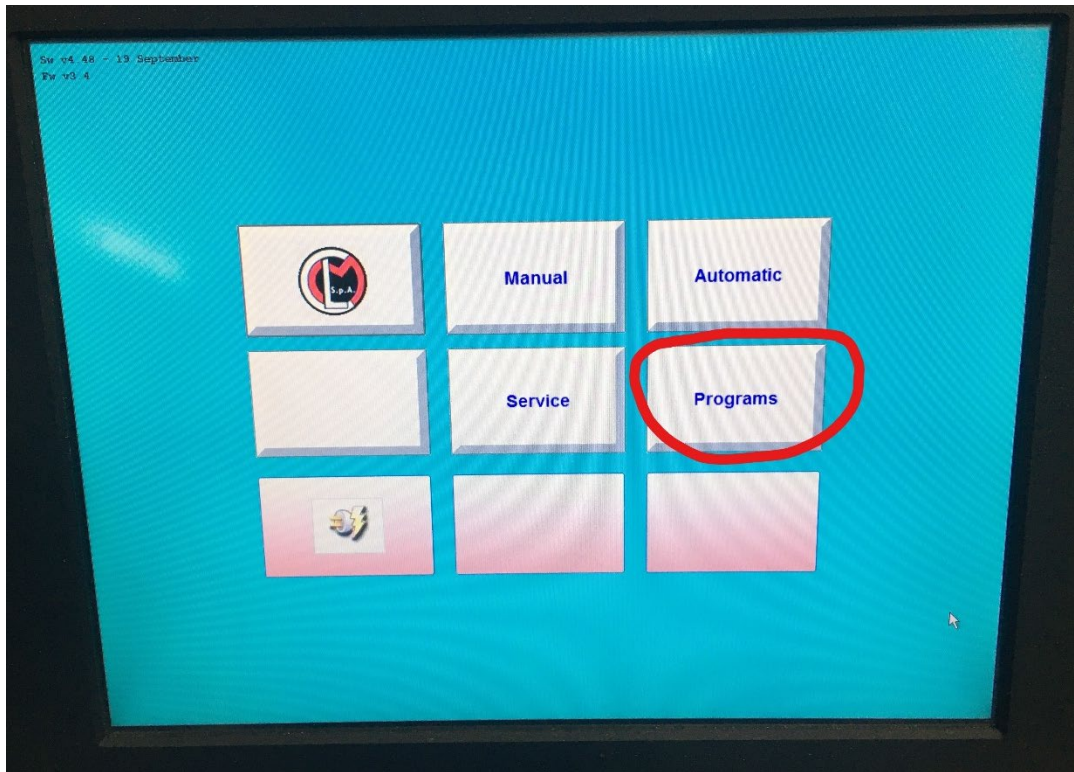# Building a Toolset File

ERCO series machines work on the premise of having a toolset (.die file), part design (.pol file) and a material springback (.spb file). The files are stored on the computer and can be utilized or chosen from your respective "library" when needed.
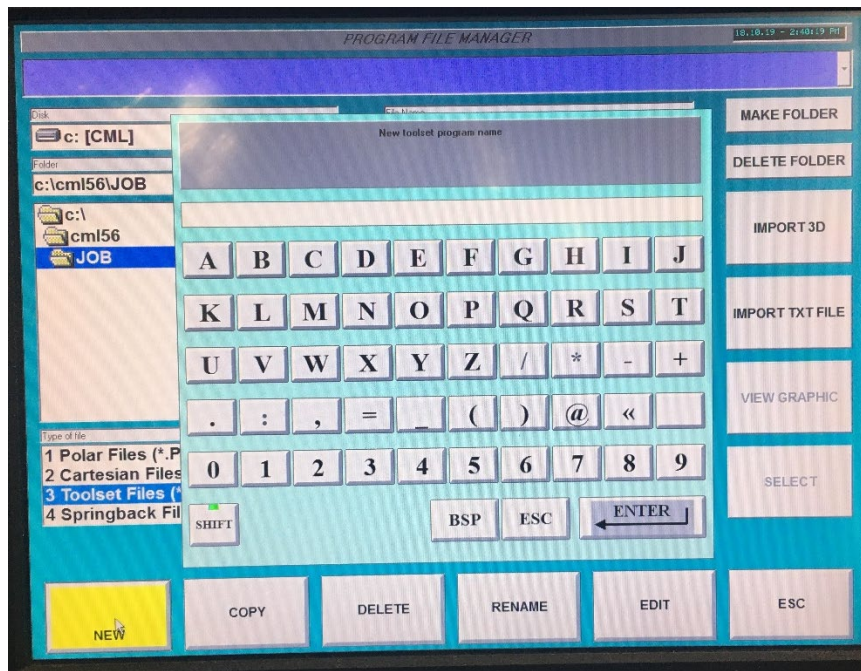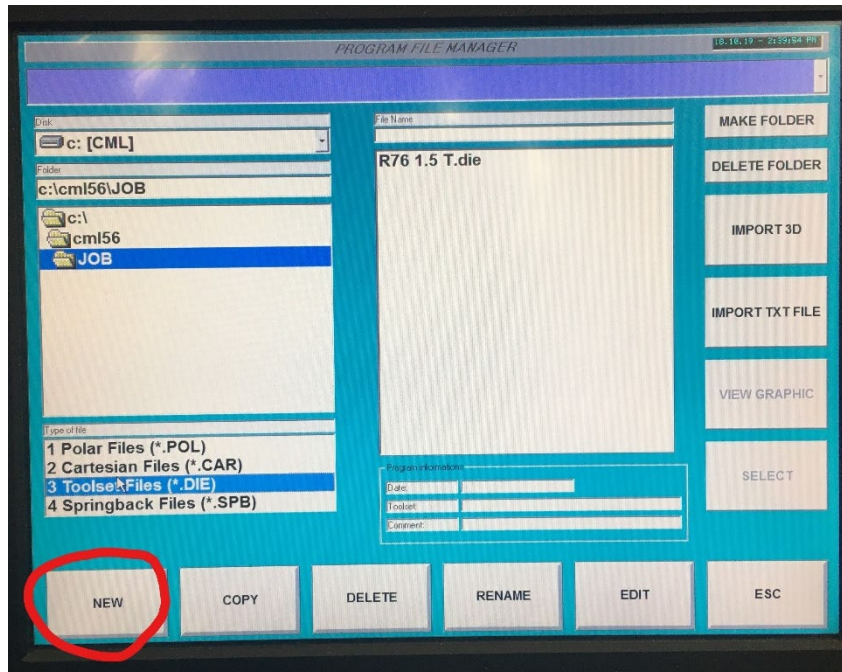
1. From the home screen select "PROGRAMS"

2. Scroll down and highlight the "TOOLSET" option in the lower left corner
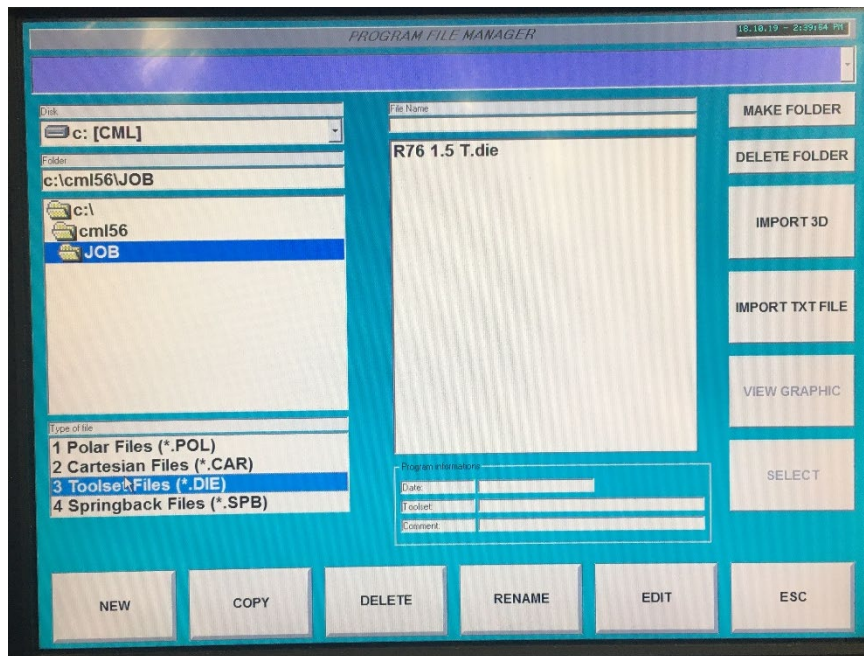
3. From the lower command bar, select "NEW". A pop up keyboard will appear that allows you to name or label the toolset. Press the "ENTER" button once the new toolset has been named.

