

Rotary Draw 3 Axis CNC Mandrel Bender for Pipe, Tube and Profile Bending

# **Operator's Manual**







BEFORE USE, BE SURE EVERYONE USING THIS MACHINE READS AND THOROUGHLY UNDERSTANDS ALL SAFETY AND OPERATING INSTRUCTIONS IN THIS MANUAL

# Important Safety Instructions WARNING!

When using electric tools, basic safety precautions should always be followed to reduce the risk of fire, shock and personal injury.

**1. Keep Work Area Clean** Cluttered areas and benches invite injuries.

#### 2. Consider Work Area Environment

Do not expose power tools to rain. Do not use the power tools in damp or wet locations. Keep work area well lit. Do not use a tool in presence of flammable liquids or gases.

#### 3. Guard Against Electric Shock

Prevent body contact with grounded surfaces. For example; pipes radiators, ranges, refrigerator enclosures.

#### 4. Keep Children Away

Do not let visitors contact tool or extension cord. All visitors should be kept away from work area.

#### 5. Store Idle Tools

When not in use, tools should be stored in a dry and high or locked-up place out of reach of children.

#### 6. Do Not Force Tool

It will do the job better and safer at the rate for which it was intended.

#### 7. Use The Right Tool

Do not force small tool or attachment to do the job of a heavy-duty tool. Do not use the tool for purpose not intended, for example; do not use a circular saw for cutting tree limbs or logs.

#### 8. Dress Properly

Do not wear loose clothing or jewelry; they can be caught in moving parts. Rubber gloves and non-skid footwear are recommended.

#### 9. Use Safety Glasses

Also use face mask or dust mask if operation is dusty.

#### 10. Do Not Abuse Electric Cord

Never yank electrical cord. Keep electric cord from heat, oil and sharp edges.

#### 11. Do Not Overreach

Maintain proper footing and balance at all times.

#### 12. Maintain Tools With Care

Keep clean for better and safer performance. Follow instructions for lubricating and changing accessories. Inspect tool cords periodically and if damaged, have repaired by authorized service facility. Inspect electrical cords periodically and replace if damaged. Keep handles dry and clean and free from oil and grease

#### 13. Disconnect Tools

Disconnect machine from power source when not in use, before servicing and changing accessories.

#### 14. Remove Adjusting Keys and Wrenches

Form a habit of checking to see that keys and adjusting wrenches are removed from machine before turning it on.

#### 15. Avoid Unintentional Starting

Always disconnect from power source before moving.

#### 16. Stay Alert

Watch what you are doing. Use common sense, do not operate tool when you are tired. (Do not use when taking medications that may cause drowsiness.)

#### 17. Check Damaged Parts

Before further use of the machine, guard or other part that is damaged should be carefully checked to determine that it would operate and perform its intended function. Check alignment of moving parts, binding of parts, breakage of parts mounting and any other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced by an authorized service center. Do not use this machine if switches do not turn it on and off. Have defective switches replaced by authorized service center.

# **Special Instructions**

- 1. Read and follow operators manual thoroughly. If you require an additional manual please contact CML USA Ercolina<sup>®</sup> at **563-391-7700** or email **info@ercolina-usa.com**.
- 2. Due to size and weight, it is recommended that qualified professionals transport, position and install the bending machine. Use proper equipment for installation including lift truck safety straps, chains binders and bars. Machine must be balanced evenly at all times.
- 3. Never place hands, finger gloves or clothing near rotation machine parts.
- 4. Always disconnect machine from power source before changing accessories.
- 5. Always use eye and hearing protection.
- 6. Never wear loose clothing, gloves or jewelry when working near machine.
- 7. Stand in a safe position when operating machine.
- 8. Always wear safety approved steel toe footwear.
- 9. Make provision for safe handling of heavy and/or awkward materials.
- 10. Use only proper tooling, keep tooling securely fastened.
- **11.** Keep machine and tooling free and clear of chips and debris.
- 12. Keep all safety features functioning and working properly.
- 13. Do not alter or modify machine. Use only OEM approved parts and accessories.

# **Operation and Programming 05/2011 Edition**

Code : W56OPPRGE5.1



English



# CML USA

# EB CNC6 – CNC8 W6 RAINBOW touch line.

www.ercolina-usa.com info@ercolina-usa.com Page 5 of 143 code : W560PPRGE5.1 05/2011

Introduction	1
Service	2
Turning On and Reference Point Approach	3
Manual Mode	4
Automatic Mode	5
Cycles	6
File manager	7
Programming tools	8
Programming tubes Polar	9
Programming tubes Cartesian	10
Programming springback	11
Simulation	12
About programming a tube shape	13
Diagnostic	14
g	

W56 system Rainbow Touch screen

# Operation & Programming

I

# **Safety Guidelines**

This manual contains notices intended to ensure your personal safety, as well as to protect products and connected equipment against damage. Safety notices are highlighted by a warning triangle and presented in the following category depending on the degree of risk involved:



### Danger

Indicates as imminently hazardous situation which, if not avoided, will result in death or serious injury or in substantial property damage.



#### Warning

Indicates a potentially hazardous situation which if not avoided, could result in death or serious injury or in substantial property damage.



#### Caution

Used with safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

#### Caution

Used without safety alert symbol indicates a potentially hazardous situation which if not avoided, may result in property damage.

#### Notice

Indicates important information relating to the product or highlight parts of the documentation for special attention.

# **Qualified person**

The unit may only be started and operated by qualified person or persons. Qualified personnel as referred to in the safety notices provided in this document are those who are authorized to start up, earth and label units, system and circuits in accordance with relevant safety standards.

## **Proper use**

Please observe the following:



The unit may be used only for the applications described in the catalog or the technical description, and only in combination with the equipment, components and devices of the other manufacturers as far as this is recommended or permitted by CML International S.p.A.. This product must be transported, stored and installed as intended, and maintained and operated with care to ensure that it functions correctly and safely.

# **1. Introduction**

W65 system rainbow touch screen is the latest system develop by CML.

The W65 system was develop including all CML experience on tube bending process :

This system is easy to use and offer various possibility on bending field.

A strong simulation software permit to realize virtually the part very close to reality to detect program incompatibility with machine possibility.

Spring back software calculation allow to realize a right first part (save material and time).

Managing files using widows<sup>™</sup> operating system guaranty compatibility with external system.

# 1.1 System hardware



www.ercolina-usa.com info@ercolina-usa.com Page 10 of 143 code : W560PPRGE5.1 05/2011

# 1.2 System software



# 1.3 Start up and shut down system.

# 1.3.1 Start up

Switch power on (main) Wait until CML main screen appears.



# 1.3.2 shut down

On main screen :



1 – Press shut down soft key.

Wait until screen become dark

2 - Switch off power

# 1.4 Screen layout and operating areas

#### Main screen

After *cml2006.exe* program loading main screen appear, press according key for the desiderate function.

	Manual	Automatic
	Service	Programs
<b>S</b> ]		

# Soft key functions :





# 1.5 Overview of the most important soft key functions

www.ercolina-usa.com info@ercolina-usa.com Page 16 of 143 code : W560PPRGE5.1 05/2011

# 1.6 Files over view.

The system utilize 4 files types :

Polar files (.POL) Cartesian Files (.CAR) Tool set files (.DIE) Spring back fifes (.SPB).

Polar files contain Part geometry description, tube specification, and some technologic parameters (speed, etc...). this is the file used to feed parameters on cycle (work cycle).

Cartesian files contain tube geometry description in Cartesian mode. Cartesian files must be convert in polar files to bend the part.

Tool set files contain tool parameter to adjust it on machine. Machine can run only with an appropriate tool set file.

Spring back files contain information on tube elasticity to correct automatically geometric polar values to obtain a right part geometry.

Note : Polar file and toolset file must be present to perform a bend cycle.

# 1.7 Soft key and keyboard.

### 1.7.1 Soft keys

Soft keys are area on touch screen each soft key is affected to one function, to execute soft key function press on area on touch screen.

Soft key function are mainly jump to an other screen or menu, execute one operation ( create, delete, calculate, select etc ...).

On following screen there is 9 soft keys, 6 are associate to a function (jump to).



On menu selection actual soft key menu is displayed in Yellow.

C:\CM	L56\JOB\PART2	.POL	POLAR FILE						15.04.10 - 11.07.21		
										~	
Co	mment		MY TUBE						IY TUBE	Spring Back	
Cal	culated tu	tube length 4364,318							Calculation		
				Bends	correctio	ns					
#	DBB/SB	DOB/SB	DBB	POB	DOB	Σ DBB	ΣΡΟΒ	Σ DOB	<b>^</b>		
_ 1	0	0,00	0	0,00	0,00	0	0,00	0,00		Reset S.B. Corr.	
2	0	0,00	0	0,00	0,00	0	0,00	0,00			
3	0	0,00	0	0,00	0,00	0	0,00	0,00			
4	0	0,00	0	0,00	0,00	0	0,00	0,00			
5	0	0,00	0	0,00	0,00	0	0,00	0,00		Calculate All Corr	
6	0	0,00	0	0,00	0,00	0	0,00	0,00			
	0	0,00	0	0,00	0,00	0	0,00	0,00			
8	0	0,00	0	0,00	0,00	0	0,00	0,00		Deast All Care	
10	0	0,00	0	0,00	0,00	0	0,00	0,00		Reset All Corr.	
11	0	0,00	0	0,00	0,00	0	0,00	0,00			
12	0	0,00	0	0.00	0.00	0	0.00	0.00			
13	0	0.00	0	0.00	0.00	0	0.00	0.00	<b>.</b>	Save	
	HEADER		YBC	BENDE DATA GRAPHIC		RAPHIC	ESC				

## 1.7.2 Introducing numerical values

To introduce a numerical value on a field, "double click" on numeric field a pop up keyboard will appear.



- 1 Parameter name
- 2 Numeric field
- 3 Pop up window.

## Pop up windows



- 1 Picture for parameter explanation.
- 2 Parameter name.
- 3 Parameter short description.
- 4 Parameter description.
- 5 Max value.
- 6 Current unit.
- 7 Min value.
- 8 Introduction field.
- 9 Keyboard.

#### Numerical keyboard :



- 1 Numeric keys
- 2 decimal point.
- 3 Switch positive to negative value (or inverse).
  4 BSP back space erase last right character.
- 5 ESC escape Close windows without modification.
- 6 Confirm introduction vale displayed in introduction field is transfer to parameter.



## 1.7.3 Introducing alpha numerical values

To introduce a alpha numerical value on a field, "double click" on numeric field a pop up keyboard will appear.



- 1 Alpha Numerical keys
- 2 Numerical keys.
- 3 Characters.
- 4 Shift function.
- 5 BSP back space erase last right character.
- 6 ESC escape Close windows without modification.
- 7 ENTER Confirm introduction vale displayed in introduction field is transfer to parameter.

Key board in shift mode :



# 1.8 Coordinate systems

Right-handed, rectangular coordinate systems are used for machine tools. Such systems describe the movements on the machine as a relative motion between tool and work piece.



Fig.1-8 Specification of the axis directions to one another







# 1.8.1 Machine coordinate system (MCS).

Axis : Y1 ( Carriage linear).



- Origin : Y1 axis , 0 position : carriage front part is tangent to machine axis (as show on picture).
   Note : This position 0 is mechanically impossible to reach.
- Type : linear
- Unit : mm or inches.
- Direction (as show on picture).

# Axis : C (bend).



- Origin : C axis , 0 position : bend die keys are parallel to machine axis (carriage) (as show on picture).
- Type : Circular
- Unit : Degrees.
- Direction (as show on picture).

www.ercolina-usa.com info@ercolina-usa.com Page 24 of 143 code : W560PPRGE5.1 05/2011

Axis : B (rotation).



- Origin : B axis , no 0 position : B axis motion are always in relative.
   Note : 0 value is loaded after turning on.
- Type : Circular
- Unit : Degrees.
- Direction (as show on picture).

#### Axis : X1 (bend radius Option).



- Origin : X1 axis , 0 position : bend axis is perpendicular to machine axis (carriage) (as show on picture).
  - o Note : This position 0 is mechanically impossible to reach.
- Type : linear
- Unit : mm or inches.
- Direction (as show on picture).

Note : With this coordinate system, X1 axis position correspond to centerline tooling radius. Example : for a die CLR 152 mm corresponding X1 axis position is 152 mm.

www.ercolina-usa.com info@ercolina-usa.com Page 25 of 143 code : W560PPRGE5.1 05/2011

#### Axis : X2 (Pressure die).



- Origin : X2 axis , 0 position : Front part of booster plate is on bend axis (as show on picture).
   Note : This position 0 is mechanically impossible to reach.
  - Type : linear
- Unit : mm or inches.
- Direction (as show on picture).

Note : there is a relation between tooling (centerline bending radius) and X2 position. The closing value of pressure die is equal to Bend die centerline radius plus pressure die horizontal dimension.

### Axis : Y2 (Booster).



- Origin: Y2 axis, 0 position: Front part of booster plate is on bend axis (as show on picture).
   Note: This position 0 is mechanically impossible to reach.
- Type : linear
- Unit : mm or inches.
- Direction (as show on picture).

www.ercolina-usa.com info@ercolina-usa.com Page 26 of 143 code : W560PPRGE5.1 05/2011

# Axis : Y3 (Mandrel).



- Origin: Y2 axis, 0 position: Front part of booster plate is on bend axis (as show on picture).
   Note: This position 0 is mechanically impossible to reach.
- Type : linear
- Unit : mm or inches.
- Direction (as show on picture).

# 1.8.2 Piece coordinate system (PCS).

Conventional drawing place part origin at tube end on first bend side.

The machine realize bend one after an other starting by a end of a strait part. First bend is always at the opposite end of machine tube origin inside collet.

The real tube reference for tube bending machine is tube end inside collet (on axis Y1).



As length of tube inside collet is not constant (mainly depending of tube diameter) it is nessecar to inform machine what tube length is inside carriage. We call this parameter "Collet length". For easy programming all distance between bend are programmed in absolute from end of one bend to

start of next one. That is not corresponding to machine coordinated system. For 2<sup>nd</sup> and next bend we can easily save programming problem using relative mode.

For first bend machine can't know where to position Y1 axis if tube length is not define.

That mean that first strait length (distance between bends 1 DBB1) is depending of 3 parameters :

- DBB1 length 1.
- Tube length.
- Collet length.

An other way to program is to program 1rst length in absolute mode (for Y1 axis).

1rts absolute Y1 position = Tube length – 1rst strait length – Collet length.

This calculation is done automatically by CML software.

During cycle according to program (tube length etc ..) machine perform length recapture cycles, collet length change (PCS change), this calculation is done automatically by CML software



# 2. Service

# 2.1 Language selection

From main menu press service :



On service menu press change language :



On language selection menu press on desired language :

		2244622446	e	
7	Logit .	-		
	-		f task	
	-	-	**	
-				 _

New language is immediately active.

Note : Current language is memorized, selected language will be always active until new language selection.

CML USA

www.ercolina-usa.com info@ercolina-usa.com Page 29 of 143 code : W560PPRGE5.1 05/2011

# 2.2 Unit selection.

Change programming and display values from mm to inches or inches to mm.

