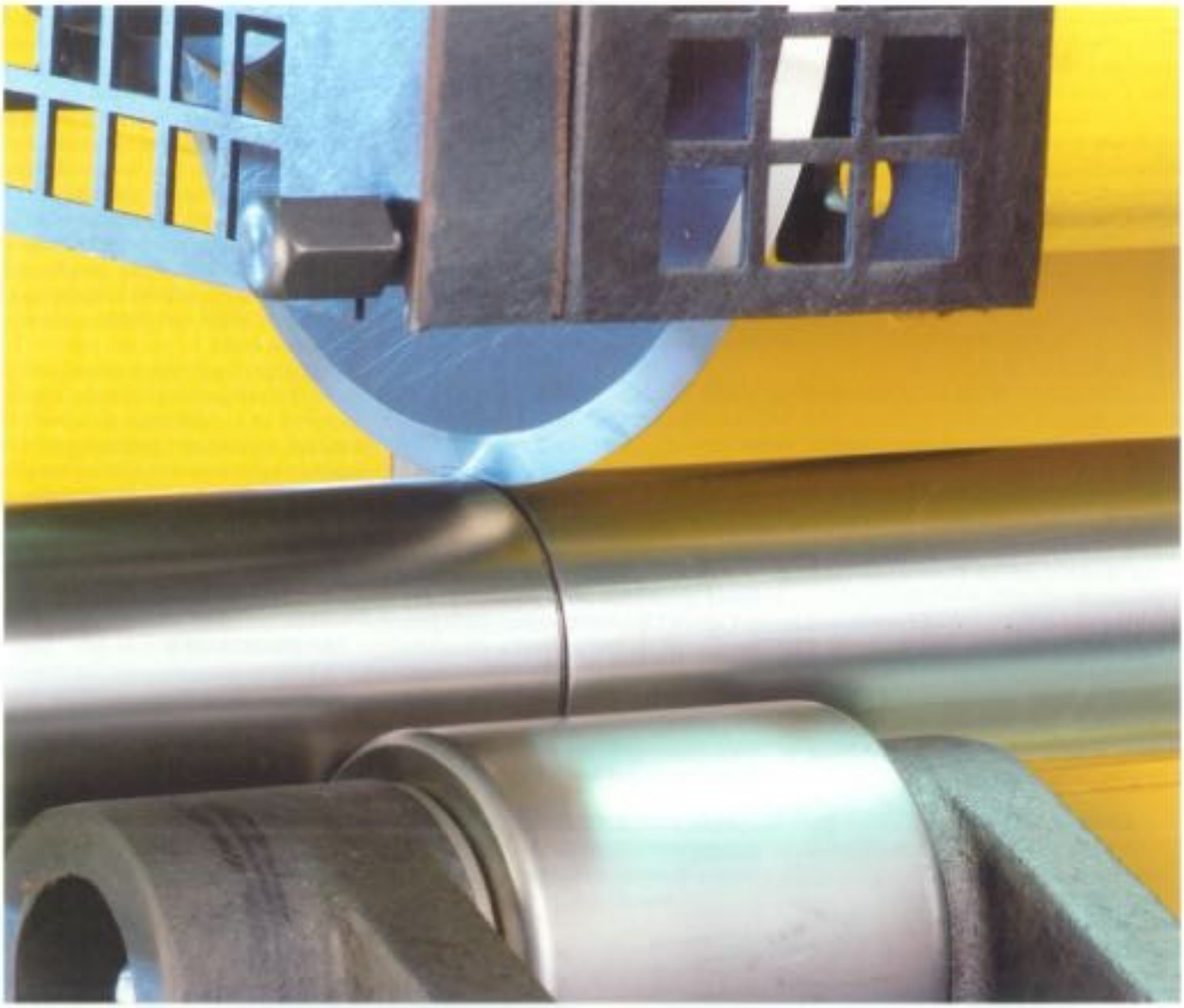

THE BASICS OF ROTARY CUTTING

Susan DeJesus

The rotary cutting concept is not new. Since its introduction in 1919, it has developed into an effective method of production tube and pipe cutting, regardless of lot sizes.

In industrial applications, a rotary cutter is basically a motorized version of a plumber's tube cutter. The tube is placed on rollers in the machine, and the rotating cut-off blade engages the tube, causing it to spin. When downward pressure is applied to the blade, it passes through the wall of the material (rather than traveling through the entire diameter) and parts the tube wall. Because the metal is parted, no material is removed during cutting, so waste is eliminated. This type of chipless cutting can also eliminate the need for additional cleaning and deburring operations.

