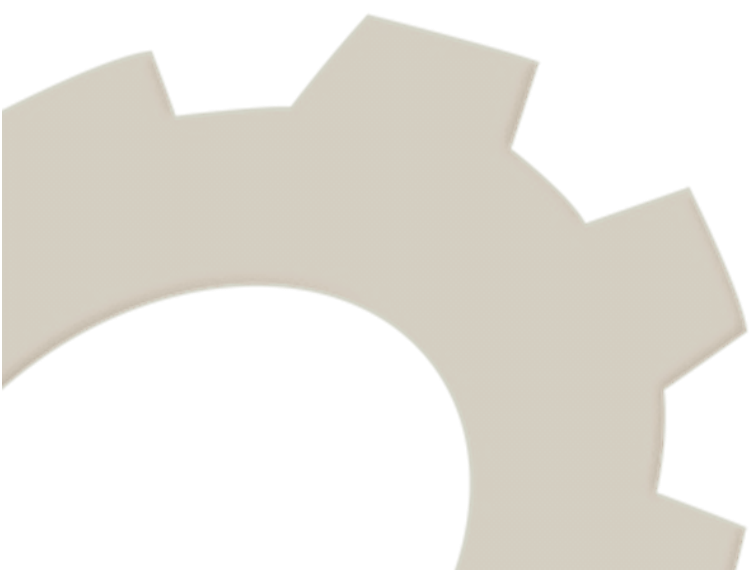
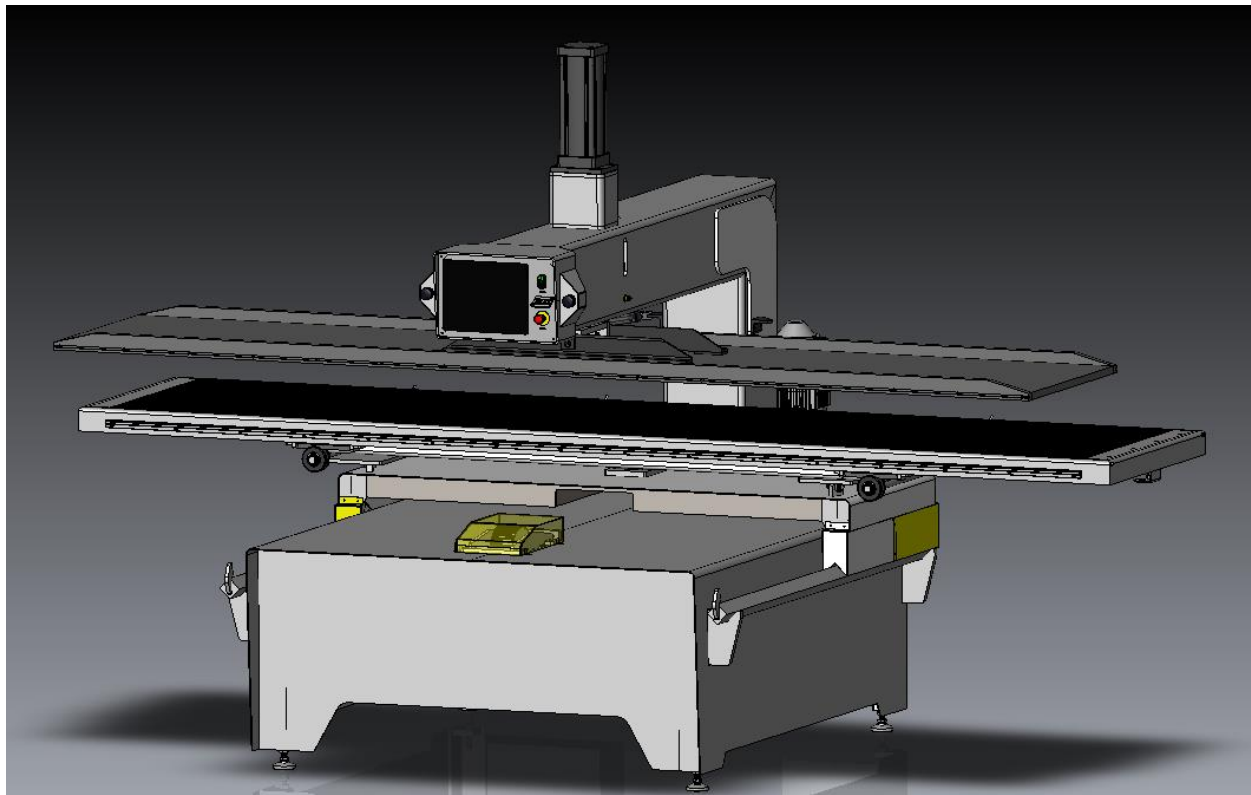




