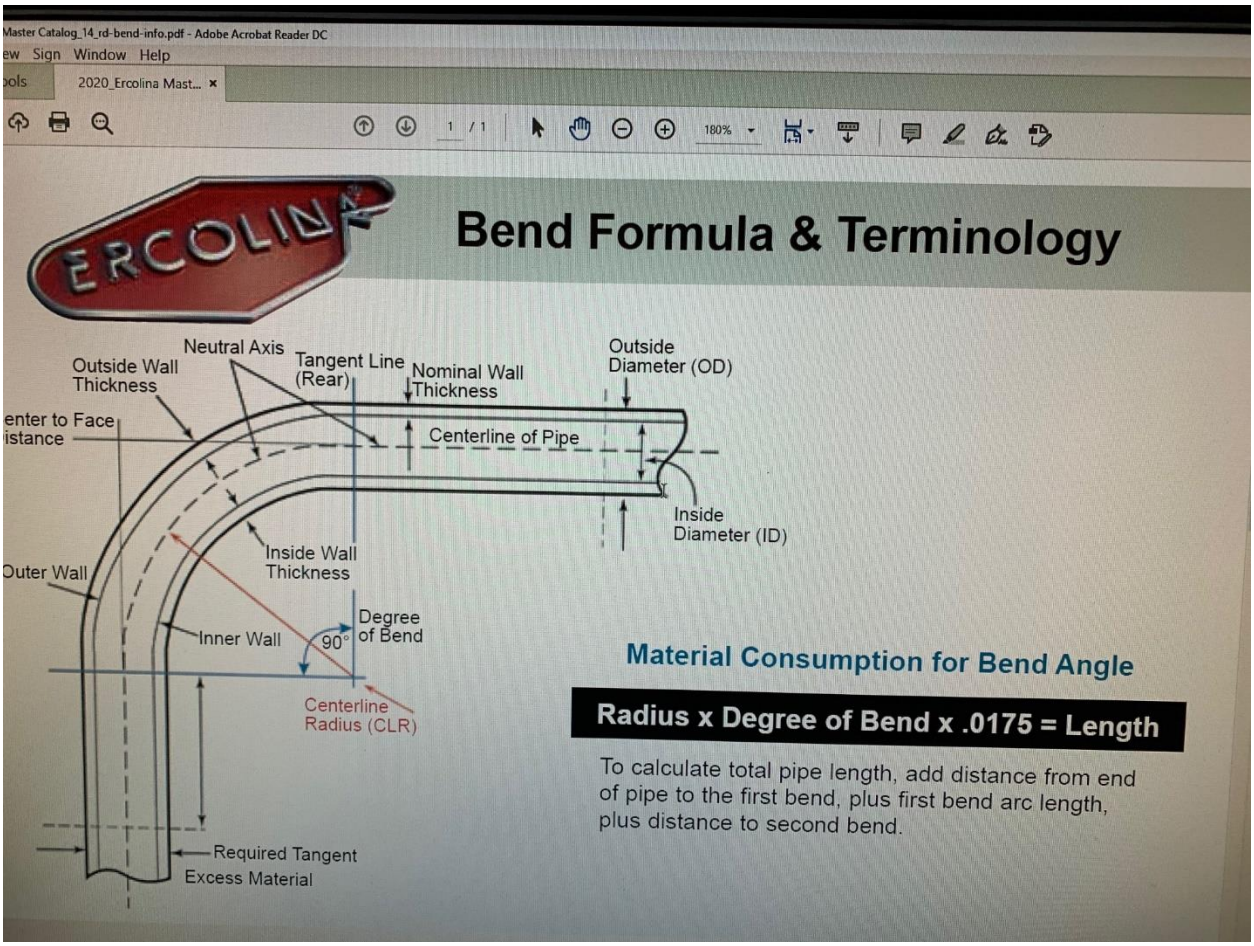
The EB76 machine programs and thinks in Straight dimensions between bends. To determine these dimensions you can use two methods.

The first is to determine the arc length of each respective bend and then deduct ½ that value for each respective side of the bend. The formula is shown below.



Remember that 90 degree bends are the exception. Simply deduct the CLR of the tooling from each side.

The second alternative is to use the CLR of the tooling multiplied by the tangent of ½ the desired angle. A table of tangents is included.

Table of tan(angle)

Angle	tan(a)	Angle	tan(a)	Angle	tan(a)	Angle	tan(a)
0.0	0.00	25.0	.4663	46.0	1.0355	71.0	2.9042
1.0	.0175	26.0	.4877	47.0	1.0724	72.0	3.0777
2.0	.0349	27.0	.5095	48.0	1.1106	73.0	3.2709
3.0	.0524	28.0	.5317	49.0	1.1504	74.0	3.4874
4.0	.0699	29.0	.5543	50.0	1.1918	75.0	3.7321
5.0	.0875	30.0	.5773	51.0	1.2349	76.0	4.0108
6.0	.1051	31.0	.6009	52.0	1.2799	77.0	4.3315
7.0	.1228	32.0	.6249	53.0	1.3270	78.0	4.7046
8.0	.1405	33.0	.6494	54.0	1.3764	79.0	5.1446
9.0	.1584	34.0	.6745	55.0	1.4281	80.0	5.6713
10.0	.1763	35.0	.7002	56.0	1.4826	81.0	6.3138
11.0	.1944	36.0	.7265	57.0	1.5399	82.0	7.1154
12.0	.2126	37.0	.7535	58.0	1.6003	83.0	8.1443
13.0	.2309	38.0	.7813	59.0	1.6643	84.0	9.5144
14.0	.2493	39.0	.8098	60.0	1.7321	85.0	11.430
15.0	.2679	40.0	.8391	61.0	1.8040	86.0	14.301
16.0	.2867	41.0	.8693	62.0	1.8907	87.0	19.081
17.0	.3057	42.0	.9004	63.0	1.9626	88.0	28.636
18.0	.3249	43.0	.9325	64.0	2.0503	89.0	57.290
19.0	.3443	44.0	.9657	65.0	2.1445	90.0	infinite
20.0	.3640	45.0	1.000	66.0	2.2460		
21.0	.3839			67.0	2.3559		
22.0	.4040			68.0	2.4751		
23.0	.4245			69.0	2.6051		
24.0	.4452			70.0	2.7475		

Use your browser "Print" command to make copies of this form.