4. Begin entering data for your new toolset. The interface is highly graphic. Double click the field you wish to edit and a graphic will display showing you exactly what is required for that particular entry. Use the pop up keypad to enter the numeric values and press, "ENTER" when finished. (Several pop-up graphic screens are shown for reference)
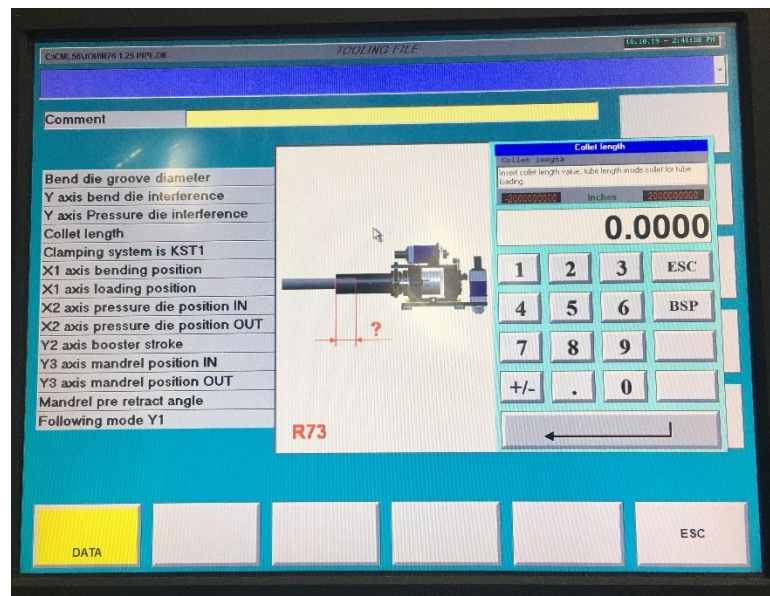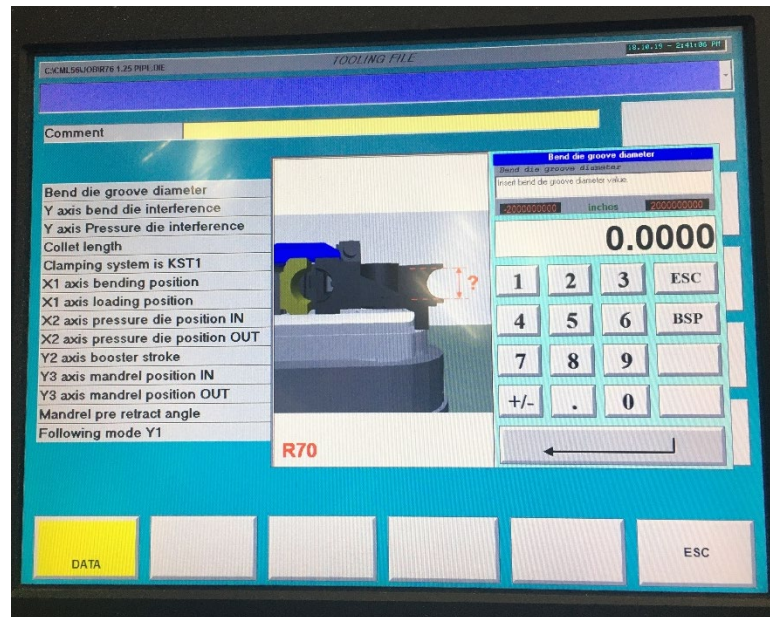
5. The first required field is "BEND DIE GROOVE DIAMETER". Enter the OUTSIDE DIAMETER of your material here. (Ex: 1-1/4" Pipe = 1.660 O.D.)
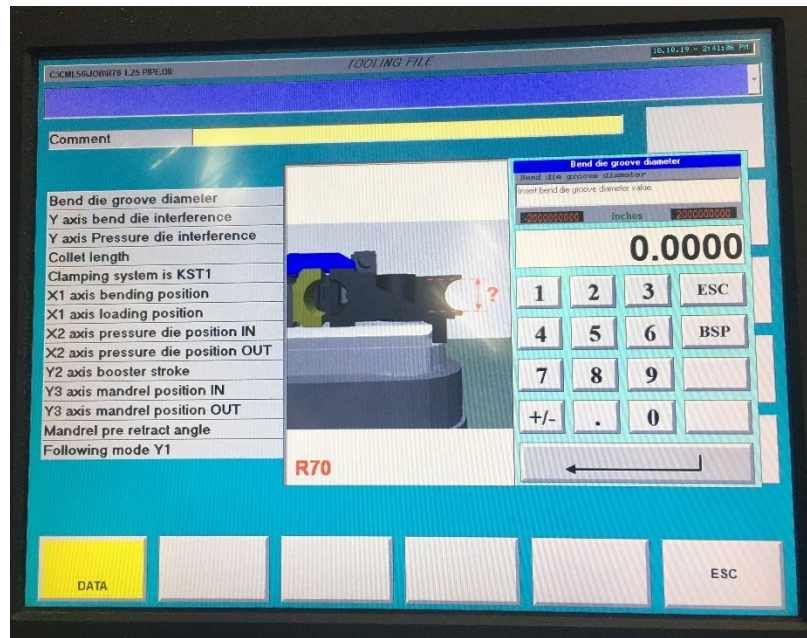
6. "Y AXIS BEND DIE INTERFERENCE". This number sets a mechanical limit on how close the carriage is able to come towards the center former. The wiper die and mounting bracket will limit the forward travel of the carriage. Also, note this value will affect the "last leg" length of your desired part. Machine must be able to position for the last bend to fully complete the automatic cycle.
