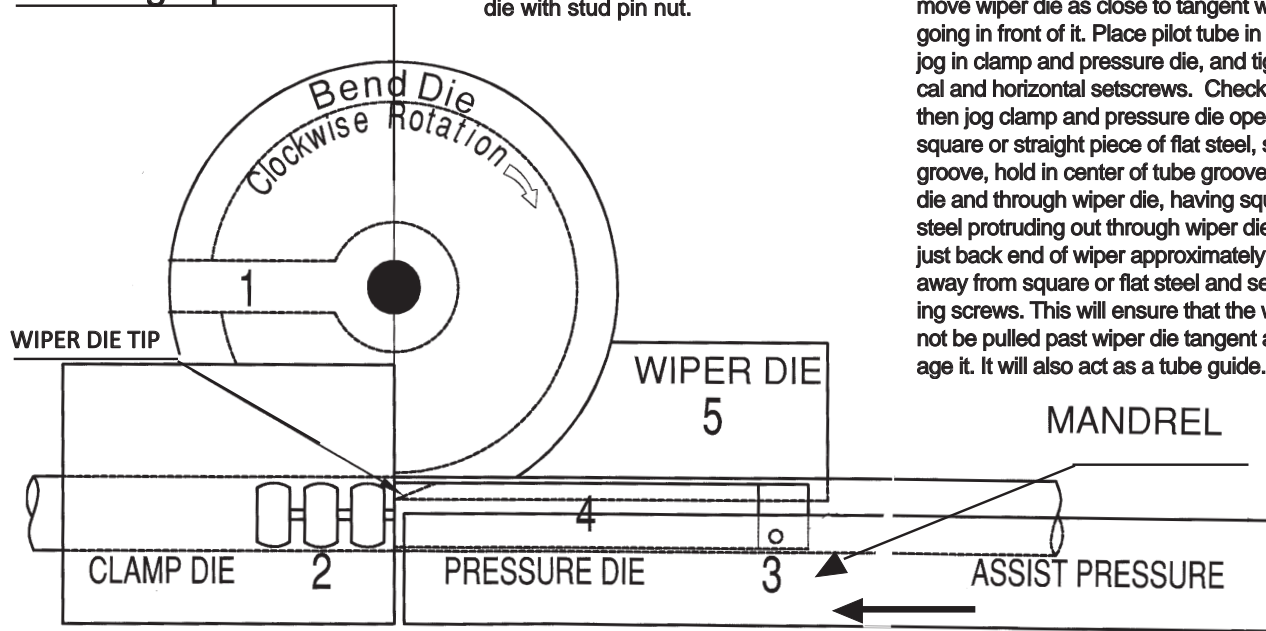


HINES BENDING SYSTEMS

Operator Bend Die Setup Information

The tangent point



1ST BEND DIE

Lower bend die over stud pin slowly fitting it to the die boss (or base). Secure die with stud pin nut.

4TH WIPER DIE

When wiper die is necessary, mount wiper die to machine holder. Keep adjusters loose, move wiper die as close to tangent without going in front of it. Place pilot tube in groove, jog in clamp and pressure die, and tighten vertical and horizontal setscrews. Check alignment then jog clamp and pressure die open. With square or straight piece of flat steel, slide in tube groove, hold in center of tube groove on bend die and through wiper die, having square or flat steel protruding out through wiper die. Now adjust back end of wiper approximately 1 to 2 mm away from square or flat steel and secure locking screws. This will ensure that the wiper die will not be pulled past wiper die tangent and damage it. It will also act as a tube guide.

2ND CLAMP DIE

Mount clamp die to holder. With the adjusters, place pilot tube in groove, jog clamp closed. Vertical and horizontal should self adjust. Set the adjusting screws until snug. Jog clamp back and check alignment. Next, adjust clamp pressure then jog clamp closed and leave 1/8-inch (3.175mm) play from tube and adjust with wrench until closed tight. Finally, jog clamp back from tube turn adjusting screw another 1/2 to 3/4 turn, then secure holder to slide before starting.

3RD PRESSURE DIE

With tube clamped to bend die, jog in pressure die and adjust alignment as you did on clamp die. Manually adjust pressure die tightly against tubing. Jog pressure die back and lock down holder before bending. More inboard adjustments may be necessary depending on the size of the tube and pressure necessary to hold work piece in bend die.

5TH MANDREL

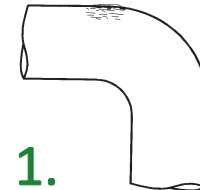
If mandrel is necessary, use the following as a starting point. Attach mandrel to rod. Locate tangent point on top of bend die (usually center of stud pin on bend die). Align 1/8-inch (3.175mm) from front of mandrel shank (not from mandrel balls). Mandrel balls will be past tangent. Mandrel extractor must be in forward position. Secure lock nut and mandrel should be close enough to begin bending.



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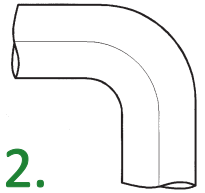


1.



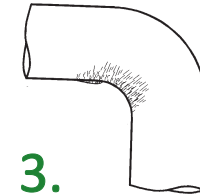
Distortion: Bulge at start of bend.
1) Move mandrel back from tangent until hump goes away.

2.



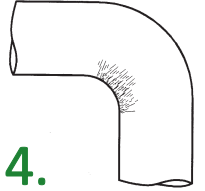
Scratches: Tool marks on bend sides.
1) Check tube O.D.
2) Check die alignment of clamp plus pressure dies.
3) Check measurement of bend die set.

3.



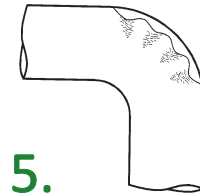
Distortion: Wrinkling occurring throughout bend and even extending into wiper die area.
1) Move wiper die closer to tangent.
2) Check rake of wiper die.
3) Wiper die may be worn out.

4.



Distortion: Wrinkles in bend area with mandrel and wiper die in proper locations.
1) Check inboard pressure on pressure die. You may need to apply more pressure on pressure die to hold tube in die. Adjust in slowly until you have no wrinkles.
2) Check mandrel fit.

5.



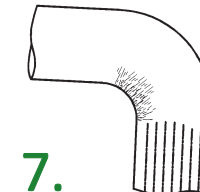
Distortion: Mandrel ball bulges at end of bend.
1) Too much drag on tube. Check inboard pressure on pressure die.
2) Check wiper die angle.
3) Mandrel may not flex enough. Could require tighter pitch.
4) Make sure you are using the specified lubrication for the job.

6.



Distortion: Deep scratches in bend and in wiper die areas.
1) Check wiper angle and increase a little.
2) Back end of wiper should not touch tube. It must have a gap.
3) Make sure tube is getting plenty of lube along with lubrication on wiper die in bend area.

7.



Distortion: Wrinkles in bend area only and scratches in bend area.
1) Make sure clamp die is not slipping.
2) Recheck pressure die pressure.
3) Clamp die may need serrations to hold tube.
4) Clamp die may be worn out.