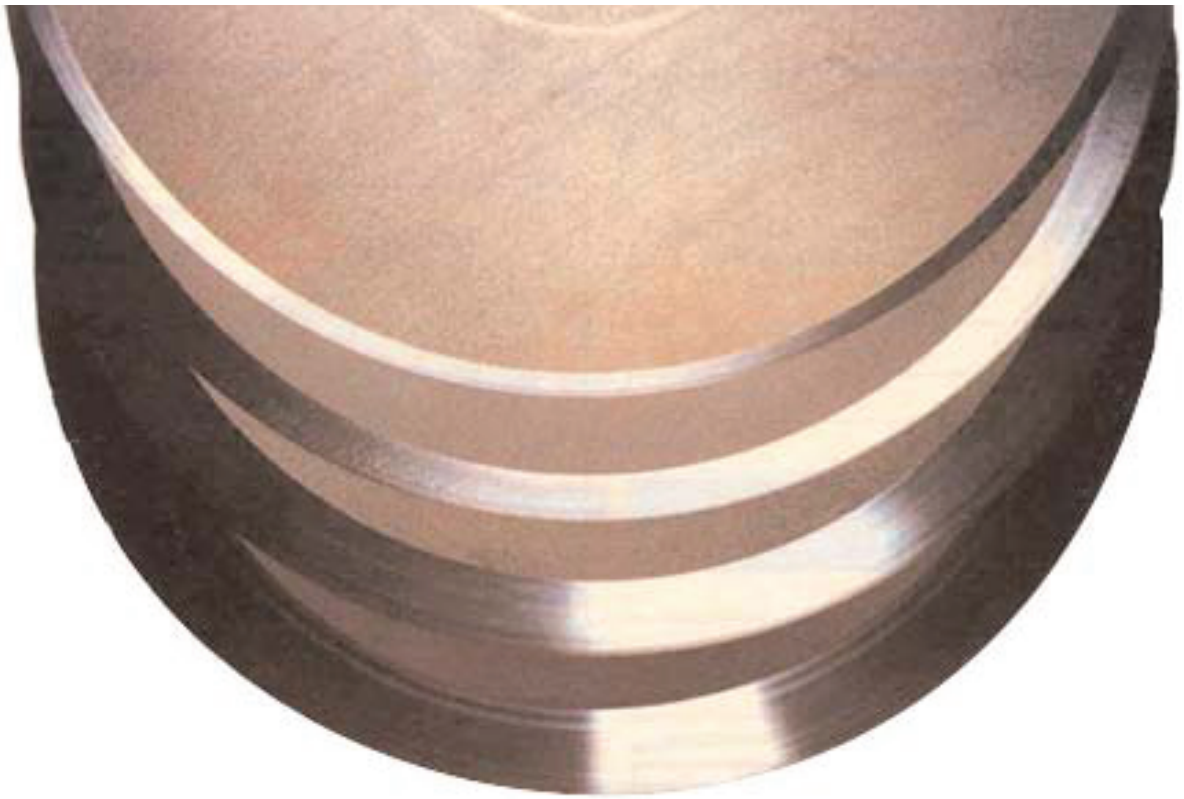


MAKING THE CUT

Understanding rotary cutoff blades and extending blade life

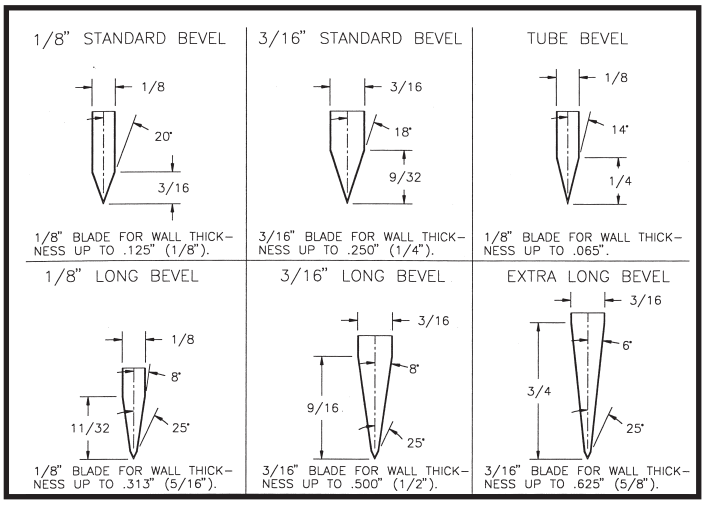
By Susan DeJesus

Economic considerations, spurred by increased competition, have caused companies to evaluate cost-effective alternatives that can provide improved products at reduced operating costs. Many companies rely on time-proven rotary cutting operations to do this.