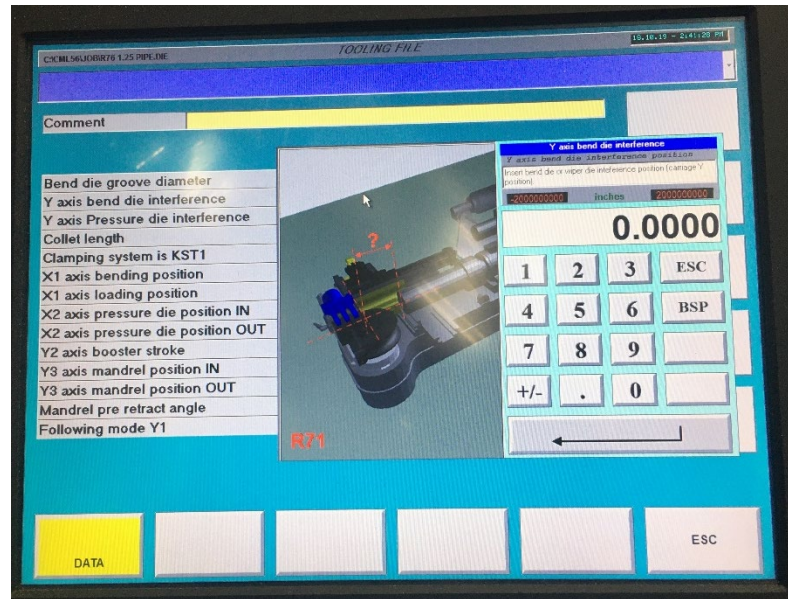
7. "Y AXIS PRESSURE DIE INTERFERENCE". The pressure die and mounting bracket will limit this position. All axis measurements are from the center of the tool spindle. The machine references that point as zero for ALL AXES.
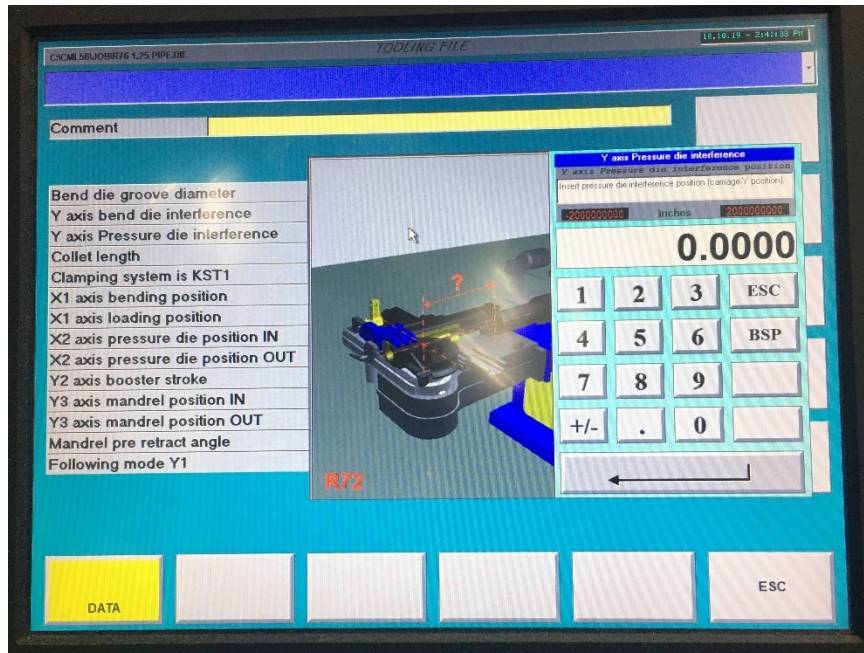
8. "COLLET LENGTH". This value is the amount of material placed within the collet prior to the bending process. All ERCO series machines are shipped with a collet stop that can be used as a fixed back gauge when loading the material. The depth of the collet stop must still be entered in this field when used. NOTE: The use of the collet stop prohibits bending materials longer than 13 feet. When bending longer materials, remove the collet stop and load all materials to a predetermined value. The minimum COLLET LENGTH for ANY material should be 2 inches.
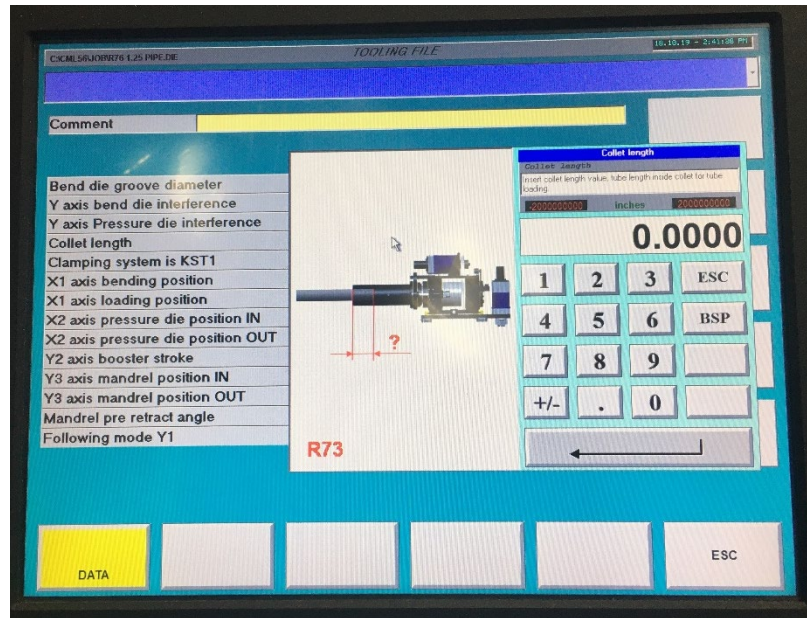
9. "CLAMPING SYSTEM is KST1". All ERCO series machines use FST or Finger Style Clamping systems and NOT the KST. The KST system is used on GB Series mandrel bending machines. A value of "NO" should be entered here.

10. "X1 AXIS BENDING POSITION". On larger GB Series mandrel bending machines, the position of the bending head may be shifted to ease the loading and unloading of material. The ERCO series machines do NOT have this option so an entry here is not required. However, it is a good practice to put the centerline radius of the forming die in this field.