Operator Manual

M920-10'

Rolling Table



TOMORROW'S COST EFFECTIVE COMPOSITE
PROCESSING SOLUTIONS



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Getting Started

1

1.1 Installation



Caution: Do not connect electrical power or factory air at this time.

- 1) Remove 4 carriage bolts that secure the machine onto the pallet
- 2) Place machine in desired location
- 3) Remove banding securing the upper and lower platens from moving
- 4) Level machine using 4 leveling pads supplied with the machine. Use the two square bar horizontal rails for the leveling points.

Lower Platen Installation (If shipped separately)

- 1) Place the lower platen on top of the carriage. It will be necessary to block up platen in order to remove the forklift forks. Lift one end at a time removing blocks. The v-rails of the platen must engage with the v-wheels of the carriage.
- 2) Connect the piston rod end of the air cylinder to the mounting boss and secure it with the hex nut. The air cylinder is located under the platen.
- 3) Verify that the platen rotates freely and moves laterally without resistance.
- 4) Connect the air hose to the cylinder.
- 5) Open the electrical enclosure.
- 6) Insert the electrical conduit connector through the hole in the side of the sheet metal and into the electrical enclosure and install the retaining nut.
- 7) Plug in the thermocouple connector
- 8) Connect the platen heater wires to the control relay as indicated by matching wire numbers and relay terminal numbers.
- 9) Connect the pneumatic lines into respective bulkhead fittings



Upper Platen Installation (If shipped separately)

- 1) Position the upper platen in line with the mounting upper platen air cylinder yoke assembly
- 2) Install the 8 bolts provided to fasten down the yoke assembly onto the upper platen
- 3) Connect the platen return air cylinder using the hardware attached to the air cylinder. The air cylinder spherical end should be positioned between the two tubular spacers to permit free movement of the platen in all directions.

Main machine connections

- 1) Connect your factory electrical power to the main power terminals in the enclosure L1, L2, L3 and Ground. You will need to determine where you will be bringing in the power and drill a hole into the enclosure. Make sure to protect all electronic pieces from metal shavings.
- 2) Close the electrical enclosure.
- 3) Connect factory air supply to machine.
- 4) Open air valve at factory air connection point.
- 5) Adjust air pressure to 80 psi.
- 6) Press "**POWER**" button.
- 7) Log into the proper level of access
- 8) Set the temperature to 100 F.
- 9) Press the home button – lower platen should move to front of machine, find the home sensor and then back off to the distance set in Set up page 1, Home Offset
- 10) The machine is now ready for a rolling operation test.

Note: Allow 60-90 minutes soak time for the lower platen to heat uniformly.



1.2 Test Run

- 1) Set Operator Controls as follows:
Rolling Length.....10
Rolling Speed.....50
Dwell Time 3.0
Roll Pressure.....35 PSI
Lower Platen Pressure.....10
Lower Platen Temp.....90
Stroke End Speed.....20
Stroke End Distance.....2

- 2) Place sample mandrel about 2" (50mm) from the rear edge of the lower platen.