RADIUS × TANGENT 12 BEND ANGLE

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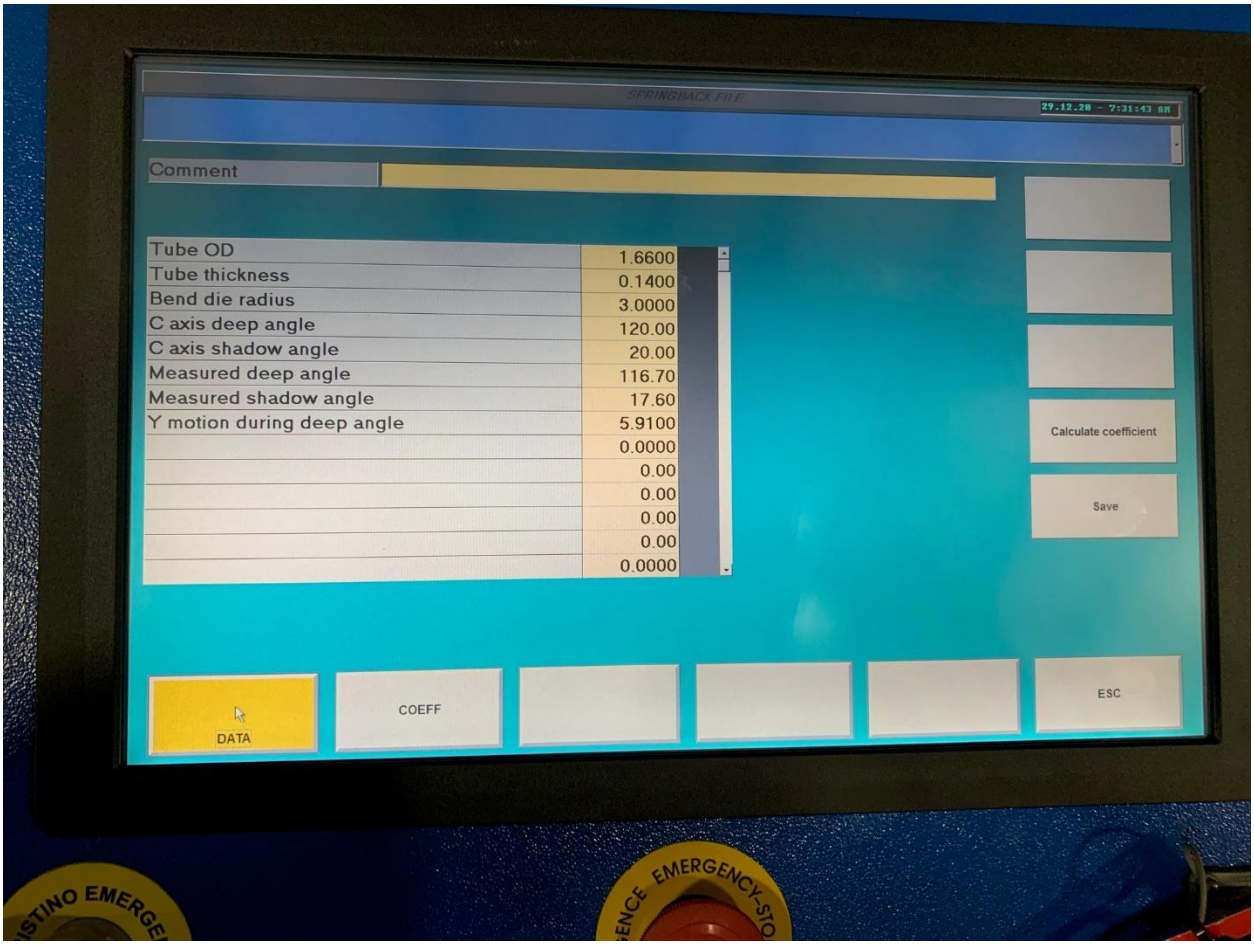
Example of 32 degree bend: 3.0(clr of bending die) x .2867 (tangent value of 16 degrees, ½ of 32) =0.8601 for the deduction to tangent.