From main menu press service :



On service menu press change unit :



On Unit selection menu press on desired unit (mm or inches) :

12	8	(harra internet)	Channel and	(Instantion	100

New unit is immediately active.

Note : a program generate in one unit is not convert to other unit (stay in creating unit). Note : the system can store and use programs in different units, but unit selection according to programs is not automatic

**CML USA** 

www.ercolina-usa.com info@ercolina-usa.com Page 30 of 143 code : W560PPRGE5.1 05/2011

Other service function :

- I/O test.
- Axis test.
- Diagnostic.

Those functions are used for maintenance and trouble shooting.

See more information on Diagnostic section §14.

# 3. Turning On and Reference Point Approach.

Notice

Before to turn on system, resd smachine specific documentation, reference point approach is specific for each machine.

# 3.1 Turn system on.

**Operating sequence** Switch on the power supply of the CNC and of the machine. After the control system has booted, you are in the main operating area,



# 3.2 Turn system off.



# 3.3 Reference point approach.

On our machine ref point are memorized on turning off.

Meaning after turning on the machine is immediately ready for operate.

Reference point must to be modify only after mechanical or electrical operation (for maintenance). Ref point approach principle is to introduce current axis position (mechanical) in axis counter (electronical) The axis stopped (without hydraulic power) measure current axis position from axis origin and introduce this value on axis counter.

From main menu :

« Diagnostic »



1 - Touch « AXES TEST »

AXES TEST Branch								.36.46	
F	léel	Idéal	Final	Erreur		Max erreur	FC +	FC -	FC 0
Y1	0	0	C		0	0	0	0	0
В	0	0	٥		0	0	0	0	0
С	0	0	C		0	0	0	0	0
X1	0	0	C		0	0	0	0	0
PID paramettre									
<sup>ke</sup> 0.130	<sup>6</sup> 0.000	Ка• С	0.000	<sup>***</sup> 4.0	000				
<sup>к</sup> ⊳ 0.200	<sup>6</sup> 0.000	Kd- C	0.000	<sup>K</sup> * 4.0	000	<sup>iLimit</sup> 10	000	)	
		Denotes de atra							
Limite fine 200	1	Donnees de depr	Vitesse 20.0		Ac	5.000			
<sup>Folérance de serrage</sup> 800	0		Course (Step)		Manivo	•• 0			
Operation         Operation <t< td=""><td></td></t<>									
+	-	+/	<b>_</b> s <sup>.</sup>	гор			E	sc	

www.ercolina-usa.com info@ercolina-usa.com Page 34 of 143 code : W560PPRGE5.1 05/2011

Double click on axis reel position (yellow field).

A pop up widow appears.



Double click on numerical field

		AXE	S TEST				HARRING ST.	- 17	32111
	teal	Ideal	Final	En	01	Мах епог	FC +	FC ·	FC O
Y1	0	0	1	0	0	0	0	0	0
B	0	0		D	0	0	0	0	0
C	0	0		0	0	0	0	0	0
X1	0	0					0	0	0
PID parameter				200000		AUDITOR			
<sup>6</sup> 0.200	<sup>6*</sup> 0.000	Kd* 0.0	00						
<sup>**</sup> 0.200	<sup>6</sup> 0.000	<sup>Kd</sup> 0.0	00	-		Tag	00000		
			4	1	2 3	ESC			
Position Zone 50		Motion data Velocity	10	4	5 6	BSP			1
Alarm Zone 300	00	Stroke (Step	100	7	8 9				1
		GAsis Y1 Zero Switch Positive linit switch Negative linit switch		+/-	. 0		/		
+	-	+/-	s	TOP			E	sc	

Insert current axis value in mm or degrees, confirm by enter.

The value is convert automatically in encoder pulses

Press escape to return to previous menu.

Note: you can control your set up in manual model (§4).

CML USA

## www.ercolina-usa.com info@ercolina-usa.com Page 35 of 143 code : W560PPRGE5.1 05/2011

# 4. Manual Mode

Functionality	The manually operated mode, is possible in the Jog mode select the axes and actuator desiderate for the movement.
Notice	Before to use manual mode, read the machine documentation, manual mode is machine-dependent functions.
Preconditions	The preconditions for executing part programs are: - Reference point approached. - The required safety interlocks are activated. - Hydraulic pumps are on

# **Operating sequence :**



1 - From main screen, press "Manual" soft key
Manual screen appears :

MANUAL PAGE							15.04.10 - 14.51	-20
No alarms	presents	5						Y
<b>Y1</b> <sup>[mm]</sup>	0,00		OFF objects					
<b>B</b>	0,00		Clamp					
<b>C</b>	0,00		Pressure Die					
X	0,00		Mandrel					
<b>X2</b> <sup>[m]</sup>	0,00		Booster					
<b>Y2</b> <sup>[mm.]</sup>	0,00		Head Shifter		(	Dpen all		
<b>Y3</b>	0,00						_	
			Collet			ude Lud.		
			Tube Support		N	lachine Lu	b.	
Select the desired	d function,pre	ess di	rection key + or - F	Press enable	butto	n to move		
JOG	HOME						ESC	

On screen select desired motion active axis or object select is display in Yellow. According to machine system select direction and activate safety unit. For more information see Machine User manual.

		MANUAL PAGE	15.84.16 - 14.57.24
No alarn	ns <mark>present</mark> s		•
<b>Y1</b> <sup>[mm.]</sup>	0,00	ON/OFF objects	
B	0,00	Clamp	
<b>C</b>	0,00	Pressure Die	
<b>X1</b> <sup>[mm.]</sup>	0,00	Mandrel	
<b>X2</b> <sup>[mm.]</sup>	0,00	Booster	
<b>Y2</b> <sup>[mm.]</sup>	0,00	Head Shifter	Open all
<b>Y3</b>	0,00		
		Collet	Tube Lub.
		Tube Support	Machine Lub.
Select the de	sired function,pres	s direction key + or - Press enable	button to move
Jog	номе		ESC

# 5. Automatic Mode

Functionality	In the Automatic mode, part programs can be executed fully automatically, i.e. this is the operating mode for standard processing of part programs.
Preconditions	<ul> <li>The preconditions for executing part programs are:</li> <li>Reference point approached.</li> <li>Hydraulic pump are on.</li> <li>You have already stored the required part program in the control system.</li> <li>You have checked or entered the necessary tool offsets.</li> <li>The required safety interlocks are activated.</li> </ul>

**Operating sequence** Use the Automatic key to select the Automatic mode. The Automatic basic screen appears that displays.

# 5.1 Automatic



Soft keys :

- 1 Auto (main page)
- 2 Program control.
- 3 Program select.
- 4 Start stop auto cycle
- 5 Parameters
- 6 Escape return to main menu.

**CML USA** 

# 5.1.1 Auto (main page).

	AUTOMATIC CYCLE	15.04.10 - 15.29.10	
		<b>-</b>	
Program selected	C:\cml56\JOB\PARA TEST.pol	MAIN	
Comment	TEST PARAMETERS		
Toolset	C:\cml56\JOB\KST3 76,1R152.die		
Tube	MY TUBE 2500MM LENGTH	DISPERTANES	E
Springback	C:\cml56\JOB\CCC.spb	DISPLAY	
Pieces to do	0 Done 0 Rest 0	FUNCTIONS	Z
Status	Bend 0 Step 0	DISPLAY BLOCKS	
Message	It is now possible to start the cycle		Z
AUTO	PRG CONTROL PRG SELECT START AUTO PARAMETERS	ESC	

This menu display main information about current active program and cycle status.

## Soft keys :

- 1 Main
- 2 Display axis
- 3 Display functions
- 4 Display blocks

#### Parameters :

Program selected : name and path of active polar file. Comment : Comment associate to active program. Toolset : name and path of active tool set file. Tube : Tube comment associate to active program. Spring back : name and path of active spring back file.

#### **Pieces counters :**

Pieces to do : Enter number of parts to do. Done : Counter incremented a each program end. Rest : Difference between pieces to do and pieces done.

#### Status :

Bend : Current active bend Step : Current active step on a bend. Message : Operators information messages.

# 5.1.2 Auto (Display axes).

	AUTOMATIC CYCLE					
4					*	
<b>'</b> ~	PROG position	Actual position	Distance to go	Feed		
	<b>Y1</b> 0,00	0,00	0,00	0.000	MAIN	
2 –	<b>B</b> → 0,00	0,00	0,00	0.000		
2 -	<b>C</b> 0,00	→ 0,00	0,00	0.000	DISPLAY AXES	
3	<b>X1</b> 0,00	0,00	0,00	0.000		
4 —	<b>X2</b> 0,00	0,00	0,00	0.000	FUNCTIONS	
	<b>Y2</b> <sup>[m]</sup> 0,00	0,00	<del>0,00</del>	<del>.</del> .000		
5 -	<b>Y3</b> 0,00	0,00	0,00	0.000	DISPLAY BLOCKS	
				Bend 0 🚽		
				Step 0 🚽		
	PRG C	ONTROL PRG SE	LECT START AL	JTO PARAMETERS	ESC	

This menu display axes position according to program value and the difference (distance to go).

1 – axis name

- 2 Programmed position (target)
- 3 Actual position.
- 4 Distance to go ( difference between target and actual position).
- 5 Feed Current speed.
- 6 Actual bend number.
- 7 Actual step number.

# 5.1.3 Auto (Display functions).

This menu display active G, M and F functions.



# 5.1.4 Auto (Display blocs).

This menu display program ISO blocs.

	AUTOMAT	IC CYCLE		15.84.18 - 16.84.89
				-
Program name Single step GO X=100 M42				MAIN
M40 G1 Y= -55 G1 B=180 F=30 M=NB(57) M=NB(81)	lso progra	m blocs		DISPLAY AXES
G91 G0 Y=-80 M47 G90 G0 B=120 G90 G0 C=0 Y=-30 G91 G1 Y=250 F=160				DISPLAY FUNCTIONS
M41 M43 R0001 = 0,000				DISPLAY BLOCKS
R0002 = 0,000 R0003 = 0,000				
			Bend 0 Step 0	
AUTO	PRG SELECT	START AUTO	PARAMETERS	ESC

3 R parameters values can be displayed.

### R parameters display :

R0004	0,000
R0002 =	0,000
R0003 =	0,000

1- Click on parameter number (numerical pop up menu appears)

2 – Insert parameter number you wont to display (from 0 to 4999)

3 – Confirm by enter.

Numerical value of selected parameter is displayed.

Note : this function is useful only using customer ISO program, on general application display R parameters value will be use only for service.

# 5.1.5 Program control (Function of software version).

This menu allow to select some function on cycle (activate or desactivate).

		AUTOMAT	IC CYCLE		15.04.10 - 16.26.53
					<b>*</b>
Bend by bend					
Step by step					
Mandrel					
Booster	1				
Tube lubrificatio	on 🗸				
4		4			
AUTO	PRG CONTROL	PRG SELECT	START AUTO	PARAMETERS	ESC

1 – Bend by bend ( After each bend cycle wait a cycle start action ).

2 – Step by step (After each step cycle wait a cycle start action ).

3 – Mandrel on / off.

4 – Booster on / off.

5 - Tube lubrification on / off.

Press on screen (1) to activate or deactivate function.

Function is active.

Function is not active.

Note : Selection are memorized.

# 5.1.6 Program select.

This menu allow to select a polar file.

	AUTOMATIC CYCLE	15.04.10 - 16.46.29
		-
Disk	Ple Name C.Verif55J08Vhandeba@1.pol	3D VIEW
C:\cml56\JOB	CARTESIAN 2.pol CENTAURE.pol handlebar81.pol	
JOB	PARA TEST.pol PART_1.pol PART2.pol	
	PART3.pol TEST.pol TUBE 114 1.pol	
	TUBE 50.pol	
Tuno of file	Date: 12/04/2010 11.32.19	
1 Polar Files (*.POL)	Toolset C-\om/56\pb/kST3 Comment	SELECT -
AUTO PRG CONTROL PRG	START AUTO PARAME	ETERS

Operating sequence :

1 – Select program on list.

2 - Press soft key select.

Program is selected

Use "3D view" soft key to display selected program in 3D view.

# 5.1.7 Start auto cycle.



On auto menu "MAIN"

1 – Press "START AUTO" soft key.

Operations :

- R parameter are transmit to CNC
- CNC turn in automatic mode.
- Cycle start is enable.

After operation complete Message display "It is now possible to start cycle".

Start cycle begin operation.

# 5.1.8 Stop auto cycle.

Note : only possible after cycle start.



1 – Press "STOP AUTO" soft key.

Operations :

- CNC turn in Manual mode.

Enable to select a other program.

# 5.1.8 Parameters R.

This page display R parameters current values. Those parameters are used by CNC in ISO program.

Parameters range from R0 to R4999.

Note : this function is useful only using customer ISO program, on general application display R parameters value will be use only for service.

				AUTOM.	ATIC CYCLI	5			22.04.10 - 11.32.07
									-
500 · 549	550 · 599	600 - 649	650 - 699	700 - 749	750 · 799	800 - 849	850 - 899	90D · 949	950 - 999
0 · 49	50·99	100 · 149	150 · 199	200 · 249	250 · 299	300 - 349	350 · 399	400 - 449	450 · 499
Par. R 0 0,	00	Par. R 10 0,	00	Par. R 20 0	,00	Par. R 30	0,00	Par. R 40	0,00
Par. R 1 0,0	00	Par. R 11 21	6,00	Par. R 21 1	0,00	Par. R 31	),00	Par. R 41	0,00
Par. R 2 0,0	00	Par. B 12 23	30,00	Par. R 22	1,00	Par. R 32	),00	Par. R 42	0,00
Par. R 3 20	0,00	Par. R 13 35	50,00	Par. R 23	,00	Par. R 33	),00	Par. R 43	0,00
Par. R 4 0,0	00	Par. R 14 50	00,00	Par. R 24	,00	Par. R 34	0,00	Par. R 44	0,00
Par. R 5 0,0	00	Par. R 15 35	50,00	Par. R 25 0	,00	Par. R 35	0,00	Par. R 45	0,00
Par. R 6 0,0	00	Par. R 16 0,	00	Par. R 26	,00	Par. R 36	0,00	Par. R 46	0,00
Par. R 7 0,0	00	Par. B 17 -1	00,00	Par. R 27	,00	Par. R 37	),00	Par. R 47	0,00
Par. R 8 0,0	00	Par. R 18 3,	00	Par. R 28	,00	Par. R 38	),00	Par. R 48	0,00
Par. R 9 44	4,00	Par. R 19 10	00,00	Par. R 29	,00	Par. R 39	100,00	Par. R 49	0,00
									>>
AUTO	þ	PRG CONTR	OL PI	RG SELECT	sто	P AUTO	PARAME	TERS	ESC

50 parameters are display in a page.