**Note: The machine may be stopped at any time by pressing the “Emergency Stop” button.
To reset the lower platen back to its home position, release the e-stop button, press
reset then Home**

- 3) Press both PALM buttons until the lower platen starts to move. If one or both buttons are released before the lower platen extends completely, the action is canceled.
- 4) The lower platen should accelerate smoothly to the selected speed.
- 5) When the lower platen reaches the distance set point, the upper platen should rise quickly and the lower platen should return to the home position.

The machine is now ready for general use.



General Overview

2

2.1 Machine Description

The M-920 Rolling Table is especially designed for smooth and positive rolling action.

A fully automated recipe driven PLC allows multiple operators to repeat the same precise process.

Recipe mode for saving all machine process setting and allowing them to be recalled by operators completely and consistently by entering recipe name

Smooth, positive rolling action is created by the worm gear drive and belt system.

Precise rolling distances (strokes) are easily set by a digital stroke adjustment. Short, positive strokes work well on fine tip sections and fly rods.

Improved rolling of unidirectional prepregs is obtained by this positive drive system. Small diameter parts and other products that require precise fiber orientation roll with ease and precision.

Controlled acceleration of the rolling stroke protects the prepreg from twisting and tearing as the rolling action begins.

Adjustable rolling pressure is provided by the pneumatic cylinder that lowers and raises the upper platen.

A lateral (crosswise) movement axis of the lower platen also helps to relieve rolling stresses on the prepreg materials. This axis compensates for the lateral displacement that occurs when rolling conical parts.

The “flexible” lower platen conforms to mandrel shapes and results in tight rolling results and straight parts.



2.2 Machine Features

Lower Platen

The lower platen is electrically driven through a worm gear reducer combined with a silent, positive belt drive.

The electric motor speed is controlled by a three-phase inverter that is programmed for acceleration and deceleration.

The acceleration time is pre-set to provide the optimum starting motion to roll the most sensitive parts such as fly rods, small tubes, soft mandrels, elliptical parts, golf shafts, etc.

The lower platen is fitted with a flexible rolling surface that will conform to multi-tapered parts as well as parallel parts. The “flexibility” is adjustable by controlled air pressure.

The “working” length of the platen can be changed by inserting furnished rods into either end of the platen to disable as many platen keys as desired. This feature is necessary when rolling short tapered parts on long platens. The “disabled” keys will remain in their “down” position and will prevent the upper platen from contacting the lower platen at the right hand end of the platens.

Upper Platen

The upper platen is pneumatically operated. Rolling pressure is controlled by air pressure adjustment on the Operator’s Control Panel.

Speed Flow controls are provided to adjust the up and down speeds of the upper platen. These controls are locked by a small set screw. In order to change the adjustments, loosen the set screw and make changes in small steps.

A small Platen Return Cylinder returns the upper platen to a parallel condition with the lower platen as the upper platen raises. A pressure regulator is provided to adjust the force of the air cylinder.



Platen Action

In addition to the normal up-downs and in-out movements of both platens, the upper platen can tilt and swivel to accommodate tapered parts. The lower platen can also swivel in the opposite direction and can move laterally (crosswise) to the horizontal stroke.

At the end of the rolling cycle, both platens return to their starting positions by means of pneumatic cylinders.

Roll Delay

A time delay system provides time for the top platen to fully contact the part before the rolling action commences. The delay time is adjusted on the operator's control panel.

Air Cylinder Cushion

The upper platen air cylinder incorporates an "air cushion" adjustment to provide a smooth, cushioned stop when the platen raises to its upper limit. The air cushion adjusting screw is located in the square top portion of the air cylinder. The adjusting screw should be turned clockwise (inward) as far as it will go to provide maximum cushioning. This will prevent the metal piston inside the air cylinder from contacting the end of the air cylinder.

Horizontal Rolling Distance Control

A digital stroke adjustment system controls the length of lower platen travel. This adjustment is very important to prevent over-rolling (rolling too far) the part. Over-rolling can cause twisted parts or bent parts as a result of the prepreg material breaking loose from the mandrel. High torque loads created by the variation of driving force on the larger diameter portion of the mandrel compared to the resisting torque of the mandrel.