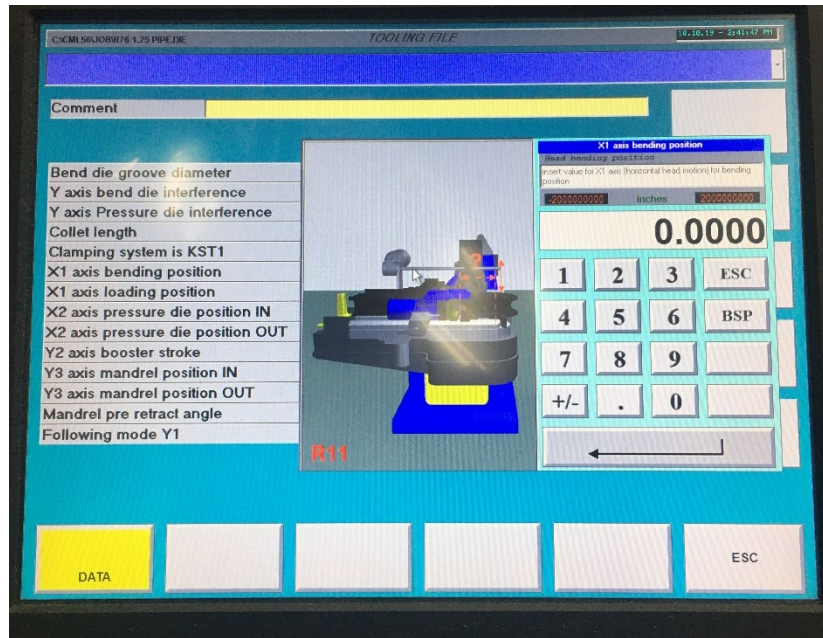
11. "X1 AXIS LOADING POSITION". On larger GB Series mandrel bending machines, the position of the bending head may be shifted to ease the loading and unloading of material. The ERCO series machines do NOT have this option so an entry here is not required. However, it is a good practice to put the centerline radius of the forming die in this field.

Press the SAVE button when finished.
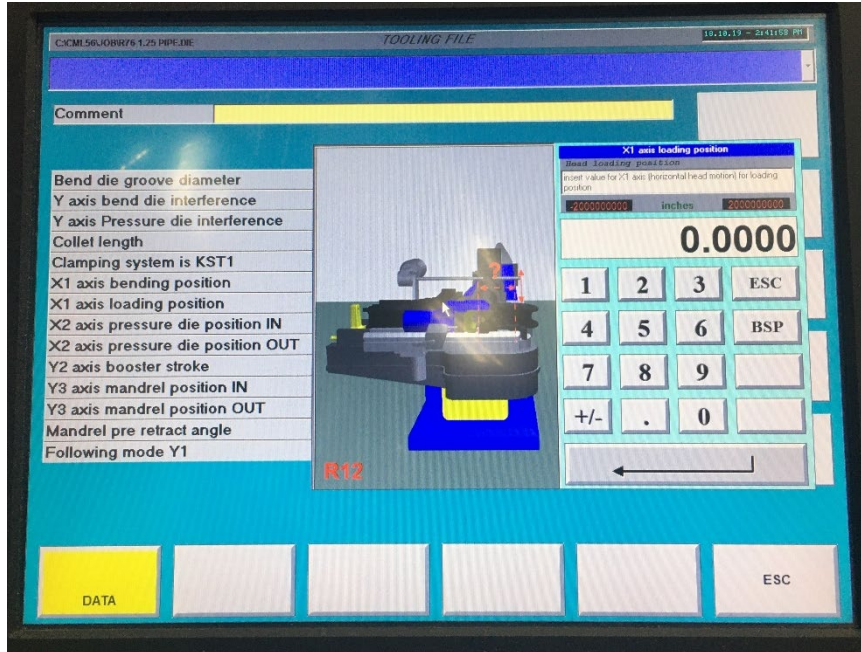
12. "X2 PRESSURE DIE POSITION IN". All axes on the machine have an encoder. The relative position displayed on the MANUAL screen can be used to determine the correct position. To set this value, insert a short piece of material over the mandrel. Go to the MANUAL screen and select CLAMP ARM. Close the clamps with the handheld control. Now select the X2 axis. Note the relative position of the pressure die with respect to the material in the clamps. Press the "+" button on the handheld and then depress the middle section of the control. Watch the pressure die move forward until it is nearly in contact with the material and release. Select CLAMP ARM, then the "-" button and release the material from the clamps. Observe the gap between the pressure die and the material. Material should be able to roll and not be locked up currently. Note the X2 axis position displayed on the MANUAL page. Allow for the current gap of the pressure die and material and enter that value on the toolset file as the PRESSURE DIE IN position. (e.g., X2 position shows 6.250 and the gap between the material and pressure die is 0.100. The IN position should be set at 6.150. The axis position will decrease as you travel closer to the machine zero point (center of the spindle).

The pressure die should be set to support the material during the bend but not excessively tight to inhibit the automatic cycle.
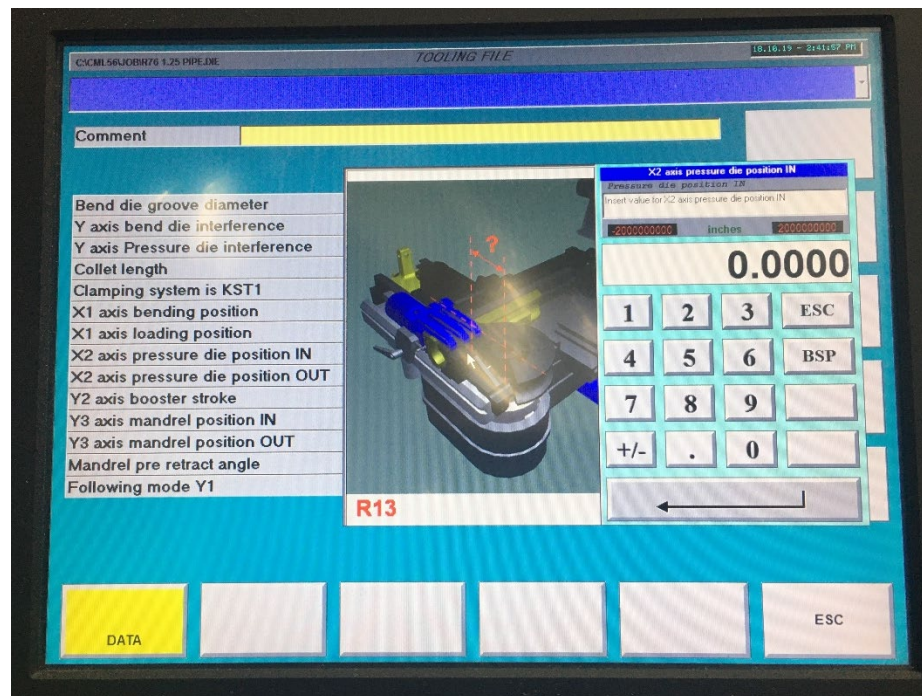
13. "X2 AXIS PRESSURE DIE POSITION OUT". This value is so the pressure die can be back and out of the way so the machine can position for the next sequential bend or come forward for the end of cycle. As a rule of thumb, the difference between the IN and the OUT position should be at least 5/8" (e.g., If the IN position is set at 6.00 then the out will be 6.625).