Change page using soft key >>

# 6. Cycles.



# 7. File manager.

From main menu



Program file manager menu appears :

	PROGRAM FIL	LE MANAGER		68.04.10 - 12.55.51
				-
Diak C: Folder	File Name			MAKE FOLDER
c:(cmisbyob C:) cmisb cmisb cmisb cmisb cmisb cmisbyob				DELETE FOLDER
Type of Re				VIEW GRAPHIC
1 Polar Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE) 4 Springback Files (*.SPB)	Program info Date: Toolset:	mations		SELECT
	Comment			
NEW COPY	DELETE	RENAME	EDIT	ESC

Using this menu you can :

- Select drive.
- Select folder on a drive.
- Select file type on a folder (filter).
- Display file (by type) on a folder.
- Create a new folder.
- Delete an existing folder.
- Create a new file on current folder.
- Copy an paste an existing file on current folder.
- Delete an existing file on current folder.
- Rename an existing file on current folder.
- Edit an existing file on current folder.
- View in 3D an existing Cartesian file on current folder.

## 5 – 1 Select drive.

You can select any drive for file manipulation by :



De:

•

C:

2 – On list click on desired one New drive is selected

.

New current

## 5 – 2 Select folder on a drive.



1 – Double click on folder name to open it.

Dek	
@c:	3
Foller	
c:\cml56\job	
Cijob 🗲	12
1	

Note : by defect program files are stored on C:\cml56\job\

## 5 – 3 Select file type on a folder (filter).

A soon as you have select a drive and a folder existing file list is displayed on file list area, according to file filter.

	Pł
c⇔. ⊡c:	•
rate c:\cml56\job	
iob	
Iverofite 1 Polar Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE)	

1 – Click on file type to show.

1 Polar Files (\*.POL) file to define part geometry in polar mode.

2 Cartesian Files (\*.CAR) file to define geometry in Cartesian mode.

3 Toolset Files (\*.DIE) file to define tooling datas.

4 Spring back Files (\*.SPB) file to define parameters for automatic tube spring back compensation.

## 5 – 4 Display file (by type) on a folder.

As soon as you have select file type corresponding existing files are displayed on file list area

## 5 – 5 Create a new folder.

1 - Select the desired place were you wont to create a new folder



3 – Pop up widow appears with alpha numeric keyboard.

1.01							_			
PQ	- 11	18R36 STEEL die				-1	MAR	EFOLD	ER	
cml56\job ]c:\ ]cml56					New Tald	ler nome				
job								MY E	OLDI	ER
	A	B	C	D	E	F	G	H	I	J
	K	L	M	N	0	P	Q	R	s	Т
la	U	V	W	X	Y	Z	17.	*	-	+
Volar Files (*.POL) Cartesian Files (*.CAR)		:		=		(	)	a	"	
Springback Files (*.SPB)	0	1	2	3	4	5	6	7	8	9

- 4 Insert folder name (in this example folder name is "MY\_FOLDER").
- 5 Confirm by enter.

New folder is create.

		68.64.16 - 15.16.44		
				-
Disk C: Folder c.\cml56\iob	File Name BB.pol			MAKE FOLDER
Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citizense Citize				DELETE FOLDER
MY_FOLDER				
Tuce of the				VIEW GRAPHIC
1 Polar Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE) 4 Springback Files (*.SPB)	Program infor Date: Toolset:	nations		SELECT
	Comment:	-i		
NEW COPY	DELETE	RENAME	EDIT	ESC

www.ercolina-usa.com info@ercolina-usa.com Page 52 of 143 code: W560PPRGE5.1 05/2011

**CML USA** 

## 5 – 6 Delete an existing folder.

1 - Select folder you wont to delete.



2 – Press soft key



3 – Confirm or abort delete folder operation.

CML USA

## 5 – 7 Create a new file on current folder.

	PROGRAM FI	LE NANAGER		
See	KST1 KST3 KST4 KST4 TOOL	25R50.clie 76.1R152.clie 114 R220.die 3.3R100.clie _25.clie	MAKE FOLDER	
Type of the				VEN GRAPHS
1 Polar Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE) 4 Springback Files (*.SPB)	1 Const			SELECT
NEW COPY	DELETE	RENAME	EDIT	ESC

1 – Select type of file you want to create.

2 - Press soft key "NEW"

Fiel Rame	1 25R50.d	lie			-			9
KST	1 25R50.d	lie			-			
KST	1 25R50.d	lie				And the second se		0.000
				KST1 25R50 die				āR 🛛
			ere toallant j					
A	BC	D	E	F	G	H	Ι	J
K I	LM	N	0	P	Q	R	S	Т
UV	V W	X	*	5Z	17.	.0	-	+
		=				æ		
0	1 2	3	4	5	6	7	8	9
SHIFT	V.	(S)	ſ	BSP	ESC		ENTE	RI
	A J K J U V · O	A B C K L M U V W . 1 , 0 1 2	A       B       C       D         K       L       M       N         U       V       W       X         .       :       ,       =         0       1       2       3         SHIFT       .       .       .       .	A       B       C       D       E         K       L       M       N       O         U       V       W       X       ≤         .       4       ,       =          0       1       2       3       4         shift       .       .       .       .       .	A       B       C       D       E       F         K       L       M       N       O       P         U       V       W       X $\overleftarrow{z}$ Z       3         .       :       ,       =       _       (         0       1       2       3       4       5         SHIFT       BSP	A       B       C       D       E       F       G         K       L       M       N       O       P       Q         U       V       W       X $$ Z       /         .       :       ,       =       _       (       )         0       1       2       3       4       5       6         SHIFT       ESC       ESC       ESC       ESC	A       B       C       D       E       F       G       H         K       L       M       N       O       P       Q       R         U       V       W       X       S       Z       /       "         .       :       ,       =       (       )       @         0       1       2       3       4       5       6       7         BSP       ESC       .	A       B       C       D       E       F       G       H       I         K       L       M       N       O       P       Q       R       S         U       V       W       X $=$ Z       7 $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$ $=$

- 3 Insert desired file name.
- 4 Confirm by enter.



## 5 – 8 Copy an paste an existing file on current folder.

- 1 Select file to copy.
- 2 Press soft key copy.

Following screen appears :

PRO	GRAM FILE MANAGER	68.64.18 - 15.57.68
		*
Diek C: Folder C:)com/560 JOB	File Name C'cm/56U08/handlebw61.pd CENTAURE.pol handlebar81.pol	MAKE FOLDER
C:\ C:\ Cml56 JOB	TEST.pol TUBE 114 1.pol TUBE 50.pol	DELETE FOLDER
Type of file		VIEW GRAPHIC
1 Polar Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE) 4 Springback Files (*.SPB)	Program informations Date: [25/03/2010 10.36.24 Toolset: [C:\ump5ijub/US13.76.18152.de	SELECT
	Comment	
	ETE RENAME ED	IT ESC

### 3 - press soft key "PASTE"

New file is create with characters [1] on file name. Note : 1 is the first copy, 2 is the second etc.. Use rename function for change file name.

> www.ercolina-usa.com info@ercolina-usa.com Page 55 of 143 code : W560PPRGE5.1 05/2011

**CML USA** 

	08.04.10 - 16.02.56	
		~
Disk C: Folder C: Jone 156 J DB	Fie Name CvanBSv0BVM*_C0PY.pd CENTAURE.pol handlebar81.pol	MAKE FOLDER
() () () () () () () () () () () () () (	MY_COPY.pol TEST.pol TUBE 114 1.pol TUBE 50.pol	DELETE FOLDER
Type of file		VIEW GRAPHIC
1 Polar Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE) 4 Springback Files (*.SPB)	Program informations Date: 25/03/2010 10 35 24 Toolot: C:vamEXva0VX513 76 19152 de	SELECT
	Comment	
NEW COPY		ESC

# 5 – 9 Delete an existing file on current folder.

1 - Select file to delete.

2 - Press soft key "DELETE".



3 – Confirm delete operation.

PROGRAM FILE MANAGER					
					-
Disk C: Folder		File Name     C.\cm/56\U01     CENT	Whandebar81[1]pol AURE.pol		MAKE FOLDER
C:\cmi56\JOB		TEST. TUBE	bar81[1].pol pol 114 1.pol 50.pol	<b>D</b> 1	DELETE FOLDER
Type of file					VIEW GRAPHIC
1 Polar Files (*.PO 2 Cartesian Files 3 Toolset Files (*. 4 Springback File	DL) (*.CAR) DIE) es (*.SPB)	Program info Date: Toolset:	mations 25/03/2010 10.36.24 C.\cm56\vobKST3 76.1R152.die		SELECT
		Comment			
NEW	СОРҮ	DELETE			ESC

## 5 – 10 Rename an existing file on current folder.

- 1 Select file to rename
- 2 Press soft key rename.

	PROGRAM FILE MANAGER					
1. 1.	Tie Name					
e:	CENTAURE.pol	MAKE FOLDER				
2:temI56JOB	Pular paggian new same					
	ABCDEF	GHIJ				
	K L M N O P O	R S T				
ge a lie	UVWX	/ * - +				
1 Polar Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE)		) <u>@</u> «				
4 Springback Files (*.SPB)	0 1 2 3 4 5 0	6 7 8 9				
	BSP 1	ESC ENTER				
NEW COPY	RENAME					

- 3 Insert new name.
- 4 Confirm by enter.

# 5 – 11 Edit an existing file on current folder.

PROGRAM FILE MANAGER					98.04.18 - 16.13.48
Disk C: Folder		File Name C:\cm56\U00 CENT/ handle	Whandlebar81.pol AURE.pol ebar81.pol	6	MAKE FOLDER
C:\		TEST. TUBE TUBE	pol 114 1.pol 50.pol	1	DELETE FOLDER
Type of file					VIEW GRAPHIC
1 Polar Files (*.F 2 Cartesian Files 3 Toolset Files ( 4 Springback Fi	POL) s (*.CAR) *.DIE) les (*.SPB)	- Program info Date: Toolset:	mations 25/03/2010 10.35.37 C:\cm56\job\KST3 76.1R1	152.die	SELECT
		Comment			
NEW	СОРҮ	DELETE	RENAME	EDIT 😽	ESC 2

1 – Select file to edit

2 – press soft key "EDIT" According to file type selection Editing page will appear :

C::CML56'JOB'HANDLEBAR81.POL		POLAF	R FILE		88.04.10 - 16.16.39
					-
Comment					
Tube					
Toolset	C:\cml56\job\	KST3 76,1R152.di	e		
Springback					
Tube OD		76			
Tube Thickness		2			
Material	FE42				
Tube length		3500			
Tube shape		0			
Tube 2nd dimension		0			
Main Cycle		0			
					Save
					Save
	VBC	CORR		CRADUIC	500
HEADER	TBC	CORR.	BENDS DATA	GRAPHIC	ESC

## 5 – 12 View in 3D an existing polar file on current folder.

Note : this function is only for POLAR files

PROGRAM FILE MANAGER STRATE				
		•		
Dirk C: Folder Culorm(56), IOP	File Name Chom56V08VCENTAURE.pol CENTAURE.pol handlebar81.pol	MAKE FOLDER		
C:\ C:\ Cml56	TEST.pol TUBE 114 1.pol TUBE 50.pol	DELETE FOLDER		
Type of Re		VIEW GRAPHIC		
1 Polar Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE) 4 Springback Files (*.SPB)	Program informations Date: 25/03/2010 13.09.40 Tooleet: c:\cm/56\pbVS513 76.18152.de	SELECT		
	Comment: PL090154			
NEW COPY	DELETE RENAME	EDIT ESC		

- 1 Select "1 Polar Files (\*.POL) " on file type
- 2 Press soft key "VIEW GRAPHIC".

8	PROGRAM FILE	NANAGER		
				-
1	Central Central bandleb	RE.pol		MAKE FOLDER
	TEST.po TUBE 11 TUBE 50	TEST.pol TUBE 114 1.pol TUBE 50.pol		
				VIEW PATH
<b>2</b> 3	Program internet Delar Contact Contact	2503/070 138940 250456 (2013 7 N 1815) 918976	3	SELECT
NEW COPY	DELETE	RENAME	EDIT	ESC

3D display of selected file is show instead of path. Note : rotation is active touching the screen in 3d field (3).

4 - Select an other file to display according view.

CML USA

## Using Window® to manipulate file.

Using widows software, open directory in according to path you chose on file manager. Files are displayed wit extension (.POL, .CAR, .DIE, .SPB).

C (1989)/08	_	-						9 E
Operation file e carbella Con nuovo carbella O Orten carbella		TUBE 50.08	108R216.de	611 2452.64	KSTO N. IRISZ.de	EST4 114 R220. 64	EST49, 291	1003.000.00
Control canala		1000,25.44	CENTRURE por	hardebert	PADA TEST. pol	PARTZ pel	PAAT3.pd	Real_TAW1
india Concernit Marcon del computer Marcon della Sanca della	0	i s	NE SI (M	TUBE 134 3.pd	2 645 406	15.2 A136-14		114.3 ALOS ADD
Dettagi		CCC. epb						
200 Catella-Afrik Data-Jima redficts wi 12 spri 2018, 14-00	in (							

# 5. Programming tool set parameters

Tool set parameters are use to adapt machines data to mechanical and technological value of a toolset. Those parameter are stored in a file with .die extension (ex : 18R36\_STEEL.die)

## 5.1 Creating a new toolset file.

From main menu



Program file manager menu appears :

1	PROGRAM FIL	E MANAGER		and a second second
ook ■c:	The Name		_	MAKE FOLDER
c:\cmi56ijob @gc:\ @gcmi56 @gob	Г	Files list	_	DELETE FOLDER
				VEW SRAPHE
1 Poles Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE) 4 Springback Files (*.SPB)	Propue roles Date: Tooket			SELECT
NEW COPY	DELETE	RENAME	EDIT	ESC

Program file manager menu.

#### **Operations**:

1 - Select " 3 Toolset Files (\*.DIE) on File type area.

List of present files appear on list.

2 - Press soft key "New" to create a new file

NEW
-----

The alpha numeric keyboard appears for introduce file name.

	PROGRAM FILE MANAGER					
		-				
204	Pile Nove					
Toda	TOOL25R50.die	MAKE FOLDER				
e:\eml56\job	New Soliest program same	New tasked program name				
(internet internet i						
al job						
	ABCDEFG	H I J				
	K L M N O P Q	RST				
Type of the		+ - +				
1 Polar Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE)	· : , = _ ()	a «				
4 Springback Files (*.SPB)	0 1 2 3 4 5 6	7 8 9				
COPY	BSP ES	C ENTER				
NEW						

3 – Dial file name (ex : 18R36\_STEEL)

4 – Introduce by enter.

Note : extension .DIE is automatically ad to file name.

Following page appears :

C:/CML56/JOB/18R36_STEEL.DIE	NE TOOLING FILE				
			*		
Comment					
Bend die groove diameter	0,00	<u>^</u>			
Y axis bend die interference	0,00				
Y axis Pressure die interference	0,00				
Collet length	0,00				
Pressure on pressure die	NO				
X1 axis bending position	0,00				
X1 axis loading position	0,0				
X2 axis pressure die position IN	0,0				
X2 axis pressure die position OUT	0,0				
Y2 axis booster stroke	0,0		Transmit		
Y3 axis mandrel position IN	0,0				
Y3 axis mandrel position OUT	0,0				
Mandrel pre retract angle	0,0				
Following mode Y1	0,000	<b>•</b>	Save		
			ESC		

### Soft keys function :



#### Parameters :

Access to edit parameters double click (or touch) on according field. After selection a pop up window appears, allow to program value

Comment : Unit : -

#### Bend die grove diameter :

Description : Bend die grove diameter, this value is stamped on bend die Unit : mm or inches R parameter location : R70 Pop up windows :



#### Y axis bend die interference

Description : Software limit switch for Y axis interference with wiper die (if exist for current tooling) or bend die. This position is absolute according to Y axis origin. It's a limitation of Y axis working area Unit : mm or inches R parameter location : R71

Pop up windows :



#### Y axis Pressure die interference

Description : Software limit switch for Y axis interference with pressure die in closed position. This position is absolute according to Y axis origin. This position must be greater than "Y axis bend die interference". If according to geometric program, tube as to came in position between this 2 limit switch, pressure die interference cycles are automatically called :

Pressure die interference cycle :

1 – Y axis position between limit switch.



