

TURNING A PROFIT ON FORMING COIL



By George Winton, P.E.

CIRCULAR coils aren't always visible, but most of us walk past one or two of them every day. Circular tubular coils are found in beverage-dispensing machines, oil and gas processing equipment, swimming pool heat pumps, laboratory equipment, and transportation equipment. The list goes on and the applications are endless. Despite the multitude of applications, just a few roll bending techniques are used for forming coils.

To form a coil successfully, it's important to match the specific coil configuration, including the end bend configuration, to the type of machinery available.



Figure 1

Some three-ring roll benders provide both CW and CCW rotation.

Matching machines to applications



THREE-RING ROLL BENDER

The coil depicted in the lead photo is a single-level design with straight ends. This is the simplest coil shape to form, mainly because the ends are straight. This coil can be formed on several types of roll benders, including the three-ring roll bender (see Figure 1), which is well-suited to low-volume production. A high-volume option is a three-ring roll bender with an integrated bulk material feeding system (see Figure 2). With the right postbend material support tooling, this type of machine can produce coil with a mean tolerance of 0.030 in.

DRUM-TYPE ROLL BENDER

Another coil configuration has 90-degree bends formed on the ends (see Figure 3).

This type of coil is common in industrial applications because both ends of the tube emerge from the same end of the coil, making it convenient to connect to a larger system. Formed from a single length of tubing, circular coils themselves typically are formed on a CNC drum-type roll bender, also

known as a mandrel-type roll bender. Note, however, that if the leg that protrudes through the inside of the coil shown in Figure 3 were instead on the outside of the coil, then a standard three-ring roller could be used.

One advantage of forming a coil as shown in Figure 3 from one piece of tubing is that the failure rate, and therefore the warranty costs, tend to be lower as compared with those of a coil made from two lengths of tubing.

The three-axis, CNC, drum-type roll bender can be used for forming double-level coils (see Figure 4).

In general, roll benders used to form coils come in NC and CNC versions.



Figure 2

Incorporating a bulk feeder is the key to high-volume production.



Figure 3

The initial leg, the one that comes up from the bottom of the coil, influences the choice of coil bender. If it is inside the coil, a CNC, drum-type roll bender is the right choice. If the leg were outside the coil, a three-roll bender could handle it.




Figure 4

Double-level coils provide for additional heat transfer, making them an excellent choice for OEM equipment with limited space.

A CNC roll bender has the distinct advantage of producing consistent coils in a shorter period of time. An NC-type roll bender has a tendency to produce more scrap than a CNC machine. This is sometimes related to the focus required by an operator.

MAKING 90S

The 90-degree bends on the coil in Figure 3 are not produced on a roll bender. An additional machine, such as a hand bender or rotary draw bender, is necessary to make these bends before or after the coil has been formed. Hand benders work well for low-volume applications. As the volume increases, so does the risk for scrap and the potential for repetitive stress injuries, lost time, and worker compensation claims. 

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