Press Coil Stock Feeding Devices

Many years ago, the majority of blanks were fed into presses by hand. Some simple progressive dies are hand fed with stock sheared from rectangular rolled sheet stock if production volume is not high.

Many older pressworking methods were somewhat dangerous. Hand feeding presses poorly guarded equipped with full revolution clutches often-resulted in amputations. When the writer started work in the industry, it was an acceptable practice to feed blanks into the press by hand while maintaining full clutch engagement by holding the clutch foot treadle down to effect continuous press actuation. A frequent incentive to take shortcuts was a piecework bonus system. However, there was a lack of standardized safety rules such as OSHA in the United States.

Types of Feeders

Press feeders are available in many different configurations depending upon the application. However, most feeders fall into two main classifications, which are:

1. Roll feeders, which advance the stock into the die by a pair of power driven rolls. The feeder may be powered directly by the press crankshaft or a motorized drive system.

2. Hitch or grip feeders, which advance the stock into the die by mechanically gripping the stock and advancing it the required amount. These also may be directly actuated by the press ram, Crankshaft or separately powered. The most common power source is compressed air.

Crankshaft Driven Roll Feeders

Crankshaft driven roll feeders have a long history in the pressworking industry. An important feature is simplicity. The main disadvantage is that some trial and error work involving skill to avoid die damage is required to set the feed pitch correctly.

Crankshaft driven feed rolls usually require some trial-and-error adjustment of the feed mechanism to achieve the correct pitch setting. To avoid die damage, the feed advance per stroke can be measured before the die is placed in the press. Precise settings can be accomplished by scribing a mark on the stock and measuring the total advance with a tape measure after cycling the press 10 to 20 times. The pitch is determined by dividing the total measured advance by the number of times the press is cycled.
Figure 1. A typical crankshaft driven roll feeder with guarding removed for clarity. Note the manual pilot release. *P/A Industries*

Figure 1 illustrates a typical crankshaft driven roll feeder mounted on a gap frame press. The feed advancement is adjusted by means of a micrometer screw on the feed dial attached to the crankshaft. The rolls are released near the bottom of the press stroke by an outboard pilot release driver attached to the press ram.
Pilot Release Devices
When any type of feeding device is used to advance the stock into progressive dies, slight inaccuracies of feed advancement occur. To overcome this problem, the stock is momentarily released upon pilot entry to permit the pilots to correctly align the stock. A slight overfeed is often helpful when using pilot release feeders as it is usually easier for the pilot to shove the stock back into the feed loop than to pull it forward.  

Figure 2. A rack-and-pinion driven roll feed driven by the press crankshaft. Note the one way overrunning clutch and adjustable feed dial. *F. J. Littell Machine Co.*

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Some roll feeding applications employ two pairs of synchronized rolls (Figure 3) with one pair pushing and the other pair pulling the stock across the die. This system works especially well with thin stock, which would be difficult to push through a progressive die with a conventional carrier web. An external scrap chopper is normally required with such a system. It is shown in Figure 3 without the required guarding for clarity.

**Servo Driven Roll Feeders**

Many modern roll feeders are powered by electrical servomotors that provide very precise control. Some of the control units have provision to preprogram the feed pitch. It is usually stored as a job number in non-volatile computer memory. If the pressworking operation is integrated with a computerized controller, it is also feasible to preset press functions such as counterbalance pressure, shut height, and tonnage limits.

**Fast Setup and Accuracy Considerations**

It is important to mark the correct pitch setting on the die as a check in case the figure from the computerized database is in error. Remember, to assume is to blunder.

The correct information for automatic set-up of the straightener and many other press functions can be accomplished automatically by inputting bar-coded information from the die or dieset work-order.

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Servo Roll feeder accuracy can be improved by using feed measuring rolls that are separate from the main feeding rolls. This is especially useful when feeding heavy stock, which may slip slightly on the feed rolls. The measuring rolls turn a digital pulse generator. As the preselected length is reached, the digital control initiates the slowdown and stopping action of the main feed rolls. Close feed accuracy and excellent repeatability can be obtained.

**Example of Servo Roll Feed Retrofit Package**

It is practical to retrofit some existing crankshaft driven roll feeders with servo motor drives and electronic control packages. This provides much easier setup of accurate feed pitch lengths. Replacing an old feeder or adding a new unit as a complete package is a straightforward modification.