Rotary tube cutting involves the chipless parting of round tube or pipe by a cutting blade that rotates in relation to the diameter of the tube or pipe. The main feature of rotary cutting is that it cuts without producing chips, which reduces material waste. A second feature is that cleaning and deburring the part is often reduced or eliminated. Because the blade penetrates quickly, there is minimal change and less work hardening at the tube end, which makes it easier to form in secondary operations.

Because of these cost-reducing advantages, rotary cutoff machines are versatile and are being used in a variety of markets.

The cutting process varies significantly depending on tube size, wall thickness, and especially the material to be cut. To cut all types of material, from fully annealed, soft aluminum to copper, brass, steel, stainless steel, and titanium, as well as a variety of wall thicknesses, cutting blades are available with inclusive angles from 12 to 40 degrees.



RECOMMENDED CUT-OFF BLADE BEVELS

Cutoff blades are made from high-impact tool steels. Tool steels, as the name implies, are used primarily for making tooling used in manufacturing and for the working and forming of metals. These tools must withstand high loads that often are concentrated on exposed areas. They might have to operate at elevated or rapidly changing temperatures while remaining in contact with various types of work materials. They often are subjected to shock or may have to perform under various adverse conditions.

Nevertheless, the tool,

when used under normal operating conditions, should not suffer major damage or wear that results in dulled edges, or be susceptible to harmful metallurgical changes.

The steel for most types of tools is heat-treated, generally hardened and tempered, to provide the properties needed for a particular application.

Cutoff Blade Selection and Maintenance

The cutoff blade is the key to a successful rotary cutting operation. The blade should be selected carefully to ensure that it will produce the proper end finish and that it will result in maximum production rates. The proper blade will also keep costs down, because machines will have less downtime.

The primary factor affecting blade selection is the material it will cut. Consideration should be given to the outside diameter of the tube or pipe, its wall thickness, surface finish, material composition, and required end finish. Figure 1 shows some correct blade bevels for various wall thicknesses.

Following are a few simple procedures that can prolong blade life.

1. Alignment. Proper alignment of the tube or pipe in the supports must be maintained as it is critical for the correct end finish and to prolong the life of the blade. If the tube is not aligned properly, the blade will walk or thread on the material and will not be able to initiate the cut.

2. Clearance. It is important to ensure that the tube or pipe is not striking the side of the cutoff blade as it is advanced into position. Insufficient clearance can damage the blade's ability to cut.

A sharp bevel generally will cut material easier and with less pressure, but it will require more frequent sharpening.

3. Material. As mentioned earlier, the cutting process must be adjusted to the type of material being cut. On tough or heavy-walled material, a lubricating oil may be needed to assist the cut. Tubing material can vary significantly, even within the same lot. Hard areas may be encountered, which can shorten the blade's life.

4. In-service inspection. Periodic blade and end finish inspection during operation is important. If the blade becomes nicked or dull, a corresponding reduction in end finish probably will occur. If an end finish deteriorates, the cutoff blade may be the culprit. When cutoff blade deterioration occurs, the blade should be removed and sharpened or replaced. If this is not done, in a relatively short time the blade will become less effective.

5. Sharpening. Proper blade sharpening is critical. During sharpening, the blade and/or blade edge should not become overheated, which can cause the edge to soften. After sharpening, the edge should be lightly honed to produce a rounded edge with a 0.003 to 0.005-inch radius.

A sharp bevel generally will cut material faster and with less pressure, but it will require more frequent sharpening. This type of edge is appropriate for thin-walled or soft tubing. A more blunt or rounded bevel will last longer and should be used for heavier-wall material. Small-diameter cutoff blades generally cannot be sharpened. However, large-diameter blades (7 and 8-inch) may be sharpened as many as 25 times before they need to be replaced.

Conclusion

In rotary cutoff operations, the cutoff blade is the key factor affecting the quality of end finishes and production rates. As demands for better end cuts on pipe and tube increase, it is important to understand the factors that affect rotary pipe and tube cutting and to follow the procedures that will improve productivity and reduce costs.

Susan A. DeJesus is Sales Coordinator with Continental Pipe & Tube Cutoff Machines, 325 S Fairbank Street, Addison, Illinois 60101, phone 630-543-7170, fax 630-543-5953. Continental Pipe & Tube Cutoff Machines manufactures rotary cutoff machines, accessories, and cutoff blades.