Material flow can be regulated with an adjustment to the feed rate or speed of the cut. Generally, the slower the

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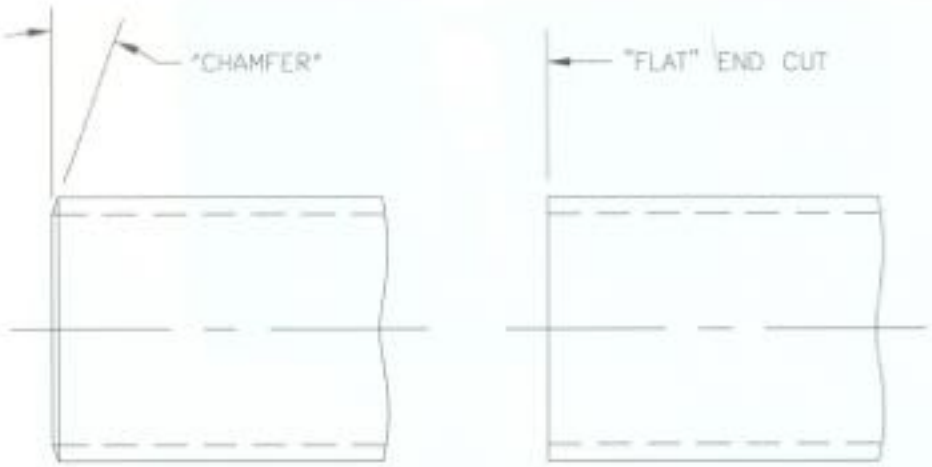

Figure #1 – Drawing of tube showing chamfer and compared to a flat end cut

cut, the more material flow to the outside diameter (OD); the faster the cut, the more material flow to the inside diameter (ID).

The cut is typically square to within several thousandths of an inch. The machine's footprint is approximately 24 by 30 inches, which allows for easy integration into a work cell. Material flow is unrestricted, and stock piling of tubing is not required.

APPLICATIONS

A variety of pipe and tube diameters and lengths can be handled with rotary cutting. Round tubing or pipe measuring 1/4" to 12-3/4" OD and .020 to .625 inch wall thickness can be cut with this method.

Rotary cutting is used in the sprinkler, automotive, metal fabrication, conveyor, heat exchanger, cylinder manufacturing, game equipment, pipe and nipple industries, and pipe and tube mills. This is just a few different industries using this type of cut for their products.

The rotary cut-off is suited for cutting all types of round metal, including copper, brass, steel, aluminum, stainless steel, titanium and incalloy. However, different grades of material determine different tooling life spans. With hard material, blade life is reduced, requiring more frequent sharpening.

In rotary cut-off, the blade parts the wall thickness only and does not go through the entire diameter, thus creating a slight chamfer on the ID to the OD. This type of cutting may not be desirable when a flat end cut is required (see Figure 1).

Cut-Off Blades can be resharpened numerous times before a new blade needs to be purchased. These blades are not immediate disposable tooling. Therefore, tooling cost can become very cost effective,. in most cases, less than 2 cents per cut. (See Figure #2)

MACHINE TYPES

Rotary cut-off machines are available from a number of manufacturers. The two main styles of machine that they offer are manually operated and air-operated, each with its own benefits for specific cut-off requirements.

Manual machines provide an economical option for shops with intermittent cutting operations or with frequent changeovers for cutting a variety of sizes. These machines are appropriate for short runs. They require an operator to advance the material to the length gauge stop and pull a handle to initiate the cut. The quality of the end cut depends on the operator's touch.

Air-operated machines allow each job to be tailored to the production rate and required end conditions required with minimal adjustment. Reducing operator fatigue can be done by adjusting the speed of the cut, air pressure, cut-off blade, and the position of the head assembly. These machines can create the same cut from the beginning of a production run to the end of the run, regardless of piece count.

ACCESSORIES

A variety of accessories are available to improve the efficiency of the cut-off operation. Listed below are several that are available from most manufacturers.