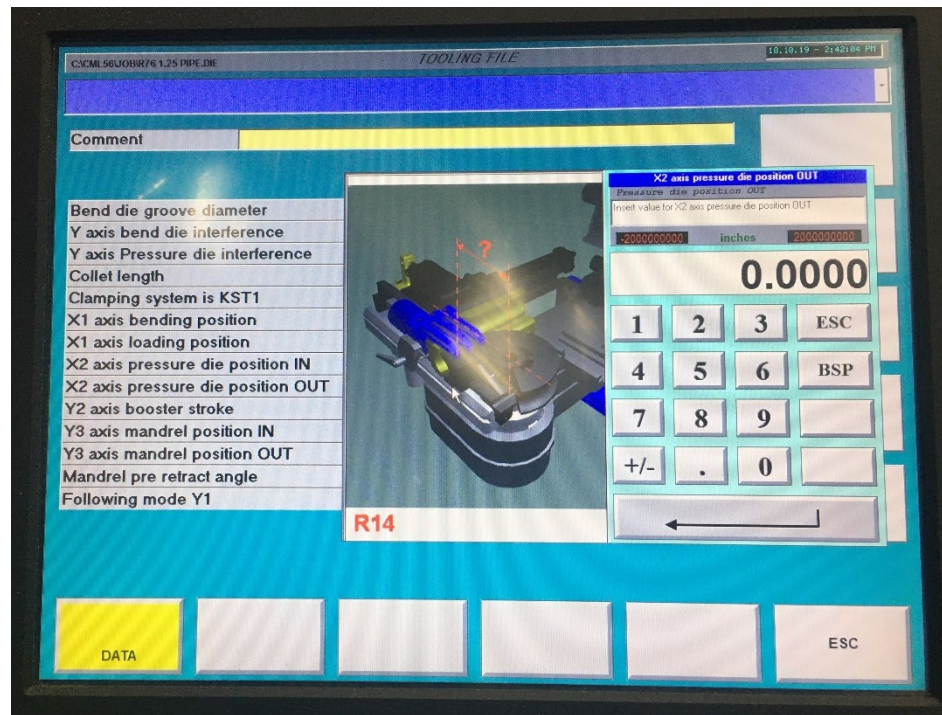
14. "Y2 AXIS BOOSTER STROKE". The Y2 Axis is the booster die. The function of the booster die is to travel with the material during the bend. The maximum stroke of this cylinder is about 9". The speed of the booster should be timed the same as the bending speed. A flow control valve mounted on top will regulate the speed. If the bending arc length is more than the value set in the toolset, the machine will automatically perform a recapture when the programmed number is reached. Always be sure that the pressure die remains in contact with the tail of the material and supports. The value input here should be set long enough to minimize or avoid recaptures during the bend cycle.
Press the SAVE button.
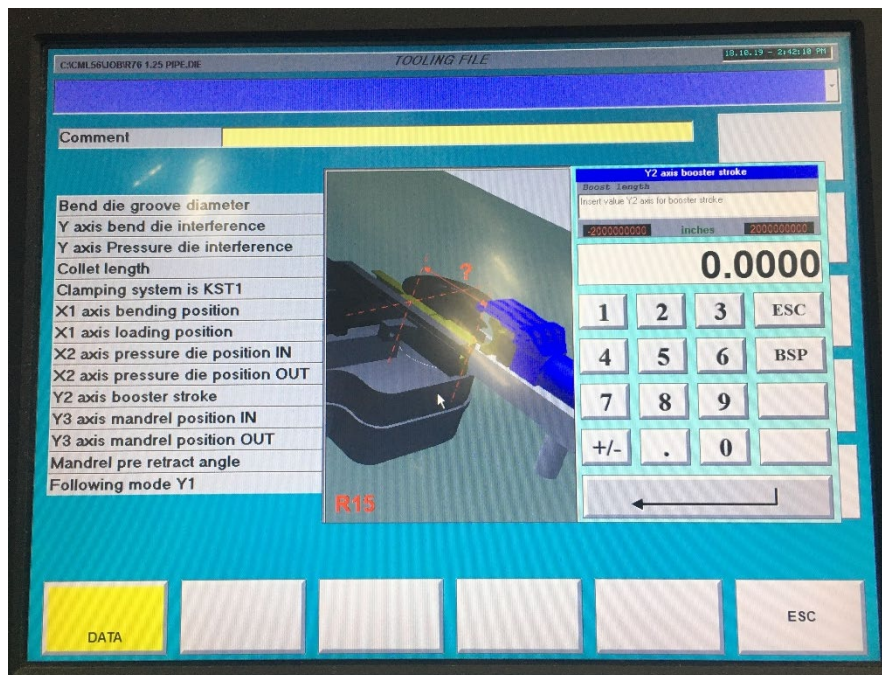
15. "Y3 AXIS MANDREL POSITION IN". The position of the mandrel during the bend greatly affects the quality of the bend. The mandrel is positioned forward to a fixed point and the material is drawn over the top. To correctly set this position, go to the MANUAL screen and select the Y3 axis. Press the "+" button on the handheld control and bring the rear mandrel cylinder to its full forward stroke. Be sure to support the draw bar and watch the mandrel for any tooling interference issues. (ALWAYS SET THE MANDREL "IN" POSITION WITH THE CYLINDER FULLY FORWARD!) The center former has line for the start of bend. The body or mandrel shank should be aligned with this mark for initial test bending. The threaded rod can mechanically adjust this and nuts at the rear draw bar cylinder. The value displayed in the MANUAL screen for Y3 with the cylinder fully extended will be entered for the Y3 mandrel IN position on the toolset file.
