INSTRUCTION MANUAL

Rotary Knife Cutter
Model: Bessemer C-Series:
C-2, C-3 & C-4

NOVATEC™
EXTRUSION

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Please record the following information, which is specific to this piece of equipment, in the space provided.
Our Parts/Service Department will need these numbers to properly respond to any of your requests.

Instruction Manual: C-Series IM 12 MAY 2015

Model #:_____

Serial #_____

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1   PURPOSE OF THIS MANUAL

This manual describes the installation and operation of the NOVATEC Model C Rotary Knife Cutter. Before installing this product, please read this guide and any additional guides associated with the system's auxiliary equipment.

Explanation of Symbols

This manual includes both general and task-specific safety precautions. These precautions are highlighted in the manual by the following categories:

WARNING: This symbol identifies situations that are potentially hazardous to personnel or equipment.

NOTE	Highlights information provided in text or procedures. This information may or may not be related to safety.

2   SAFETY PRECAUTIONS AND WARNINGS

These operating instructions must be read, understood, and implemented by all personnel responsible for this system.

- ❑   All mechanical and electrical work must be performed by qualified personnel only.

- ❑   Always disconnect power before servicing.

- ❑   Refer to the machine serial number nameplate and drawings supplied with this system for actual power requirements.

- ❑   Be sure to install the equipment with the proper electrical connections according to all national and local regulations.

- ❑   Electric power supply should be through a separate disconnect switch with properly sized overload/fuse protection.

- ❑   The customer is required to operate the equipment with all safety features in proper working condition.

- ❑   NOVATEC shall provide no further guarantee for function and safety in the event of unauthorized modifications.

2.1 Safe Access to Guarded Blade Area

It is safe to access the guarded blade area when the power is on. NOVATEC Cutters use a servo that has built in safety. It can execute a Safe Stop on E-Stop and has a Safe Torque Off which is executed within 0.5 seconds of E-Stop. It also is monitoring itself for Safe Standstill which is interlocked to the guard lock. With the addition of redundant safety relays, motor contactor and guard interlock, the system can exceed SIL-3, PL-d safety requirements for a Cat3 safety hazard.
NOTE: Additional guarding may be required where the product enters and exits the bushing.

NOTE: The Safety Circuit Must Be Tested on 90 Hour Intervals
To meet the requirements for a Cat3 safety system, the safety circuit must be tested at regular intervals to insure that it is functioning properly. When the system is first powered on, the power must be engaged and then the E-Stop activated to ensure that it is functioning. After 90 hours of continuous operation a Warning Message will appear instructing the operator to perform the safety verification test which involves pressing the E-Stop and the resetting the circuit. Production can continue while the message is present but arrangements should be made to perform the test as soon as possible.

Even though there is no power to the blade when the system is E-Stopped, there is still the hazard of the sharp blade. Care should always be taken when working in this area.

Please contact Novatec if there are any questions or concerns.

3.0   GENERAL DESCRIPTION

The NOVATEC, C Series Rotary Knife Cutter offers high versatility to cut a wide range of profiles. It is able to cut small profiles at high speeds and large profiles at lower speeds. Extrudate is fed into the cutter from upstream, typically by a puller. Two cutter bushings, on either side of the knife, guide the extrudate through the cutter. A rotary knife is mounted to a 12" diameter cutter head and driven by a servo motor through a gear reducer. This knife cuts material that is supported between the bushings. The knife is positioned at a home position until the cut motion begins. The knife then rotates through a cutting lubricant/chip collection reservoir, through a felt blade wipe to clean the blade, and then through the bushings again to make another cut. The cut extrudate continues to move through the bushing where it is either collected or is conveyed further downstream by an optional conveyor.

Two cutting modes are available: ON-DEMAND cutting mode and CONTINUOUS cutting mode. Within these two major modes of operation, a wide range of parameters may be adjusted for consistent, repeatable, and precise results.

- ON-DEMAND cutting mode allows 250 cuts per minute. The blade does not continuously rotate, but instead starts and stops as needed.
- CONTINUOUS cutting mode allows up to 750 cuts per minute by continuously rotating the cutter head at a speed sufficient to cut the desired length at the measured line speed.

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4.0 SPECIFICATIONS

Model Number	C-2	C-3	C-4
Bushing Diameter	2.25 in.	3.25 in.	4.25 in.
Maximum Profile	2 in. Dia.	3 in. Dia.	4 in. Dia.
Power - HP	5	5	11.8
Max Continuous Cuts (1 Blade)	800 CPM*	800 CPM*	750 CPM*
Maximum On-Demand Cuts (1 Blade)	300 CPM @ 600 RPM	300 CPM @ 600 RPM	200 CPM @ 600 RPM
Maximum On-Demand Blade RPM	1000**	1000**	900**
Maximum Peak Torque (in./lbs.)	1130	1130	3720
Blade Mount	12 in. Stainless Steel Cutter Head		

* Higher rates may be available for certain applications with specific cutter. Single and multiple blade configuration.
**See charts below for actual CPM @ Maximum RPM.

52.37" Floor to C.L Control

58.5

39.9

36 "

28

37 7
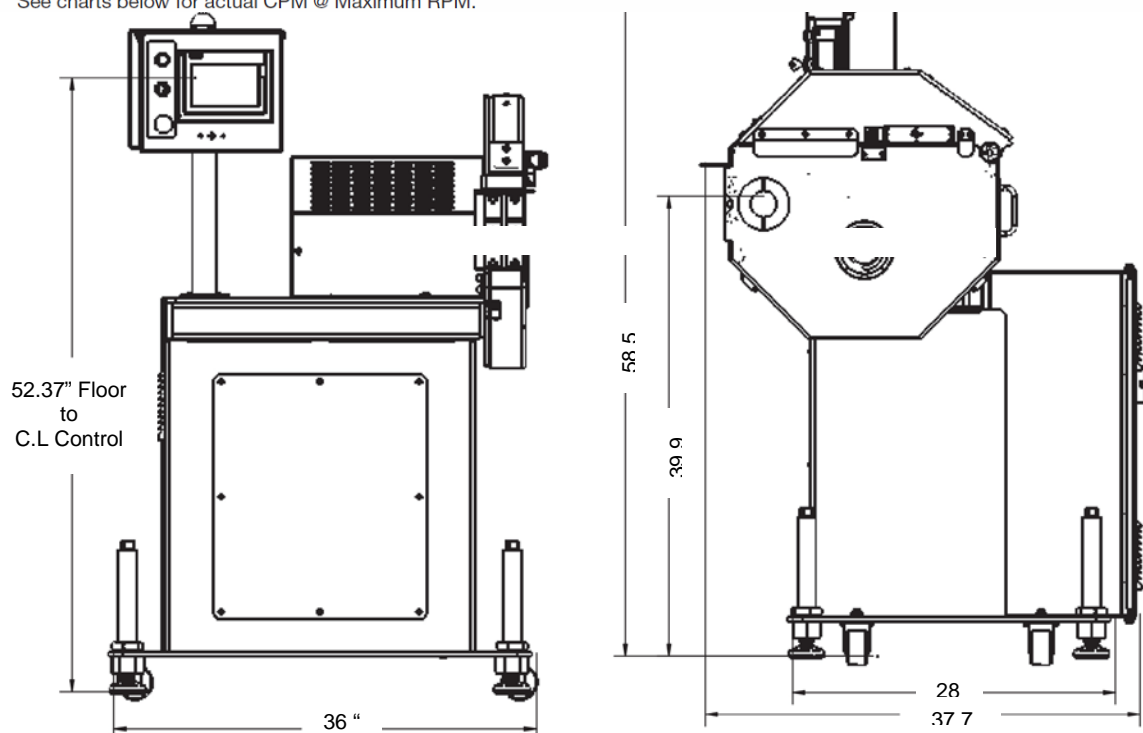
4.1   Product Features

- 12" high torque cutter head
- Accepts rectangular bushings 19.75mm thick x 89.75mm wide x 150mm long
- Apex Dynamics 4:1 speed reducer
- Taper lock shaft bushing hardware
- 2500 count quadrature cut length encoder with 12" circumference measuring wheel
- Knife thicknesses of .015, .020", .025", .030", .040" available; Blades shaped and sharpened to meet custom application requirements
- Safety interlocks provided for operator safety
- Removable cutting chamber cover with integral reservoir provides full access to cutting chamber and cutting fluid reservoir
- Split clamp bushing arrangement provides easy bushing setup
- Indicator lights for machine status indication
- 5-Year Warranty

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5.0 BLADE SPEED VS CUTS PER MINUTE