Platen Heat

The lower platen is heated by several radiant heating rods. The heat from the heating rods is also reflected upward to the "keys" by a full length reflector.

Platen temperature is sensed at a special "key" located in the center of the platen that contains a thermo couple.

Platen temperature is controlled by an electronic temperature controller in the operator's control panel. This controller is "self-tuning" and has been tuned and inspected at the factory.



Platen Covers

The lower platen keys are covered with a ¼” rubber pad to smooth out any variation in the keys. A canvas cloth cover is provided on top of the rubber pad to act as a replaceable surface in the event of resin transfer from wet or “tacky” prepreg materials.

The upper platen is covered with the same canvas (cloth) and can be changed as needed. Some users prefer the canvas covers, while others prefer using only the rubber pad on the lower platen and others do not use the rubber pad. We have provided everything needed, and you may choose any combination that works best with your prepreg materials.

Motor Torque Protection

The output torque of the motor is limited (and adjustable) to protect the belt components if the lower platen assembly moves past the end-of-travel safety switches.

The drive belt is rated for 850 pounds of pulling force. The motor torque is limited by the AC Inverter that controls the motor.

Safety Controls

Two start buttons are provided for safety reasons. Both START buttons must be held until the upper platen contacts the part and the rolling action commences.

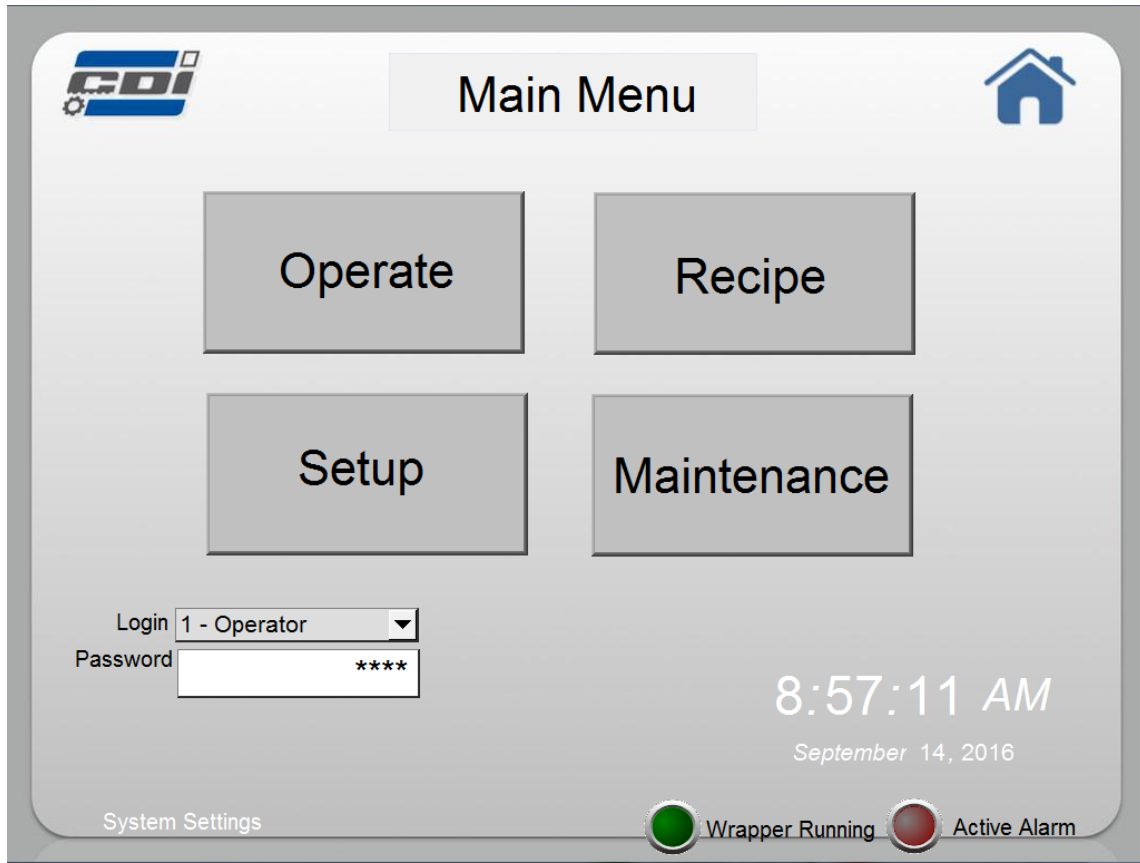
An EMERGENCY STOP button is located in the operator’s control panel. When the EMERGENCY STOP button is pressed, the lower platen will stop immediately and the upper platen will raise to its uppermost position. The EMERGENCY STOP button must be rotated to release it from the depressed position before any other action can be initiated.