- 2 Close clamp.
- 3 Open collet.
- 4 Y axis position to Pressure die interference limit switch.



5 - Bend cycle.

Unit : mm or inches R parameter location : R72 Pop up windows :



### **Collet length**

Description : Length of tube inside collet at cycle origin (loading). This value is used for carriage positioning (Y axis) for the first bend. Unit : mm or inches R parameter location : R73 Pop up windows :



## Pressure on pressure die :

Description : Insert 1 for YES, 0 for NO.

Selection YES, hydraulic pressure is apply on pressure die cylinder during bending. Selection NO, hydraulic pressure is not apply on pressure die cylinder during bending. In general case using a wiper die Select YES, select NO if wiper die is not used. Unit : -

R parameter location : R10 Pop up windows :



## X1 axis bending position :

Description : Position of X1 axis for bending. This position is generally equal to bend die centerline radius. Unit : mm or inches R parameter location : R11 Pop up windows :



### X1 axis Loading position :

Description : Position of X1 axis for tube loading . This position must be greater or equal to R11 X1 bending position.

Unit : mm or inches R parameter location : R12 Pop up windows :



#### X2 pressure die position IN

Description : Position of X2 axis, pressure die for bending (CLOSE).

To get this position one solution is to move pressure die in manual mode with a low pressure as pressure die touch the tube. On this position note X2 axis position and insert this value on "X2 pressure die position IN"

Unit : mm or inches R parameter location : R13 Pop up windows :



## X2 pressure die position OUT

Description : Position of X2 axis, pressure die for tube positioning (OPEN).

This position must be greater than R13 "X2 pressure die position IN" .

Pressure die position for tube positioning. This position must allow carriage to pass on pressure die area. If this position is too small, Carriage must collapse pressure die.

Unit : mm or inches

R parameter location : R14 Pop up windows :



## Y2 axis booster stroke.

Description : Booster Stroke limitation.

According to pressure die length, booster stroke can be limited.

A length of pressure die must always maintain tube in machine axis, this pressure die length must be minimum of 1,5 tube outside diameter.

That means Booster stroke must be program to "pressure die length minus 1,5 tube outside diameter". Example : Pressure die length 350 mm tube OD 76.2 mm

76.2 x 1.5 = 114.3 mm

Booster stroke must be program : 350 - 114.3 = 235.7 (235)

If this stroke is not enough to perform a complete bend, booster recapture cycle are automatically called Unit : mm or inches

R parameter location : R15

Pop up windows :



Y3 axis Mandrel position in

Description : Mandrel position for bending. Front mandrel position, in general case use 0 value. Unit : mm or inches R parameter location : R16 Pop up windows :



### Y3 axis Mandrel position OUT

Description : Mandrel position for tube positioning. Back mandrel position. Unit : mm or inches R parameter location : R17 Pop up windows :



### Mandrel pre retract angle.

Description : Angle relative in C axis to retract mandrel before bending angle end.

This function allow to retract mandrel before bending final position to decrease deformation caused by mandrel body on tube extrados.

Unit : Degrees R parameter location : R18 Pop up windows :



#### Y1 following mode coefficient.

Description : coefficient of tube following according to bend radius.

According to bending radius and bend angle tube have to move in linear off a value equal to (2 x pi / 360) x Bend radius x bend angle.

This distance can be corrected by this coefficient in function of tube elongation. Programming 1.000 The carriage stroke (Y! axis) is equal to bend developed length. Programming 0.900 The carriage stroke is 10% less than bend developed length. Programming 1.100 The carriage stroke is 10% more than bend developed length.

By defect use 1.000 Unit : -

R parameter location : R19 Pop up windows :



When data entry are complete press "Save" store this value on current file (1).

Comment T00L SET 0D76 2 B15	2.4 STEEL		
	1.4 01222		
Bend die groove diameter	76,20	<u> </u>	
Y axis bend die interference	250,00		
Y axis Pressure die interference	500,00		
Collet length	50,00		
Pressure on pressure die	YES		
X1 axis bending position	152,40		
X1 axis loading position	200,00		
X2 axis pressure die position IN	188,60		
X2 axis pressure die position OUT	300,00		
Y2 axis booster stroke	350,00		Transmit
Y3 axis mandrel position IN	0,00		
Y3 axis mandrel position OUT	-120,00		
Mandrel pre retract angle	3,0		
Following mode Y1	1,000	-	Save 🧲

Press "ESC" to return to previous menu "File manager" (2)

## 5.2 Editing an existing toolset file.

#### From main menu



Program file manager menu appears :

6		PROGRAM FI	LE MANAGER		THE REPORT
Dex C: False		Finitume Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Finite Fini	ASTEEL.die		MAKE FOLDER
c:/cmi56job		TOOL	25R50.die	2	DELETE FOLDER
			Files list		
Type of the					VIEW GRAPHIC
1 Polar Files (*.F 2 Cartesian File 3 Toolset Files ( 4 Springback Fi	POL) s (*.CAR) *.DIE) les (*.SPB)	Topas M Dax	1004/27012.2017		SELECT
		Circut	POOL SET 00/02/01/524	HER.	
NEW	COPY	DELETE	RENAME	EDIT -	ESC 3

Program file manager menu.

## **Operations**:

1 - Select " 3 Toolset Files (\*.DIE) on File type area.

List of present files appear on list.

2 - On file list select file to edit



3 – Press soft key 📑
Following page appears with previous values :

C:/CML56\JOB\76.2R152.4 S.DIE	TOOLING FILE		08.04.10 - 12.48.58
			-
Commont TOOL SET OD76 2			_
Comment 1002 SET 0076.2	R152.4 31EEL		
Bend die groove diameter	76,20	<u> </u>	
Y axis bend die interference	250,00		
Y axis Pressure die interference	500,00		
Collet length	50,00		
Pressure on pressure die	YES		
X1 axis bending position	152,40		
X1 axis loading position	200,0		
X2 axis pressure die position IN	188,6		
X2 axis pressure die position OUT	300,0 🛀 1		
Y2 axis booster stroke	350,0		Transmit
Y3 axis mandrel position IN	0,0		
Y3 axis mandrel position OUT	-120,0		
Mandrel pre retract angle	3,0		
Following mode Y1	1,000	<b>•</b>	Save
		1	
DATA			ESC

1 - Double click on desired data to display keyboard on pop up window

Example : X2 pressure die position in :



Previous value is displayed on input field.

- 2 insert new value with numerical keyboard
- 3 Confirm by enter

#### 4 - Save the file :

C:/CML56\JOB\76.2R152.4 S.DIE	TOOLING FILE		88.84.18 - 12.58.28
			*
Comment TOOL SET OD7	5.2 R152.4 STEEL		
Bend die groove diameter	76,20	<b></b>	
Y axis bend die interference	250,00		
Y axis Pressure die interference	500,00		
Collet length	50,00		
Pressure on pressure die	YES		
X1 axis bending position	152,40		
X1 axis loading position	200,0		
X2 axis pressure die position IN	188,80		
X2 axis pressure die position OUT	300,0		
Y2 axis booster stroke	350,0		Transmit
Y3 axis mandrel position IN	0,0		
Y3 axis mandrel position OUT	-120,0		
Mandrel pre retract angle	3,0		
Following mode Y1	1,000	-	Save
			ESC

# 7. Programming a part using Polar coordinate

Note : a polar file must always be associate to a toolset file.

# 7.1 Creating a new Part.

From main menu



Program file manager menu appears :

	PROGRAM F	ILE MANAGER		68.64.10 - 16.33.30
				-
Dak C: Folder	File Name C:\cm56\UC CENT hand	JBNTEST.pol		MAKE FOLDER
C:\ C:\ Cml56	TEST TUBE TUBE	.pol 114 1.pol 50.pol		DELETE FOLDER
Type of Re				VIEW GRAPHIC
1 Polar Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE) 4 Springback Files (*.SPB)	1 Program in Date: Toolset:	/ormations 24/02/2010 11.01.04 C:\cm/56\job/KST48.3R101	D.die	SELECT
	Comment			
	DELETE	RENAME	EDIT	ESC

Program file manager menu.

# **Operations** :

1 - Select "1 Polar Files (\*.POL) " on File type area.

List of present files appear on list.

2 - Press soft key "New" to create a new file



The alpha numeric keyboard appears for introduce file name.

	PROGRAM FILE MANAGER		
tex	Fishere	-	
🕮 c: 🔹	Cherrifer, OBV/US1 pot	MAKE FOLDER	
Fader	CENTAURE.pol	HATE TOEDEN	
C:hemi56iJOB C:h C:h C:h C:h C:h C:h C:h C:h C:h C:h	Here pills proposi nome		
	A B C D E F G	HIJ	
	K L M N O P Q	R S T	
Type of Me	UVWXY	* - +	
1 Polar Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE)	.:,=_()	a «	
4 Springback Files (*.SPB)	0 1 2 3 4 5 6	7 8 9	
сору	VHIPT BSP ES		

3 - Dial file name (ex : PART\_1)

4 - Introduce by enter.

Note : extension .POL is automatically ad to file name.

Following page appears :

C:/CML56/JOB/PART 1.POL		POLAF	R FILE		88.04.10 - 16.53.21
					~
Comment					
Tube					
Toolset					
Springback					
Tube OD		0			
Tube Thickness		0			
Material					
Tube length		0			
Tube shape		0			
Tube 2nd dimension	1	0			
Main Cycle		0			
					Save
				0.010	
HEADER	ABC	CORR.	BENDS DATA	GRAPHIC	ESC

# Soft key :

C:/CML56\JOB/PART 1.POL	POL	AR FILE		88.04.18 - 16.53.21
				<b>*</b>
Comment				
Tube				
Toolset				
Springback				
Tube OD	0			
Tube Thickness	0			
Material				
Tube length	0			
Tube shape	0			
Tube 2nd dimension	0			
Main Cycle	0			
				Save
				E
	1	1		
	VEC		CRAPHIC	FRC
HEADER		BEINDS DATA	GRAFHIC	ESC
			,	

- 1 Header : General part information (current).
- 2 YBC : Geometric part definition using Length, Rotation, Angles.
- 3 Corr. : Correction added on geometric definition to compensate tube elasticity.
- 4 Bends data : Parameters associate to each bend, like speed, over travel, etc ...
- 5 Graphic : Graphic display, simulation and anti-collision.
- 6 ESC : escape return to previous menu.
- 7 Save : Save file on current folder.

EB CNC

### **Parameters Header :**



**Comment :** Description : Comment. This field allow to introduce a comment associate to the file. Unit : -R parameter location : -Pop up windows : Alpha numeric keyboard

**Tube :** Description : Tube comment. This field allow to introduce a comment associate to the file. Unit : -R parameter location : -Pop up windows : Alpha numeric keyboard

#### Toolset :

Description : Name and location of associate toolset file. This field allow to select associate tool set file used for the current part. Unit : -R parameter location : -Pop up windows : -

C:/CML56/JOB/PART 1.POL		POLAF	R FILE		09.04.10 - 9.19.35
					*
Comment					
Tube					
Toolset					
Springback		1			
Tube OD		0			
Tube Thickness		0			
Material					
Tube length		0			
Tube shape		0			
Tube 2nd dimension	on	0			
Main Cycle		0			
					Save
	YBC	CORR.	BENDS DATA	GRAPHIC	ESC
HEADER					

1 - Double click on Toolset field :

Following page appears :

	PROGRAM FILE MANAGER		
De:	No News	-	
en Scml56JOB	KST1 25R50.die KST3 76,1R152.die KST4 114 R220.die	Mane Fullen	
GC:\ C:\ Guide Guide	KST48,3R100.die TOOL_25.die		
		VIEW ORAPHIC	
Toolset Files (*.DIE)	August Homeson Sear (\$5000001100354	SELECT -	
	Long Long		

2 - Select desired Toolset in list

3 – Press soft key "SELECT"

CML USA

C:/CML56\JOB'PART 1.POL		POLAF	R FILE		09.04.10 - 11.21.50
Comment					
Tube					
Toolset	C:\cml56\JOE	KST4 114 R220.c	lie		
Springback					
Tube OD		0			
Tube Thickness		0			
Material					_
Tube length		0			
Tube shape		0			
Tube 2nd dimension	1	0			
Main Cycle		0			
					-
					Save
	1				_
	VRC	COPP		CRAPHIC	ESC
HEADER	IBC	CORR.	BENDS DATA	GRAPHIC	ESC
					L

Fine name and path are displayed on toolset file selection. :

# Spring back :

Description : Name and location of associate spring back file.

This field allow to select associate tool spring back used for the current part.

