solution which utilizes standard, "off-the-shelf" A.C. servo motors. A link or toggle mechanism coupled with the motors creates mechanical ratios which allow for standard motor sizes from proven motor and control suppliers. No proprietary motors or motor controllers are required.

Direct Drive

A direct drive system employs proprietary, high-torque, low-rpm motors especially designed for press applications. These motors replace the standard motor, flywheel, and clutch/brake in an otherwise traditional crankshaft type of mechanical press.

In either type of servo press, proprietary press controls specifically designed for the servo press achieve a wide variety of stroke and slide movement profiles, while supplying full working energy even at low speeds. Unique profiles can be created by the user and preprogrammed profiles can include:

- cycle
- swing
- multi-pass
- Simulation of link motion
- compound pressing and forging
- deep drawing
- general forming
- perforation/blanking
- warm forming
- deep drawing

With full working energy at any speed and the ability to dwell anywhere in the stroke, servo presses are taking a big bite out of the drawn and formed parts pie. However, servos are still mechanical presses at heart, and therefore achieve full tonnage capacity near the bottom of the stroke. So in many cases hydraulic presses, with full tonnage and energy throughout the entire stroke, still have the advantage."

In summary, mechanical presses are still the fastest, but they lack flexibility. Hydraulic machines allow more versatility in drawing and forming of complex parts but they're slow. A servo press has many of the best characteristics of both. If you have additional questions, contact Stamtec at 1-855-871-0561 for more information.

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