Screen Operations

3

3.1 Main Menu



Main Menu Screen	
Operate	Directs user to the Operation Screen
Recipe	Directs user to the Recipe Screen
Set-up	Directs user to the Set-up Screen
Maintenance	Directs user to the Maintenance Screen
Login	User must select log in access level.
Password	There are 4 levels: 1. Operator 2. Maintenance 3. Process 4. Administration
System Settings	Directs user to the System Settings Screen. Only accessible with Administration log in



3.2 Main Operations Screen

Operate	
Stop	Stops the motion of the table and raises the upper platen.
Home	Sends the lower platen to the Home position
Pause	Stops the lower platen and raises the upper platen. Push the 2 hand palm buttons to resume.
Rolling Length	Displays the distance the lower platen will travel
Pattern Width	Allows the operator to enter the flag or material width to ensure that the material will completely wrap around the mandrel
Rolling Speed	Determines the Speed the lower platen will move
Dwell Time	A time delay system that provides time for the top platen to fully contact the part before the rolling action commences.
Upper Platen Pressure	Displays the amount of pressure in PSI that is applied to the cylinder to lower the platen
Upper Platen Force	Determines the amount of down force the upper platen exerts onto the mandrel in pounds force per inch, Lbf/in
Part Length	A dimension that is necessary to calculate the Upper platen force
Platen Key Pressure	Sets the amount of force that pushes up the keys on the lower platen
Lower Platen Temp	Determines the Temperature setting of the lower platen
Stroke End Speed	Sets a deceleration speed at the end of the roll in order to achieve a tight wrap at the end of the material.
Stroke End Distance	Sets the distance from the end to begin the Stroke End Speed



3.3 Recipe

Name	PatternWidth	RollingSpeed	DwellTime	UpperPlatenPressure	PartLength	Plat
RECIPE01	7.00	20	3.2	10	10.00	

Recipe

Pattern Width	7.00 In
Rolling Speed	20 %
Dwell Time	3.2 Sec
Upper Platen Pressure	10 PSI
Part Length	10.0 In
Platen Key Pressure	23 PSI
Lower Platen Temp	39.0 F
Stroke End Speed	1 %
Stroke End Distance	1.50 In

Recipe Control

Load
Add
Delete

Save Changes
Grab Current Values

Recipe	
Add	Takes the highlighted recipe and duplicates it at the bottom of list
Defaults	Puts the values back to factory default settings
Delete	Deletes the highlighted recipe
Save Changes	Saves any changes made to current recipe
Grab Current Values	Grabs any manually input values from the Operate screen



3.4 Set Up 1

Setup 1	
Return Speed	Sets the travel speed for the table as it returns to home after completing a wrap
Home Offset	Sets the start position relative to the home target. Leave at 0 as a default
Final Dwell Time	A time delay system that provides time for the top platen to stay in contact with the part after the table stops moving at the end of the sequence.
Roll Pressure Alarm	Sets alarm temperature range for Roll pressure
Lower Platen Pressure	Sets alarm temperature range for Lower platen pressure
Lower Platen Temp	Sets alarm temperature range for Lower platen temperature