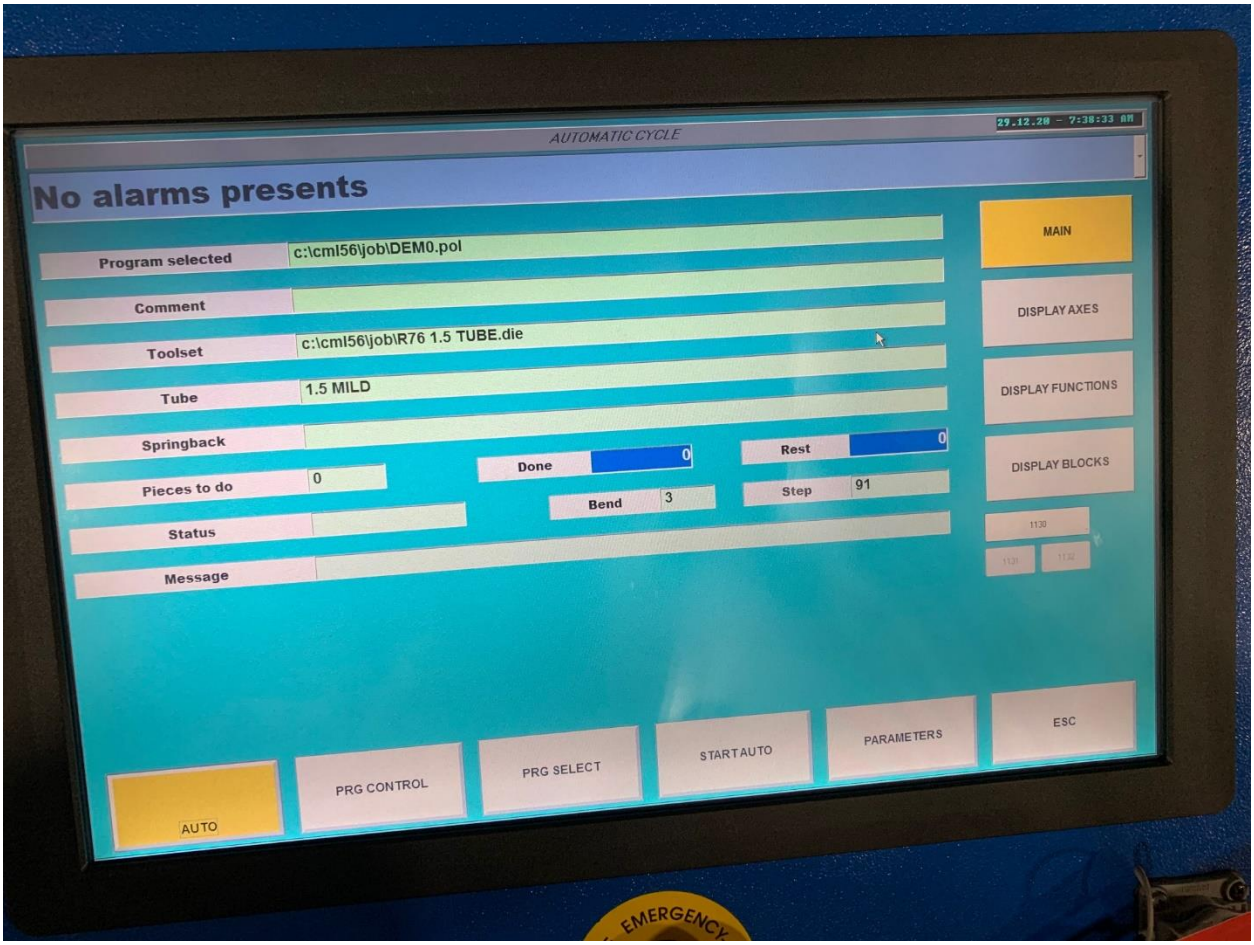
The Springback program/function is designed to compensate for material elasticity and tensile.

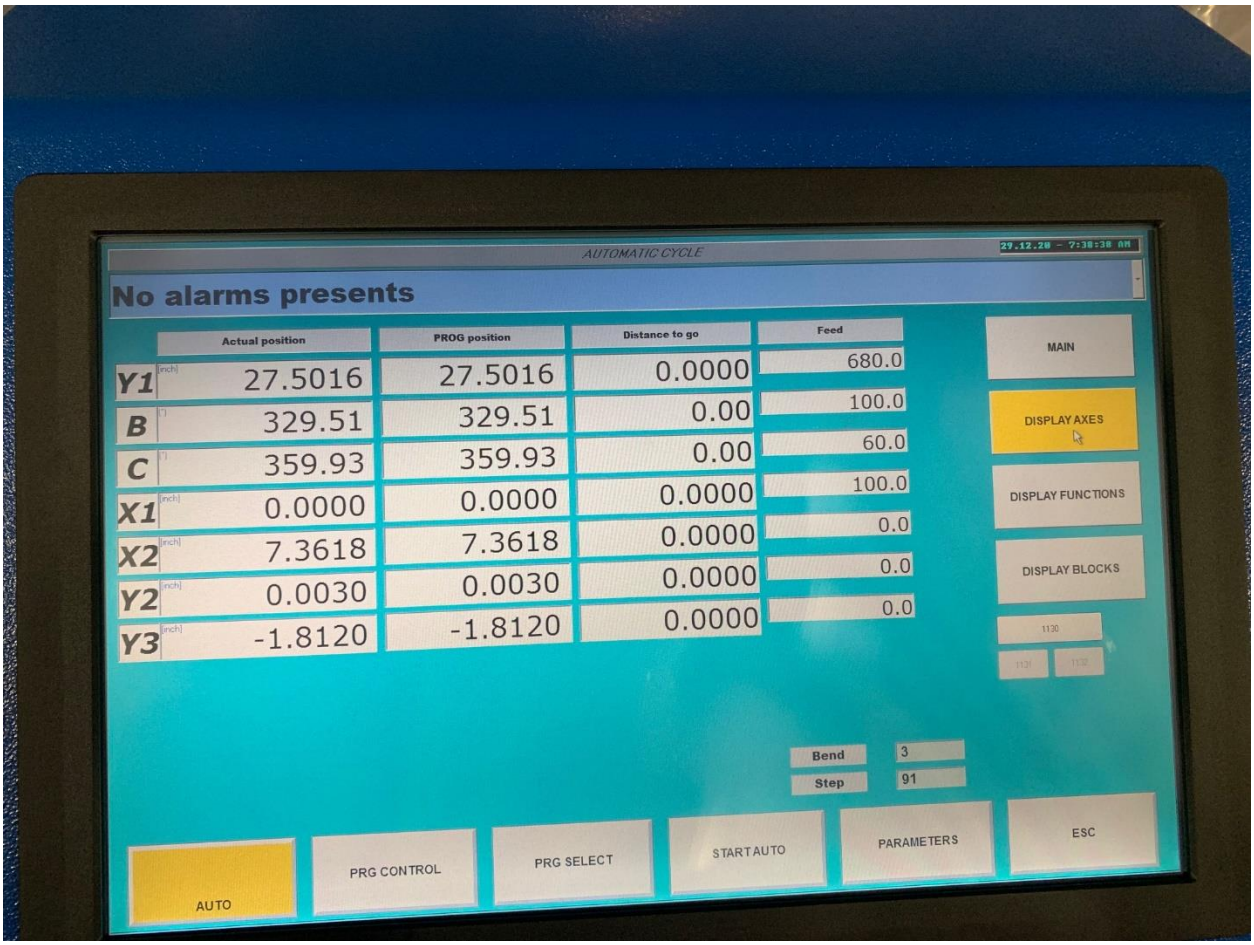
Two angles are bent (a 20 degree and a 120 degree bend) the actual measured values are input into the respective fields.



