6 Reducing Wire EDM Costs

Wire EDM costs can be greatly reduced if the material has been properly prepared and the EDM process is understood. Unfortunately, the opposite is also true. Wrong preparation can be costly.

Create One Slug

To reduce costs, the general aim should be to create one slug. Wire EDM is an automatic process; if more slugs are made, it requires more down time and operator services. Also, when surfaces close to an edge are cut, inadequate flushing occurs which reduces cutting speed.

When entering a workpiece on a slight angle, feathered-edge machining occurs. This feather-edge machining may cause slight surface irregularities. Skim cutting can be used to remove such irregularities; however, unnecessary skim cuts increase cost. Cutting one slug is much more cost effective. See Figures 6:1-4.

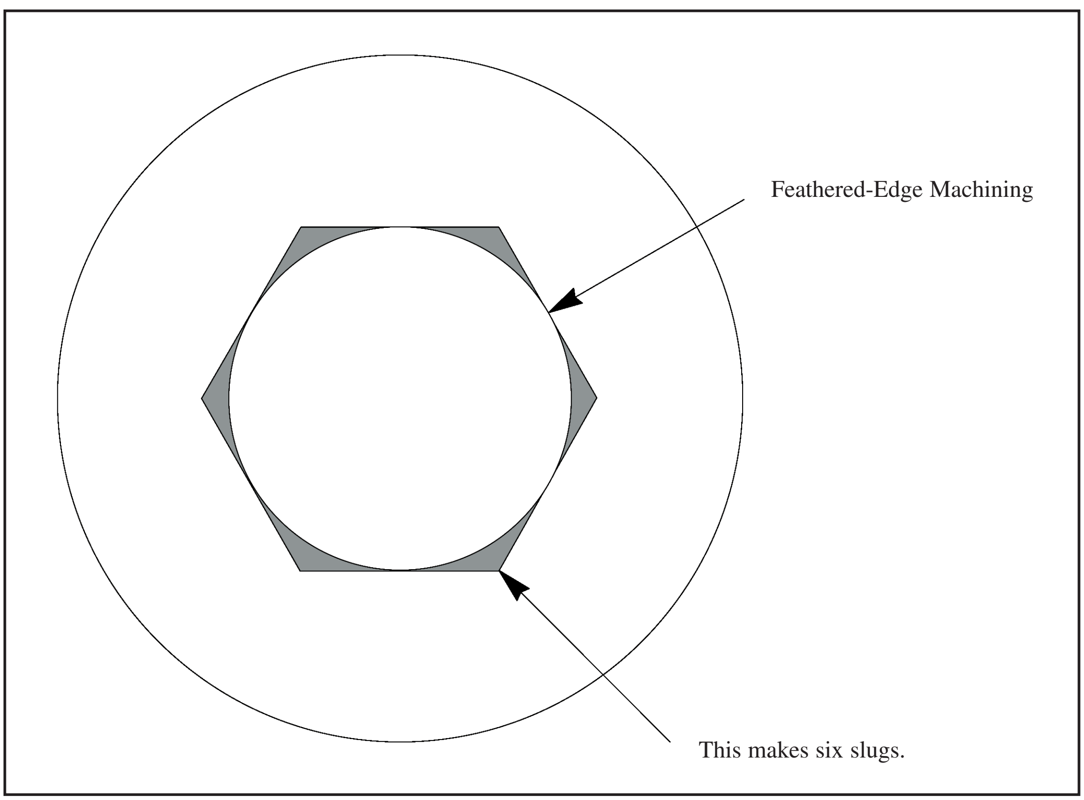

Figure 6:1
Wrong Procedure—Creates Six Slugs and Slows EDM Process with Feather-Edge Machining