Note : if no spring back file are selected, or if spring back file is empty, spring back corrections are null. Unit : -

R parameter location : -

Pop up windows : -

C:/CML56/JOB/PART 1.POL		POLAF	R FILE		89.04.18 - 11.21.58
					*
Comment					
Tube					
Toolset	C:\cml56\JO	B\KST4 114 R220.c	lie		
Springback		_			
Tube OD		0	<b>1</b>		
Tube Thickness		0			
Material					
Tube length		0			
Tube shape		0			
Tube 2nd dimension	on	0			
Main Cycle		0			
					Save
	YBC	CORR.	BENDS DATA	GRAPHIC	ESC
HEADER					

1 - Double click on Spring back field : Follo

ollowing	page	appears	:
----------	------	---------	---

		PROGRAM FI	LE MANAGER		
ien Celle :		* Parters Products 1144.3	A106.spb		MAKE FOLDER
C:\cmI56iJOB		2 GAS 76.2 A 88.9R CCC.s	2 GAS.spb 76.2 A106.spb 88.9R150_304L.spb CCC.spb		DELETE POLDER
iyedhi	3				VIEW GRAPHIC
e opringback r	ses (*,or b)	Pegarah Data Toster Corraet	(04.04.70110 11 48.90) 1		SELECT
NEW	COPY	DELETE	REMANE	KDIT	ESC

2 – Select desired Toolset in list 3 – Press soft key "SELECT"

CML USA

www.ercolina-usa.com info@ercolina-usa.com Page 81 of 143 code : W56OPPRGE5.1 05/2011

C:\CML56\JOB\TUBE 114 1.POL POLAR FILE Comment Tube Toolset mi56\job\KST4 114 R220.and C:\cml56\JOB\114.3 A106.spb Springback Tube OD 114.30 Tube Thickness 3,60 Material FE42 Tube length Tube shape Tube 2nd dimension 2000,00 3 60,00 Main Cycle 0 Save BENDS DATA GRAPHIC үвс CORR. ESC HEADER

Fine name and path are displayed on toolset file selection. :

**Tube OD :** Description : Tube outside diameter. Unit : mm or inches R parameter location : R80 Pop up windows :



#### **Tube Thickness :**

Description : Tube thickness. Unit : mm or inches R parameter location : R81 Pop up windows :

CHEMISSING THE 114 UPOL		POLAI	R FRE		COLOR OF STREET, STREE			
Comment				_				
Tube								
Toolset	C:\cml56\lob\KST4	114 R220.dl	e		1.1			
Springback	C:\cmi56\JOB\114.	3 A106.spb			-			
Tube OD	114	30		/	Take thinks	Take This		_
Tube Thickness	0	00	X	7	Irvest hato hida	the knows value		
Material	14							Concession of
Tube length	0	00			-			
Tube shape	1	0					(	0.00
Tube 2nd dimension	0.	00			Contract of Contract		STORE 1	
Main Cycle		0			1	2	3	ESC
					4	5	6	BSP
					7	8	9	
					+/-		0	
			401		+		-	J
HEADER	YBC	CORR.	BENDS DATA	GRAPHIC	ESC			

#### Material :

Description : Tube material. You can on this field insert material name or specification (comment) Unit : -R parameter location : -Pop up windows : Alpha numeric keyboard

#### Tube length :

Description : Tube length you will insert on machine (cutting length). This value is used for first bend position : First bend absolute position = Tube length – Collet length – First strait length Unit : mm or inches R parameter location : R82 Pop up windows :



#### Tube shape :

Description : tube shape selection, insert number according to tube shape. 0 – Round, 1 – Square, 2 – Rectangular, 3 – Oblong, 4 – Oval. Unit : -R parameter location : -Pop up windows :



**Tube 2<sup>nd</sup> dimension :** Description : for tube shape 2 – Rectangular, 3 – Oblong, 4 – Oval, a second dimension is needed. For those tube OD mean tube horizontal dimension. Tube 2<sup>nd</sup> dimension mean tube vertical dimension. Unit : mm or inches. R parameter location : R82 Pop up windows :

Main cycle : Description : Main cycle selection. Used for special application, in standard use main cycle 0. Unit : -R parameter location : R83 Pop up windows :



# **Polar files YBC**

C:\CM	L56\JOB\TUBE 1	14 1.POL		F	POLAR FILE				12.64.10 - 9.62.12
									<b>~</b>
Coi	mment					TUBE	TEST 114 R	220	
									Insert
			B	ends Data P	olar				
#	Length	Rotation	Angle	Radius	Arc Length	Begin	End	-	
1	300,00	0,00	90,00	220,00	345,58	2200,00	1854,43	F -	Delete
2	500,00	0,00	0,00	0,00	0,00	1354,43	1354,43		20000
3	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
4	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
5	0,00	0,00	0,00	0,00	0,00	0,00	0,00		Mirror
6	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
7	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
8	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
9	0,00	0,00	0,00	0,00	0,00	0,00	0,00		Reverse
10	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
11	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
12	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	•	Save 🧲
				COPP	BEN		CRAPH		ESC
	I LADE		ИВС С	2	۳ 😎		JRAFI	2	
_				4			4		

Soft keys general polar file :

- 1 Header : General part information.
- 2 YBC : Geometric part definition using Length, Rotation, Angles (current).
  3 Corr. : Correction added on geometric definition to compensate tube elasticity.
- 4 Bends data : Parameters associate to each bend, like speed, over travel, etc ...
- 5 Graphic : Graphic display, simulation and anti-collision.6 ESC : escape return to previous menu.
- 7 Save : Save file on current folder.

# EB CNC

### Soft key specifics YBC menu :

C:\CM	L56\JOB\TUBE 1	14 1.POL		F	OLAR FILE				12.04.10 - 9.82.12	
									•	
Сог	mment					TUBE	TEST 114 R2	220		
_					•				insert 🧲	1
			B	ends Data P	olar					
#	Length	Rotation	Angle	Radius	Arc Length	Begin	End	LA .		
1	300,00	0,00	90,00	220,00	345,58	2200,00	1854,43		Delete	
2	500,00	0,00	0,00	0,00	0,00	1354,43	1354,43		<b>-</b> -	$\boldsymbol{\omega}_{n}$
3	0,00	0,00	0,00	0,00	0,00	0,00	0,00			2
4	0,00	0,00	0,00	0,00	0,00	0,00	0,00			
5	0,00	0,00	0,00	0,00	0,00	0,00	0,00		Mirror	
6	0,00	0,00	0,00	0,00	0,00	0,00	0,00		<b>~</b>	2,
7	0,00	0,00	0,00	0,00	0,00	0,00	0,00			3
8	0,00	0,00	0,00	0,00	0,00	0,00	0,00			
9	0,00	0,00	0,00	0,00	0,00	0,00	0,00		Reverse 📥	
10	0,00	0,00	0,00	0,00	0,00	0,00	0,00			- 4
11	0,00	0,00	0,00	0,00	0,00	0,00	0,00			
12	0,00	0,00	0,00	0,00	0,00	0,00	0,00			
13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	•	Save	
						1				
	HEADER			CORR.	BEI	NDS DATA	GRAPHIC	:	ESC	
			/BC							

Insert (insert a bend).
 Delete (delete a bend)
 Mirror (symmetric piece invert rotation direction).
 Reverse (Reverse bend order)

#### **Parameters :**

#### Length :

Description : Length between bends or between tube end and bend. This value correspond to Y axis, Carriage linear motion. Unit : mm or inches R parameter location : Rn00 Pop up windows :

	Insert	BE TEST 114 R220	т				ment	Cor
	Accesso		lar	ends Data Pr	Be			
	-	End .	Arc Length Begin	Radius	Angle	Rotation	Length	
igfi		and some state of the local division of the	345,54	220,00	90,00	0,00	300,00	1
de values	Joshanne Bartaman be Invest doutance between be	-	0.0	0,00	0,00	0,00	500,00	2
		11	0.0	0,00	0.00	0,00	0,00	3
m <b>Billion</b>	and the second s		0,0	0,00	0,00	0,00	0,00	4
300 0	1	1	0,0	0,00	0,00	0,00	0,00	5
500,0			0,0	0,00	0,00	0,00	0,00	8
2 55	1 2		0,0	0,00	0,00	0,00	0,00	7
3 1.5		0	0.0	0,00	0,00	0,00	0,00	8
6 BS	4 5	11	0,0	0,00	0,00	0,00	0,00	9
0 55	4 5	//	0,0	0,00	0,00	0,00	0,00	10
0	7 0	/	0,0	0,00	0,00	0,00	0,00	11
9	10	ξ.	0,0	0,00	0,00	0,00	0,00	12
0			0,0	0,00	0,00	0,00	0,00	13
0	+/- +	11						
	-		Rico					
				Constanting of				

#### Rotation :

Description : Rotation between bends, define angle between plan off 2 successive bends. Note for first bend the angle is only a tube rotation can be used for seam welding positioning. Unit : Degrees.

R parameter location : Rn01 Pop up windows :

	A REAL TODE T	it stor.					-	
Com	ment				TU	BE TEST 114 R220	Insert	
			в	ends Data P	olar		and the second second	
1 1	ength	Retation	Angle	Radius	Arc Length Begin	End		_
1	300,00	0,00	90,00	220,00	345,54			el e
2	500,00	0,00	0,00	0,00	0,0		Firm of Send Cid a broad Linds Intowin class	d2 approximate the fit
3	0,00	0,00	0,00	0,00	0,0	8		or a manufacture of the second
4	0,00	0,00	0,00	0,00	0.0	1		editers
5	0,00	0,00	0,00	0,00	0,0			0.00
6	0,00	0,00	0,00	0,00	0,0			0,00
7	0,00	0,00	0,00	0,00	0.0			2 500
8	0,00	0,00	0,00	0,00	0,0	CAL-		3 150
9	0,00	0,00	0,00	0,00	0,0		1 2	C DED
10	0,00	0,00	0,00	0,00	0,0		+ 0	0 Dor
11	0,00	0,00	0,00	0,00	0,0			
12	0,00	0,00	0,00	0,00	0,0	71	1 8	9
13	0,00	0,00	0,00	0,00	0,0			
							+/	0
							10 million and 10 million	
					THO	V		
			-	-		1		
	HEADER			CORR	BENDS DATA	GRAPHIC	ESC	
			rec:					

EB CNC

#### Angle :

Description : Bend angle. Unit : Degrees. R parameter location : Rn02 Pop up windows :



#### Radius :

Description : Centerline bending radius, in general case this value is equal to tooling radius. Unit : mm or inches R parameter location : Rn03

Pop up windows :

Cor	nment					TUB	E TEST 1	14 R220	Inser	t		
			B	ends Data P	olar							
	Length	Rotation	Angle	Radius	Arc Length	Begin	End		-			
1	300,00	0,00	90,00	220,00	345,5		100				Radius	
2	500,00	0,00	0,00	0,00	0,0	1	P		Casharda Ived series	ine bend salu	dias	
3	0,00	0,00	0,00	0,00	0,0	1	- and	and the second				
4	0,00	0,00	0,00	0,00	0,0	-	~	-			1000	
5	0,00	0,00	0,00	0,00	0,0						22	0 0
6	0,00	0,00	0,00	0,00	0,0				-		22	0,0
7	0,00	0,00	0,00	0,00	0,0		-		1	2	3	FSC
8	0,00	0,00	0,00	0,00	0,0					4	3	Lot
9	0,00	0,00	0,00	0,00	0,0				4	5	6	RSI
10	0,00	0,00	0,00	0,00	0,0						0	10.51
1	0,00	0,00	0,00	0,00	0,0				7	0	0	11
12	0,00	0,00	0,00	0,00	0,0	- 1			/	0	9	_
3	0,00	0,00	0,00	0,00	0,0				+/	Text	0	
									1/-		U	_
												1
						Re30				•		
			1							1		

#### Arc length (display only) :

Description : Length of bend arc, on centerline radius. Arc length = (2 x Pi / 360) x Radius x Bend angle Unit : mm or inches R parameter location : Rn31 Pop up windows : -

#### Begin (display only) :

Description : Absolute position of bend start origin on tube end on collet. Unit : mm or inches R parameter location : Rn32 Pop up windows : -

#### Begin (display only) :

Description : Absolute position of bend end origin on tube end on collet. Unit : mm or inches R parameter location : Rn33 Pop up windows : -



Those positions correspond nearly to carriage absolute position.

Note : For last bend Begin and end values are equal.

Note : For last bend if strait length (with bend at 0) is not defined, begin and end are at 0.

Note : according to tube length if last strait length is not correct, the values are positive if last strait length is too short, negative is last strait length is too long. 0 if tube length correspond exactly to part developed length.

# Polar files COR.

#### Effect of elasticity on the bending angles.

Having created the bend, the tube is under pressure. The action applied to the tube generates a reaction that opposes the action that has created it.

Once freed (opening of the vice) it tends to return to its original shape (straight).

In this way the bending corner created on the tube is still lower than the deformation that has caused it.

The yellow bending area is an area of plastic deformation.

The blue bending area is in an area of elastic deformation (and therefore it tends to return to its initial shape).



The elastic return angle on the bends is always negative

# Effects of elasticity on the bending radius.



Hypothesis of the neutral fibre on the tube remains constant : OA : arc length tube under pressure. OB : arc length tube at rest. There is 2 arcs with same length with different angles, that mean 2 diffetrent radius.

THE BENDING RADIUS ACHIEVED IS STILL HIGHER THAN THE RADIUS OF THE TOOL

This difference of radius affect tube geometry.



It is necessar for respect a geometry to modify (correct) stait length to compense the radius difference. By applying corrections to the lengths, therefore a reduction to the straight parts, the following result is achieved:



Polar CORR parameter allow to ad some values (positive or negative) to lengths, angles and rotations. Those corection can be included directly to YBC values but on this case tube definition is lost (YBC values are not exact tube definition).

Using corrections, YBC values are are according to theorical geometry, corrections are aplly to compensate tube elesticity.

Spring back function calculate automaticaly thoses correction according to a bending test.

This function is usefull because defining one time tube reaction, elacticity calculated parameters can be use for several tube geometry.

Also if tube reaction change (new batch, new material), modify only one spring back file all part using corresponding spring back file will be modify.

# Polar files COR.

C:\CM	L56\JOB\PART2	2.POL			POL	AR FILE				14.84.18 - 9.59.82
										~
Cor	mment							N	IY TUBE	Spring Back
Cal	culated tu	ıbe lengti	า	390	5,727					Calculation
				Bends	correctio	ns				
#	DBB/SB	DOB/SB	DBB	POB	DOB	ΣDBB	ΣΡΟΒ	ΣDOB	<b>A</b>	
1	0	0,00	0	0,00	0,00	0	0,00	0,00		Reset S.B. Corr.
2	0	0,00	0	0,00	0,00	0	0,00	0,00		
3	0	0,00	0	0,00	0,00	0	0,00	0,00		
4	0	0,00	0	0,00	0,00	0	0,00	0,00		
5	0	0,00	0	0,00	0,00	0	0,00	0,00		Calculate All Corr
6	0	0,00	0	0,00	0,00	0	0,00	0,00		
	0	0,00	0	0,00	0,00	0	0,00	0,00		
8	0	0,00	0	0,00	0,00	U	0,00	0,00		
10	0	0,00	0	0,00	0,00	0	0,00	0,00		Reset All Corr.
11	0	0,00	0	0,00	0,00	0	0,00	0,00		
12	0	0,00	0	0,00	0,00	0	0,00	0,00		
13	0	0,00	0	0,00	0,00	0	0,00	0,00		Save 📥
		0,00		0,00	0,00		0,00	0,00		
		1						1		
	HEADER	☜,	YBC	$\mathbf{P}_2$	CORR.		NDS DA	P 4		5 ESC 😴

Soft keys general polar file :

- 1 Header : General part information.
- 2 YBC : Geometric part definition using Length, Rotation, Angles.
- 3 Corr. : Correction added on geometric definition to compensate tube elasticity (current).
- 4 Bends data : Parameters associate to each bend, like speed, over travel, etc ...
- 5 Graphic : Graphic display, simulation and anti-collision.
- 6 ESC : escape return to previous menu.
- 7 Save : Save file on current folder.