In addition, the observed travel of the Y1 axis is put in the field named “Y motion”. It is important to watch this axis during the test bend.

A test program is created with a 20 degree bend and a 120 degree bend. In Auto CYCLE it is possible to look at the position of all axes during the sequence.

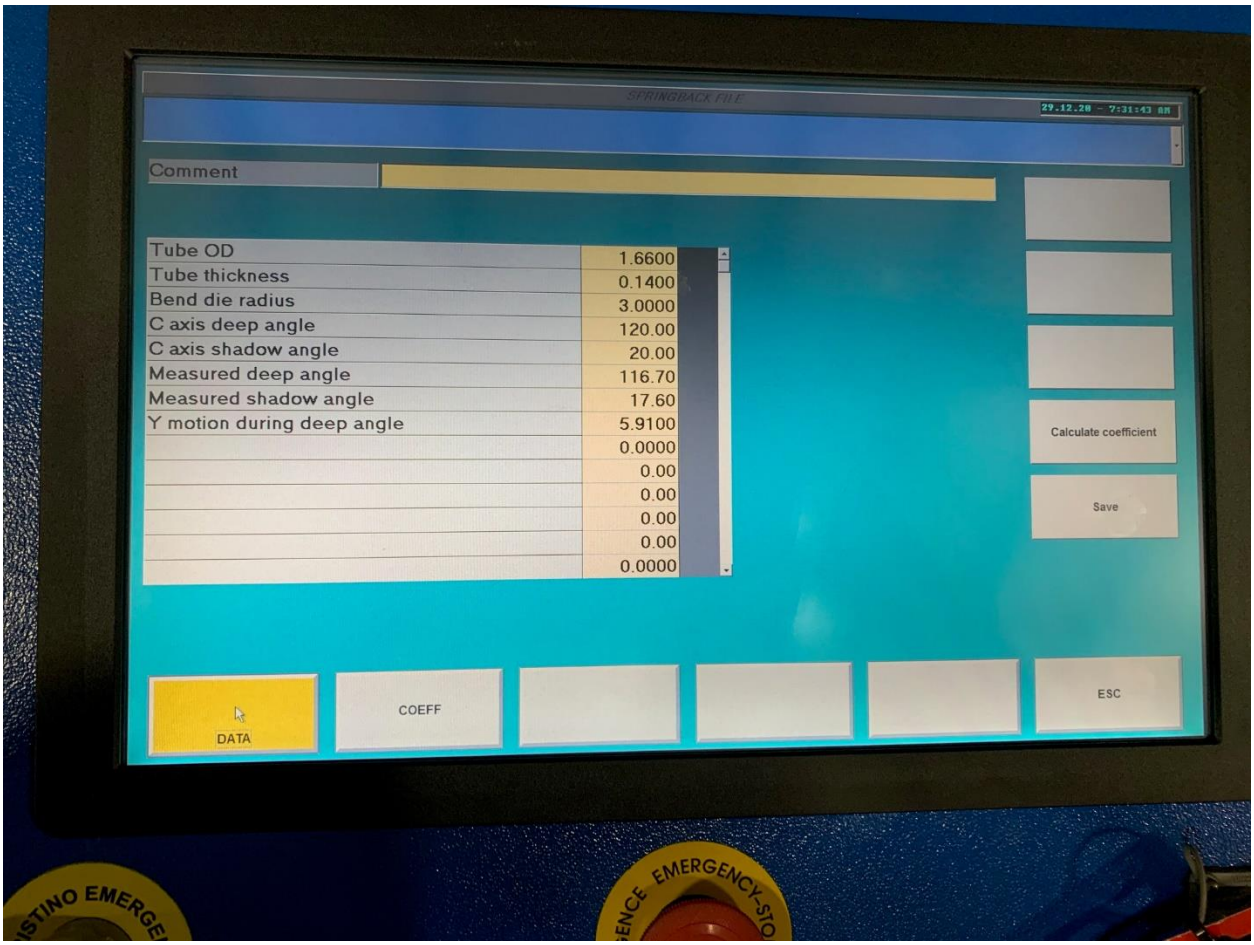




Before the 120 bend starts, look at the Y1 actual position and write it down. It is possible to stop mid-cycle in Automatic by lifting your finger off the center actuator button. The cycle will resume when depressed again.