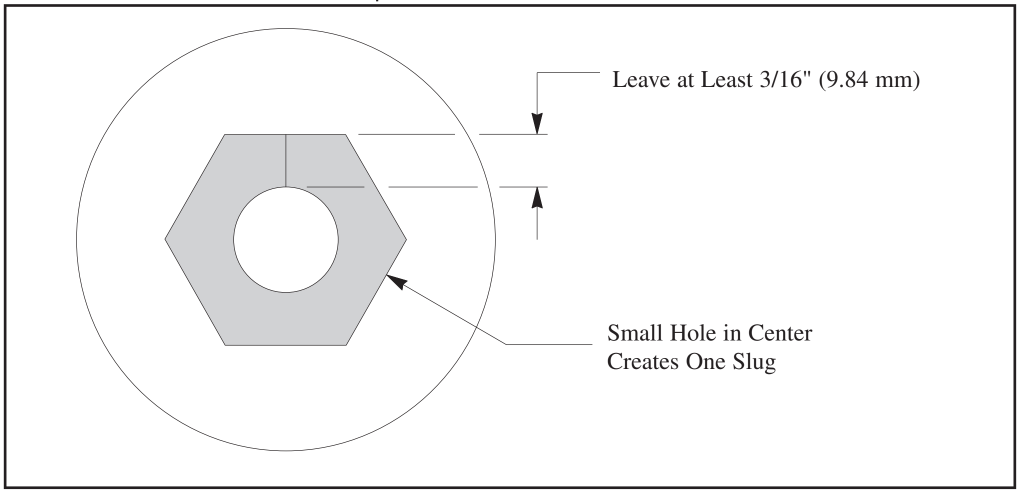

Figure 6:2

Right Procedure—Creating One Slug: Produces More Efficient Machining

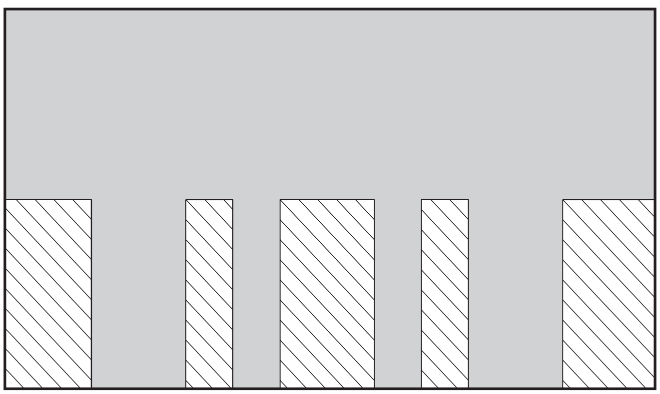

Figure 6:3

Wrong Procedure—Creates Five Slugs
Five starting Cuts Must be Made Plus Five Slugs

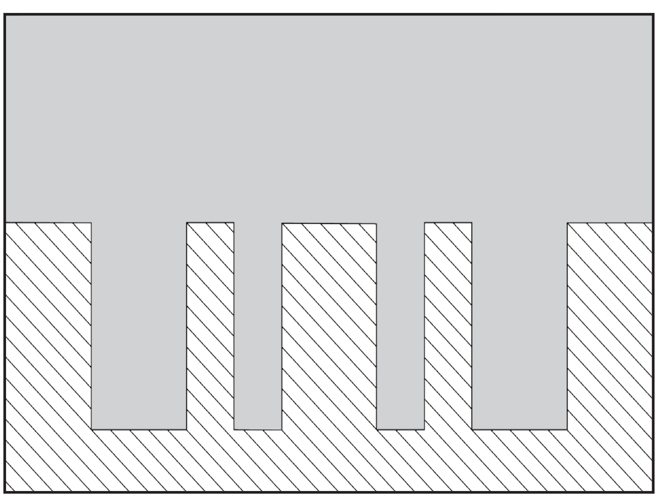

Figure 6:4

Right Procedure—Creates One Slug

Leaving Extra Material Allows for One Slug to be Cut

Keeping Flush Nozzles on the Workpiece

The most efficient method for wire EDMing is placing both top and bottom flush nozzles on the workpiece, as shown in Figure 6:5. This placement allows for maximum flushing pressure to remove the eroded chips.

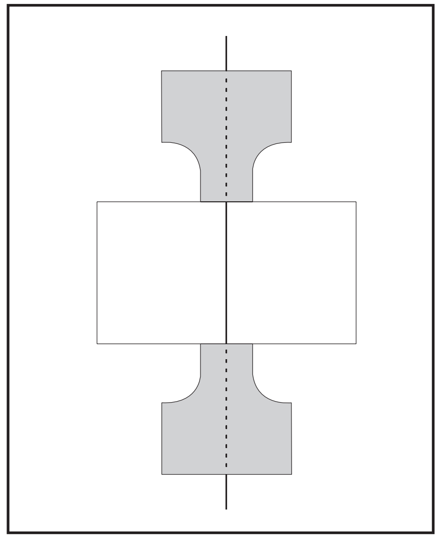

Figure 6:5

Most Efficient Cutting Occurs when Both Flush Nozzles Rest On Part

If possible, nozzles that are not on the workpiece should be avoided because it is less efficient because of less water pressure in the cut. See Figure 6:6.