3.5 Set Up 2

Setup 2

	Raw AI		Scale Out		Actuals	
	Raw AI	Min	Max	Min		Max
Upper Platen Pressure	12768	300	31500	0.0	75.0	30.0 PSI
Platen Key Pressure	10112	300	31500	0.0	75.0	23.2 PSI
Lower Platen Temp	33.1 C			Offset	-25.0	66.4 F

	Setpoint	Scale Out		Raw AO		Raw AO
		Min	Max	Min	Max	
Upper Platen Pressure	30.0 PSI	0	75	1000	30000	12600
Platen Key Pressure	22.0 PSI	0	75	1000	30000	9507
Rolling Speed	0.0 %	0	100	2000	15000	2000

Page 1

Page 3

Setup 2

Shows Raw data and scaling values.
 These values were set at the factory and should not be changed unless approved by CDI



3.6 Set Up 3

Setup 3	
Displays the heater calibration controls as well as a temperature graph	
Lower Platen Home Speed	Sets the speed that the table travels to home during a homing routine
Lower Platen Jog Speed	Sets the jog speed of the lower platen
Lower Platen Max Temp	Limits the maximum temperature that can be set on the Operate screen
Counts Per .100	This can be adjusted if you find that the distance traveled does not match exactly what you had entered
Gear Ratio	Set value of gear box. Leave at preset number
Platen Max Travel	Limits the distance that can be entered on the operate screen
Diameter Cylinder	Displays the piston diameter for force calculation purposes. Note: This should not be changed unless a different size cylinder is installed.



3.7 Maintenance 1

The screenshot shows the 'Maintenance 1' control panel. At the top left is the CDI logo. To its right are two green square indicators labeled 'Ready' and 'Homed'. In the center, the text 'Maintenance 1' is displayed. To the right of this text is a green circular indicator labeled 'Running' and a blue house icon. Below these are two buttons: 'Auto' (highlighted in green) and 'Manual'. To the right of these is the 'VFD Motor Controls' section, which includes 'Jog Fwd' and 'Jog Rev' buttons. Below these is a digital display for 'Platen Position' showing '0.0 In'. To the left of the 'Jog' buttons is the 'Platen Position Manual' section, which includes 'Up' and 'Down' buttons. Below this is an 'Alarms Active' indicator (a red square) and a 'Reset' button. To the right of the 'Alarms Active' indicator is the 'Cycle Counter' section, which shows a digital display with the number '53' and a 'Reset' button. At the bottom right is a 'Page 2' button.

Maintenance 1
Allows manual testing of machine components for diagnosis.



3.8 Maintenance 2

Maintenance 2

DI 750-430 8ch 24VDC

- 01 E-Stop OK
- 02
- 03 Palm Switch
- 04 Home Switch
- 05
- 06
- 07
- 08

DO 750-430 8ch 24VDC

- 01 Safety Relay Rst
- 02 Platen Fwd
- 03 Platen Rev
- 04
- 05 Heaters ON
- 06 Platen Down Sol
- 07
- 08

AI
750-459 0-10VDC

- 01 Lwr Plat Key Pres 1
- 02 Roll Pressure
- 03 Lwr Plat Key Pres 2
- 04 Lwr Plat Key Pres 3