![Figure 4](image.png)

Figure 4. A microprocessor based AC servo roll feed retrofitted to an older OBI press.  
*P/A Industries*

Figure 4 shows a microprocessor based AC servo roll feed retrofitted as a turnkey package to a Minster 60-ton OBI press. Guarding has been removed for clarity.

One feature that contributes to the cost-effectiveness of this unit is the mechanical pilot release actuated by an outboard driver attached to the press ram. It is simple, easy to adjust and easily understood. Mechanical pilot releases provide positive action and are preferred for this type of application. The control package is simple to program and has job setup memory capability.
Retrofitting Existing Rollfeeds with Servo Motors
Servo drive motors are available as standard off the shelf components from a number of motor manufacturers. The motor together with a solid-state controller are building blocks in a standardized system. The motor controller, which may have a programmable microprocessor, based programmable or interfaces directly with an external computerized controller. Interfacing the motor controller to a personal computer with appropriate software can provide job memory capability. In addition, other press settings can be controlled as well.

Figure 5. An off the shelf generic servomotor and gear belt drive retrofitted to a crankshaft driven rollfeeder on an older Minster straightside press. Note the pilot release cylinder. Guarding has been removed for clarity. R. Olson Company

Limitations on Combining Roll Feeding and Straightening
While economy and space limitations may dictate otherwise, the best feeding practice is to separate the roll straightener from the feeder. Feeding is naturally an intermittent operation. Better results of removing coil curvature in a roll straightener are achieved if the machine runs at a uniform velocity. This is accomplished by providing space for a material storage loop (Figure 1) that maintains a relatively constant supply of material between the feeding and the straightening operations.
Progressive-die operations that require a pilot release work best if the feeding and straightening operations are separate. Upper feed rolls are automatically lifted to allow the pilots to shift the material. The material may not have the desired flatness if the upper straightening rolls are lifted after each progression of the material.

**Hitch Feeds**

Figure 6 illustrates one type of press powered hitch feed. This type of hitch feed has a reciprocating head having a gripper unit. There is a similar gripper on the stationary unit. On the downstroke of the press, a cam attached to the press slide contacts a cam roller on the reciprocating head. Continued downward motion of the press slide pushes the reciprocating head outward, compressing a spring.

![Figure 6. A press-powered hitch feed is actuated by a cam attached to the press ram or upper die shoe. *Dickerman Div., Reed National Corp.*](image-url)

During the downward press stroke, the gripper plate on the stationary head prevents the stock from moving backward. On the upward stroke of the press, the stock is held by the movable gripper plate as the head moves inward propelled by the compressed spring. The amount of feed advance is set by a feed-length adjustment nut.

**Air Powered Hitch Feeds**

Air powered hitch feeds feature an air cylinder that powers the back-and-forth feed motion. Short-stroke cylinders actuate both the stationary and moving grippers. The feeder may have a provision for pilot release by releasing both grippers upon pilot entry.

**Quick Setup of Hitch Feeds**
A proven technique for quickly adjusting the correct pitch setting of air-driven hitch feeders is to use a measuring bar equal to the pitch length to adjust the device. Power to the device (usually compressed air) is first locked out and residual air drained. The reciprocating member is then moved by hand between the adjustable stops and the correct adjustment of the stops made. An excellent way to store the measuring bar is to bolt it to the die shoe.

**Limitations on Hitch Feed Applications**
Both press driven and pneumatic hitch feeds provide accurate and dependable feeding of stock. Both types work best in light to medium duty applications.

Pneumatic units that grip only one side of a wide strip are subject to binding and erratic operation. Adding an unpowered roll straightener adds to the unbalanced pull on the pneumatic grippers. Inaccurate feeding, scrap, and die damage may result. While such units may seem attractive from an initial cost standpoint, if they are not capable of long-term service in the intended application, the initial savings is quickly lost through scrap, tooling damage and downtime.

**Aligning a Coil Feeding System**
The state-of-the-art method of aligning press coil handling machinery is to use laser-sighting equipment. If laser alignment equipment is not available, a taut length of music wire stretched from the press through the feeder and decoiler provides an excellent straight-line reference. Conventional hand tools such as squares and scales are then used to verify alignment.

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