#### Soft key specifics YBC menu :

C:\CN	ML56\JOB\PART2	2.POL			PO.	LAR FILE				14.04.10 - 9.59.02	
										~	
Co	mment							N	IY TUBE	Spring Book	
Ca	lculated tu	ıbe lengtl	۱	390	5,727					Calculation	$\mathbf{D}$
				Bends	correctio	ns					1
#	DBB/SB	DOB/SB	DBB	POB	DOB	ΣDBB	ΣΡΟΒ	ΣDOB	<b>_</b>		
1	0	0,00	0	0,00	0,00	0	0,00	0,00		Reset S.B. Corr.	
2	2 0	0,00	0	0,00	0,00	0	0,00	0,00			$\mathbf{E}$
3	8 0	0,00	0	0,00	0,00	0	0,00	0,00			2
4	0	0,00	0	0,00	0,00	0	0,00	0,00			
5	5 0	0,00	0	0,00	0,00	0	0,00	0,00		Calculate All Corr	
6	<u> </u>	0,00	0	0,00	0,00	0	0,00	0,00			د ت
	0	0,00	0	0,00	0,00	0	0,00	0,00			•
8		0,00	0	0,00	0,00	0	0,00	0,00		Desit All Oran	
10		0,00	0	0,00	0,00	0	0,00	0,00		Reset All Corr.	$\geq$
11	0	0,00	0	0,00	0,00	0	0,00	0,00			- 4
12		0,00	0	0,00	0,00	0	0,00	0,00			
13	. 0	0,00	0	0,00	0,00	0	0,00	0,00		Save	
10	, U	0,00	, v	0,00	0,00	Ű	0,00	0,00			
_											
	HEADER		YBC		COPP	BE	NDS DATA	GF	RAPHIC	ESC	
					CORR.						

1 – Spring back calculation.

2 - Reset spring back calculation.

3 – Calculate all corrections.

4 - Reset all corrections.

#### Specific soft key function :

#### 1 – Spring back calculation.

Pressing this key, DBB/SB and DOB/SB will be automatically calculated in function of current parameters of selected sprig back file (define on header). DBB : Distance Between Bends (strait length) DOB : Degrees Of Bend (Bend angle) SB : Spring back.

#### 2 – Reset spring back calculation.

Pressing this key will delete all parameters DBB/SB and DOB/SB DBB : Distance Between Bends (strait length) DOB : Degrees Of Bend (Bend angle) SB : Spring back.

#### 3 – Calculate all corrections.

Pressing this key will add spring back correction to manual correction and diplay in  $\Sigma$  (sum) area Note : is those correction are apply to bending program.

#### 4 – Reset all corrections.

Put all correction at 0.

### Parameters :

#### DBB/SB (Display only) :

Description : Calculated length correction of spring back function. Unit : mm or inches. R parameter location : -Pop up windows : -

#### DOB/SB (Display only) :

Description : Calculated bend correction of spring back function. Unit : Degrees. R parameter location : -Pop up windows : -

### DOB :

Description : Manual length correction. Note : correction is added to length value, insert a positive value to increase length a negative value to decrease length. Unit : mm or inches. R parameter location : -Pop up windows :

	CONTRACTOR OF COMMENT				AR FILE	POL			POL	L59 JOB PWRT	CEC
	•	AV TURE								mmont	Co
	Spring Back	WY TOBE					-			mment	
	Calculation					5,727	390		ibe lengt	culated to	Ca
	_		2 DOB	ΣΡΟΒ	ns ΣDBB	correction DOB	Bends POB	DBB	DOB/SB	DBB/SB	
1990 Martin John President Longer frei Bei scher is als	Zeinhatern berlemen 2					0,00	0,00	0	0,00	0	1
	to programed value	1				0,00	0,00	0	0,00	0	3 4
					-	0,00	0,00	0	0,00	0	5
3 ESC	1 2			1	-	0,00	0,00	0	0,00	0	7
6 BSF	4 5			(	-	0,00	0,00	0	0,00	0	9
9	7 8				Ì	0,00	0,00	0	0.00	0	11
0	+/-					0,00	0,00	0	0,00	0	13
			6	Rn10							
	ESC	RAPHIC	G	INDS DAT	в		1	увс		HEADER	

#### POB:

Description : Manual rotation correction.

Note : correction is added to rotation value.

Rotation value is signed (from 180 to +180°).

If rotation is positive, a positive value increases absolute angle a negative decreases absolute angle. If rotation is negative, a positive value decreases absolute angle a negative increases absolute angle. Unit : Degrees.

R parameter location : -Pop up windows :

	ark	Spring P	TUBE	MY T								nment	Col
	ion	Calculati						5,727	390	N	be length	culated tu	Cal
							ns	correctio	Bends				
				B	12 DO	<b>Z POB</b>	Σ DBB	DOB	POB	DBB	DOB/SB	DBB/SB	
POR							(	0,00	0,00	0,00	0,00	0	1
a ha nas en this scalar is a Merci Io	head managing	Flav of b					(	0,00	0,00	0	0,00	0	2
	La	programed val	la er				0	0,00	0,00	0	0,00	0	3
diese Room	de de	- Constant	NI de					0,00	0,00	0	0,00	0	4
0.0			1.17				(	0,00	0,00	0	0,00	0	5
0,0		-					0	0,00	0,00	0	0,00	0	6
3 5	2						(	0,00	0,00	0	0,00	0	7
3 2	4		1	-		-	(	0,00	0,00	0	0,00	0	8
6 R	5	4	1			C	9	0,00	0,00	0	0,00	0	9
0 0							9	0,00	0,00	0	0,00	0	10
0	9	7					9	0,00	0,00	0	0,00	0	11
-	0	/						0,00	0,00	0	0,00	0	12
0	196	+/				10		0,00	0,00	0	0,00	0	13
U	•												
21						Rn11							
		-				-							

#### DOB :

Description : Manual bend correction. Note : correction is added to bend value. Rotation value is signed ( from 180 to +180°). A positive value increase absolute angle a negative decrease absolute angle. Unit : Degrees. R parameter location : -Pop up windows :

CICH	LS6 JOB PWR	2.POL		_	PO	LAR FILE		_			
Col	mment iculated tr	ube lengt		30/	15 7 27			м	Y TUBE	Spring Back	
1	DBB/SB	DOB/SB	DBB	Bends	correctio	ns ΣDBB	ΣΡΟΒ	EDOB		Caccasion	
1 2 3 4 5 6 7 8 9 10 11 12 13		0,000 0,000 0,000 0,000 0,000 0,000 0,000 0,000 0,000 0,000 0,000		0,000 0,000 0,000 0,000 0,000 0,000 0,000 0,000 0,000 0,000 0,000	0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,0		I.		7	2017 201 201 2010 2010 2016 1 2 4 5 7 8 +/	000 reactions 0,000 3 ESC 6 BSP 9 0
_		-11-		-11			Rn12	-			
	HEADER		YBC		CORR.	в	ENDS DATA	GR	APHIC	ESC	

#### DBB (Display only) :

Description : Length correction sum. Note : is this correction active for bend program. Unit : mm or inches. R parameter location : -Pop up windows : -

#### □POB (Display only) :

Description : Rotation correction sum. Note : is this correction active for bend program. Unit : Degrees. R parameter location : -Pop up windows : -

### □DOB (Display only) :

Description : Bend angle correction sum. Note : is this correction active for bend program. Unit : Degrees. R parameter location : -Pop up windows : -

# Polar files Bend data.

C:\CM	L56\JOB\PART2.	POL			POLAR	R FILE				14.04.18 - 11.28.34
										~
Coi	mment							MY	TUBE	
Cal	culated tu	be length		3905,7	727					
				Bends	s data					
#	Y speed	B speed	C speed	Over Y	Over B	Cycle	ST tool	Y repos	<b>^</b>	
1	1	1	1	0	0,00	0	1	0		
2	1	1	1	0	0,00	0	1	0		
3	1	1	1	0	0,00	0	1	0		
4	1	1	1	0	0,00	0	1	0		
5	1	1		0	0,00	0	1	0		
7	1	1	1	0	0,00	0	1	0		
8	1	1		0	0,00	0	1	0		
9	1	1	1	0	0.00	0	1	0		Bend / Calendering
10	1	1	1	0	0,00	0	1	0		
11	1	1	1	0	0,00	0	1	0		
12	1	1	1	0	0,00	0	1	0		
13	1	1	1	0	0,00	0	1	0	-	Save 🔁
							1			
	HEADER		үвс 🧲	- c	ORR. 🚽		-	GRAF	ніс 🧲	ESC 📥
		· • • •	1	2		BEN	OS DATA	4		5

# Soft keys general polar file :

- 1 Header : General part information.
- 2 YBC : Geometric part definition using Length, Rotation, Angles.
- 3 Corr. : Correction added on geometric definition to compensate tube elasticity.
- 4 Bends data : Parameters associate to each bend, like speed, over travel, etc ... (current).
- 5 Graphic : Graphic display, simulation and anti-collision.
- 6 ESC : escape return to previous menu.
- 7 Save : Save file on current folder.

EB CNC

### **Parameters:**

#### Y speed :

Description : Y axis linear speed. Note : percentage of maximum axis speed. Note : By defect Y speed is set at maximum speed. Unit : percent. R parameter location : Rn20 Pop up windows :



#### B speed :

Description : B axis rotation speed. Note : percentage of maximum axis speed. Note : By defect B speed is set at maximum speed. Unit : percent. R parameter location : Rn21 Pop up windows :



#### C speed :

Description : C axis bending speed. Note : percentage of maximum axis speed. Note : By defect C speed is set at maximum speed. Unit : percent. R parameter location : Rn22 Pop up windows :



#### Over Y :

Description : Over travel axis Y linear.

This value is added to linear motion before tube rotation. After tube rotation tube return in linear of "Over Y" value.

R parameter location : Rn40 Pop up windows :

	E	TUBE	MY:								nment	Co
							27	3905.7		be length	culated tu	Cal
							data	Bends				
1. C.			repos	Y	ST tool	Cycle	Over B	Over Y	C speed	B speed	Y speed	1
1		~		1000	6		0,00	0	1	1	1	1
		Lite stat	champe in t	ani to pri	Denker F Den Kannfran V a		0,00	0	1	1	1	2
1	_	_			-		0,00	0	1	1	1	3
1	-		-	100			0,00	0	1	1	1	4
	0						0,00	0	1	1	1	5
							0,00	0	1	1	1	6
1.1	180		2	2	1		0,00	0	1	1	1	7
	un.	_		4	-		0,00	0	1	1	1	8
end / Calendera	as D	1	6	=		2	0,00	0	1	1	1	9
	9.9E	_	0	9			0,00	0	1	1	1	10
			0	0	-		0,00	0	1	1	1	11
1000			9	9	/		0,00	0	1	1	1	12
Save			0				0,00	0	1	1	1	13
	_		U	•	T/-							
						- Pir						
				_	4-							

#### Over B :

Description : Over travel axis B rotation. Note : not active for this software. R parameter location : Rn41 Pop up windows :

#### Cycle :

Description : Specific bend cycle. Note : not active for this software. R parameter location : Rn50 Pop up windows :

EB CNC

Cycle :

Description : Specific bend cycle. Note : not active for this software. R parameter location : Rn50 Pop up windows : -

#### ST tool :

Description : Stack tool selection. Note : not active for this software. R parameter location : Rn51 Pop up windows : -

#### Y repos :

Description : Repositioning Y axis linear. Note : not active for this software, length recapture cycle are automatic. R parameter location : Rn52 Pop up windows : -

# Polar files Graphic 3D.



# Soft keys general polar file :

- 1 Header : General part information.
- 2 YBC : Geometric part definition using Length, Rotation, Angles.
- 3 Corr. : Correction added on geometric definition to compensate tube elasticity.
- 4 Bends data : Parameters associate to each bend, like speed, over travel, etc ... (current).
- 5 Graphic : Graphic display, simulation and anti-collision (current).
- 6 ESC : escape return to previous menu.

# Soft keys Specific graphic :



1 – 3D display tube in 3D.

2 - Simulate : simulate tube execution on machine with collision detection...

# Polar files / Graphic / 3D.



- 1 Press Zoom to zoom in or out.
- 2 Press Rotate to turn part in space.
- 3 Press Translate to translate part in space.
- 4 Press Ortho view to display part in orthogonal view

**CML USA** 

www.ercolina-usa.com info@ercolina-usa.com Page 105 of 143 code : W560PPRGE5.1 05/2011

# Zoom function :

CHESKAUBPART LPDE		POLAR FI	κ <i>Ε</i>		
					2004
					ROTATE
			<b>~</b>	2	TRANSLATE
		b			ORTHO VIEW
			4	L 7	
		<u> </u>	1		
HEADER	YBC	CORR.	BENDS DATA	GRAPHIC	ESC

### 1 – Press Zoom

2 – Touch screen and move vertically from top to bottom to zoom OUT.



3 - Touch screen and move vertically from bottom to top to zoom IN.

# Rotate function :



### 1 – Press Rotate

2 – Touch screen and move on direction of coordinate axis origin to rotate in direction linked to actual axis system display.



# **Translate function :**



### 1 – Press translate.

2 - Touch screen and move on desired direction to translate part on actual position system.


# Orthogonal view function :

On Each action or "Ortho View" soft key, the system display part on one origin axis system direction (X then Y then Z etc...).



# **Simulation function**

Simulation principle is to create a virtual machine, a virtual tool, a virtual tube, and assembly this 3 component on the same display to create a video of machine cycle.

The virtual tube is generate operation by operation (program line by line) as the reel machine do.

Virtual machine and reel machine use the same ISO cycle, if virtual cycle is correct, reel cycle will be correct.

Virtual machine and tooling are issue of our cad file, the volume definition is reel.

The system detect collision and, if a collision is detected stop simulation and a message is displayed.



For simulate a part :

1 – Tool set file must correspond to simulation selected tool.

2 – Polar file must be complete.

Note : on simulation spring back effect is not display, the only difference between simulation and reel bending is effect of tube elasticity.

Polar files / Graphic / Simulation.



- 1 Zoom function.
- 2 Rotate function.3 Translate function.
- 4 Ortho view function.
- 5 Display mode solid or wire frame.
- 6 Machine component display selection.
- 7 Tool set selection.
- 8 Auto play (start cycle).
- 9 Step by step play (start cycle).
  10 Stop play (reset).
  11 Exit.

## 1 – Zoom function.



1 – Press Zoom

2 – Touch screen and move vertically from top to bottom to zoom OUT.



3 – Touch screen and move vertically from bottom to top to zoom IN.

## 2 – Rotate function.



1 – Press Rotate

2 – Touch screen and move on direction of coordinate axis origin to rotate in direction linked to actual axis system display.



3 - Translate function.



1 - Press translate.

2 - Touch screen and move on desired direction to translate part on actual position system.



CML USA

## 4 – Ortho view function.

On Each action or "Ortho View" soft key, the system display part on one origin axis system direction (X then Y then Z etc...).



5 – Display mode solid or wire frame.

ZOOM R0003 = 0.000 R4061 = 0.000 ROTATE 0.000 R4031 = TRANSLATE ORTHO VIEW Toolset selection EXIT ZOOM R0003 = 0.000 R4061 = 0.000 ROTATE 0.000 R4031 = TRANSLATE ORTHO VIEW Toolset selection EXIT

On Each action on 😥 soft key, the system switch display in mode "solid" or "wire frame".

- 6 Machine component display selection.
- 1 Press on soft key machine structure.



Machine architecture is display.



Select on list component to hide and select desired status hide or show:

☑ Component hided.

 $\Box$  Component show.

**CML USA** 



Press again soft key machine structure to exit of machine display components.



Note : Exiting of this menu all components will automatically return to status show.

## 7 – Tool set selection.



Press "Tool set selection" soft key.
 Open tool set list.
 Select desired tool set.
 Note : Empty mean empty tooling.



Tool selected is assembly on machine.

8 - Auto play (start cycle).



