

GETTING A GRIP ON TUBE BENDING



How a collet closer can influence quality



By George Winton, P.E.

A collet closer, commonly found on CNC or NC tube benders, serves an important role in the bending process. When quality is good, little attention is paid to its operation. When one or more quality parameters fall outside of acceptable limits, often the collet closer again is overlooked.

A collet closer is a simple yet important device that must sing in harmony with the overall bending process. It

must open and close its grip with consistent repeatability on the tube at a precise point in time (see **Figure 1**).

Collet closers come in various shapes and sizes. Most are powered pneumatically or hydraulically (see **Figure 2**). All-electric closers are rare.

Pneumatic units often are found on small CNC benders; hydraulic units are more likely to be used in cases in which the forces produced by pneumatics are

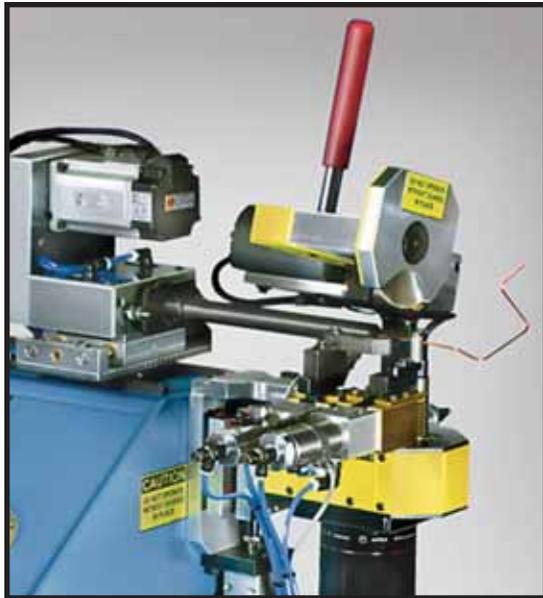


Figure 1

When designed well, direct-acting collet closers can reduce maintenance costs.



Figure 2

A direct-acting hydraulic collet closer can supply a large amount of gripping force. Photo courtesy of Hines Bending Systems.

not sufficient to hold a tube.

However, as far as troubleshooting a collet closer on a tube bender goes, what holds true for air often holds true for hydraulics.

TOO MUCH GRIP

Too much gripping force can turn the collet closer into a swaging machine; this is not good for quality. This is true for both hydraulic and pneumatic versions.

Typically this condition can be overcome by lowering the pressure to the collet closer. Some designs involve a cam-type action in which a mechanical thread is adjusted to change the closing pressure. However, even in this case, the line pressure must meet a minimum for sufficient clamping.

TOO LITTLE GRIP

What are some telltale signs that the grip is too light? In the case of a CNC tube bender with a free-floating carriage, too little grip can cause the tube to slip inside

the collet pads. This usually increases the distance between bends.

If the carriage is intended to follow the bend head as the bend is being formed (that is, if it is electronically geared), a light grip (with no shoulder in the collet) also can cause the distance between bends to vary as the carriage attempts to press the collet pads over the tube axially. This results in too little distance between bends.

Finally, a light grip can cause slippage between the collet pads and the tube, causing the plane rotation between bends to vary outside of a specified tolerance.

Just as decreasing the pressure to the collet closer decreases the gripping force, the reverse is true—increasing the grip can often be accomplished by increasing the pressure. In other cases, a light grip on a tube can be compensated by adjusting the acceleration or deceleration time of the servomotor that controls the plane rotation. It is not the top speed of the

plane rotations that causes the slip; it is the acceleration and deceleration, the sudden starting and stopping, that puts the most stress on the grip between the tube and the collet pads.

A good way to put most of these problems to rest is to make sure the bender's software warns the operator of a low-pressure condition.

Other root causes of a light grip might be:

- Incorrect collet pads installed
- Worn collet pads
- A mechanical malfunction of the closer
- An intermittent relay
- A sticking valve
- A lack of lubrication



George Winton, P.E., is the founder and president of Winton Machine Co., 470 Satellite Blvd., Suite F, Suwanee, GA 30024, 888-321-1499, gwinton@wintonmachine.com, www.wintonmachine.com.