750-469 Thermocouple K

- 05 Upper Temp (Deg C x 10)
- 06

750-637 Encoder Module

Counts

AO
750-559 0-10VDC

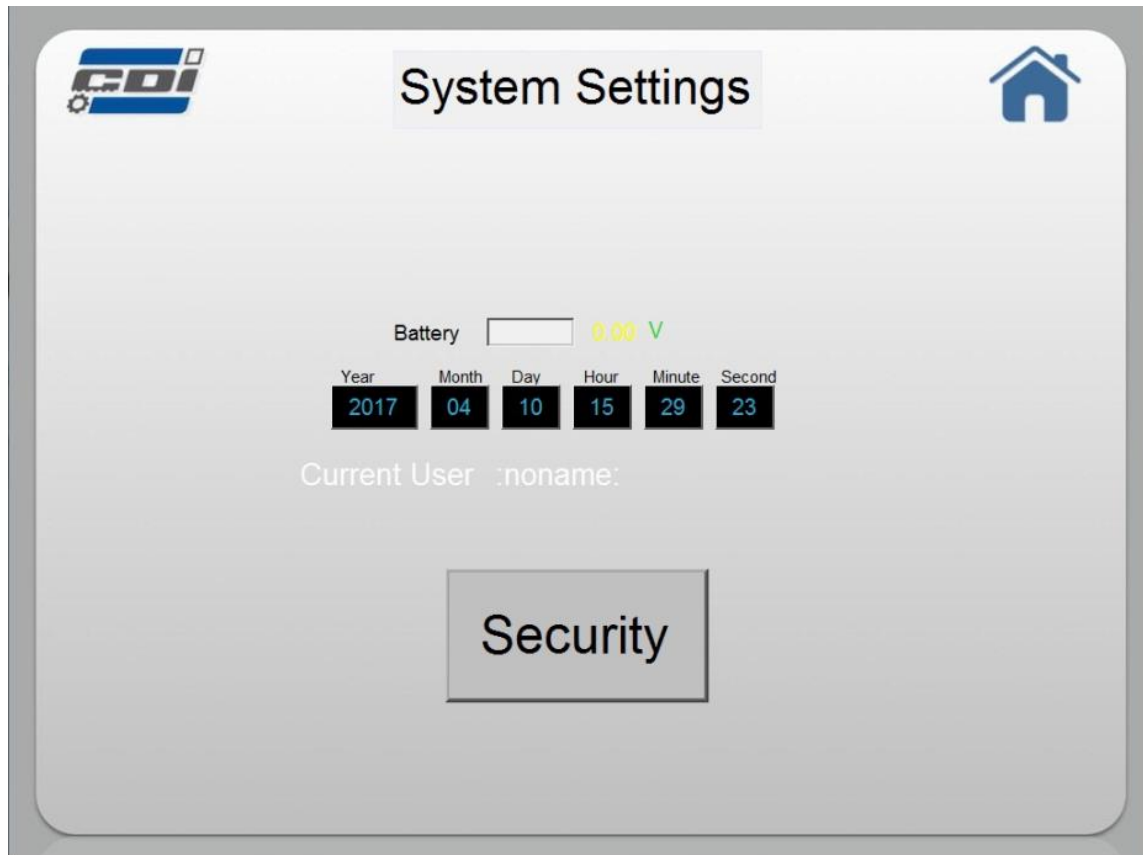
- 01 VFD Speed Ref
- 02 Lwr Plat Key 1 SP
- 03 Roll SP
- 04 Lwr Plat Key 2 SP
- 05 Lwr Plat Key 3 SP
- 06

Maintenance 2

Displays Raw In/Out data for diagnosis



3.9 System Settings & Security



System Settings
For setting system time and changing access codes for each log in level

Security screen can only be accessed by Administration level



3.9.1 Security

The screenshot shows a web interface titled "Security". At the top left is the CDI logo, and at the top right is a home icon. Below the title, there is a "Login" dropdown menu currently set to "4 - Admin". Underneath is a "Password" field containing four asterisks. Further down, there are four "New Password" input fields labeled "1", "2", "3", and "4", each containing four asterisks. A green "Update" button is positioned below these fields.

This screen is where you can change the passwords for all accounts. Only the Administration level access can change passwords

[Below are the set passwords as shipped](#)

Operator - Access Level: 1
Password: 1111

Maintenance - Access Level: 2
Password: 2222

Processing - Access Level: 3
Password: 3333

Admin - Access Level: 4
Password: 4444



Maintenance

4

4.1 Platen Straightening Procedure

Long upper platens may develop a slight “bend” when they are used over an extended period of time. The bend is generally upward at the ends of the platen.

The platen is held flat by the reinforcement of the side rails via the attachment bolts that connect the side rails to the platen.