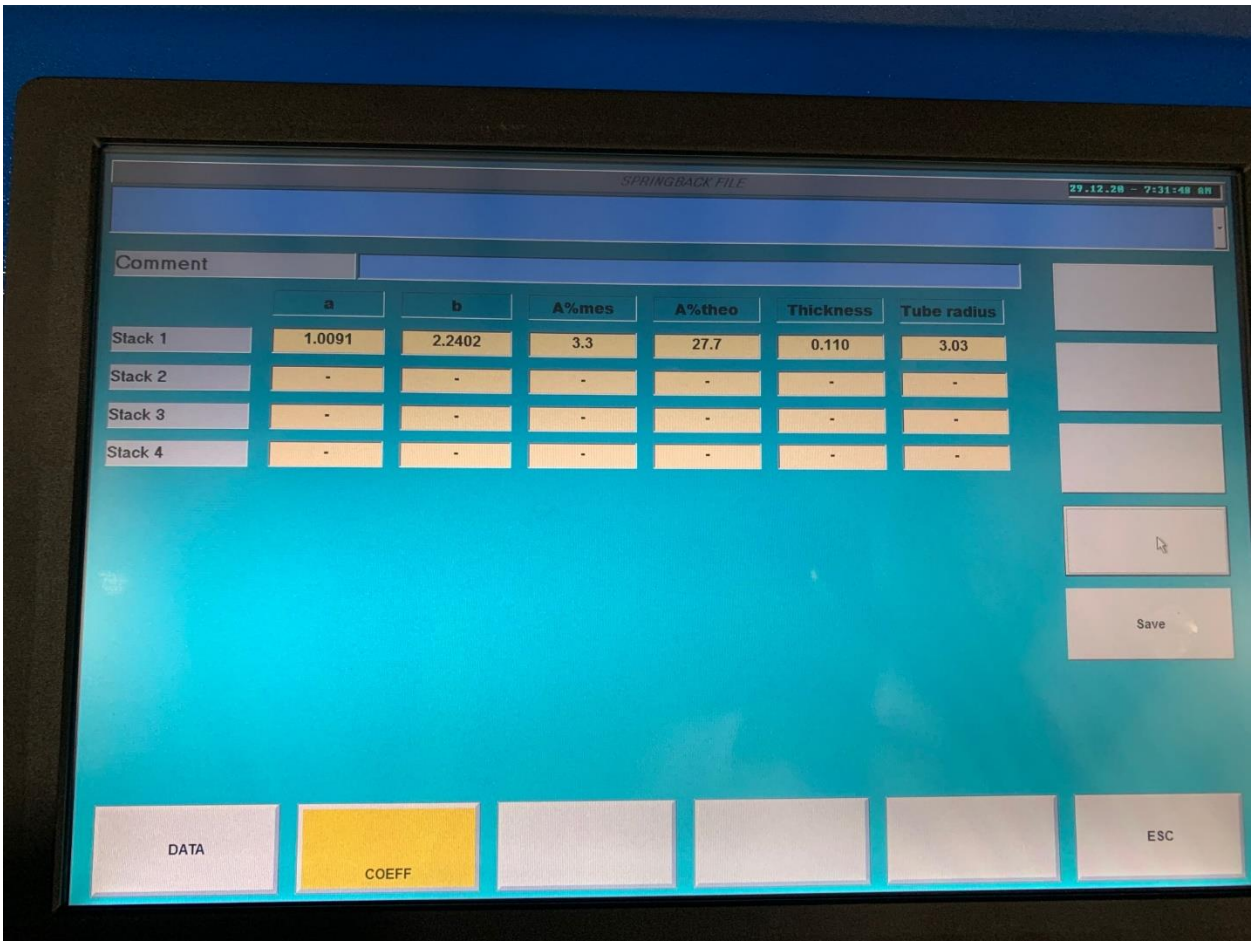
Once the 120 bend is complete, lift your finger again and not the Y1 actual position. The difference in the Y1 position values is the value input on the springback file.

Input the observed value on the front page of the spring back file. Y1 Motion During Deep Angle