9 - Step by step play (start cycle).

ISO CODE			36
	R0003 =	0.000	ZOOM
	R4061 =	0.000	ROTATE
	R4031 =	0.000	TRANSLATE
			ORTHO VIEW
			Ø E
			Toolset selection
			EXIT

EB CNC

10 - Stop play (reset).



11 – Exit.



# 7. Programming a part using Cartesian coordinate

Cartesian system is a geometric definition of segments in space Those segment are created by intersection of strait length on a part. Segment intersection are points. Those point are define on a coordinate system XYZ.



This method of definition is correct in mechanics but it cannot be used by a machine bender.

Classical machine benders create bends one after another, a positioning system (carriage ) positions the tube in a polar mode length and rotation.

It is necessary to convert Cartesian definition to polar definition understandable by bending machine.



www.ercolina-usa.com info@ercolina-usa.com Page 122 of 143 code : W560PPRGE5.1 05/2011

**CML USA** 

EB CNC

## 5.1 Creating a new Cartesian file.

#### From main menu



Program file manager menu appears :

	PROGRAM FILE	NANAGER		(Increased and
cek C:	TUBE 50.	car	_	MAKE FOLDER
C:\cml56UOB C:\ C:\ C:\ C:\ C:\ C:\ C:\ C:\ C:\ C:\		Files list		DELETE FOLDER
Type of the				VIEW GRAPHIC
1 Polar Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE) 4 Springback Files (*.SPB)	Program information Datas Topices			SELECT
NEW 2 COPY	DELETE	RENAME	EDIT	ESC

Program file manager menu.

NEW

## **Operations**:

1 - Select "2 Cartesian Files (\*.CAR) on File type area.

List of present files appear on list.

2 - Press soft key "New" to create a new file



The alpha numeric keyboard appears for introduce file name.

	PROGRAM FILE MANAGER	CRONORMORDS
		-
ink	Fic Name	
older	TUBE 50.car	MAKE FOLDER
C:\cml56\JOB	New carls	rdan program name
C:\		
lene lene		
	A B C D F	FGHIJ
	K L M N C	PQRST
	UVWX	æz, / ± - +
1 Polar Files (*.POL)		3
2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE)	· · · ·	
4 Springback Files (*.SPB)	0 1 2 3 4	5 6 7 8 9
		ENTER ENTER
	SHIP1	BSP ESC
COPY		

	PROGR	AN FILL	AMAMAG	iER .				100		
Set.	-	None					=			
Toda	Т	00L25	R50.di	e				MAK	EFOLD	ER
c:\cml56\job					ee taalaat g					
Cilcil Cilcilio										
🔄 job										_
	Constant of			-					-	
	A	В	C	D	F	F	G	н	1	J
	K	L	М	N	0	Р	Q	R	S	Т
fice of the	U	V	W	X	Y	Z	1	+	-	+
1 Polar Files (*.POL)				-						
3 Toolset Files (*.DIE)				_		<u> </u>		a		_
4 Springback Files (*.SPB)	0	1	2	3	4	5	6	7	8	9
	SHIFT	1			F	DUD	FUC		ENTI	R I
CORY	shiri	1				pər	2.50			_
NEW			10							

3 - Dial file name (ex : Cartesian 1)

4 - Introduce by enter.

Note : extension .CAR is automatically ad to file name.

Following page appears :

CML USA



## Soft keys :

- 1 Graphic.
- 2 ESĊ.
- 3 Insert.
- 4 Delete.
- 5 Generate polar file.
- 6 Save.

## **Parameters :**

Comment : comment. Tube OD: tube outside diameter (mm or inches).

X : Coordinate of point on X axis (mm or inches).

Y: Coordinate of point on Y axis (mm or inches).

Z : Coordinate of point on Z axis (mm or inches).

Radius : Centerline bending radius (mm or inches). Note : at tube ends radius must be null.

# **Operation sequence :**

# Insert Comment

Insert tube OD value.

Insert XYZ coordinate and centerline bending radius on appropriate points.

C:\CI	AL56)	JOBICARTESIAN 1	.CAR		CARTE:	SIAN FILE		14.04.10 - 16.17.51
								-
Co	mm	nent	MY C	ARTESIAN F	ILE			
Tu	be	OD	50,00					Insert
			Be	nds Data Ca	artesian			
#		x	Y	Z	Radius		<u> </u>	
	1	0,00	0,00	0,00	0,00		-	Delete
	2	300,00	0,00	0,00	75,00			
	3	300,00	250,00	0,00	75,00			
_	4	600,00	250,00	0,00	75,00			
_	5	600,00	0,00	0,00	75,00			
	6	900,00	0,00	0,00	0,00			
_	7	0,00	0,00	0,00	0,00			
_	8	0,00	0,00	0,00	0,00			
	9	0,00	0,00	0,00	0,00			Generate Polar File
_	10	0,00	0,00	0,00	0,00			
	12	0,00	0,00	0,00	0,00			
-	12	0,00	0,00	0,00	0,00			Save
	10	0,00	0,00	0,00	0,00		-	
_								
		XYZ					GRAPHIC	

# Display part in Graphic mode .

Press soft key graphic (1).



Note : Graphic display function are equal to Polar files.

**CML USA** 

## Save .

C:)	CML56	JOB/C	ARTESIAN 1.	CAR		CARTE.	SIAN FILE		14.84.18 - 16.17.51
									•
С	omn	nent		МҮ С	ARTESIAN F	ILE			
Т	ube	OD		50,00					Insert
				Be	ends Data Ca	artesian			
#		x		Y	Z	Radius	-	•	
	1		0,00	0,00	0,00	0,00		-	Delete
	2		300,00	0,00	0,00	75,00			
_	3		300,00	250,00	0,00	75,00			
_	4		600,00	250,00	0,00	75,00			
_	5		600,00	0,00	0,00	75,00			
_	6		900,00	0,00	0,00	0,00			
_	7		0,00	0,00	0,00	0,00			
_	8		0,00	0,00	0,00	0,00			
_	9		0,00	0,00	0,00	0,00			Generate Polar File
_	10		0,00	0,00	0,00	0,00			
-	12		0,00	0,00	0,00	0,00			
-	12		0,00	0,00	0,00	0,00			Save 🧲
	13		0,00	0,00	, 0,00	0,00			ouve C
		,						GRAPHIC	ESC
		XYZ							

1 - Press soft key Save.

# Generate polar file.

с:ЮМ	L56\JOB	BICARTESIAN 1.0	AR		CARTE	SIAN FILE		14.84.18 - 16.17.51
								•
Con	nmer	nt	MY C	ARTESIAN F	ILE			
Tub	e OI	)	50,00					Insert
			Be	nds Data Ca	artesian			
#	×	1	Y	z	Radius	-		
	1	0,00	0,00	0,00	0,00			Delete
	2	300,00	0,00	0,00	75,00			201310
	3	300,00	250,00	0,00	75,00			
	4	600,00	250,00	0,00	75,00			
	5	600,00	0,00	0,00	75,00			
	6	900,00	0,00	0,00	0,00			
	7	0,00	0,00	0,00	0,00			
	8	0,00	0,00	0,00	0,00			
	9	0,00	0,00	0,00	0,00			Generate Polar File
1	0	0,00	0,00	0,00	0,00			
1	1	0,00	0,00	0,00	0,00			
1	2	0,00	0,00	0,00	0,00			
1	3	0,00	0,00	0,00	0,00			Save
		_						
							GRAPHIC	ESC
	X	Z					or the file	200

1 - Press soft key generate polar file.

COMP	JUBC/	VRTESIAN Z.C.MR			CARTES	AN FILE		URCHORMONOLO
Com	nen	CARTESIAN FILE	S EDITOR					
Tube	OD							Insert
-		4	.Pol file	not existing.	Do you wan	t to create it ?		-
*	×						1.00	1000
2								Delete
3			-			1		
4				YES 🗧		NO		
5					- 1_			
7		0.00	0.00	0.00	0.00			
8		0,00	0,00	0,00	0.00			
9		0,00	0,00	0,00	0,00			Generate Polar File
10		0,00	0,00	0,00	0,00			· · · · · · · · ·
11		0,00	0,00	0,00	0,00			
12		0,00	0,00	0,00	0,00			Save
10		0,00	0,00	0,00	0,00			
							GRAPHIC	ESC
	XYZ							10000

Pop up widows ask you if you wont to create polar file answer YES (1)

C:\CML5	6\JOB\Ci	ARTESIAN 2.CAF	२		CARTESI	AN FILE			14.84.18 - 16.28.55		
									*		
Comment MY CARTESIAN											
Tube	OD	0		CONVERSIO	ON COMPLE	ETED	0		Insert		
#	×	U	Deservation		d - Tube T	historia CT to al	U				
<u>*</u> 1	Ê		Parameters	to set by har	ia = Tube T	nickness - 51 tool			Delete		
2	2					_			Delete		
3	8				01						
5						$\mathbf{E}_1$					
6											
- 7		0,00	0,00	0,00	0,00						
9	)	0,00	0,00	0,00	0,00				Generate Polar File		
10	)	0,00	0,00	0,00	0,00						
11	) )	0,00	0,00	0,00	0,00						
18	8	0,00	0,00	0,00	0,00		•		Save		
		_			_						
							GRAPHIC	:	ESC		
	XYZ										

A new pop up window inform you that some parameter must be set.

# Answer OK (1)

Polar file is create with the same name but with extension .POL.

# 7. Programming spring back file.

Creating a new spring back file

From file manger :

	FROGRA	M FILL	MANA	RER				<b>UR</b>	NO. CON	
ca ∎c: -	Rel	Name	enh					мак	E FOLDI	ER
Fold C:\cml56iJOB C:\ Geml56 JOB		<b>109</b> - 3	spb	Kov	* springhacl	t program r				
	A	B	C	D	E	F	G	H	Ι	J
	K	L	M	N	0	Р	Q	R	s	T
Type of the	U	V	W	X	Fe	73	1/2	÷#	-	+
1 Polar Files (*.POL) 2 Cartesian Files (*.CAR) 3 Toolset Files (*.DIE)	•	4	•	=		(		a	«	
4 Springback Files (*.SPB)	0	1	2	3	4	5	6	7	8	9
COPY	SHIFT					BSP	ESC		ENTI	R
NEW 2	1									

- 1 Select spring back files ( 4 Spring back files (\*.SPB))
- 2 Press soft key NEW.
- 3 Insert file name.
- 4 Press enter.

Following page appears :

	SPRINGBACK FILE	14.04.18 - 17.07.53
		×
Comment		
Tube OD	0.00	
Tube thickness	0.00	
Bend die radius	0.00	
C axis deep angle	0.00	
C axis shadow angle	0,00	
Measured deep angle	0,00	
Measured shadow angle	0,00	
Y motion during deep angle	0,00	
	0,00	
	0,00	Calculate
	0,00	coefficient
	0,00	
	0,00	
	0,00	Save
		ESC 😴

## Soft keys :

- 1 Data
- 2 Coefficient
- 3 Calculate coefficient
- 4 Save
- 5-Escape.

## **Parameters :**

## Comment :

Description : Comment. This field allow to introduce a comment associate to the file. Unit : -R parameter location : -Pop up windows : Alpha numeric keyboard **Tube OD :** Description : Tube outside diameter. Unit : mm or inches R parameter location : -Pop up windows :



#### Tube Thickness :

Description : Tube thickness. Unit : mm or inches R parameter location : -Pop up windows :

		SPRINGBACI	K FILE		Inchose			
Comment	106x3.2 R216 T	40 2010/04/01		_				
Tube OD		108,00	E			-		
Tube thickness		0,00		_	-	Table	thickness	
Bend die radius		0,00	- V	2	Tube 15k		Service of	
C axis deep angl	e	0,00			arsed size to	ioneli vare		
C axis shadow ar	igle	0,00					100	
Measured deep a	ingle	0,00					3	0 00
Measured shadow	w angle	0,00						0,00
Y motion during a	teep angle	0,00				-	2	Dect
	15 18/0	0,00			1	4	3	LSC
		0,00				-	1	nen
		0,00			4	0	0	BSP
		0,00						
		0,00			7	8	9	
		0,00	-		[]		0	
					+/-	•	0	
			R81	-		•		_
DATA	COEFF				ESC			

EB CNC

# Bend die radius :

Description : Centerline bend die radius. Unit : mm or inches R parameter location : -Pop up windows :

	SPRINGBACK FILE	LINCOLUMN ACCOUNT
Comment 108x3.2 R216 T40 20100	M/01	
Tube OD	108,00	
Tube thickness	3,20	Deed die tadea
Bend die radius	0,00	Anord size radius
Caxis deep angle	0,00	
C axis shadow angle	0,00	
Measured deep angle	0,00	- 0.00
Measured shadow angle	0,00	0,00
Y motion during deep angle	0,00	1 3 2 Per
	0,00	1 2 3 130
	0,00	A Z C DED
	0,00	4 5 0 Bar
	0,00	
	0,00	/ 8 9
	0,00	
		+/ 0
	Rv30	<b>ـــــ</b> ا
DATA		ESC

#### C axis deep angle :

Description : Deep angle for spring back test, C axis rotation (generally 120°). Unit : Degrees R parameter location : -Pop up windows :

	SPRINGBACK FILE	LETISTICALENDER
Comment 106x3.2 R216 T40 20	10/04/01	
Tube OD	108,00	
Tube thickness	3,20	C axis deep angle
Bend die radius	216,00	C and a deep angle livest deep angle value (130')
Caxis deep angle	0,00	
C axis shadow angle	0,00	Boutination degrees Boutination
Measured deep angle	0,00	0.00
Measured shadow angle	0,00	0,00
Y motion during deep angle	0,00	1 2 3 ESC
	0,00	
	0,00	4 5 6 BSP
	0.00	
	0,00	7 8 9
	0.00	
-	0,00	+/- 0
		المشا لمتنا لمتنا لمست
COEFF		ESC

#### C axis shadow angle :

Description : shadow angle for spring back test, C axis rotation (generally 20°). Unit : Degrees R parameter location : -Pop up windows :

		SPRINGBACK FILE	ILIUSIONEMINE
Comment	108x3.2 R216 T40 2	910,04/01	
Tube OD Tube thickness Bend die radius C axis shadow i C axis shadow i Measured deep Measured shad Y motion during	jie angle • angle ow angle • deep angle	108.00 3.20 216.00 120.00 0.00 0.00 0.00 0.00 0.00	Calif Shidow and water scheding and hyper Hadaro ogte color frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency frequency freque
		0,00 0,00 0,00 0,00 0,00	4 5 6 BSP 7 8 9 +/ 0
DATA	COEFF		ESC

#### Measured deep angle :

Description : Measured deep angle for spring back test, result of a angle deformation of value programmed in C axis deep angle.

