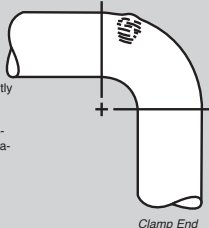


# CORRECTIONS FOR POORLY BENT TUBES

**1. PROBLEM**  
Hump at end of bend.

**CORRECTION**

- 1) Adjust mandrel slightly back from tangent until hump is barely visible. This is also a good system to find the best location for the mandrel.
- 2) Increase force on pressure die assist.

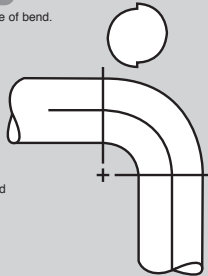


Clamp End

**2. PROBLEM**  
Tool marks on centerline of bend.

**CORRECTION**

- 1) Re-adjust vertical alignment of clamp and/or pressure die.
- 2) Undersized tube groove in bend die.
- 3) Tooling not purchased from TFB.

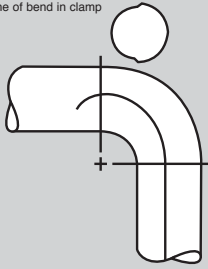


Clamp End

**3. PROBLEM**  
Tool marks on centerline of bend in clamp and pressure die area.

**CORRECTION**

- 1) Reduce pressure and clamp die forces.
- 2) Oversized tube or undersized tube groove from bad tooling source.

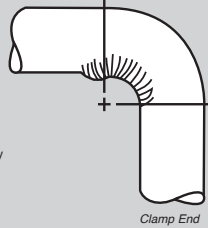


Clamp End

**4. PROBLEM**  
Wrinkling throughout bend, even extending into wiper die area.

**CORRECTION**

- 1) Advance wiper die closer to tangent.
- 2) Decrease rake of wiper die.
- 3) Recut worn wiper by TFB.

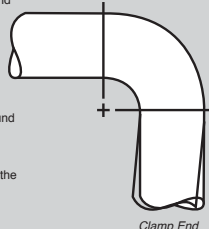


Clamp End

**5. PROBLEM**  
Bad mark at start of bend and over bend for 90

**CORRECTION**

- 1) Removable clamping portion of bend die not matched properly to round part of bend die.
- 2) Clamping portion of bend die not parallel to the key way.

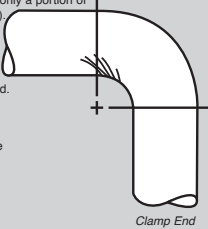


Clamp End

**6. PROBLEM**  
Wrinkling occurring for only a portion of the bend (45 out of 90)

**CORRECTION**

- 1) Bend die out of round. Bad centering ring or counter bore.
- 2) Taper in pressure die (from bottom of tube groove to back of die).

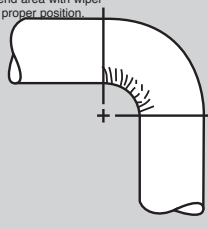


Clamp End

**7. PROBLEM**  
Wrinkles throughout bend area with wiper and mandrel in known proper position.

**CORRECTION**

- 1) Check for undersized mandrel.
- 2) Increase pressure die force only after checking wiper fit and mandrel location.
- 3) Reduce force on pressure die advance.

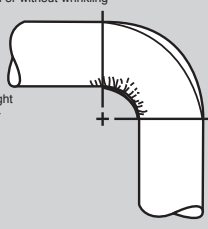


Clamp End

**8. PROBLEM**  
Excessive collapse with or without wrinkling throughout entire bend

**CORRECTION**

- 1) Advance mandrel toward tangency until slight hump occurs (most mandrels must project somewhat past tangent).
- 2) Need more balls on mandrel.

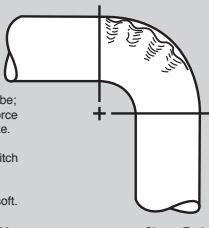


Clamp End

**9. PROBLEM**  
Mandrel ball humps.

**CORRECTION**

- 1) Too much drag on tube; back off pressure die force - increase wiper die rake.
- 2) May require closer pitch mandrel ball assembly.
- 3) Tubing material too soft.
- 4) Increase force on pressure die assist.

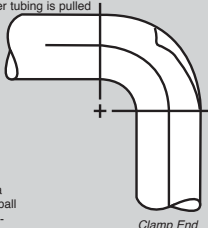


Clamp End

**10. PROBLEM**  
Excessive collapse after tubing is pulled off mandrel balls.

**CORRECTION**

- 1) Check for too much drag on tube; back off pressure die force - increase rake on wiper die, etc.
- 2) Increase mandrel to support; change from a plug to a one ball; a 3 ball instead of a 2 ball mandrel, etc.

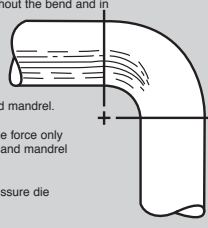


Clamp End

**11. PROBLEM**  
Deep scratches throughout the bend and in wiper die area.

**CORRECTION**

- 1) Increase rake.
- 2) Check for undersized mandrel.
- 3) Increase pressure die force only after checking wiper fit and mandrel location.
- 4) Reduce force on pressure die advance.
- 5) Use more and/or a better lube.
- 6) Recut tube groove at TFB.

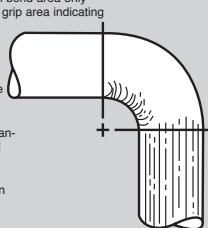


Clamp End

**12. PROBLEM**  
Heavy wrinkles through bend area only and linear scratches in grip area indicating clamp slippage.

**CORRECTION**

- 1) Reduce pressure die force.
- 2) Check location of mandrel and wiper die (and lube).
- 3) Increase pressure on clamp die.
- 4) Use serrated or carbide spray in tube groove of clamp die



Clamp End