Protecting Your Punching Tool Investment

Application-related problems and solutions

Economic shortcuts in the build process almost always add to production costs in the form of increased maintenance and production scrap. To avoid these costs, initial concerns should be directed toward the type of die construction.

Elements such as the stripper design, type of punch retention, and whether to use a hardened backing plate in a particular application tend to have the greatest effect on tool life.

Stripper Considerations

The main purpose of the stripper is to pull material from the ends of the punches at the withdrawal phase of the perforating process.

Stripping force varies based on part material type and thickness, as well as punch-to-matrix clearance. This force can range from nearly zero to as much as 25 percent of the force required to perforate the initial hole. Most applications do not require more than 10 percent of the perforating force.

Punch overentry, or closing a die below its recommended shut height, can have catastrophic consequences. Excessive stripper travel can:

1. Drive stripper screws into parallels or the ram of the press, potentially breaking the screws or bending the stripper.
2. Compress die springs beyond design limits, causing premature failure.
3. Result in stripper interference with the radius bend on the punches, causing broken punch points and heads.

Overentry of the punches also will cause excessive galling and wear on the punch points.

Fixed Strippers

A fixed stripper (also known as a bridge, positive, channel, solid, or tunnel stripper) is a steel plate with a clearance slot to allow the part material to pass under it (see Figure 1). This plate is mounted to the die retainer in a fixed position. Clearance holes are cut through the stripper plate, letting the punches extend through without interference. At withdrawal, the part material hits the bottom of the stripper, preventing it from lifting as punches are retracted. The part material is stripped off of the end of the punch or punches.

FIG. 1
A fixed stripped (also known as a bridge, positive, channel, solid, or tunnel stripper) is a steel plate with a clearance slot to allow the part material to pass under it.
Although fixed strippers are inexpensive and easy to maintain, they have several drawbacks. They do not hold the stock strip flat and lack the ability to absorb impact and snap-through shock. In high-volume applications, the result can be poor part flatness and premature punch failure.

The clearance under a fixed stripper commonly is set at 1.5 times the part material. This clearance allows considerable part material deformation under the punch points, resulting in punch point chipping. That deformation also can cause lateral movement of the part and the punches, resulting in punch point breakage and poor part quality.

The sudden unloading of pressure on the punches and part material at snapthrough generates shock. This shock, which is particularly high when working with stainless steel, can lead to punch head breakage.

At withdrawal, the part material tends to buckle. This buckling effect binds the part on the ends of the punches, increasing stripping pressure and potentially chipping the punch face.

Spring Strippers

With spring strippers (see Figure 2), as the die closes, the stripper holds the stock strip or part flat and in place while the perforating and stripping operations take place. The stripper prevents the part material from lifting or hanging up on the punches.

Because the stripper lifts away from the part material after each stroke, visual monitoring of the die performance is simplified.

A spring stripper absorbs shock at snap-through and eliminates shock at withdrawal that otherwise would be damaging to the tooling and possibly the press.

Spring strippers have a high initial cost and require periodic maintenance. However, the increased tool life of spring strippers improves part quality and productivity in the long run.