



Ercolina mandrel systems incorporate five (5) individual tooling components to effectively support the profile during bending process. These components; **Center former**, **pressure die**, **clamp die**, **wiper die** and **flexible mandrel** are specific to material type and dimension.

**The following must be supplied when ordering mandrel tooling:**

Profile shape, interior and exterior dimensions, wall thickness, material type, minimum distance between bends and number of bends per day required. It is highly recommended dimensional drawings of finished product be supplied with mandrel tooling orders. All mandrel tooling is special order and requires **non refundable** advanced payment.

## When is a Mandrel Necessary?

When a tube is bent the outside wall collapses and thins out, and the inside compresses. When bending thin wall tube to tight radius a mandrel and wiper die are necessary. Use of a mandrel minimizes the amount of ovality occurring during bending.

### COMPONENTS OF MANDREL BENDING



**Center Former/Bend Die:** The primary tool which determines bend radius. Manufactured from tool steel or alloy steel and heat treated depending on requirements. Clamp face is serrated to assist grip strength.



**Clamp Die:** Matches center former clamp surface. The clamp die's primary function is to hold tube securely to the center former.



**Pressure Die:** Maintains constant pressure on tube at tangent where the bend occurs, providing reactionary force to make the bend. Length of the pressure die depends on the degree of bend (DOB) of part being bent and the machine design.



**Wiper Die:** Manufactured to match center former radius. Mounts into the groove of the center former with tip positioned near tangent point of bend. Primary function is to prevent wrinkling on the inside radius of the tube. Wiper dies are typically manufactured from AMPCO® bronze.



**Mandrels:** Generally made from the same material as the wiper die. Primary function of the mandrel is to prevent inside diameter of the tube from collapsing. Choosing the correct mandrel is very important in determining the quality of bend. Three basic styles of mandrels are:

1. **Plug mandrel** used for heavier walled tube or large CLR bending.
2. **Standard open pitch mandrel** is most widely used because it covers the widest range of bending applications. Standard mandrels are made with one to three balls. Open pitch mandrel is the most durable of the three flexible mandrel configurations because it uses the largest size links possible.
3. **Thin wall mandrel (close pitch mandrel)** used mostly for thin wall tubing. Thin wall style mandrels use the same style linkage as standard mandrels except the link size is the next size smaller than it would be on a standard mandrel. For example, where a standard style mandrel would use a #10 size link, a thin wall style mandrel would use a #9 size link. The ball segments are now closer together and provide more support needed for thin walled tube bending. Strength is sacrificed for more support.



2" Stainless Steel  
.065wall – 3" CLR  
Cutaway to  
show mandrel



**Collet:** The collet is mounted in the tailstock of machine and holds material securely in carriage. Collets are size-specific and must match the tooling mounted on machine.

**Lubrication:** Comes in several different forms such as oil, grease, and paste. The kind of lubrication used will depend on material to be bent. A generous amount of lubrication may be applied to mandrel and inside of tube, however precautions should be taken to avoid getting lubrication on center former and clamp die. Proper lubrication is important to making good bends.