The blade speed can be set anywhere from the Minimum On Demand Blade Speed to the Maximum Blade Speed set on the System Setup page. Typically, the blade speed will be set so that the product has the best possible cut. If the blade speed is set too low and the CPM requirement is too high, the blade will not travel around in time to start the next cut and the next cut will be ignored resulting in a part that is twice as long as intended. It is also possible to set the On Demand Blade Speed and the Required CPM so high that eventually, it faults the drive because there is too much power required for the move. Below are charts that show the blade speed versus CPM for several cutters. It was determined by shop testing. Actual results might be less due to lower supply power or higher ambient temperatures.
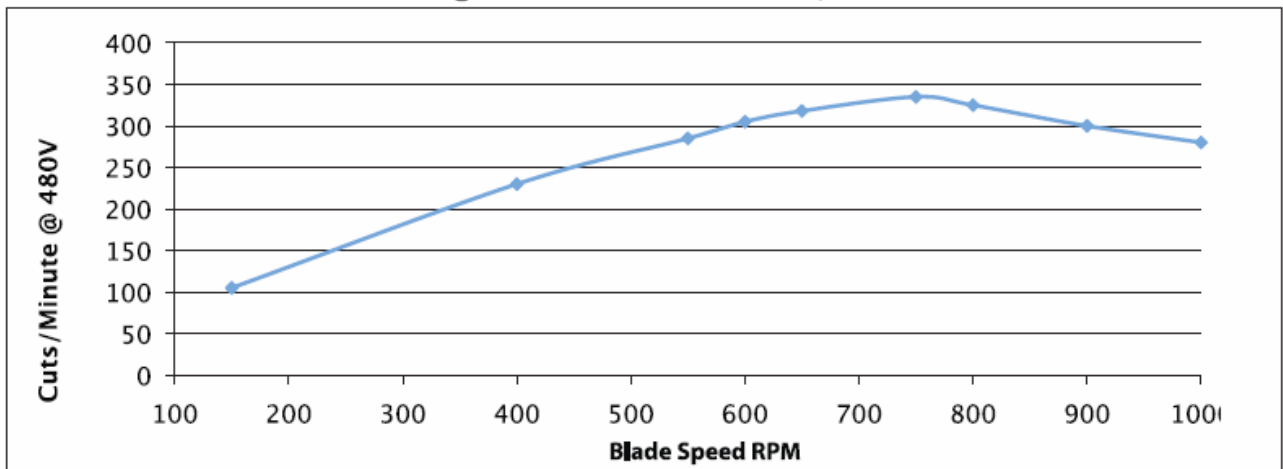The tests were performed with 480VAC at 75F.

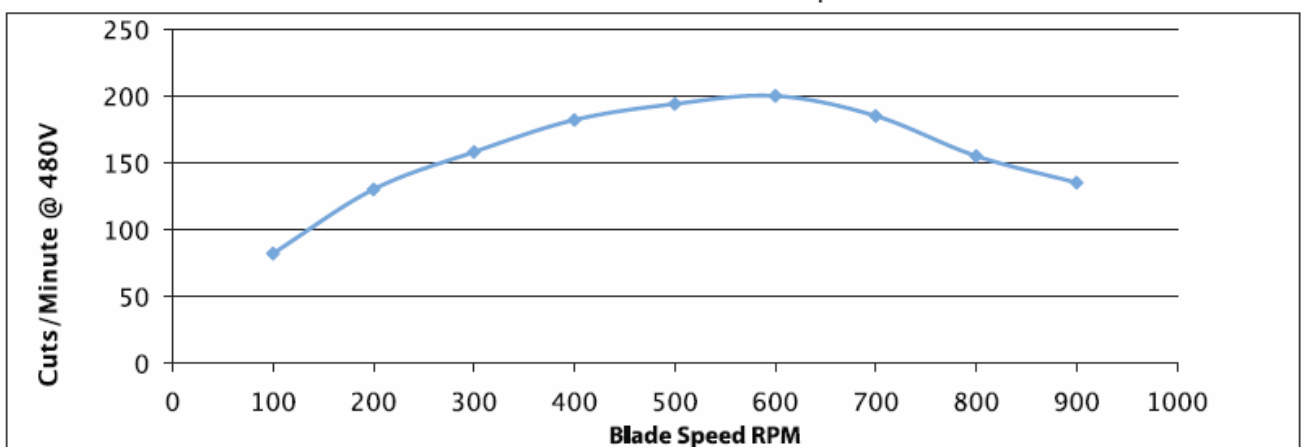# Performance Data:

C-2 & C-3

Max speed 800 RPM continuous
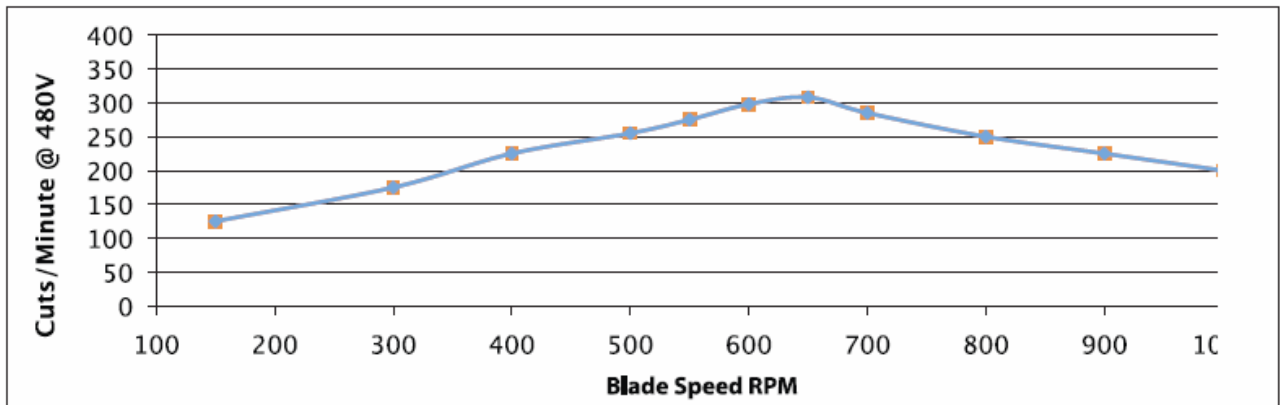
C-2 & C-3 - Light

Max speed 800 RPM continuous

C-4

Max speed 750 RPM continuous

8

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6.0 OPERATING PRINCIPLES

The NOVATEC Model C rotary knife cutter model C is used to cut lengths of plastic extrudate. In either the ON DEMAND or CONTINUOUS MODE.

ON DEMAND MODE: Plastic extrudate is fed through two inline bushings, which guide the plastic through the cutter. The instant of cutting can be determined by a sensor, length of time or an Encoder. Once the signal is sent to the PLC, the PLC processes the request and initiates the cut. A servomotor rapidly accelerates the cutter head with attached blade(s) to rotate either 180° or 360°, slicing through the extrudate. The cutter head then returns to its home position and waits for another cut signal from the PLC.

CONTINUOUS MODE: Plastic extrudate is fed through two inline bushings, which guide the plastic through the cutter. The instant of cutting can be determined by a length of time or an Encoder. Once the signal is sent to the PLC, the PLC processes the request and initiates the cut. A servomotor continuously rotates the cutter head with attached blade(s), slicing through the extrudate. The cutter head rotates continuously at a speed sufficient to cut the desired length at the measured line speed.

7.0 INSTALLATION

1. Carefully unpack the cutter and any other components delivered with it. Check all packaging for loose parts, documentation, and other included items. Carefully inspect the cutter. Ensure that no wires, bolts, screws, terminals, or other connections have come loose during shipping. Check to ensure that all moving parts are not obstructed by debris or excess packing material.

2. You may require the following tools to complete the installation:
   a. 16" or 18" adjustable wrench
   b. Feeler gauges

3. All national and local electrical, building, and safety codes need to be followed. Proper grounding of all equipment is important. Check the electrical wiring schematic for wiring numbers and details. The following paragraphs describe installation of typical system components. Some of them are optional and may not be required for your system.

   CAUTION: *All machines must be grounded to prevent "shocks" from static electricity that is generated by some materials as they are moved. This is an extremely important step.*

   ⚠️ *All electronics are susceptible (to varying degrees) to electrostatic damage and, although as much protection as possible has been designed into the system; this cannot completely eliminate upsets due to electrostatic voltage being accidentally introduced into the electronic circuitry.*

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7.1 Mechanical Installation

Determine the position of the cutter. This should be done with consideration to the location of the adjacent puller and to the nature of the extrudate. For flexible and semi-flexible extrudate, locate the cutter closer to the puller to minimize extrudate buckling during a cut. For rigid extrudate, allow more space between cutter and puller to improve cut finish quality and consistency.

Once the general position has been determined, carefully align the cutter with the extrusion line. It is easiest to adjust the position on the floor before adjusting to the proper height. Ensure that all downstream equipment is properly aligned (pullers, tanks, etc.). To adjust the centerline height of the cutter, adjust each foot pad at the corners of the base of the cutter with a 16 or 18 inch adjustable wrench. Ensure that the cutter is level.

7.1.1 The Blades

When installing the cutter blades, great care should be taken to avoid being cut. Use cut-resistant gloves to avoid injury. Wait until the knife assembly fully stops before opening the inspection door.

Ensure the cutter has stopped rotating; rotate the key switch clockwise (to 2 o'clock) and wait 5 seconds for the door to unlock; open the bushing guard (yellow cover).

Rotate the cutter head to a point where the hole in the Cutter head, lines up with a hole in the cutter enclosure. Insert an Allen wrench through the two holes to hold the cutter head in place.

This avoids the possibility that the cutter head will move while loosening/tightening bolts.

Remove the bolts holding the counter-balance or the old blade(s), remove counter balance or the old blade(s), and fasten new blade(s) in the same way the old blade was attached.

Check that the new blade fully extends through the bushing so that the entire product is cut. **Tighten the knife-securing hardware to 140 inch-pounds of torque.**

Always check the blade(s) to bushing clearance after installing a new blade(s) by rotating the cutter head manually and inspecting the gap between each of the bushings and the blade(s).
Ensure that the blade(s) moves freely through the bushings and that the bushings are properly

secured before re-powering the machine.

NOTE: Counter-balance should be removed on end where blade is installed.