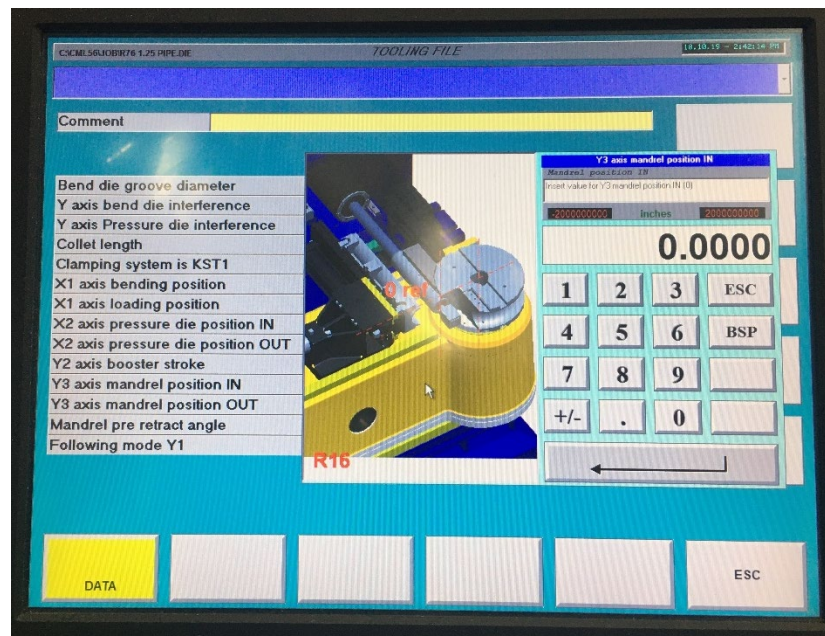
16. "Y3 AXIS MANDREL POSITION OUT". The mandrel must be extracted from the material and be to the rear of the tangent area. This will be the OUT position of the mandrel on the toolset. Be sure the entire mandrel including the spheres are clear of the tangent. From the MANUAL screen, select the Y3 axis. Press the "-" on the handheld control. Depress the center button and move mandrel back towards the rear of the machine. Physically look at the mandrel and confirm that all portions are clear and to the left of the tangent mark. Read the displayed value and input that as the value for the OUT position on the toolset.
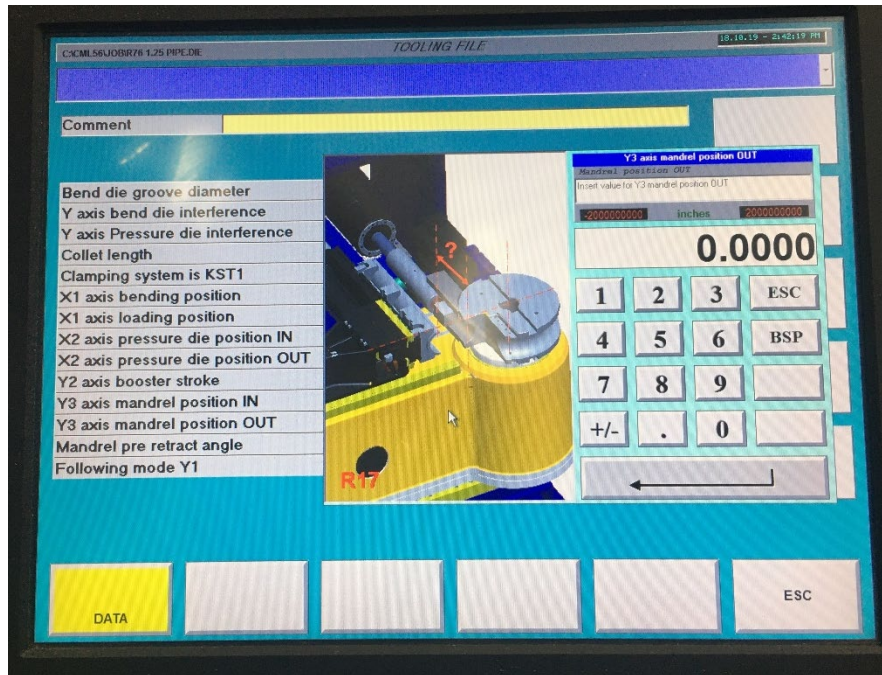
17. "MANDREL PRE RETRACT ANGLE". The mandrel is sitting at the tangent point during the bending process. If it is left there during the entire bend, a hump will be formed at the end of the bend. A standard feature on all Ercolina mandrel machines is the PRE RETRACT. This setting is the number of degrees prior to the desired bend angle that the rear cylinder extracts the mandrel form the tangent point. (Ex. 90 degree programmed angle and a PRE RETRACT angle of three. The rear cylinder will pull the mandrel out at 87 degrees, 90-3) a setting of three in this filed is a good reference or starting point. It may need to be adjusted depending upon the bend outcome.
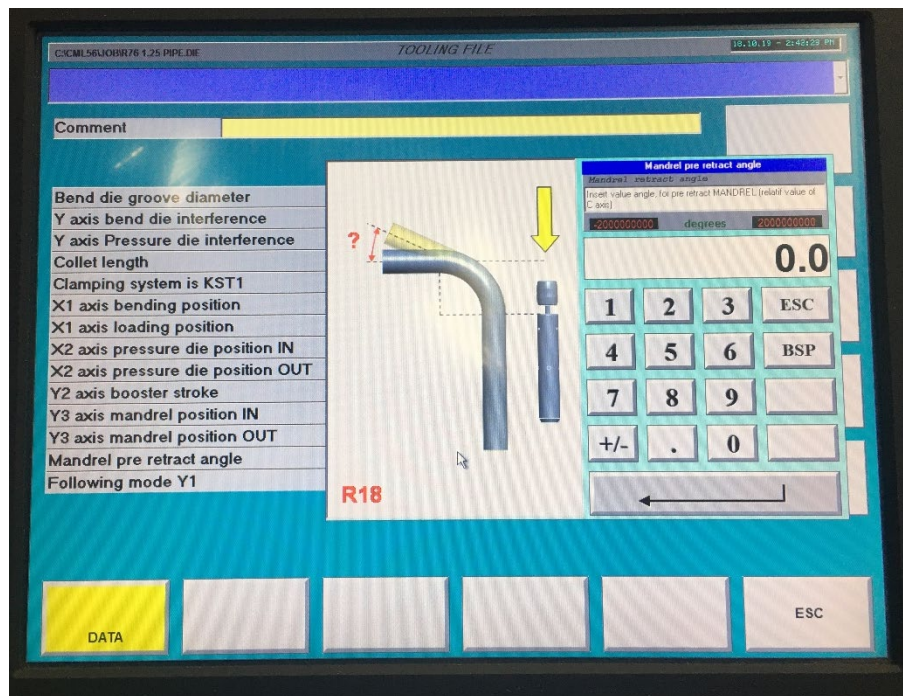
18. "FOLLOWING MODE Y1". The carriage or Y1 axis must always follow the material during the bending process. This must be set at 100 (100%) to ensure correct positioning of sequential bends.