Unit : Degrees

R parameter location : -

Pop up windows :

	SPRINGBACK FILE	
Comment 106x3.2 R21	5 T40 2010/04/01	
Tube OD Tube thickness Bend die radius C axis deep angle C axis shadow angle Measured shadow angle Y motion during deep angle	108,00 3,20 216,00 120,00 20,00 0,00 0,00 0,00 0,00 0,0	Local         Annual         Annual           Maximum         Annual         Annual           Maximum         Annual         Annual           I         2         3         ESC           I         5         6         BSP           7         8         9           +/-         0         -
DATA		ESC

EB CNC

#### Measured shadow angle :

Description : Measured shadow angle for spring back test, result of a angle deformation of value programmed in C axis shadow angle. Unit : Degrees R parameter location : -Pop up windows :

	SPRINGBACK FILE	UNCOMMON DE LA COMPANY
		E
Comment 106x3.2 R216 T40 2010	64/01	
Tube OD	108,00	
Rend die radius	216.00	Measured choice angle Neasured statist angle
C axis deep angle	120.00	Anset weaswed shadow angle value
C axis shadow angle	20,00	Summer degrees
Measured deep angle	114,30	0.00
Measured shadow angle	0,00	0,00
Y motion during deep angle	0.00	
	0,00	I Z J ESC
	0,00	4 2 6 Dep
	0,00	4 5 0 bar
	0,00	7 8 0
	0,00	
	0,00	+/ 0
	1	•
COEFF		ESC

#### Y motion during deep angle :

Description : Tube consummation during deep angle test. Best way is to measure length carriage motion during bending deep angle.

How to measure :

- Note carriage absolute position on display before deep angle (bend start).
- Note carriage absolute position on display after deep angle (bend end).
- Calculate difference between two values inert this value on parameter.
- Unit : mm or inches

R parameter location : -Pop up windows :

		SPRINGBACK FILE		(Increase Annes	
Comment	108x3.2 R216 T40 20	0/04/01	-		
Tube OD Tube thickness Bend die radius C axis shadow ar Measured deep s Measured shador Y motion during o	e Igle Ingle Vangle Jeep angle	108,00 3,20 216,00 120,00 20,00 114,30 17,20 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,000 0,000 0,000 0,000 0,00		Y estate           P and the field of the field	vide date y style sp. style vide vake fording drop orgin (0,000) (3) ESC (6) BSP (9) (0)
DATA	COEFF			ESC	

	14.84.18 - 17.54.87	
		· · · · · · · · · · · · · · · · · · ·
Comment 108x3.2 R216 T40 2010	/04/01	
Tube OD	108,00	
Tube thickness	3,20	
Bend die radius	216,00	
C axis deep angle	120,00	
C axis shadow angle	20,00	
Measured deep angle	114,30	
Measured shadow angle	17,20	
Y motion during deep angle	406,80	
	0,00	
	0,00	Calculate
	0,00	
	0,00	
	0,00	
	0,00	Save
COFFE		ESC
DATA		200

- 3 Calculate coefficient.
- 4 Save.

**CML USA** 

## www.ercolina-usa.com info@ercolina-usa.com Page 136 of 143 code : W560PPRGE5.1 05/2011

EB CNC

# 13. Diagnostics.

Acces to diagnostics area :



### 1 - Press on « SERVICE »

		PAGE SE	RVICE		2769710 - 127621H
U	a).	Changement de	Changement	Diamastique	ESC
NOs TES	AXES TES	lange .	d'urme	Diagnos	

Soft keys :

- 1 Input / Output test
- 2 Axis test
- 3 Change language 4 Change unit
- 5 Diagnostics
- 6 Back to main menu



1 - Led (green = 1, red = 0) 2 - Port number.

3 - Pin in port number (0 to 7).

4 - Signal description.

Note : Output use prefix OUT (output). Inputs use prefix Inp (Input).

#### **Touches logicielles :**

1 - « Previous port ».
2 - « Next port ».
3 - « ON » Fix output a 1.
4 - « OFF » Fix output at 0.
5 - « ESC » Bck to previous screen.

Signal state 0 :
Out KA50 Voyant bouton reset



#### Forçage d'une sortie :



## Warning.

Fix one output at 1 can occur machine damage. The operator must know actions occurred by fixing an output at 1.



1 - Select signal.

Fix at 1 : Press on key 3 « ON ». Fix at 0 : Press on key 4 « OFF».

Note : The corresponding output is fixed a 1, but safety circuit are still active.

## Port 0 Outputs :

Test In/Out						Batter		
	Port number: 0							
Pin	Desc	ription			Mask: ð	Negal.	Static	Transit.
0	Ou	t KA50 Res	et button li	ght	Ý			
1	Out	t KA51 M1	Hydr. pump	axes	~		~	
2	Out	t KA52 M2	Hydr. pump	o actuators	~		~	
3	Out	t KA53 M3	Aux pump		×			
4	Out KA54 M4 Heat exch.							
5	Out	t KA55 By-	pass pump	axes Hi.pre	es 🗸			
6	6 Out KA56 By-pass pump actuators							
7	7 Out KA57 Clamp IN 🗸							
Previous	port	Next port	ON	OFF			ESC	

## Port 1 Outputs :

	Test In/Out					
Port number: 1						
Pin	Description	Mask:				
0	Out KA58 Clamp OUT	×				
1	Out KA59 Pressure die IN	×				
2	Out KA5A Pressure die OUT	¥				
3	Out KA5B Booster IN					
4	Out KA5C Booster OUT					
5	Out KA5D Tube support UP					
6	Out KA5E Tube support DOWN					
7 Out KA5F Collet IN 🗸						
Previous	port Nextport ON OFF	ESC				

## Port 2 Outputs :

	Test In/Out							
	Port number: 2							
Pin	Description			Mask:				
0	Out KA60 Collet OUT							
1	Out KA61 Mandrel IN							
2	Out KA62 Mandrel OUT							
3	Out KA63 Following mode							
4	Out KA64 Lubrification							
5	Out KA65 By-pas	s pump	axis Lo.pre	s 🗸				
6	Out KA66 Clamp DOWN							
7 Out KA67 Clamp UP								
Previous	sort Next port	ON	OFF		ESC			

## Port 3 Outputs :



www.ercolina-usa.com info@ercolina-usa.com Page 140 of 143 code : W560PPRGE5.1 05/2011

**CML USA** 

## Port 4 Inputs :

	Test In/Out						
Port number: 4							
Pin	Description			Mask:			
0	Inp FS1 24Vdc OK						
1	Inp E1 3-phas	ses sequenc	e controlle		× ×		
2	Inp M1 Motor	protection (	Axes group	)			
3	Inp M2 Motor	protection (	Actuators of	group)			
4	Inp M3 Motor	protection (	Aux pump)				
5	Inp M4 Motor	(Heat excha	ange)				
6	Inp SL1 Oil le	vel					
7 Inp ST1 Oil temperature							
Previous	port Next port	ON	OFF		ESC		

## Port 5 Inputs :

	Test In/Out	17.02.11 - 17.59.05
	Port number: 5	
Pin	Description Mask:	
	Inn charo	
	inp spare	
1	Inp E-STOP	
2	Inp 2-Hands Control	
3	Inp T2+	
4	Inp T1-	
5	Inp SQ31 Clamp UP	
6	Inp SQ32 Clamp DOWN	
7	Inp SQ33 Clamp IN	
Previous	port Nextport ON OFF	ESC

## Port 6 Inputs :

		Test li	n/Out		INCOMPACT AND INCOME.
		Port nur	nber: 6		
Pin	Description			Mask:	
0	Inp spare				
1	Inp SQ200 Y1 A	xis LS+			~
2	Inp SQ201 Y1 A	xis LS-			×
3	Inp spare				
4	Inp spare				
5	Inp spare				
6	Inp Tube Suppo	ort UP			
7	Inp spare				
Previous	port Next port	ON	OFF		ESC

## Port 7 Inputs :



www.ercolina-usa.com info@ercolina-usa.com Page 141 of 143 code : W560PPRGE5.1 05/2011

## **CML USA**

## Port 8 virtual Inputs:

	Test In/Out	[1+00-1] == [0-00-2]
	Port number: 8 [Virtual]	
Pin	Description	Mask:
0	In Error counter axis Y1	~
1	In Error counter axis B	~
2	In Error counter axis C	~
3	In Error counter axis X1	~
4	In -	~
5	In -	~
6	In -	~
7	In -	×
Previou	sport Nextport ON OFF	ESC

## Port 9 virtual Inputs:

	1651 110001	
	Port number: 9 [Virtual]	
Pin	Description	Mask:
0	In Encoder fail axis Y1	×
1	In Encoder fail axis B	~
2	In Encoder fail axis C	×
3	In Encoder fail axis X1	~
4	In Encoder fail axis X2	~
5	In Encoder fail axis Y2	~
6	In Encoder fail axis Y3	~
7	ln -	×
Previous	I port Next port ON OFF	ESC

## Port 10 virtual Inputs:

	Test In/Out	17.48.11 - 16.48.1
	Port number: 10 [Virtual]	
Pin	Description	Mask:
0	In Division by zero	× ×
1	In Operation code not existing	~ ~
2	In Variable not existing	~ ~
3	In G function not existing	~ ~
4	In M function not existing	~ ~
5	In Stack overrun	~ ~
6	In Vector overrun	× ×
7	In Axis overrun	~
Previous	port Next port ON OFF	ESC

EB CNC

Notes :

## TERMS AND CONDITIONS OF WARRANTY

**1. Definitions.** CML USA, Inc. ("CML") hereunder; the term "End-User" means the ultimate user of the Goods; the term "Dealer" means an independent contractor of CML whom purchased the Goods from CML to sell to the End-User; and the term "Goods" means the goods, equipment, products, parts, services, labor, or other items or work provided.

2. Warranty. CML hereby disclaims any warranty regarding speed of production or output or economics of operation with respect to the Goods. If such matters are set forth or described in the specifications applicable to the Goods such statement or description shall be deemed to be an estimate only. Any warranties of CML with respect to the Goods shall be null, void and without effect if such Goods have been altered or repaired by persons or entities other than CML, unless otherwise agreed to (in writing) by CML. Notwithstanding any contrary provision contained herein, the warranties of CML hereunder shall become effective and valid only for one year from the date of the bill of lading issued by the carrier at the designated FOB point. THE WARRANTIES ATTACHED TO THIS ARE CML'S CURRENT EXCLUSIVE WARRANTIES AND CML EXPRESSLY DIS-CLAIMS ALL OTHER WARRANTIES (WHETHER WRITTEN, ORAL, IMPLIED OR STATUTORY), INCLUDING (BUT NOT LIMITED TO) ANY WARRANTIES OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Any claim for breach of CML's warranties must be demonstrated to CML's satisfaction to have existed at the time of delivery of the Goods and shall be deemed waived by the End-User unless written notice of such claim is actually received by CML within twelve (12) months after CML has shipped the Goods (FOB, CML's Factory) to which such claim relates. CML's liability shall be expressly limited (at CML's option) to the replacement or repair of non-conforming or defective Goods or to the credit for the purchase price of non-conforming Goods. Prior to said repair, replacement, or credit, CML has the right to inspect the Goods claimed to be defective or non-conforming, and, if requested by CML, End-User shall return such Goods to CML at CML's direction and expense. No Goods are to be returned to CML without CML's prior written authorization. THE REMEDIES SET FORTH HEREUNDER SHALL CONSTITUTE THE EXCLUSIVE REMEDIES AVAILABLE TO THE END-USER AND ARE IN LIEU OF ALL OTHER REMEDIES.

**3. End-User's Materials.** All materials required by CML to test the operation of the Goods shall be furnished by the End-User (at its sole cost and expense). All materials and equipment furnished by the End-User for the construction, remodeling, or testing of Goods (or for any other purpose) shall be delivered to CML at no cost to CML, FOB CML's warehouse floor. The End-User shall bear the risk and cost of returning all such materials and equipment to the End-User. The End-User shall pay all applicable crating and delivery costs and expenses for samples and parts delivered to the End-User and, except as may be required for testing purposes, the End-User shall pay all costs and expenses pertaining to producing parts or samples requested by the End-User.

4. Tolerance and Variations. Except as specified by the End-User and expressly agreed to by CML (in writing), the Goods shall be produced in accordance with CML's standard business practices. All Goods (including, but not limited to, Goods produced to meet an exact specification) shall be subject to tolerances and variations consistent with good manufacturing practice in respect to dimensions, weight, section, chemistry and mechanical properties, the normal variations in surface and internal conditions and in quality, and to deviations from tolerances and variations consistent with practical testing and inspection methods.

**5.** Limitation of Liability. IN NO EVENT SHALL CML BE LIABLE FOR INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES RESULTING FROM THE FURNISHING, PERFORMANCE, OR USE OF THE GOODS SOLD HEREUNDER (IF AT ALL), WHETHER AS A RESULT OF BREACH OF CONTRACT, BREACH OF WARRANTY, THE NEGLIGENCE OF CML OR OTHERWISE. CML's liability under no circumstances will exceed the purchase price for the Goods for which liability is claimed.

6. Indemnification; Assumption of Risk. To the extent permitted by law, the End-User agrees to indemnify and hold CML (and its respective agents and employees) harmless from and against any and all liabilities, damages, losses, actions, causes of action, claims (including, but not limited to, claims of patent infringements), expenses, costs (including, but not limited to, attorney's fees), fines, penalties and any other expenses directly or indirectly arising from End-User's actual use or intended use of the Goods. The End-User agrees to assume all risk of loss or damage to person or property while on the premises of CML or of CML's related corporations. To the extent permitted by law, the End-User (on behalf of itself and all of its agents and employees) hereby releases and forever discharges CML (and its respective employees and agents) from any and all claims, demands, causes of action, liabilities, losses or damages resulting or arising from the End-User's presence (or the presence of the End-User's employees and agents) on the premises of CML. The End-User warrants to CML that the End-User has the authority to grant this release on behalf of the End-User's agents and employees.

7. Non-Waiver. No waiver, alteration or modification of any of the provisions hereof shall be binding on CML unless such waiver is expressed in writing by CML. Waiver by CML of any breach or default by End-User hereunder shall not be deemed a waiver by CML of any default or breach by End-User which may thereafter occur.

**8. Assignment.** CML reserves the right to subcontract all or any part of the work to be performed hereunder, without obtaining the consent of the End-User. No notice to the End-User of any subcontracting by CML is required. The rights and obligations of the End-User hereunder may not be assigned without the prior written consent of CML.

**9. Governing Law; Jurisdiction; Venue.** The laws of the State of Iowa shall govern all disputes, controversies, interpretive matters and litigation arising under this warranty. PROPER AND EXCLUSIVE JURISDICTION AND VENUE for all disputes, controversies, interpretive matters and litigation arising hereunder (or otherwise between the parties) lies with the Iowa District Court located in Scott County, Iowa or the United States District Court for the Southern District of Iowa, Davenport Division. The End- User hereby submits to the personal jurisdiction of such courts.

**10. Limitations for Suits.** Any cause of action or claim arising out of or relating to CML's performance or failure to perform hereunder or the furnishing, performance, or use of the Goods hereunder must be commenced within one (1) year after the claim or cause of action has accrued.








ONLINE SHOPPING





Download a QR Code Reader app on your phone. Open the app, focus on the code you wish to view; Programming Videos or Online Shopping.



CML USA Inc. Ercolina® 3100 Research Parkway Davenport, IA 52806 Phone 563-391-7700 or Fax 563-391-7710 www.ercolina-usa.com • info@ercolina-usa.com