NOTE: When a single blade is installed, it must be installed on same end of cutter head as the HOME SENSOR is installed.

NOTE: Counter-balance weight, opposite the blade, must remain bolted in place if only one blade is used.

7.1.2 The Bushing

Ensure the cutter has stopped rotating; rotate the key switch clockwise to "UNLOCK" (2 o'clock) and waiting 15 seconds for the door to unlock before opening the bushing guard (yellow cover). Loosen the rectangular bushing by loosening the12mm socket head set screw located on the top of each cylindrical bushing holder. Test the location of the bushings for accuracy by retightening the bushing holder socket head set screw and manually rotating the cutter head to ensure that the blade passes through the two bushings. When satisfied with the fit, fully retighten the bushing holder, inspect the blade clearance an additional time and make sure the cutter head can rotate a full revolution while clearing the bushings. During initial set up, the cylindrical bushing holders should be adjusted relative to one another by loosening the socket head cap screws on the front of the machine that clamp the bushing holders in place. This adjustment ensures the rectangular bushing holders are rotationally aligned about the axis of the cylinder.

7.2 Electrical Installation

Always disconnect and lock out the main power supply before wiring power and control cables between the NC rotary knife cutter controller and the external devices. Refer to the wiring diagram and general arrangement drawings supplied with this system before making electrical connections.

❑ Use shielded cable for communications wiring.

❑ Keep communication cables and control wiring as far as possible from high voltage equipment. If you must run cable across power lines, run the cable at right angles to the line.

❑ Ensure the equipment grounding is properly connected. Shielded cable should be grounded at one end only and is typically grounded in the main I/O enclosure.

WARNING: Do not install communication cable where it will come into contact with any buildup of electrical charge!

It may be tempting to run the wire next to the material conveying lines, but a substantial buildup of electrical charge can and will occur, especially with certain types of plastic resins and, if the conveying lines are not grounded, they can arc to the cable disrupting communications and/or possibly causing damage.

Open the cutter's electrical enclosure and insert the main power through a knockout in the wall of the enclosure. Connect the power wire as indicated on the included wiring diagram. Check that all terminal screws are secure. Close electrical enclosure.

Before testing the machine, confirm that the placement and wiring of the cutter conform to all applicable national and local regulations. When ready, turn on the main disconnect. Make sure that the E-Stop button is in the out position. Press the reset button.

ALARM LIGHT

**RESET
EMERGENCY STOP**

**KNIFE GUARD
LOCK/UNLOCK**

EMERGENCY STOP
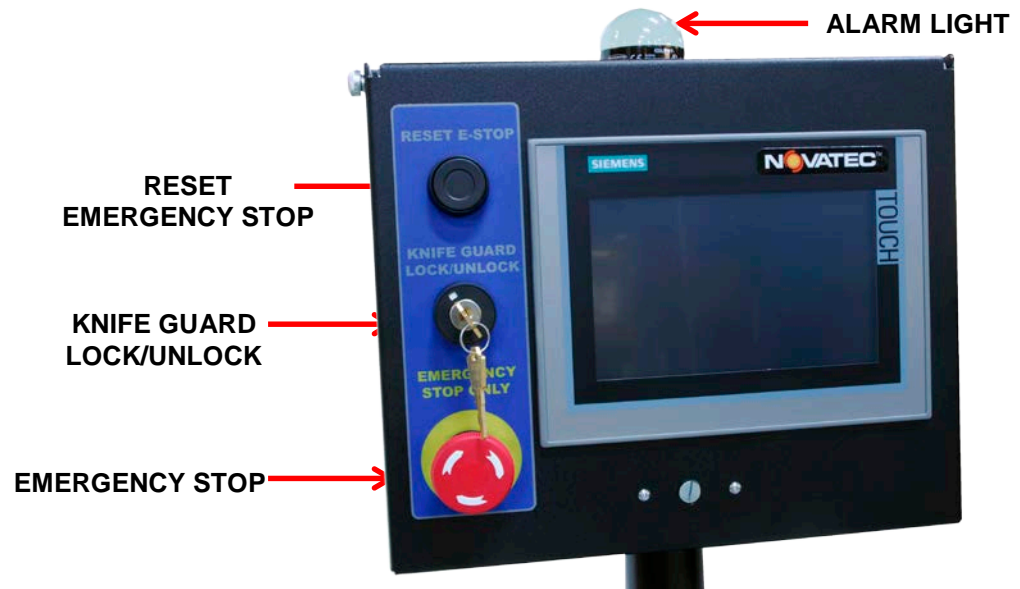
8.0 INDICATOR LIGHT DESIGNATIONS

The indicator light on top of the operator panel is used for machine alarm and status conditions. Following is the meaning of those designations.

- **Red – Cutter is Faulted**
  There is a fault condition that has stopped the machine or powers down the safety circuit.

- **Solid Orange – Warning is Present**
  There is a condition that requires operator attention. The machine will continue to run.

- **Flashing Orange – Blade is Homing**
  The safety circuit has been powered on and the blade servo is homing.

- **Flashing Green – Cutter is Ready**
  The system is ready to start but is not running. Press the Run Product or Run Scrap button to start machine.

- **Solid Green – Cutter is Running Production**
  The system is cutting production parts.

- **Flashing Green/Orange – Cutter is Running Scrap**
  The system is cutting Scrap parts.

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9.0 PLC GENERAL OVERVIEW

The NOVATEC, C Series cutters use a Siemens PLC controller to control a servomotor actuated knife which can be signaled to cut, based on a number of input sensors.

Siemens Operator Interface and Programmable Logic Controller

The Siemens Human Machine Interface (HMI) is a touch-screen viewing and data entry device, located on the face of the control panel. The screens are graphical in nature and display information in text and/or by symbol change. The HMI communicates with the internal Siemens Programmable Logic Controller (PLC) using standard Ethernet protocols.

9.1 Startup and Power Loss

When power is first applied to the Cutter following a power loss, the Cutter will return to the Quick Ops screen and must be re-initialized. Recipes saved on the device will retain their settings, and the machine will be in the last state it was in before powered down.

10.0 SCREEN CONVENTIONS AND COMMON ELEMENTS

10.1 Button Borders

Any item which has an operation will appear raised by the use of shadowing around it to form a border. If the border is grey, then the current user logged on does not have access to activate the operation. If the operator presses a button with a grey border a popup screen will appear prompting them to enter a user name and password. When a button is pressed, the shadowing on the border will change to indicate to the operator that the system recognized the button being pressed. Any button or field that has a grey background cannot be activated. Items will appear on grey backgrounds if they are to report information only or they are unavailable in the current mode of operation.

10.2 Logon

These two buttons will appear in the top right corner of every screen. The right button will display "Logon" to indicate that no one is logged on or it will display the user level of the current person logged on. Pressing this button will bring up a popup to allow the operator to enter a user name and password. The button on the left is used to log out and secure the system. It is possible to change the default user in the machine setup.

10.3 Screen Title
A Title will appear in the top center or every screen.

QUICK OPS

10.4 Machine Status
In the top right hand of every screen will be the current running status of the machine.

STOPPED

10.5 Standard Navigation Buttons
These 4 buttons appear on the bottom of every screen for quick navigation to other screens.

To Previous Page	To Home Screen	To QUICK OPS Screen	To Alarms Page
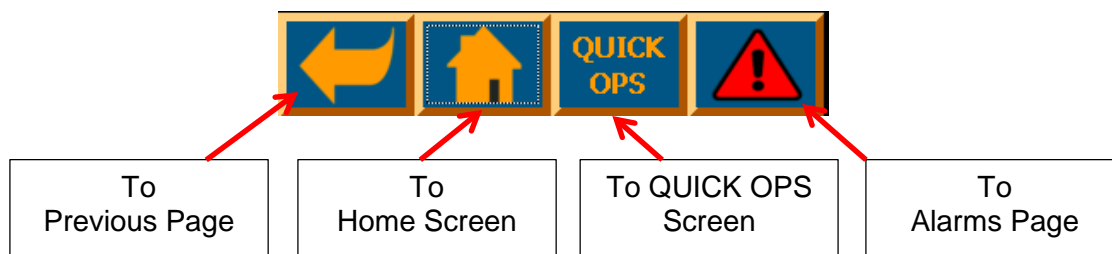
10.6 Cut Start/Stop Buttons

CUT PRODUCT - Press this button to start the cutting of good product using the mode and setting from the recipe. If the count is enabled, it will count each part as the blade crosses into it.

STOP - Press this to stop the cutter with the blade at home position (even in continuous mode).

CUT SCRAP - Press this button to shift to the scrap settings and stop counting.

NOTE: The cutter will quickly and automatically switch between any modes including between continuous and on-demand cutting. The Cut Scrap button may be hidden in the system setup.

TEST CUT - Press this button to activate a single on-demand test cut. The test cut can be executed while the system is running on-demand product. It will not be counted and the following cut will be cut at the proper length/time. If the cut is done very close to when the set on-demand cut needs to execute, it may interrupt that cut. The method for executing a Test Cut can be set in two ways in the system setup. It can be set so that a popup menu shows up to confirm the test cut or it can be set so that the button must be held for 1/2 second before the test cut is executed. This is to prevent inadvertent test cuts.

NOTE: A Test Cut cannot be executed while the unit is running in continuous mode.

11.0 SYSTEM STARTUP

When powering up the machine, a series of operations must take place to insure that the safety system is functioning properly. It only needs to be done once on power up.