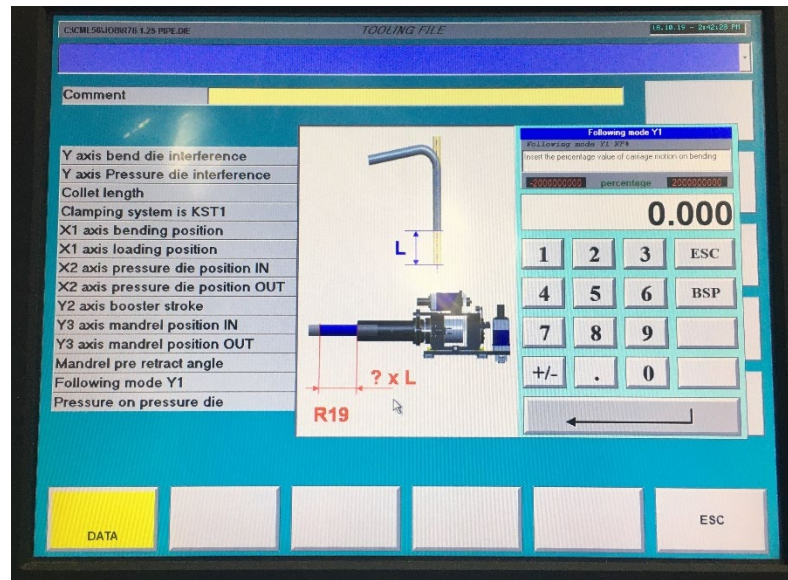

19. "PRESSURE ON PRESSURE DIE". The IN and OUT position of the X2 pressure die axis have already been set in the toolset file. This setting is meant to resist the tendency of the pressure die to be pushed out of position and exert additional forward pressure to maintain the set IN value. It is typically used when bending extremely heavy wall material or material near the capacity of the machine. For most bending, a setting of "NO" is used.
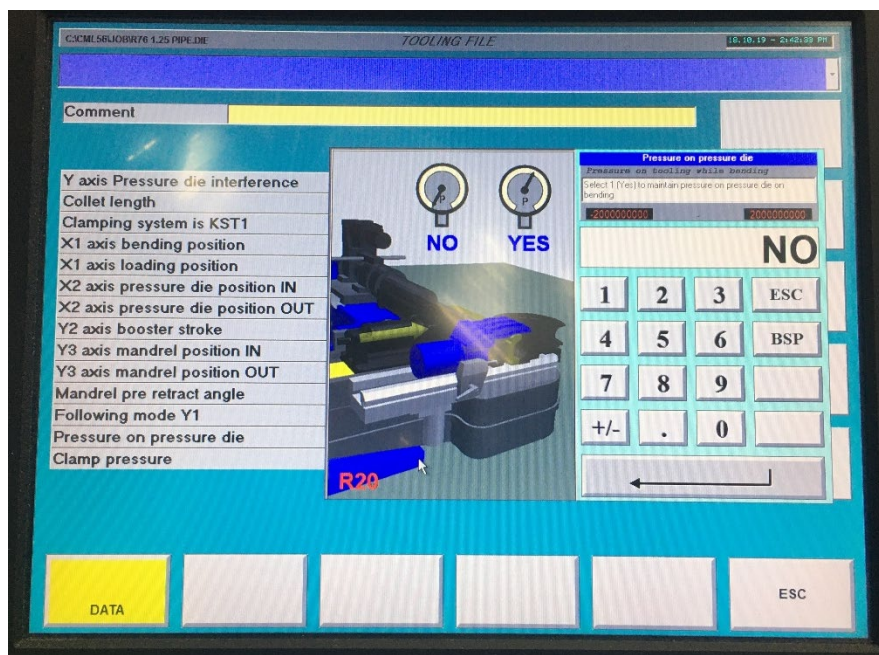
20. "CLAMP PRESSURE". This field is informational only. The clamping pressure used for the material can be put here, as a reminder for the operator to change if needed. During the tooling set up, the clamping pressure can be adjusted at the gages on the machine base. The set pressure should be input here on the toolset.
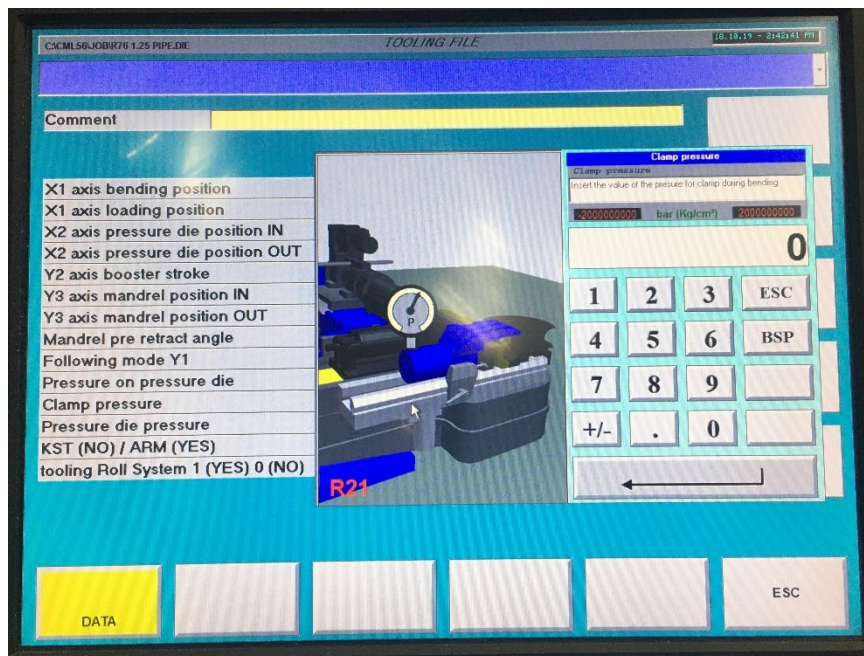
21. "PRESSURE DIE PRESSURE". This field is informational only. The pressure die pressure used for the material can be put here, as a reminder for the operator to change if needed. During the tooling set up, the pressure die pressure can be adjusted at the gages on the machine base. The set pressure should be input here on the toolset.
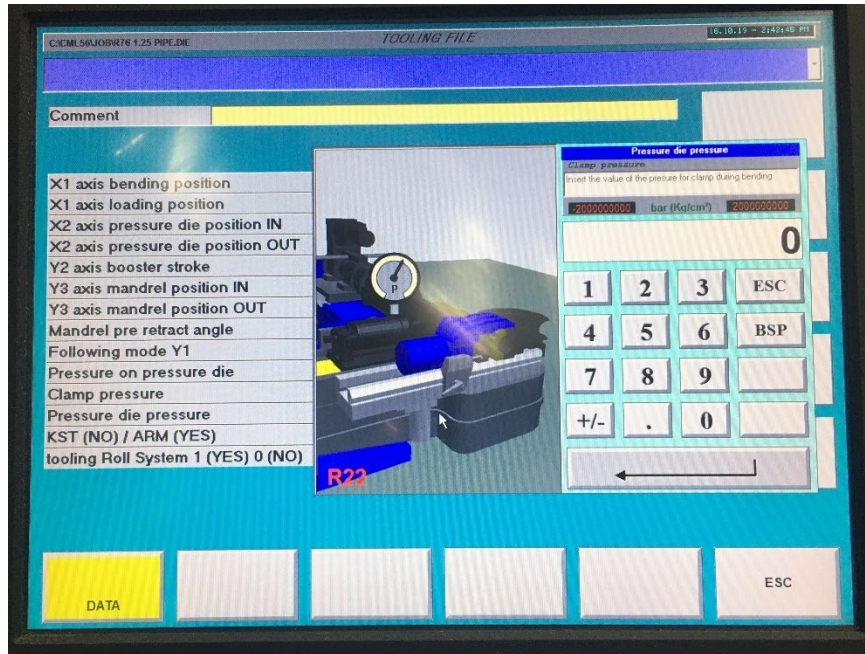
22. "KST (NO) / ARM (YES)". All ERCO series mandrel bending machines use the FST style clamps with the bending ARM. This value of the toolset should ALWAYS be set to YES.