Press SAVE and then CALCULATE COEFFICIENT

The screen will automatically roll to the second page



Press SAVE again

Please note the value populated in the TUBE RADIUS

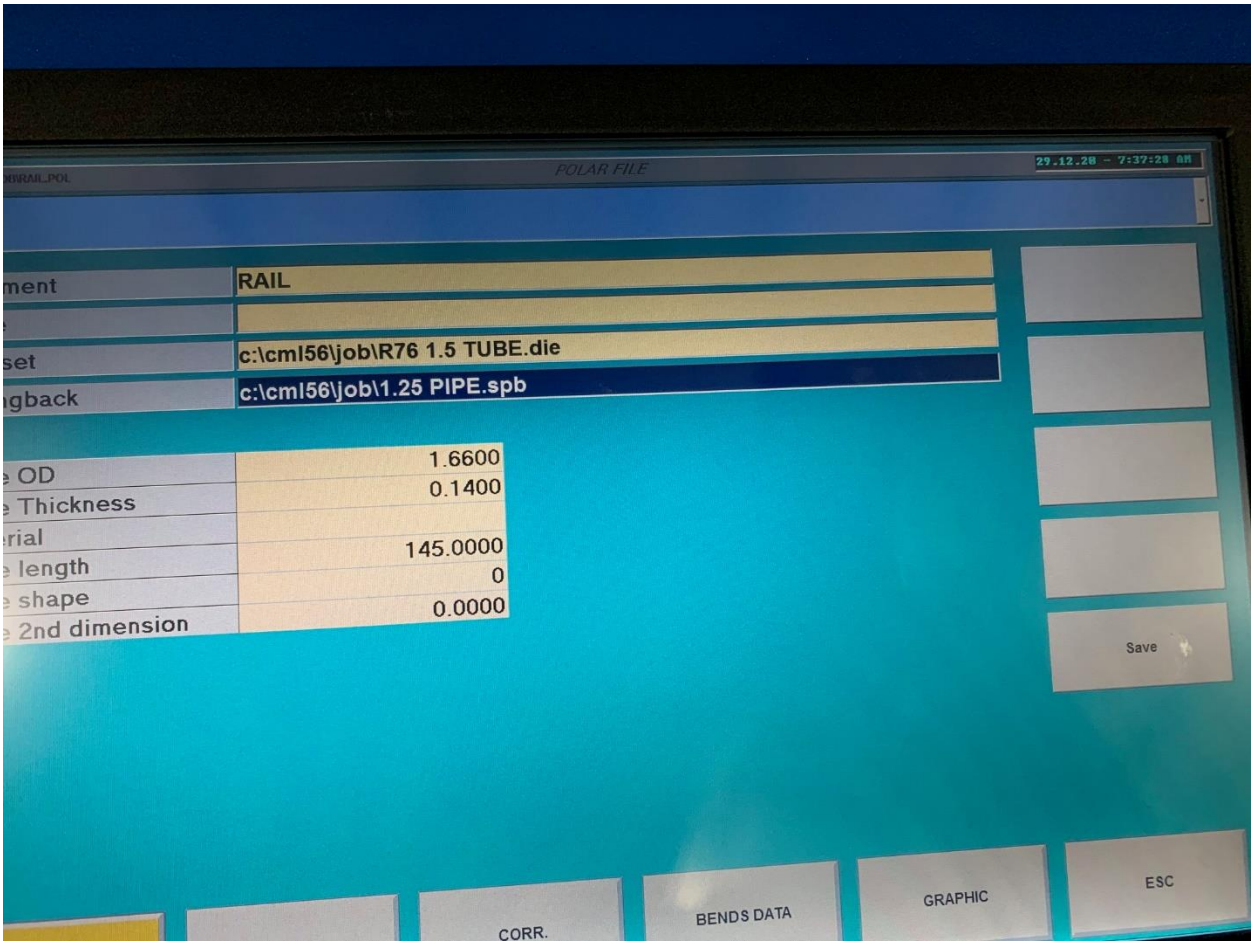
In this example it is 3.03 The tooling has a stated radius of 3.0 This value is the calculated radius based upon the actual observed values input.

Theoretical 120 degree bend 120 x 3 x .0175 =6.3

This is the theoretical arc length. The actual observed Y1 travel or arc length was 5.91

The program will use the radius of 3.03 for all corrections once applied.

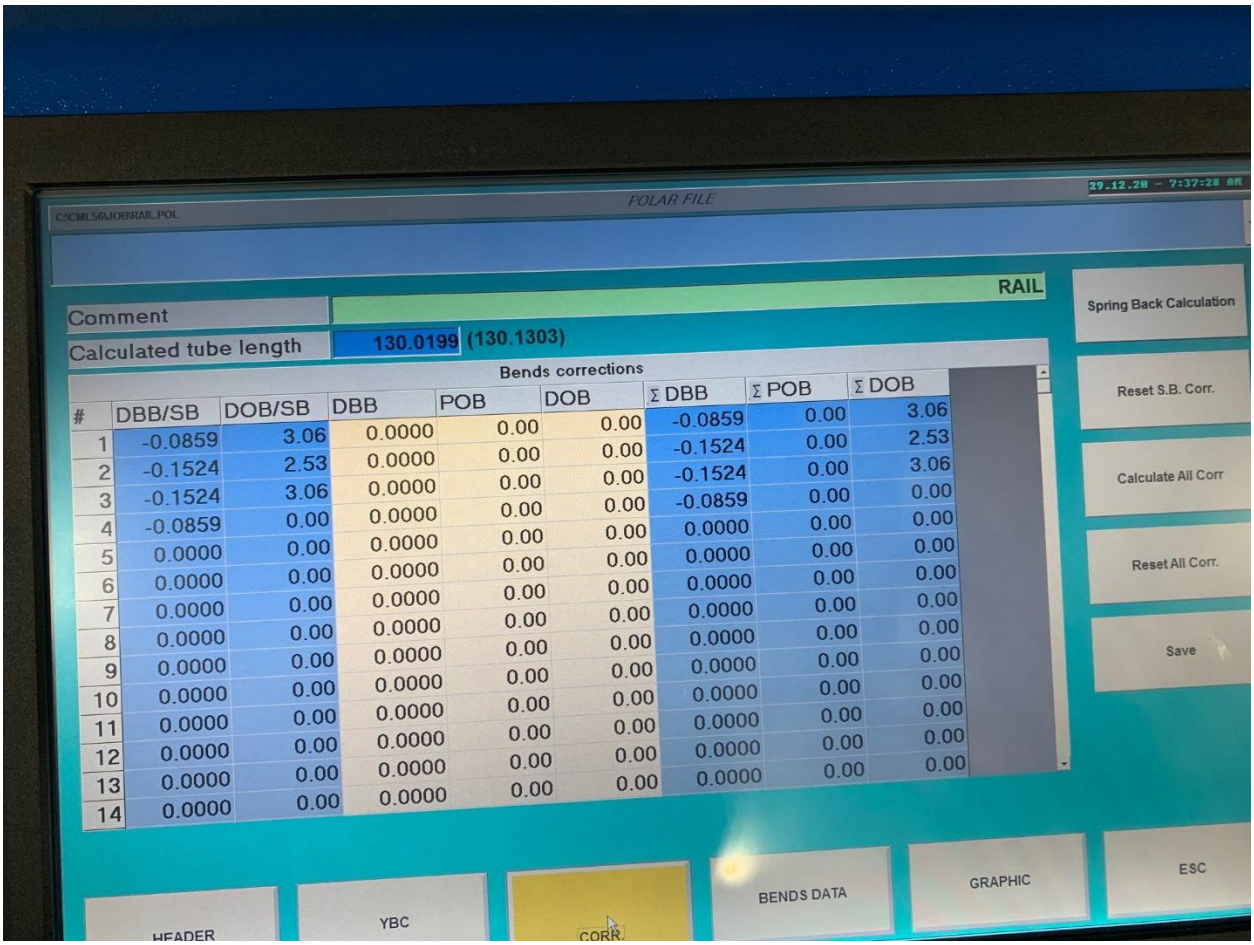
With the springback file complete, it is now available for use on the polar files.