11.1 Initial Screen -

While the system is booting up the screen will first be blue with a few icons and then this initial screen will appear for about 3 seconds.

If it is not replaced by the screen below after 15 seconds, there is a problem with the equipment and it should be looked at by maintenance.

11.2 POWER UP Screen

This screen instructs the operator in the procedure to verify that the safety system is functioning properly. The operator must first satisfy all of the conditions of the safety circuit. The first 4 lines of the screen prompt instruct the operator on the procedure.

11.2.1 Verify Safety/Reset System Screen

This screen appears and instructs the operator in the procedure to verify that the safety system is functioning properly. The operator must first satisfy all of the conditions of the safety circuit.

The first 4 lines of the screen prompt instruct the operator on the procedure.

11.2.2 Verify Safety/Press E-Stop Screen

If the operator performed the correct functions above, **the light will blink orange** and this screen appears. The prompt in the upper left corner instructs the operator to "PRESS E-STOP".
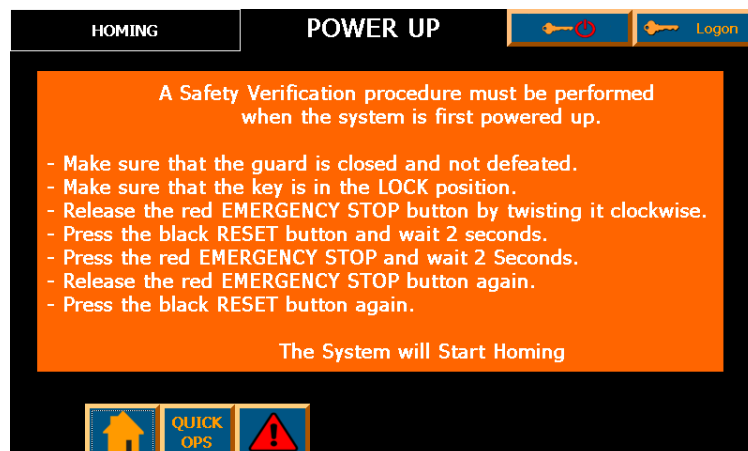
This tests that the equipment will respond properly if the E-Stop is pressed when there is a true emergency.

11.2.3 Reset System to Home Screen

The prompt in the top left corner now instructs the operator to Reset the System again by twisting the Red Emergency Stop button clockwise...AND pressing the Black RESET button again.

11.2.4 Homing Screen

Homing - The prompt in the top left corner now indicates that the system is Homing. **The light will blink orange again.**

When complete, the screen will change to the Quick Ops screen and the light will blink green.

12.0 MACHINE OPERATION

The factory pre-sets allow the cutter to start production using the encoder input.

If you want to use the encoder input, simply enter a length in the SET LENGTH [1] box. A numeric screen will pop-up. Enter the cut length and press ← to return to the Quick Ops screen. Enter the RPM's in the same manner, based on your experience. The cutter will run in ON DEMAND or CONTINUOUS MODE based on your entries.

12.1 Quick Ops Screen Items
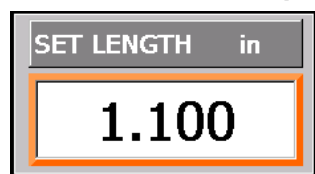
Cut Parameter - Used to enter the value to control when the cutter activates. It is dependent on the cut mode set on the recipe screen. It will always show the product cut values when the system is stopped.

Cut Mode	Parameter	Units
Encoder	Set Length	in/mm
End		
Sensor	Delay Time	sec
Time	Cycle Time	sec

Blade Speed - Enter the optimum blade speed for the cut when running in On Demand mode. In Continuous Mode, this is greyed out and shows the currently running blade speed that is determined by the calculation of Set Length and Line Speed.
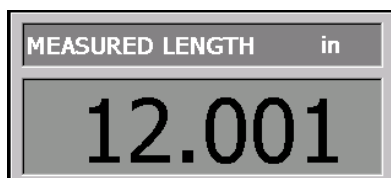
Measured Length - This is the length of the cut measured by the encoder signal. If an encoder is not used, this field will always be zero. It can be set up to always read the last cut length or hold the last cut length for a specified time before showing the accumulated cut length.

12.2 Cut Start/Stop Buttons

CUT PRODUCT - Press this button to start the cutting of good product using the mode and setting from the recipe. If the count is enabled, it will count each part as the blade crosses into it.

STOP - Press this to stop the cutter with the blade at home position (even in continuous mode).

CUT SCRAP - Press this button to shift to the scrap settings and stop counting. The cutter will quickly and automatically switch between any modes including between continuous and on-demand cutting. The Cut Scrap button may be hidden in the system setup.

TEST CUT - Press this button to activate a single on-demand test cut. The test cut can be executed while the system is running on-demand product. It will not be counted and the following cut will be cut at the proper length/time. If the cut is done very close to when the set on-demand cut needs to execute, it may interrupt that cut. A text cut cannot be executed while the unit is running in continuous. The method for executing a text cut can be set in two ways in the system setup. It can be set so that a popup menu shows up to confirm the test cut or it can be set so that the button must be held for 1/2 second before the test cut is executed. This is to prevent inadvertent test cuts.

12.3 Changing the CUT MODE

You can change to END SENSOR MODE or TIME MODE by logging in as LEVEL 1.
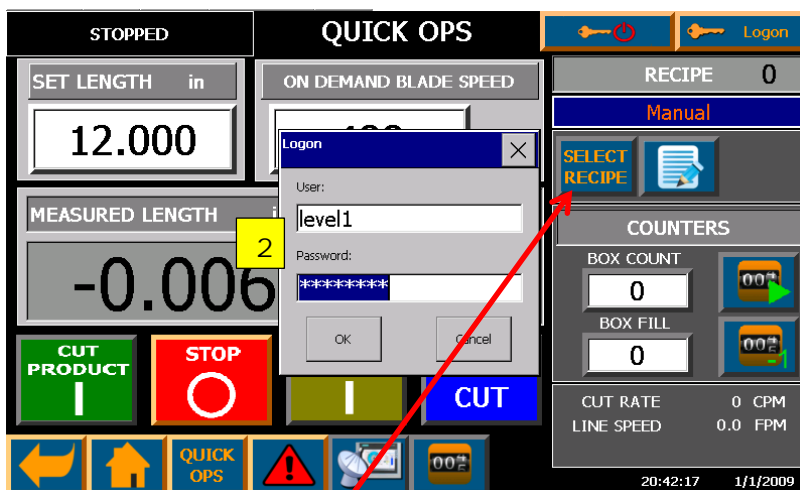
Press LOGON button.
A small pop-up screen will appear

Then press the ******** button below level1.
An alpha/numeric screen will appear.
Enter 1111 then touch toreturn to the Quick Ops Screen.

Press the SELECT RECIPE button.
The Recipe Select screen (below) will appear.

User name and Password factory defaults:
level1   : 1111 (Operator)
level2   : 2222 (Production Supervisor)
level3   : 3333 (Maintenance)
setup   : 4444 (Factory Presets – Setup Group)

12.4 Recipe Select Screen

Recipe #	Recipe Select Material ID	Material Name
1	0	Recipe 1
2	0	Recipe 2
3	0	Recipe 3
4	0	Recipe 4
5	0	Recipe 5
6	0	Recipe 6
7	0	Recipe 7
8	0	Recipe 8
9	0	Recipe 9
10	0	Recipe 10

Use the Up/Down arrows to navigate to the recipe that you wish to run.
NOTE: To select Recipe 1 you must first press the down button and then the up button.

Select the recipe with the arrow key which points to the left. [icon] Alternatively you can press the "Load Default Values" button to load the Manual recipe.
This will return you to the Quick Ops screen and the loaded recipe number will appear on the Quick-Ops screen.

**NOTE: Recipe "Save As" Screen**
The Recipe Save As screen is the same as the Recipe Select except that the Load Default Values is replaced by the check box. Select the recipe that you want to save as and press the check box.
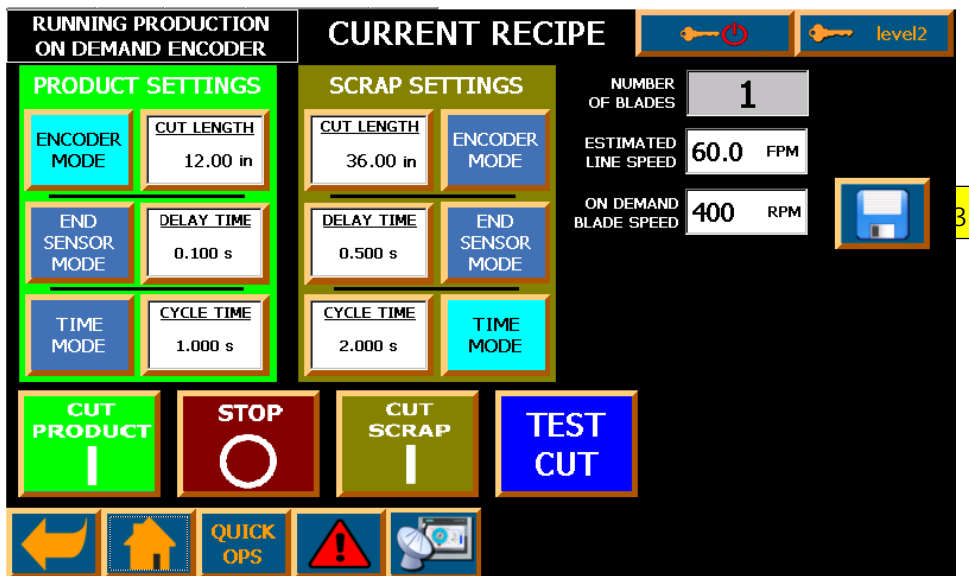
Now that a recipe number is entered you can press the EDIT RECIPE icon [icon] on the Quick Ops screen and the CURRENT RECIPE screen will appear.