Cutter Block Assemblies

These are available in different sizes for specific tube and pipe diameters, by providing support at the machine for

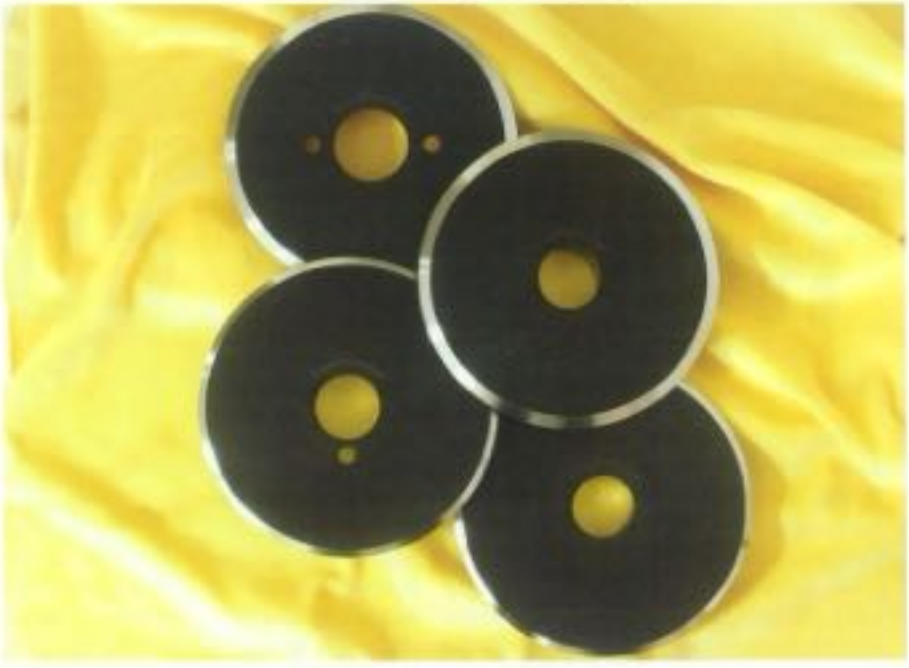

Figure #2 – Continental Pipe and Tube Cut-off Blades available in many OD's, bevels and bore sizes.

the material while it is being cut. Cutter block rolls should be spaced so the diameter of the tube or pipe is "cradled" a third of the way into the rolls.

Generally, spreading the rolls farther apart reduces OD burr. Moving them closer together reduces ID burr. (See Figure #3)

Figure #3 – Continental Cutter Block Assembly

Standard Length Gauge Assembly This assembly provides a positive stop for repetitive cutting of material. The assembly permits consistent, repeated cuts in production runs without remeasuring.

Automatic Length Gauge Assembly This assembly permits a positive stop for repetitive cutting and automatically initiates the cut-off cycle when the material length has been determined. For high production runs, an automatic length gauge can add speed and efficiency on air operated models while reducing worker fatigue. The stop is set to the desired cut length, and when the material hits the stop, it activates a micro switch that bypasses the foot switch and starts the cutting cycle automatically. This accessory makes the cutting a semi-automatic option.

SUPPORT SYSTEMS

Individual Support Stands hold one piece of material for tube and pipe cutting. They should be carefully aligned with the machine and bolted to the floor. One Support should be used for 3-4 ft. of stock material.

The **Tube Support System** is designed to increase productivity, and to be used where the expense of an automatic feeding system cannot be justified. This system permits an operator to load the tubing into the tube rack, index one tube into the tube feed section, and manually feed the tube into the cut-off machine. The primary benefit is a reduction in the loading time of the tubing (multiple vs. single pieces), and the improved feeding of the tube into the cut-off machine.

The **Automatic Tube Feed System** can be provided with the cut-off machine as a complete unit or be retrofitted to an existing cut-off machine. The auto feed is programmable and will improve the quality and productivity of the cutting operation. The operator selects desired program to run; presses start; the carriage moves into cutting position for a trim cut (if needed); first cut is initiated and then programmed cuts occur automatically. The operator is now free for other tasks! (See Figure #4)

Custom Support Systems can be designed by most manufacturers to meet customer-specific tube and pipe support requirements.

MAINTENANCE

A cut-off machine can endure many years of active service when simple preventative maintenance steps are taken.

For example, checking levels of fluid in the air line lubricator and the hydrocheck unit (for air operated machines); lubricating pivot points and bearings; and checking drive belts for wear, tightness, and adjustment should be done on a routine basis. These steps can enhance the longevity of a cut-off machine.

CONCLUSION

Because it is economical, durable, and efficient, rotary cutting of tube and pipe presents a viable option for small shops that require several hundred cuts per day or large production operations that require thousands of cuts. ❑

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Figure #4 – Continental Automatic Tube Feeder

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