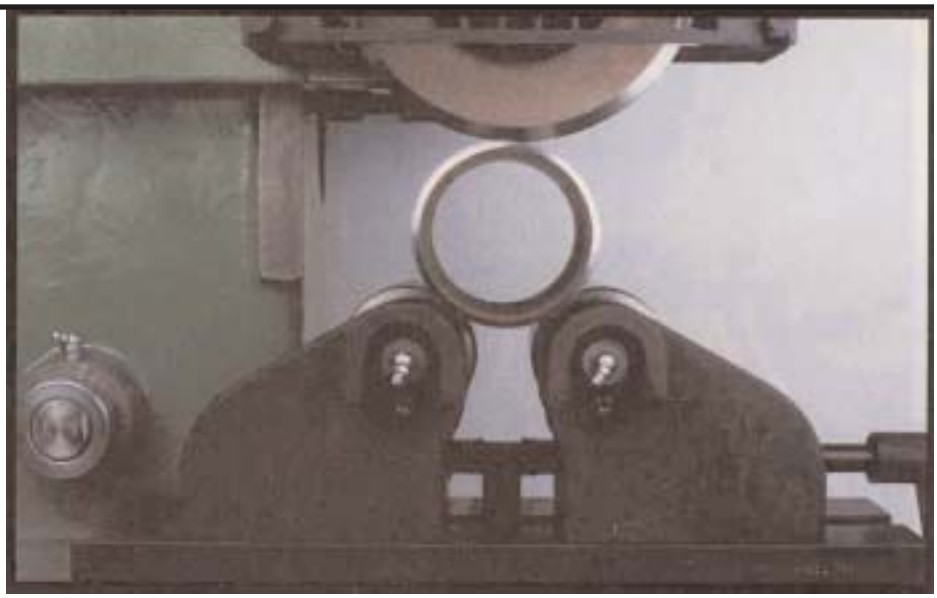
Troubleshooting Rotary Tube and Pipe Cutoff



Many shops out there today use a rotary cutoff machine to cut round tube and pipe. Why? The operation is simple and fast. Essentially, the rotary cutoff machine is like a motorized version of a plumber's cutting tool. The rotary cutoff blade spins at 300 rpm. The tube is placed on rollers in the machine, and the rotating cutoff blade engages the tube, causing it to spin. When downward pressure is applied to the blade, it passes through the wall of the material, parting the tube wall thickness only. Because the metal is parted, no material is removed during cutting, so waste is eliminated.

But the machine does require some expertise to take full advantage of its cost efficiency. For example, say you run a production shop and one of your operators is having a problem, the rotary cutoff machine is leaving ragged-end cuts. Something's wrong.

But this doesn't make sense. The cut seems simple enough - 3/4-inch-diameter 6061 aluminum tube. So you check the blade. Yes, it's got the correct bevel, and it was sharpened the day before. The material OD seems consistent. Then you look at the pressure - 60 psi. Way too much, so you adjust it down to 40 psi, make a test cut, which turns out clean, then tell your operator to return to cutting.

Then the operator comes back to your office and says he's having the same problem. When you get there, though, you see that the pressure has been changed back to 60 psi. You realize that lowering the air pressure slows down your cut by about a second and a half, and that second and a half means the operator can't make bonus.

This is just one of the many not-so-obvious factors to consider when troubleshooting your rotary tube and pipe cutoff operation. Whether you work in a large production environment requiring thousands of cuts per day or a small shop that requires several hundred cuts per day, there are fundamental variables essential for a clean cut.

MATERIAL

Look at material first. If you're working with black pipe, watch for hard spots that can cause some irregularity. When the blade comes in contact with a metallurgical hard spot, similar to a knot in a tree, the saw will try to force its way though the material, and in the end the blade will chip. All grades of pipe or tubing can vary significantly, even within the same lot.

BEING SQUARE

If either the blade or the material is misaligned, problems will occur. Proper alignment is critical for the correct end finish, and will also prolong blade life. Problems can also occur if the blade isn't tightened properly onto the shaft. The blade will wobble or spin unsteadily and try to make a cut that may end up chipping the blade. So, be sure the blade is perfectly square with the workpiece.

BLADES

Versatility is important in a blade. Blade changes make downtime, and the more versatile a blade is, the fewer changes are necessary. Shops using an S7 tool-steel blade can cut stainless, copper, nickel, brass, steel, aluminum and titanium all with one blade. The only item that changes in cutting different grades of material is the blade life, which decreases dramatically when cutting stainless steel or titanium.

Blades are ground on both sides to ensure flatness (0.010 TIR - total indicated runout). Blade OD and the bore are concentric within 0.002 TIR. The bevel and end-radii are hard-turned. The bevel on the blade should have a 0.003 to 0.005 radius. It is important that the blade is not sharp when making cuts. The radius is extremely important for clean cuts and optimal blade life.

Blade bevel ultimately depends on wall thickness. If cutting extremely heavy wall, an extra-long bevel blade should be used. This blade is 3/16-inch thick and has double-bevel on both sides. The bevel starts at 25 degrees and changes to a six-degree bevel. The initial bevel pierces the wall and the six-degree bevel continues through the wall, displacing less material while making the cut. For thinner-wall material, the blade thickness should not exceed the wall thickness.

AIR PRESSURE

Adjusting air pressure changes the total force available to push the cutoff blade through the cut. It should generally be set at 40 to 60 psi. Lighter-wall tubing requires lower pressure, and heavier-wall tubing requires higher pressures.

For example, say a mechanical contractor is cutting 2-inch, 4-inch and 6-inch Schedule 40 pipe. He would use 90 to 100 psi to get a hard, fast cut. The cuts are made in 1, 1.5 and 2 seconds, respectively. However, when cutting 2-inch-OD mild steel with a 0.065 wall, the air pressure would be 40 psi, producing a cut in 2.5 seconds.

SMOOTHNESS AND SPEED

For ideal smoothness, remember this rule of thumb: The faster the cut, the material flows to the ID; the slower the cut, the material flows to the OD.

For example: A furniture manufacturer needs table legs to be capped - that means those leg cutoffs cannot have OD flow, so the cut would be made in 2 to 5 seconds. Even at a slow speed, the machine remains cost-effective. Indeed, depending on the material, a rotary saw can cut 12-inch OD in less than 30 seconds.

MARRING

When working with powder-coated material, it is possible to mar the material as it's spinning on the cutter-blocks. Using polyurethane-coated or UHMW material on the rolls will prevent marring.

PUTTING IT ALL TOGETHER

Whether the cutoff machine is in constant use or it is used only occasionally, not every operator or supervisor may know how to operate the machine. By listing all the vital stats on a chart, right at the machine, there is never any question on how any job needs to be set up and run properly. List the OD of material, the wall thickness, the amount of air pressure used, the blade number and the speed of the cut.

This way, even a new operator can step up to the machine and make a quality cut.

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