12.5 Current Recipe Screen

Note: Similar recipe settings are available for both product and scrap.

Encoder – Press this button to change the mode to cut based on the cut length. The length is typically measured by an encoder but can be set up with other methods.

Cut Length – Set the part length that will activate the cut cycle when in Encoder Mode.

End Sensor – Press the button to change to a cut that is activated by a sensor input. The sensor typically is supplied by the customer.

Delay Time – Set the time in seconds after the end sensor activates to activate the cut cycle. This can be used to trim the length very precisely instead of trying to mechanically move the sensor very small distances.

Time – Press the button to change to a cut that is activated by a repeating internal timer that is accurate to 1 millisecond.

Cycle Time – Set the time from the start of one cut cycle to the start of the next cut cycle.

<u>Level 2</u> or above personnel can use the SAVE 3 button to save the recipe.

If there is a change to the running recipe from what is currently saved, it will appear blue and pressing it will open the following popup screen where the operator can save the recipe under the current number by pressing "Yes" or save it as a different recipe number by pressing "Save As". To cancel the recipe save, the operator can press "No".

Press [↵] to return to the Quick Ops screen.

The operator can choose test cut or cut scrap until the product is satisfactory and then cut product to commence with production as explained on page 17.

12.6 Setting Up Counters
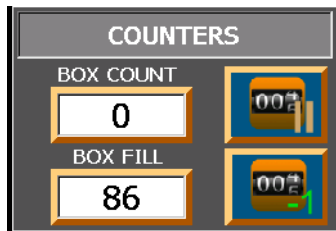
COUNTERS
(Located on the Quick Ops Screen under the EDIT RECIPE icon.) These fields show and control the current batch count. The fields displayed will depend on whether box count is enabled or disabled. The count values may be changed at any time by pressing on the numeric field. For the Box Count and Box Fill fields, a popup will ask you to enter the numeric value or cancel it. The button in the top right corner will appear with the pause symbol if the count is running or it will appear with the green arrow when it is stopped. The button on the bottom right is to remove one part from the count. This can be convenient when the operator finds a bad part and removes it from a box and is especially useful in high speed lines where editing the part count while running is nearly impossible.

Batch Counter Setup Access
This button, located under the Test Cut button, is used to open a screen which contains all of the batch count features. (See Batch Count Screen) Can also be accessed through the HOME screen.

12.7 Production Metrics

(This box is on the Quick Ops screen below COUNTERS) This displays some extra information about the process. The cut rate is based on the time between the last 2 cuts and is rounded off to a whole number. The line speed is what is being perceived by the system. It can be set up to come from many sources including the encoder. The Part Temp is only available with the added option and displays the temperature of the part as it enters the cutter.

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12.8 Quick Ops Screen Versions
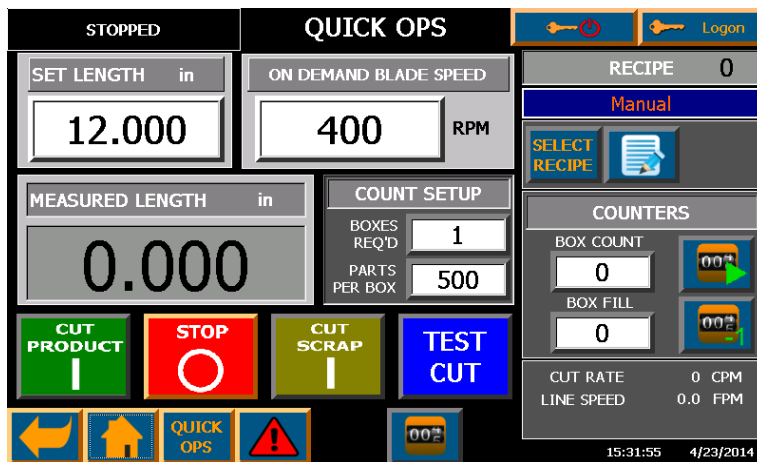
This is the default screen on startup and can also be accessed with the Quick Ops button on the bottom of every screen. It is a quick overview of the current running operation and has only buttons and information relevant to the current mode. This is the screen view without the operator being logged in. It will change look based on operating conditions and user setup selections.

This is the view when the user is logged on as level1 authority but there is an alarm that has caused the system to shut down. If the alarm horn is enabled, the red Silence Alarm button appears in the middle of the screen. notice that the Cut buttons are grey because they are no longer functional. The alarm button also changed colors to indicate a problem.

This is the view with everything operational and the operator logged on. Also the box count was disabled so now only the piece count is visible.
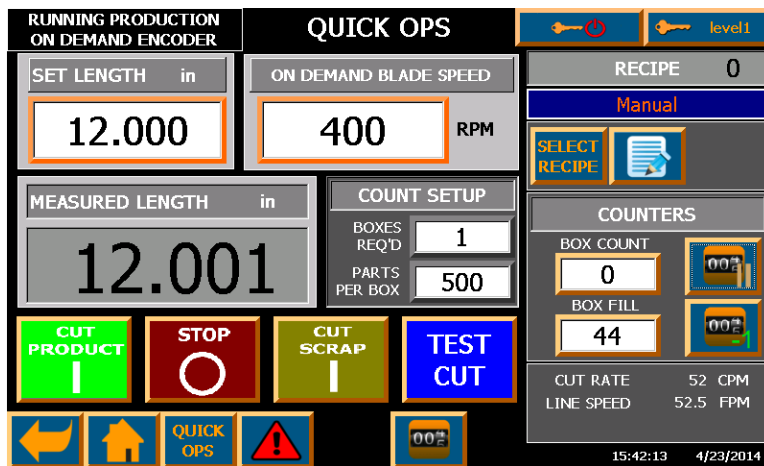
This view shows the system cutting product. The red Stop button has dimmed and the green Cut Product button has lit up. The status box in the top left hand corner has changed to indicate the current mode.

The start count button was pressed and the counters are now incrementing with each cut.
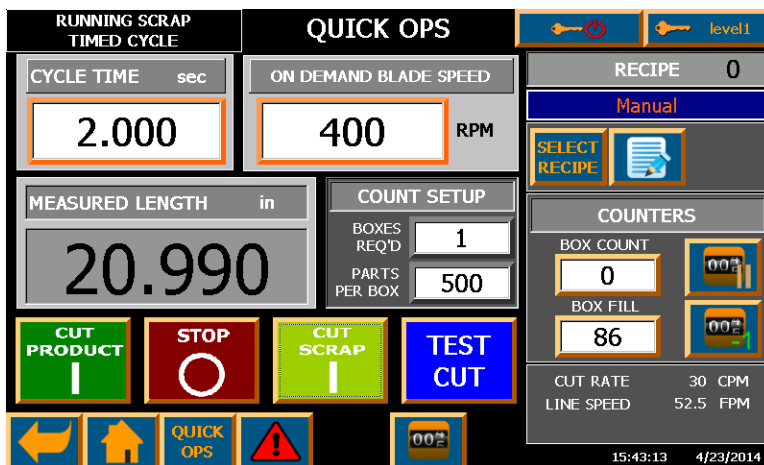

In this view the Cut Scrap button was pressed and it is cutting scrap in timed cycle mode which is indicated in the status box and by the lighted cut scrap button. The field beneath the status box now shows Cycle Time in seconds instead of Set Length in inches. This is the parameter that controls when the cut cycle is activated and is dependent on the operation mode. When stopped, it always shows the mode that is set for cutting product. The modes can be changed on the recipe screen.
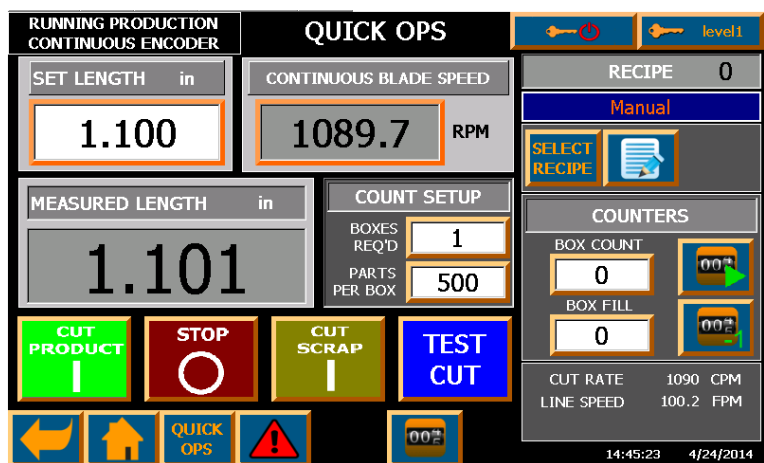
This view shows the machine running continuous mode which is a special encoder mode of operation. This mode is automatically activated when the cut length and line speed causes too little time between cuts for the system to run in On Demand mode. Notice that the blade speed is greyed out. The system automatically adjusts it to maintain the set length based on the line speed. Test cut is not available when running in continuous.