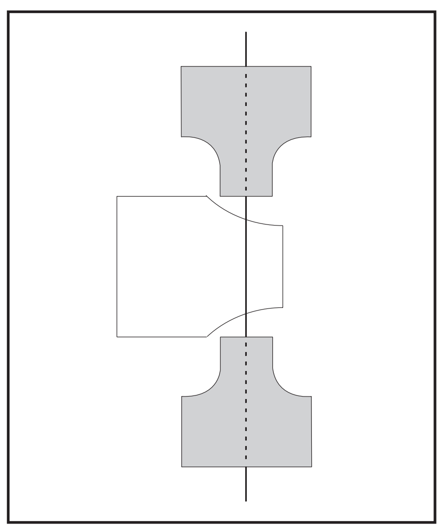

Figure 6:6

Cutting with Nozzles Not On Workpiece Is Possible, but Is Inefficient

For many applications, however, there is no alternative but to have nozzles off the workpiece. At our company, Reliable EDM, we cut many jobs with nozzles off the workpiece, including tall parts. See Figure 6:7.

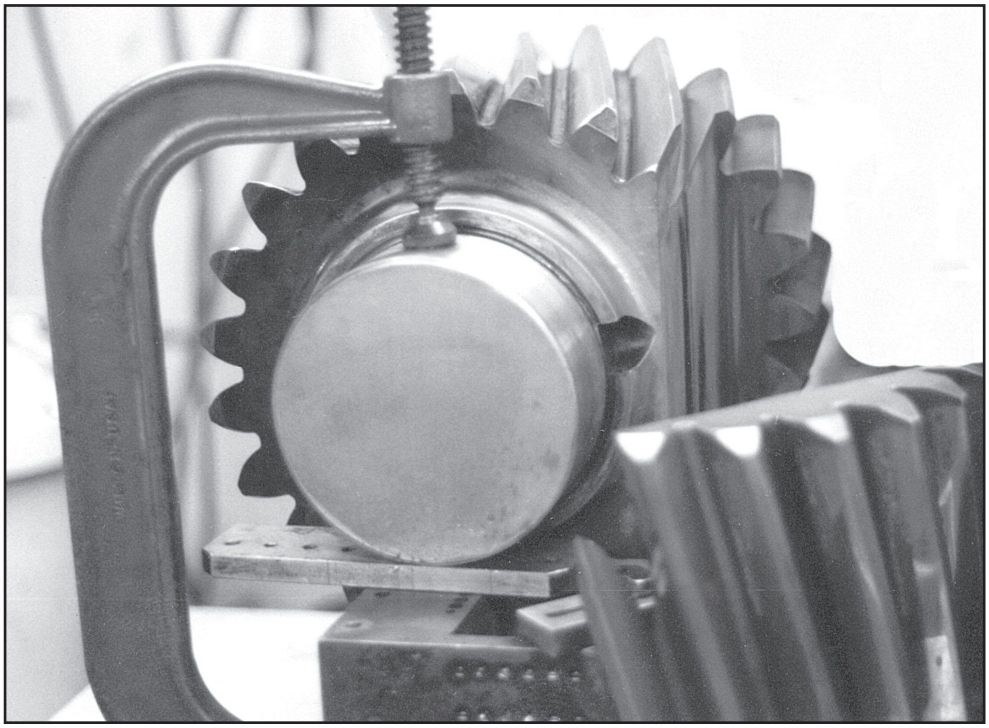

Figure 6:7

An 11-1/2 Inch (292 mm) Test Specimen Cut with Nozzles Not on Workpiece

Machining After Wire EDM

To avoid cutting with nozzles off the workpiece, it is sometimes more economical to do machining after, rather than before the EDM process. This is particularly true with shallow recesses, as in Figure 6:8.