Double click the yellow springback field. Click Springback files, select correct file and double click to attach to polar/program file.

Press SAVE when finished.

Press the CORR button on the bottom of the page. This will take you to the CORRECTIONS page



#	DBB/SB	DOB/SB	DBB	POB	DOB	Σ DBB	Σ POB	Σ DOB
1	-0.0859	3.06	0.0000	0.00	0.00	-0.0859	0.00	3.06
2	-0.1524	2.53	0.0000	0.00	0.00	-0.1524	0.00	2.53
3	-0.1524	3.06	0.0000	0.00	0.00	-0.1524	0.00	3.06
4	-0.0859	0.00	0.0000	0.00	0.00	-0.0859	0.00	0.00
5	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
6	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
7	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
8	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
9	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
10	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
11	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
12	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
13	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
14	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00

Press SPRING BACK CALCULATION and CALCULATE ALL CORR. Press SAVE

Two corrections are automatically applied:

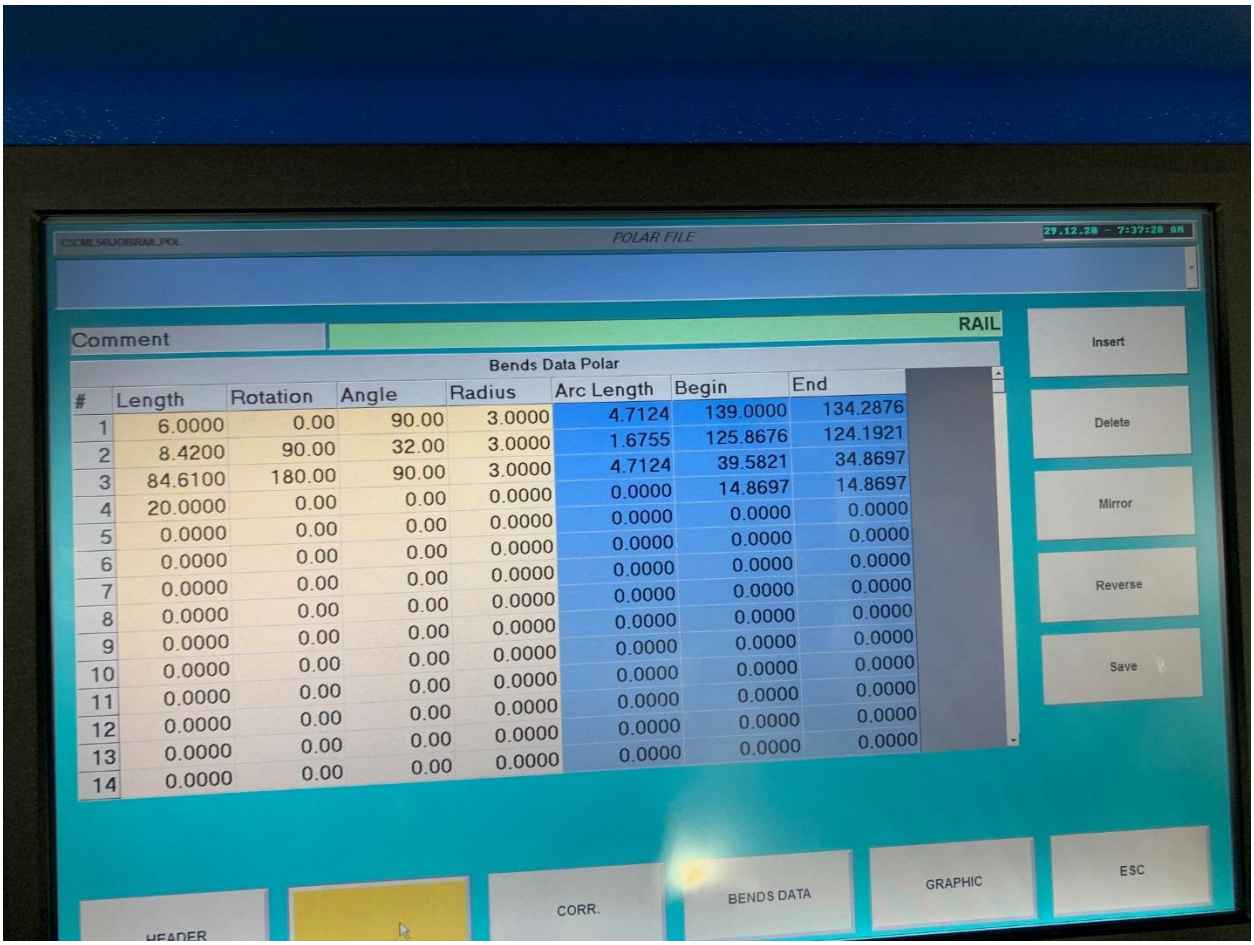
DBB/SB This is a Distance Between Bends correction. The values in this field are always a small negative number. In the picture above, Line 1 has a DBB/SB of -0.0859