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13.0 SETUP SCREENS
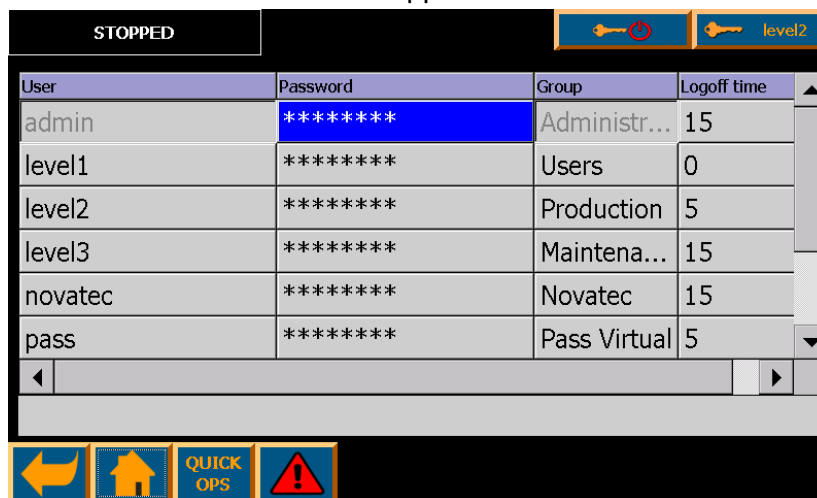
13.1 Accessing the SETUP screens
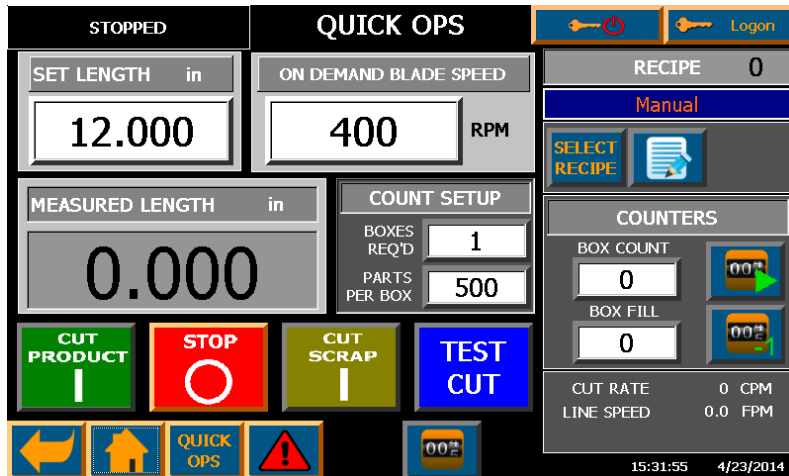
SETUP screens are accessed through the HOME screen. Many entries on the SETUP screens require a Level 3 password.

Press [home icon] to access HOME screen.

Then follow the instructions below to LOGON.

13.2 LOGON

Press [Logon] in upper RH corner of HOME screen and the following screen will appear.

Then press the ******** button next to level2.
An alpha/numeric screen will appear.
NOTE: If the proper level of password protection has
not been entered prior to attempting changes,
the alpha/numeric password entry keypad will appear, prompting the user to input the proper user name and password before changes can be made.

User name and Password factory defaults:
level1   : 1111 (Operator)
level2   : 2222 (Production Supervisor)
level3   : 3333 (Maintenance)
setup   : 4444 (Factory Presets – Setup Group)

Enter 3333 then touch [↵] to return to the HOME Screen.
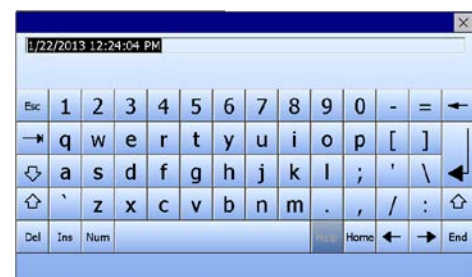
NOTE: Access levels should be assigned to specific levels of personnel to avoid unwanted changes being made to sensitive settings.

13.3 Home Screen

1 **Quick Ops Button** Opens the Quick Ops screen. Same function as pressing the Quick Ops button at the bottom of the screen.

2 **Recipe Select** - Opens the recipe select screen. Same function as on the Quick Ops screen. (Pages 18,19 and 25)

3 **System Setup** - Opens the system setup screen to access extended functions for different machine operations and configurations. Requires Level 3 password for access.

4 **Batch Counters -** Opens the batch counter screen. Has the same function as on the Quick Ops page. (See 13.9 page 33)

5 **Cutter Picture** - Shows the picture and model number for this cutter. If the picture is blank, there was a problem with the servo and PLC communicating. Try cycling power. Contact maintenance if the problem persists.

6 **Installed Software Version** - This is important to note when contacting NOVATEC service.

7 **Time & Date** – If time and date are not correct they should be corrected so ALARMS will have the correct time and date stamp. (See 13.5 page 26)

NOTE:
If either time or date need to be corrected, press [icon] to access SETUP PAGE 1.

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13.4 Recipe Functions

Recipe Number - The gray field on top shows the currently active recipe number.

Recipe Name - The blue field underneath shows the currently active recipe name associated to the number. By default, the recipe name is Recipe followed by the number. It can be set by a level 2 operator on the recipe management page.

Select Recipe - Pressing this button opens a screen for the operator to choose a preconfigured recipe. When the machine is powered up, it will recall the recipe and all changed settings that were present when it was powered down. This makes recovery from power outages as simple as possible. (See Recipe Select Screen)

Edit Running Recipe - The next button, which looks like a piece of paper and pencil, is the Edit Running Recipe button. Pressing this button opens the screens to change all of the settings of the currently running recipe. The cut parameter, on-demand blade speed and count setup values on this page are part of the recipe. They are made available on this page for quick access. There are some items in the recipe that can be changed by the level 1 operator and others require a level 2 operator but all items are visible to both. (See Current Recipe Screen)

Save Recipe - The next button that looks like a floppy disc is used to save the recipe. It is visible to level 2 and higher operators. If the recipe hasn't changed, it will appear grey and will not function. If there is a change to the running recipe from what is currently saved, it will appear blue and pressing it will open the following popup screen where the operator can save the recipe under the current number by pressing "Yes" or save it as a different recipe number by pressing "Save As". To cancel the recipe save, they can press "No".

Special Manual/Default Recipe - There is a special recipe that is used when the operator wants to manually enter in recipe values without accidentally overwriting an existing recipe. They can recall this "Default" recipe when they go to the recipe select screen. The recipe number will show as 0 and the title will be "Manual". This recipe cannot be saved over so it remains constant. It is set to have good known starting values for setting up a new product. (See Recipe Select Screen)

13.5 SETUP SCREEN 1

To change Time and/or Date: Press the appropriate Button and enter the date as: xx/xx/xxxx or the time as xx:xx:xx (24 hour clock).

Press [↵] to return to the SETUP 1 screen.

---

2 Press [👤] to access **User Configuration** to change the usernames, passwords and auto-logoff times. See 13.3 on page 23. You can assign specific personnel or personnel levels for each of the access levels.

All items on this page are accessible to be changes by a level 2 or higher user. **The arrow** [**3**] **to go to the second setup page will only appear for level 3 and higher users.**

SYSTEM OPTIONS
Enable/Disable Scrap Mode – Press this button to Enable Scrap Mode.
Imperial/Metric Units – Press this button to toggle the display units between English and Metric.
AT END OF BOX
Count Triggers - Triggers change in machine operation when part count reaches end of box and production. Is the same function as on the Counter Screen.

PRODUCTION OUTPUTS 1 - There are two dry contact outputs supplied in the control panel. Q0.0 corresponds to Production Output 2 and Q0.1 corresponds to Production Output 1. They can be configured to trigger on many events including Part Cut, Box Change, Production Done, Running, Run Product, Run Scrap, Stopped or Faulted. The signal can be delayed and held for a user settable amount of time. They are not high speed response signals. There is a typical lag of about 30 ms with an error of +/-10 ms. If a higher speed, more precise output is required, option NC8016 shown on schematics is required. Sales must be contacted to ensure the proper form of the output device.

LENGTH DISPLAY HOLD TIME - This value determines how long the display will show the last cut length before showing the accumulated length of the next part. Set it to zero to always show only the last cut length. It is recommended to be set to at least 500ms. Parts that are cut faster than 500ms may be difficult to see no matter the setting.

END SENSOR MASK
RESET TIME
0.05 sec
RESET CONDITION
None

END SENSOR MASK
It is commonly required to mask the end sensor signal after activation to prevent subsequent activations. Set the timer value to prevent a second activation until the time set has expired. Never set the value higher than the time between cuts or cuts will be missed. The mask can be can also be configured to reset on either the positive or negative going production signals or by a customer provided signal to input 1.0 on the PLC.

13.6 SETUP Screen 2

This screen is used to set some of the more advanced features of the equipment. All of the items on the left column require a setup authorization. Everything else can be accessed by level 3 authorization.