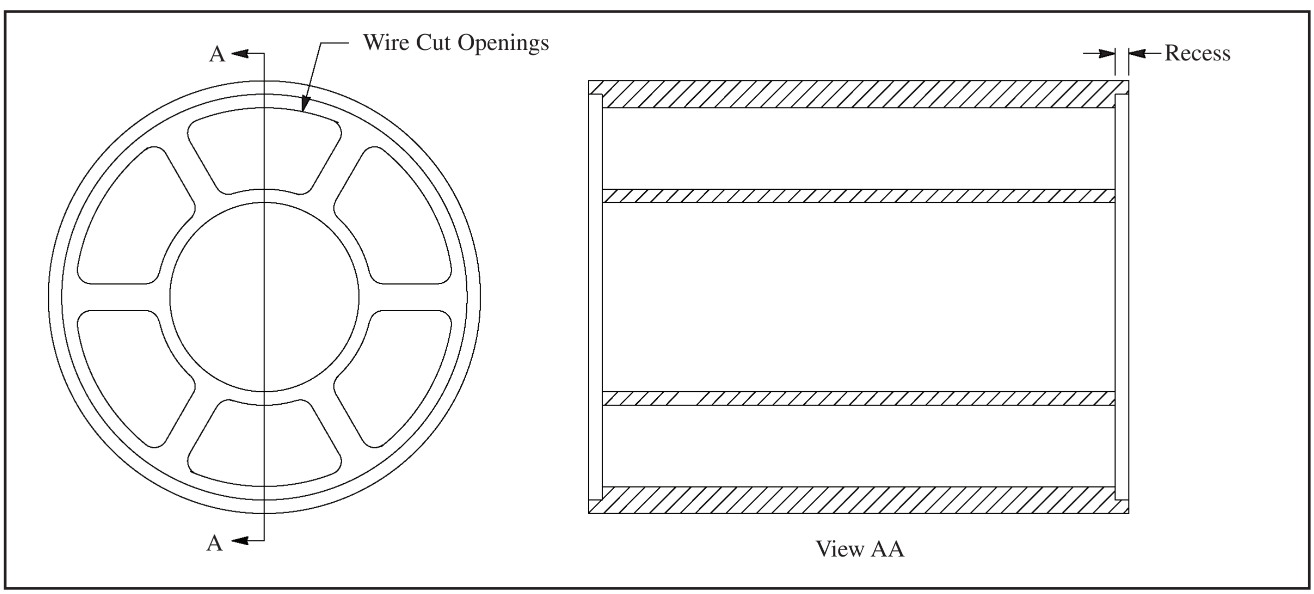

Figure 6:8

Machine the Workpiece After Wire EDMing
Since Recess is Shallow, More Efficient EDMing Would be to Machine Part after EDM

Often, parts are stacked to reduce costs. When parts have intricate dimensions, stacking may be difficult if parts have been previously machined, as shown in Figure 6:9.

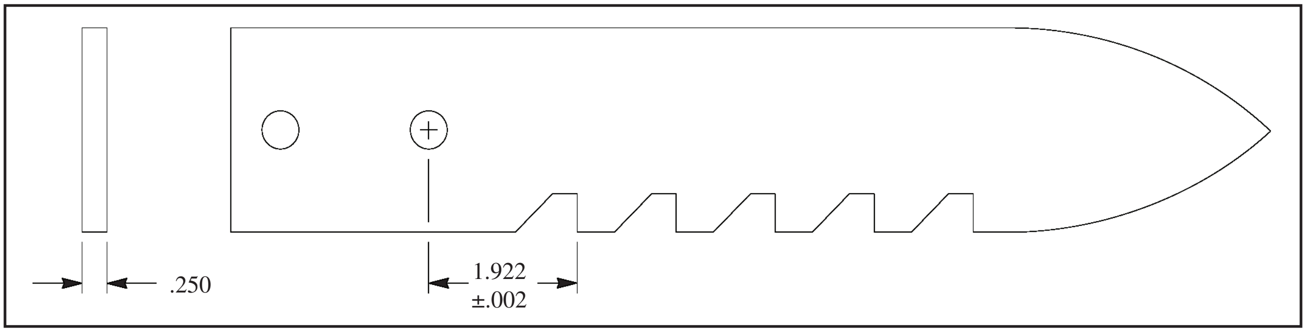

Figure 6:9

Holes should be put in after EDMing.
Making one piece presents no problem; however, parts like these are stacked. If holes are premachined, it is difficult to line up the holes when cutting large stacks.