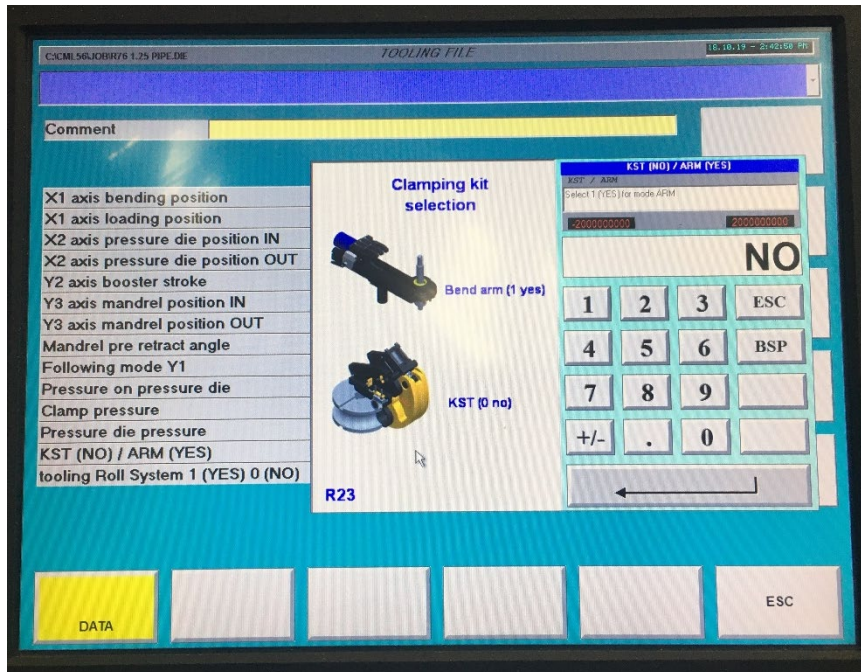
23. "TOOLING ROLL SYSTEM 1 (YES) 0 (NO)". Currently, all ERCO series mandrel bending machines only utilize a single stack of tooling for bending. This parameter is meant for future use and multi-stack tooling machines. The value input should be NO.
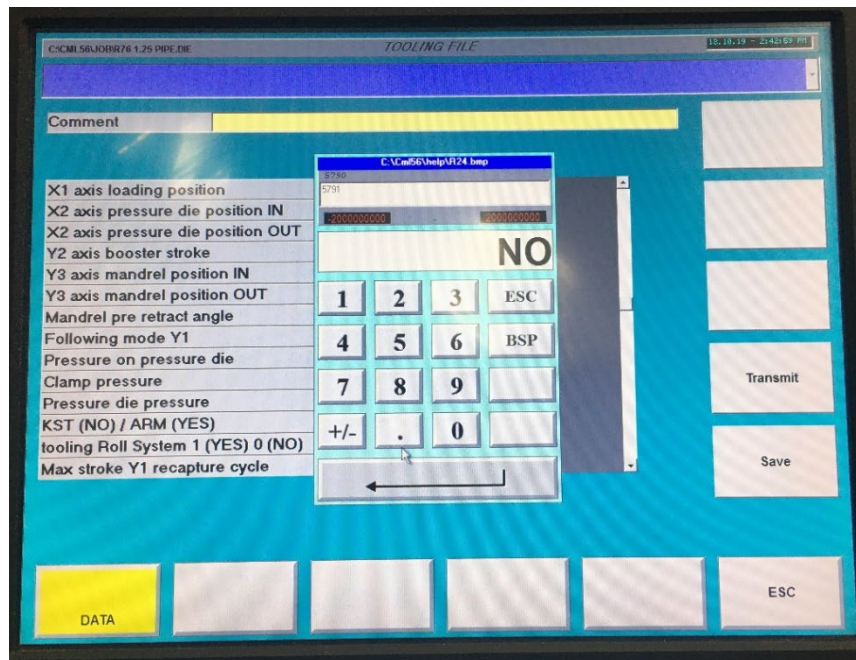
24. "MAX STROKE Y1 RECAPTURE CYCLE". This parameter is not applicable to the ERCO series machines.
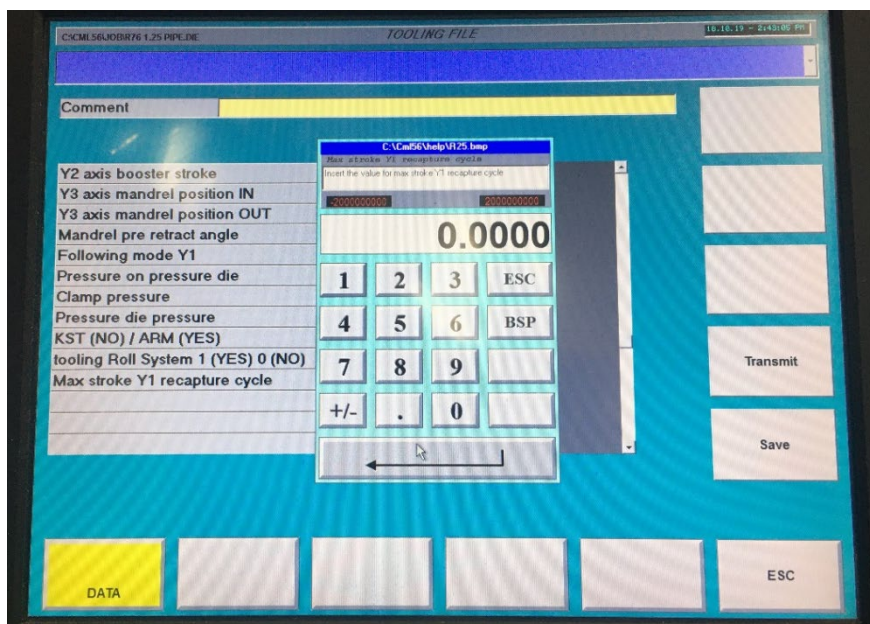
The remaining fields of the toolset are not applicable for most bending applications and do not require entries. It is vital that all entries are confirmed and the entire toolset file is SAVED.