Objective

**Problem Definition**
- Design and construct an automatic tube bending machine capable of bending 1/4" diameter copper or stainless-steel tubes into geometries such as spirals, for RH Systems to use in their manufacturing facility.

**Process**
- **Bending Mechanism and Straightener Die**
  - Tube gets secured into vise clamps by the stepper motor.
  - Actuator extends driving the tube into the bending mechanism.
  - Servo motor rotates driving gear to force the driven gear and bending dies to bend the tube to the desired angle.
  - Once bent, actuator continues to feed tube through dies to finish the bend of the tube.
  - Z-axis die catches tube and stepper motor allows die to ascend to create spiral shape.

**Final Design**

**Assembly**
- Bearings placed within the dies to allow the dies to spin and decrease friction with feed of tube.
- Dies and gears placed upon 8mm bolts.
- Bending dies placed on gear to create initial bend.
- Driving gear placed on servo motor to allow for autonomous rotation.
- Straightener dies placed between bending dies and actuator to prevent kinking.
- Tube gets placed into vise, gets pushed by actuator and feeds into the bending dies.
- Linear track placed between linear actuator and bending dies to allow vise assembly to be pushed.
- Z-axis powered by stepper motor.

**Future Implementations**
- Stepper controlled Z-axis die.
- Ability to bend 10ft of tube.
- Ability to bend steel tubing.
- Design safety measures.
- Continuous feeding.
- Adding a second clamp for more stability.

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