If parts can be stacked, it is preferred that holes be put in after the part has been EDMed. Putting holes in first can cause alignment difficulties when the parts are set up in a fixture, as in Figure 6:10.

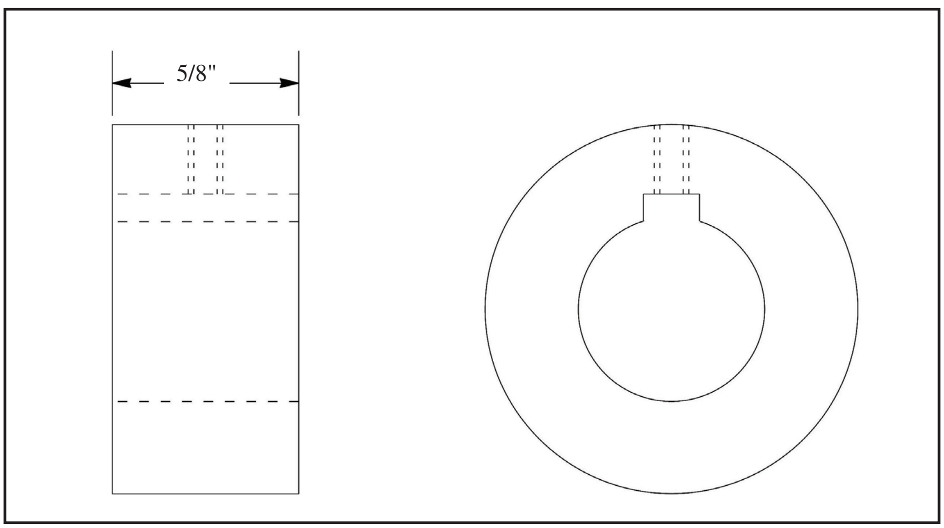

Figure 6:10

Put tapped hole in after EDMing.
Parts like these are often stacked in a "V" block. Higher machining costs occur because tapped holes cause alignment difficulties.

Cutting Multiple Plates and Sheet Metal Parts

Stacked sheet metal can be held with fixtures without the need for welding. However, when multiple parts from one stack and starter holes are required, the stack can be bolted with flat head screws or welded on its sides. The stack should be flat, and the EDM job shop should be consulted for the ideal stack thickness.

Accuracy, efficiency, and machine capabilities determine the height for stacked parts.

Wire EDM will cut through light rust; however, heavy rust and scale must be removed. Many times, plates are warped. The plates should be clamped tightly together before welding. At least 1/2" (13 mm) should be left on the sides for welding and clamping the part. See Figure 6:11 for proper stacking.