STOPPED   SETUP 2   level2

ENABLE TEMP SENSOR
BUSHING SENSOR INSTALLED
TEST CUT CONFIRM REQUIRED
WEB SERVER ENABLED

STARTUP LOGON
NONE

ENCODER SETTINGS
ENCODER COUNTS/REV   10000
WHEEL CIRCUMFRENCE   12.000 in

ON DEMAND LENGTH REF
Encoder Position

CONTINUOUS SPEED REF
Encoder Position

AUDIBLE ALARM TYPE
FAULT   SLOW BEEP
WARNING   SHORT BEEP
COUNT   FAST BEEP

Beep Times(ms)
	CYCLE	ON TIME
Fast	600	300
Slow	1600	800
Short	3000	200

QUICK OPS

ENABLE TEMP SENSOR
BUSHING SENSOR INSTALLED
TEST CUT CONFIRM REQUIRED
WEB SERVER DISABLED

ENABLE TEMPERATURE SENSOR – This field enables the temperature display on the Quick Ops Screen. This is an optional item that must be purchased separately or the end user must install their own device.
BUSHING SENSOR INSTALLED – Press this to enable bushing sensors if they are installed. Sensors are not installed on systems that have permanently installed bushings.
TEST CUT CONFIRM REQUIRED - This button toggles the requirement for the popup window to confirm a test cut. To avoid accidental activation, the test cut button will require it be held for 1/2 second.
WEB SERVER ENABLED/DISABLED - Toggles the availability of the screens to be accessed from another HMI or web browser. If it is enabled without the required license installed, an annoying message will appear every few minutes.

STARTUP LOGON
NONE

STARTUP LOGON
All machines ship with the user login set to none as default which means the operator must log in to start the machine. The system can be set so that it is always level 1, level 2 or level 3 when it starts or is logged off. Be careful when setting it to higher levels because it may give unintended access to features which operators don't understand.

ENCODER SETTINGS

Encoder Counts/Rev – The number of quadrature pulses per revolution of the encoder. (If it is 2,500 ppr quadrature then the value is 10,000)

Wheel Circumference – Distance for one revolution of the encoder, typically the circumference around wheel connected to encoder.   If the encoder is measuring slightly off, change this value to correct.

ON DEMAND LENGTH REFERENCE – Choose the measuring method that the system will use to activate the cut sequence when using encoder mode.

None – The length is calculated based on the Estimated Line Speed entered by the operator in the recipe. This is useful for setup or when the customer wishes to enter the puller speed manually.

Encoder – The encoder input pulses are used to determine the length.

ProfiNet – An Ethernet connection between a Novatec supplied puller and the cutter is required. The puller transmits its actual speed every 1/10 seconds and the cutter uses this to calculate the accumulated length. It calculates the point between the 1/10 second data by assuming the last received speed to get very accurate cuts.

CONTINUOUS SPEED REFERENCE – This has the same options as the length reference but is used to determine the speed reference when running in continuous. It is possible to use different modes for each depending on how stable a signal is. The signals should be nearly identical or unpredictable switching might occur when changing between On Demand and Continuous modes.
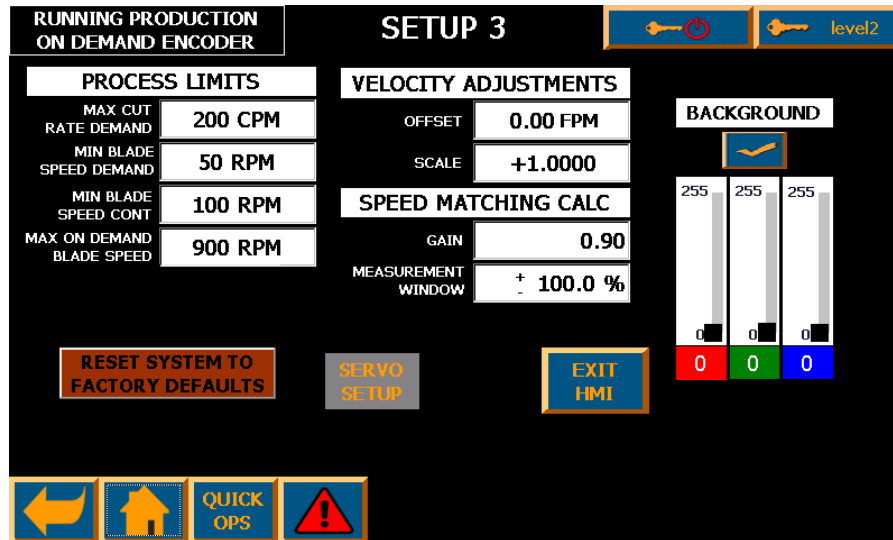
AUDIBLE ALARM TYPE

This is used to configure the horn sounds. Different sounds can be set for Fault, Warning, and when the Count gets to set values. the choices are None, Slow Beep, Short Beep, Fast Beep, and Continuous. Each beep duration and cycle time can be customized so that operators can distinguish between machines audibly.

13.7 SETUP Screen 3

All items on this page require setup authorization except for Exit HMI and background color.

PROCESS LIMITS – Determine the blade speed limits and the points at which the cutter will switch between On Demand and Continuous Mode.
Max Cut Rate Demand – This determines the minimum time between on Demand cuts. It also determines when the system should switch to continuous mode.
Min Blade Speed Demand – Sets the minimum speed that can be entered as the On Demand blade speed on the recipe screen.
Min Blade Speed Cont – Sets the minimum permissible RPM of the blade in continuous mode. Typically this is set to a value which can still give a good cut to the product.
Max On Demand Blade Speed – This sets the maximum blade speed for On Demand cutting. This will be limited by the max motor speed and is typically set by NOVATEC so that the drive does not fault when accelerating and decelerating and the overall system can handle the forces of the blade motion.

Note: It is possible to make settings where there are line speeds that cannot be handled by Max On Demand CPM or Minimum Continuous Mode blade speed.
The Max continuous speed is the max speed of the motor and the gear box. It is possible to run the continuous speed so fast that when it stops or transitions to On Demand Mode, the drive faults.

VELOCITY ADJUSTMENTS - Adjusts the velocity so that the received velocity creates parts of the correct cut length.
Offset – Adds the value in the offset to the value read.
Scale – Multiplies the value in the scale to the value read.

SPEED MATCHING CALC – Sets the characteristics for how the cutter responds to the speed signal when running continuous mode.
Gain - Determines how fast the cutter will respond to changes in line speed. Setting it to .99 will make it react immediately but can cause oscillation. A typical setting it between 0.5 and 0.8.
Measurement Window – This will determine what values outside the range of the set line speed will be ignored as noise. Three consecutive readings outside the window will cause the cutter to stop. Setting it to 100% effectively overrides it.

Screen BACKGROUND Color - Select the Red, Green and Blue content using the sliders or the numeric entry fields. The area around the check box will show the new background color. When the color is ok, press the checkbox to change the background colors of all the screens. Black(0,0,0) is the default background color.
Care should be taken to not use very bright colors or colors that match other fields because they will bleach out some items.

RESET SYSTEM TO FACTORY DEFAULTS
Pressing this button will set all of the setup values to the defaults for the type of machine detected. A drop down box will appear to accept or cancel. **This should only be pressed if the setup values were altered such that the machine cannot run properly.**

SERVO SETUP – This button is for maintenance and experienced operators only. Pressing this opens the detailed setup information for the blade servo. This button will be greyed out if the system is running.
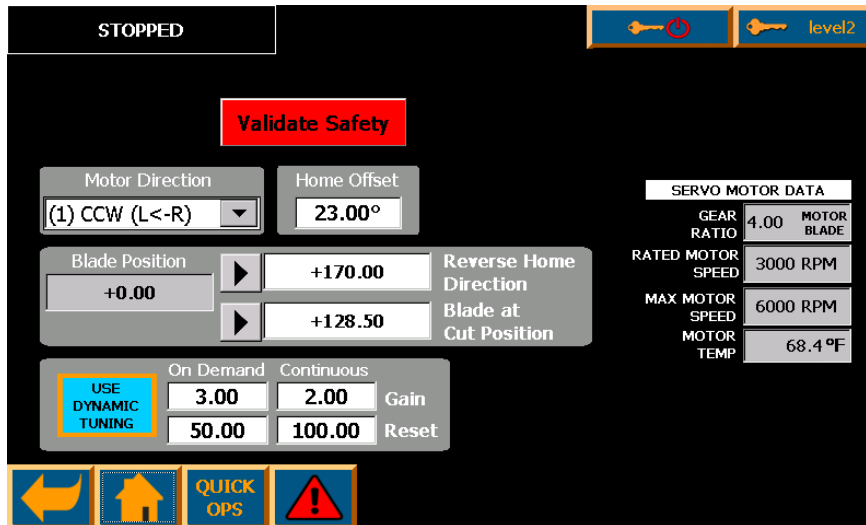
EXIT HMI
This button is for maintenance persons only. It will stop the operator interface program and return the unit to the Windows CE operating system. All control of the machine is lost until the program is restarted or power is cycled. The emergency stop will still be functional.

13.8 Servo Setup Page

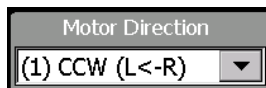This page is for maintenance and experienced operators only.

CAUTION: Great care should be used when accessing this page. Incorrect values could make the equipment unusable.

 Validate Safety – This button is only used when commissioning the servo system or if a component is replaced. The procedure checks the components of the system against the safety program written and ensures that they are compatible. Because components and software can be upgraded at later dates, the test must be performed even if the component being changed is the same type. The validation components are the servo motor, encoder, power module, control unit, program and CF card. The safety license is stored on the CF card. If it is missing, an alarm warning will be displayed but the system is still operational.

 Motor Direction – The motor direction is set when the machine is first commissioned based on the hardware used. It is dependent on the machine being fed from the left side or right side.