If these attachment bolts loosen (even slightly) the platen may take a set from its normal flat condition when rolling parts.

- 1) Position lower platen directly under upper platen.
- 2) Remove the platen cover retaining rods from both edges of the platen.
- 3) Loosen all side-rail attaching bolts at least two full turns.
- 4) Place wooden block (1" -2" thick) on the lower platen at center point.
- 5) Release air pressure from the machine by backing off the main pressure regulator and allow the top platen to rest on the wooden block. The lower platen must be pushed inward to line up with the upper platen.
- 6) Clamp ends of the platens to induce a slight bend in the opposite direction.
- 7) Tighten all side rail attachment bolts.
- 8) Release clamps and check for straightness.
- 9) Repeat procedure if necessary.
- 10) Introduce air pressure slowly by adjusting the main pressure regulator. This will prevent the lower platen from rapid movement to its starting position.



4.2 Lubrication

V wheel bearings are pre-lubricated and sealed for lifetime use.

Main vertical sliding quill require monthly lubrication. Access can be made through the hole in the side of the top frame. Add lubricant until lubricant is visible at the bottom of the quill.

Gearbox is filled and sealed. If oil is observed leaking from the gearbox, keep filled with 250w gear oil - any brand is acceptable (refer to manufacturers' instruction book).

4.3 Belt Tension and Belt Tracking

The drive belt does not stretch due to its internal construction of steel wires and / or Kevlar cords.

If, however, the belt needs adjustment, remove the front belt guard to access the belt tension and tracking adjustment screws.

Proper belt tension is measured by 0.5" to 0.75" of vertical looseness when the belt has no load from the motor.

Belt tracking is also adjustable at the rear of the machine by means of opposing screws on the motor mounting plate. The drive belt should track in the center of the drive pulleys and should not ride against the side flanges of the drive pulleys.



4.3 Troubleshooting Chart

PROBLEM	PROBABLE CAUSE	REMEDY
Loosely rolled blank.	<p>Insufficient rolling pressure.</p> <p>Broken tack between prepreg and mandrel.</p>	<p>Increase rolling pressure on front panel.</p> <p>Be certain tack is secure between the prepreg and the mandrel.</p>
Tip not rolling tightly.	<p>Insufficient rolling pressure at tip.</p> <p>Broken tack between prepreg and mandrel.</p> <p>Mandrel too short for the length of platen.</p> <p>Part improperly placed on lower platen.</p>	<p>Increase the roll pressure, platen pressure or both.</p> <p>Be certain tack is secure between the prepreg and mandrel.</p> <p>Apply tacking resin to mandrel.</p> <p>Insert bars into right hand side of lower platen to disable a sufficient number of keys.</p> <p>Approximate center of part should be under the mounting yoke of upper platen. A trial and error method of part placement will determine the proper position.</p>
Prepreg twists on mandrel.	<p>Rolling stroke too long - prepreg breaks away from mandrel.</p> <p>Mandrel is not straight when placed on lower platen, causing the prepreg to wrinkle.</p> <p>Prepreg is too tacky or resin is too rich.</p>	<p>Shorten rolling stroke.</p> <p>Be certain the mandrel is placed properly on lower platen.</p> <p>Decrease temperature of lower platen.</p> <p>Contact prepreg supplier.</p>
Cloth unwinds after roll is complete	<p>Prepreg is too dry.</p>	<p>Increase heat on lower platen. Prepreg may be outdated.</p> <p>Contact prepreg supplier.</p>
Cloth sticks to canvas platen cover.	<p>Resin accumulation.</p> <p>Prepreg is too aggressive or tacky.</p>	<p>Sprinkle talcum powder on lower platen to absorb excess resin.</p> <p>Decrease temperature setting on lower platen.</p> <p>Contact prepreg supplier.</p>
Machine "labors" during rolling stroke.	<p>Excessive rolling pressure.</p>	<p>Reduce ROLL PRESSURE setting.</p>