How it works: On the LRA program page the first straight length is 6 inches (see below)

The machine will actually position for the first line at 6 minus 0.0859 =5.9141

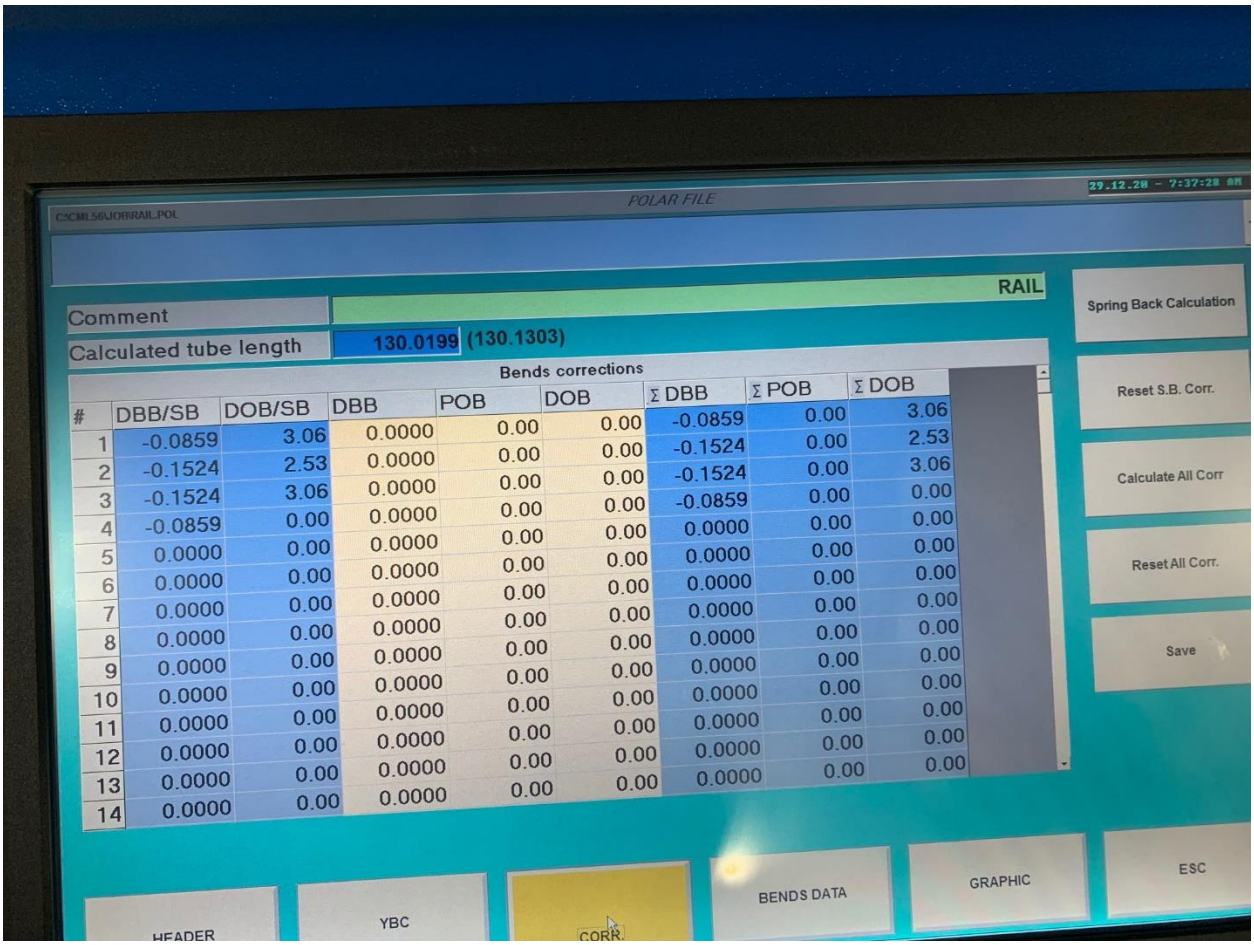
And the same calculation is performed for all successive lines.

IT IS IMPORTANT TO LOOK AT THE VALUES IN THE DBB/SB COLUMN AND ENSURE THEY ARE SMALL NEGATIVE VALUES!!!!



The second correction is for Degree of Bend DOB/SB

Based upon the actual measured values of the test angles (20 and 120), the program compensates for the bend angle.



#	DBB/SB	DOB/SB	DBB	POB	DOB	Σ DBB	Σ POB	Σ DOB
1	-0.0859	3.06	0.0000	0.00	0.00	-0.0859	0.00	3.06
2	-0.1524	2.53	0.0000	0.00	0.00	-0.1524	0.00	2.53
3	-0.1524	3.06	0.0000	0.00	0.00	-0.1524	0.00	3.06
4	-0.0859	0.00	0.0000	0.00	0.00	-0.0859	0.00	0.00
5	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
6	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
7	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
8	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
9	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
10	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
11	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
12	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
13	0.0000	0.00	0.0000	0.00	0.00	0.0000	0.00	0.00
14	0.0000	0.00	0.0000	0.00	0.00			

IF DISTANCES BETWEEN BENDS ARE NOT CORRECT:

1. **CHECK VALUES INPUT ON LRA PAGE FOR ACCURACY**
2. **CHECK VALUES ON DBB/SB COLUMN ON CORRECTIONS PAGE**
3. **REPEAT SPRINGBACK TEST PROCEDURE AND BE AWARE OF Y1 MOTION DURING DEEP ANGLE AND ACCURATELY MEASURE ANGLES PRODUCED.**