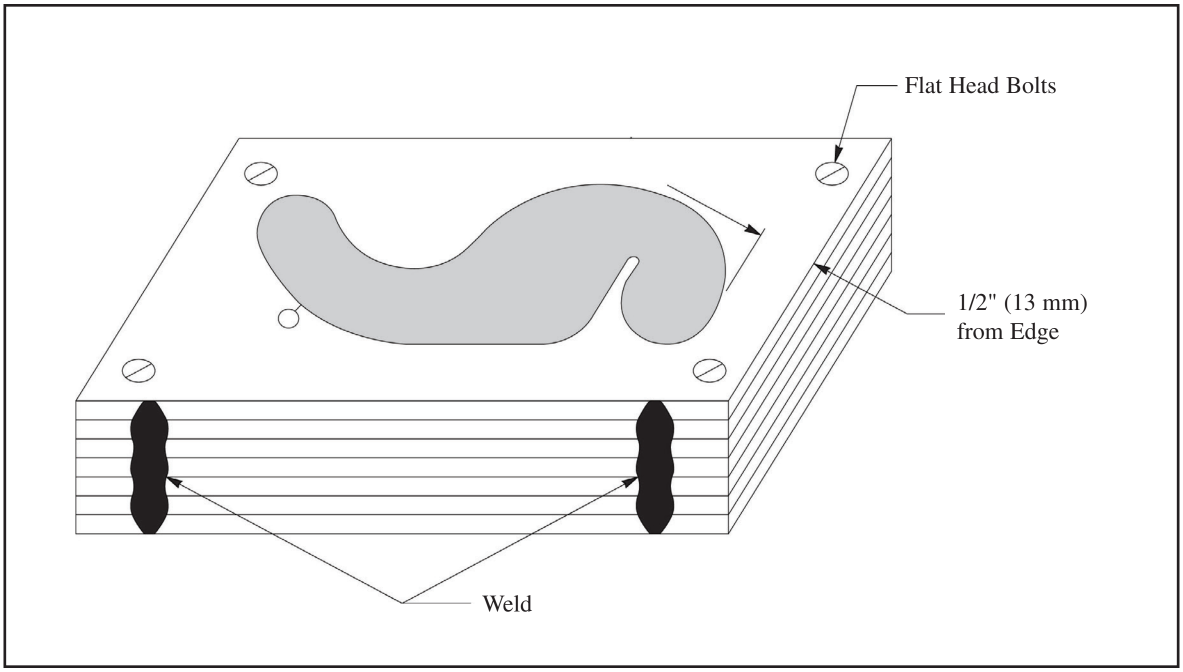

Figure 6:11

Stacks Welded or Bolted
At least 1/2" (13 mm) should be left for clamping and a frame to support part while cutting. Caution: If parts are welded or bolted, both sides of plates must be clean and free from heavy scale, tape, paper, or any other non-conductive materials.

If sheets or plates are badly warped, each stack should be divided in half and the belly should hit the center. The ends are then clamped together and welded. The aim should be to produce a flat surface. The weld should be removed from the top and bottom of the stack so flush ports do not hit the weld.

When putting stacks together, all sheets must be clean—marker paint, (not magic marker), scale, tape, or paper between the sheets must be removed. Wire EDM cuts by spark erosion; it cannot cut through non-conductive materials.

Production Lots

Wire EDM is an excellent machining method for production work. Fixtures are often used to hold the multiple parts. It is important that production lots are machined the same in the area where they will be located. Parts also need to be machined square. See Figure 6:12.