 Home Offset - When the machine is first powered up, it homes to a sensor and then moves an offset and sets this as the final home position. This is so that a machine with 2 blades will not stop with one of the blades in the cut area and to maximize the cut energy. It can set for the blade being used. To perform the home offset, enter a new offset in degrees and cycle power to the machine. This will be the new zero or home position.

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Blade Position – This shows the current position of the blade in degrees relative to the home offset position. To set either of the positions to the right, move the blade to the desired position and press the arrow to save the position. A confirmation will appear in the numeric field and you must accept or cancel.

Reverse Home Direction – This position sets the position of the blade where it will go backwards or forwards to home. If the position is lower than this value it goes backwards to home, otherwise it goes forward to home. When homing on power up, the blade always homes in the forward direction. If there is product in the path of the blade, it will obstruct the blade or it will be cut. If 2 blades are installed and the system is stopped improperly with the Emergency Stop, the blades will stop immediately where they are. When the system is powered up, there is a 50% chance that the blades will need to move through the product to get home and therefore the product will need to be removed to allow the blade to move to home.

Blade at Cut Position – This sets the position of the blade where it counts the product. It is usually set when it is completely through the product.

USE DYNAMIC TUNING
Dynamic tuning is used to change tuning parameters when running between on-line and continuous.

On Demand operation requires an extremely fast response with large acceleration torques being used.
Continuous mode prefers a slower response to maintain the set speed in a tighter tolerance.

The values shown in the window can be adjusted to account for changing loads and aging of the equipment. Be very careful changing any of these. Improper settings could cause the servo to become unstable, loose torque or continuously fault. Dynamic tuning can be turned on and off with the button. The servo will use the parameters that were running when it was turned off.

SERVO MOTOR DATA– These settings are for reference only. The values are read by the drive and depend on the equipment installed.
Gear Ratio - Shows the gear box attached.
Rated Servo Speed - Rated speed of the motor at rated torque at 400V. It can be affected by the ambient temperature and supply voltage.
Max Servo Speed – This is the maximum possible speed that the motor can obtain though torque will be reduced from the nameplate rating.
Motor Temp – The temperature of the motor. Most motors can handle temperatures up to 140C. Frequent heating and cooling of the motor can cause premature damage.

13.9 Batch Counter Screens
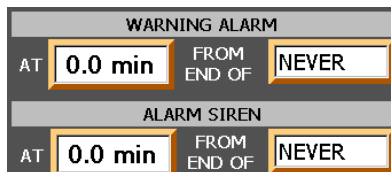(Accessed through Home Screen)

Counter Screen with Box Count Disabled   Counter Screen with Box Count Enabled

Most of the fields are duplicates of what is on the Quick Ops screen. The following explains the extra buttons.

 Count Reset - Press and hold to reset the counters.

 Warnings and Alarms - Signals can be set to activate a warning message or sound a siren when production reaches a certain point. The system calculates the time remaining at the current production rate and determines if the alarm should activate. Set the time in minutes and tenths of minutes and the event to activate the alarm which can be Never, End Of Box, End of Production, or Both. The Warning Alarm will active a warning message the same way as any other. The Alarm Siren activates the horn only which can be silenced on the Quick Ops Screen. The siren must be configured in the system set up to activate.
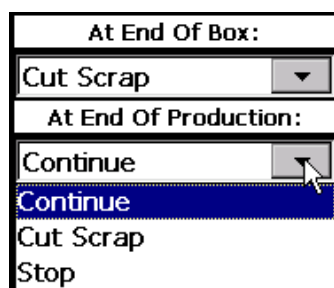
 At End of Box: - (Requires box count to be enabled). Used to determine the action of the cutter when the part count has reached the end of box.
At End of Production: – Used to determine the action of cutter when the part count has reached the total pieces setting.
Continue – The cutter keeps cutting the same product and counter keeps incrementing
Cut Scrap – If scrap mode is Enabled, the cutter will execute the   scrap recipe and the counter will not increment.
Stop – The cutter will stop.

 Enable/Disable Box Count - Press this button to change the counting mode. Box count is enabled if the button is bright.

14.0 MAINTENANCE

It is recommended that maintenance and inspection be performed on a scheduled basis. Maintenance requirements may vary widely for each installation and specific operating conditions. It is suggested that a complete inspection be performed with necessary maintenance at the end of the first month, the first three months, and the first six months. These inspections will indicate how often future maintenance will be necessary.

- ❑ All electrical, mechanical repairs and tests are to be performed by qualified personnel only.

- ❑ Disconnect electric power from control box before opening panel for maintenance.

- ❑ Depressurize pneumatic system before performing maintenance or repairs on pressure containing components. Check all pressure gauges to ensure that depressurization has occurred.

- ❑ Cutter enclosure may be hot. Components inside the enclosure will be hotter than the air inside, especially the servomotor and resistor.

- ❑ Do not disable or bypass equipment safety features.

- ❑ Refer to system component manuals for additional information.

⚠ WARNING: Before beginning repair work, disconnect all power sources and secure against inadvertent reconnection.

⚠ WARNING: Auxiliary equipment may contain moving parts that may cut, crush, or otherwise injure personnel when safety/access covers are removed.   Do not place hands or limbs in equipment during operation.

At Startup

- ❑ Verify all guards are in place and able to be fully closed.

- ❑ Ensure blades are attached securely.

- ❑ Record equipment Serial Numbers and the NC Controller program revision level.

Every bushing or blade change

- ❑ Verify free motion of blade(s) past bushings and that bushing gap is properly set

Daily

- ❑ Clean bushings and lubricant tray.

Every 3 Months

- ❑ Check all electrical connections to make sure that they have not become loose, especially those connections at contactors, like motor starters.

15.0 WARRANTY – NOVATEC, INC. - EFFECTIVE DATE 6-12-2012

NOVATEC, INC. OFFERS COMPREHENSIVE PRODUCT WARRANTIES ON ALL OF OUR PLASTICS AUXILIARY EQUIPMENT. WE WARRANT EACH NOVATEC MANUFACTURED PRODUCT TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP, UNDER NORMAL USE AND SERVICE FOR THE PERIODS LISTED UNDER "WARRANTY PERIODS". THE OBLIGATION OF NOVATEC, UNDER THIS WARRANTY, IS LIMITED TO REPAIRING OR FURNISHING, WITHOUT CHARGE, A SIMILAR PART TO REPLACE ANY PART WHICH FAILS UNDER NORMAL USE DUE TO A MATERIAL OR WORKMANSHIP DEFECT, WITHIN ITS RESPECTIVE WARRANTY PERIOD. IT IS THE PURCHASER'S RESPONSIBILITY TO PROVIDE NOVATEC WITH IMMEDIATE WRITTEN NOTICE OF ANY SUCH SUSPECTED DEFECT. WARRANTED REPLACEMENT PARTS ARE BILLED AND SHIPPED FREIGHT PRE-PAID. THE PURCHASER MUST RETURN THE SUSPECT DEFECTIVE PART, FREIGHT PREPAID AND WITH IDENTIFYING DOCUMENTATION TO RECEIVE FULL CREDIT FOR THE PART RETURNED. NOVATEC SHALL NOT BE HELD LIABLE FOR DAMAGES OR DELAY CAUSED BY DEFECTS. NO ALLOWANCE WILL BE MADE FOR REPAIRS OR ALTERATIONS WITHOUT THE WRITTEN CONSENT OR APPROVAL OF NOVATEC.

The provisions in equipment specifications are descriptive, unless expressly stated as warranties. The liability of NOVATEC to the purchaser, except as to title, arising out of the supplying of the said equipment, or its use, whether based upon warranty, contract or negligence, shall not in any case exceed the cost of correcting defects in the equipment as herein provided. All such liability shall terminate upon the expiration of said warranty periods. NOVATEC shall not in any event be held liable for any special, indirect or consequential damages. Commodities not manufactured by NOVATEC are warranted and guaranteed to NOVATEC by the original manufacturer and then only to the extent that NOVATEC is able to enforce such warranty or guaranty. NOVATEC, Inc. has not authorized anyone to make any warranty or representation other than the warranty contained here. Non-payment of invoice beyond 90 days will invalidate the warranty. A renewed warranty can be purchased directly from NOVATEC.

Please note that we always strive to satisfy our customers in whatever manner is deemed most expedient to overcome any issues in connection with our equipment.

Warranty Period:

Note: All warranty periods commence with the shipment of the equipment to the customer.

NPS Bessemer Series Pullers = 5 Years

C Bessemer Series Cutters = 5 Years

NC Bessemer Series Cutters = 5 Years

Custom Built Equipment = 1 Year

Exclusions:

Routine maintenance/replacement parts are excluded from the warranty. These include, but are not limited to: belts, knives, hoses, gaskets, motors, internal solenoids, fuses and motor brushes. Use with abrasive materials will void the warranty of any standard product. Wear resistant options may be available to extend usable service life with abrasive materials. NOVATEC reserves the right to limit the warranty if the customer installs replacement parts that do not meet the specifications of the original parts supplied by NOVATEC.

This warranty shall not apply to equipment:

1. Repaired or altered without written approval of NOVATEC unless such repair or alteration was, in our judgment, not responsible for the failure
2. Which has been subject to misuse, negligence, accident or incorrect wiring by others
3. Warranty is void if processing rates exceed manufacturer-recommended levels or if damage is caused by ineffective power isolation and/or power spikes/sags or incorrect installation.

NOTE: All conditions and content of this warranty are subject to changes without notice.

NOVATEC, Inc.
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