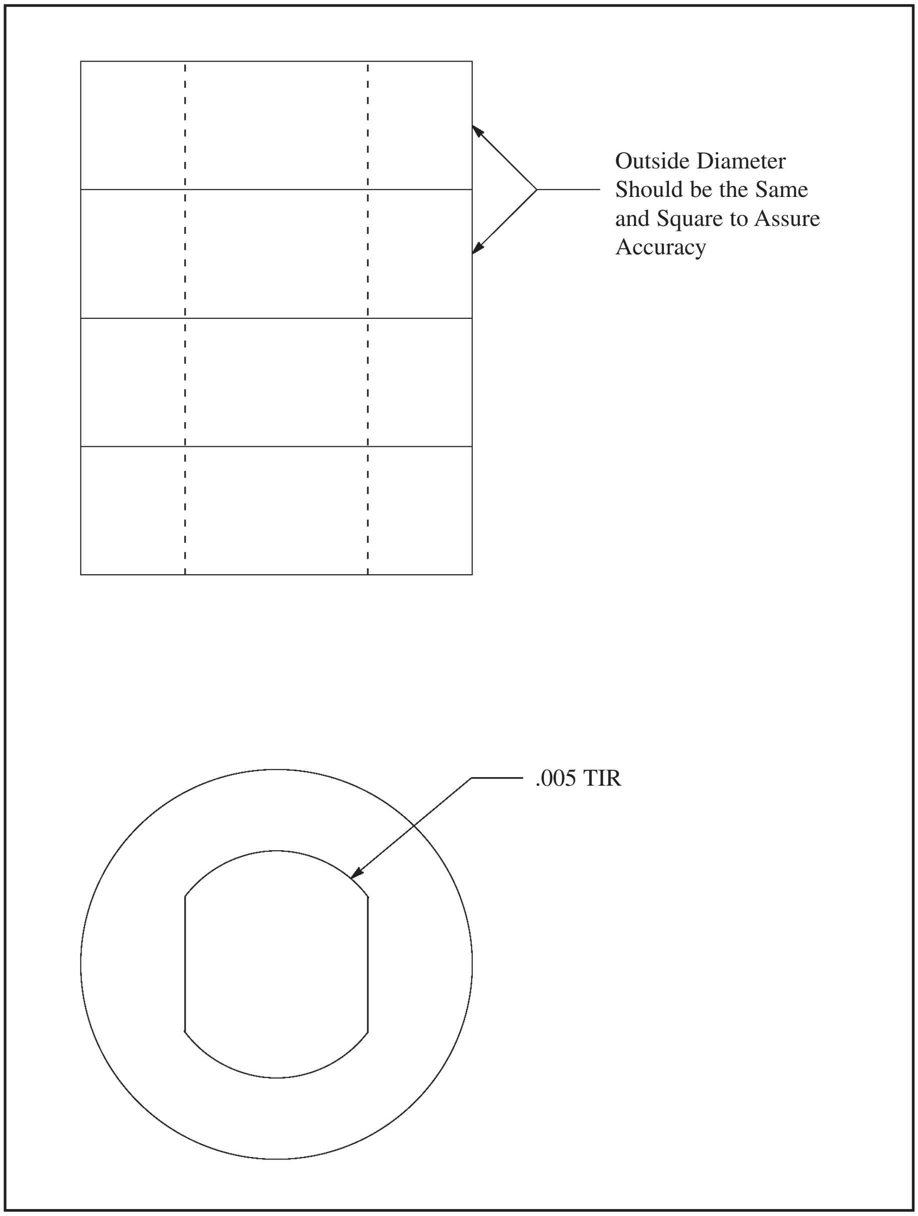

Figure 6:12

Production EDMing—When Machining Parts, Consider for Stacking to Reduce Costs

Stipulating Wire Sizes

Some machines can cut with .0008" (.020 mm) wire. One wire EDM job was done on a .015" (.38 mm) diameter air turbine rotor. It had 13 slots cut with .00039" (.01 mm) wire. This was done on a specialized wire EDM machine.

The difficulty with cutting with thin wires is that it machines much slower because less energy can be applied to the wire. Also, thin wires break much more easily than standard wire sizes. Some applications require thin wires; however, whenever possible stay with the standard wire size of .010" (.25 mm) or .012" (.30 mm) wires. Stipulating thin wire can add significant costs to the wire EDM process because of slower cutting feeds and difficulties associated with such wires.

Premachining Non-Complicated Shapes

It is not always necessary to EDM the entire part. Sometimes premachining can reduce costs, as shown in Figure 6:13.

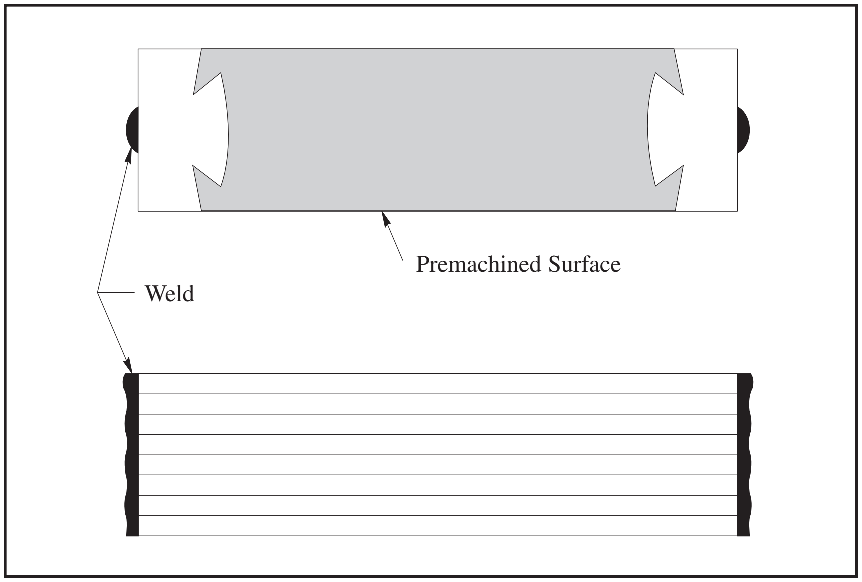

Figure 6:13

Premachine Parts to Reduce Costs

Wire EDM is an extremely efficient method to machine parts. However, costs can be further reduced by understanding this unique process of cutting metal. In the next chapter, we will be discussing the advantages of wire EDM in tool and die making. Understanding this process can result in substantial savings in producing stamping dies.