USER GUIDE

Rotary Knife Cutter

MODELS:
> **NC-5-HD**
> **NC-5-HD-LF**

In the space provided below you should record the model and serial number(s) of your equipment and the date the equipment was received.

In the event you would need aftermarket assistance our parts and service department uses this information, along with the manual number, to provide help for the specific equipment installed.

Please keep this instruction manual, any relevant addendums, engineering prints and parts lists together for accurate documentation of your equipment.

User Manual: **NC-5-UG 5 AUGUST 2019**

Serial Number(s):

Model Numbers:

NOTES

Table of Contents:

1.0 PURPOSE OF THIS MANUAL

This manual describes the installation and operation of the NOVATEC Model NC-5 HD 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.**

2.0 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. The Novatec NC-5 cutter is equipped with a safety rated servo and a control system that allows it to be safe to access the blade guard error without removing power from the machine. The safety system can exe-

cute 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 blade movement for Safe Standstill which is interlocked via redundant safety relays to a safety rated contactor between the drive and motor and a guard lock interlocked to the contactor. 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.

In order to fully meet the requirements for a SIL-3, additional guarding must be installed by the end user where the extruded material enters and exits the bushing area. The guarding required will depend on the extrusion size and profile.

To meet the requirements for a SIL-3 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 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 warning 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, NC-5 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 16" diameter flywheel 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.

4.0 PRODUCT FEATURES

- 16" high torque flywheel
- ON DEMAND cutting
- CONTINUOUS cutting
- Accepts standard 5-1/4" diameter bushings
- Blade speed adjustable for maximizing cut quality
- Apex Dynamics 5:1 speed reducer
- Taper lock shaft bushing hardware
- 8000 count per revolution motor encoder
- 2500 count quadrature cut length encoder with 12" circumference measuring wheel
- Knife thicknesses of .025, .032", .039", .047", .062" available; Blades shaped and sharpened to meet custom application requirements
- Safety interlocks, bushing sensors and speed safety sensor provided for operator safety
- Downward sliding door provides full access to flywheel and cutting fluid reservoir
- Split clamp bushing arrangement provides easy bushing setup
- Indicator lights for machine status indication
- 5-Year Warranty

5.0 SPECIFICATIONS

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 150 cuts per minute. The blade does not continuously rotate, but instead starts and stops as needed.
- CONTINUOUS cutting mode allows up to 800 cuts per minute by continuously rotating the cutter head at a speed sufficient to cut the desired length at the measured line speed.

5.1 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 shows 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 test were performed with 480VAC at 75F.

5.2 Performance Data

NC-5-HD — Max Skimitar Blade Speed 700 RPM Continuous

NC-5-HD — Max Sharkfin Blade Speed 700 RPM Continuous

Model Number	NC-5
Bushing Diameter	5 in.
Maximum Profile	4.5"x7.5"
Power - Hp	5"
Max Continuous Speed (rpm)	11.8
Maximum On Demand Blade Speed	700
Maximum Peak Torque (in/lbs)	750 RPM @ 34 CPM
Cutter Head	16 in. Dia. X 1" Flywheel
Bushing Discharge Location	Above Flywheel center

*Higher rates may be available for certain applications with specific cutter. Single and multiple blade configurations.

6.0 UNPACKING

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 follow- ing 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 GROUND-ED TO PREVENT "SHOCKS" FROM STATIC ELECTRICITY THAT IS GENER-ATED 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.

7.0 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 or18 inch adjustable wrench. Ensure that the cutter is level.

7.1 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 up to 5 seconds for the door to unlock; open the bushing guard (yellow cover).

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) according to the following pictures depending on the blade type specified.

Note the location of the Homing Flag Nut in reference to the Blade and Counterweight.

(Note: All pictures are for right hand machine. Actual installation will be reversed for left hand machines)

Tighten the knife and counterweight securing hardware to 140 inch-pounds of torque.

Check that the new blade fully extends through the bushing so that the entire product is cut. Always check the blade(s) to bushing clearance after installing a new blade(s) by rotating the cutter head manually and in-specting 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.

Scimitar Blade
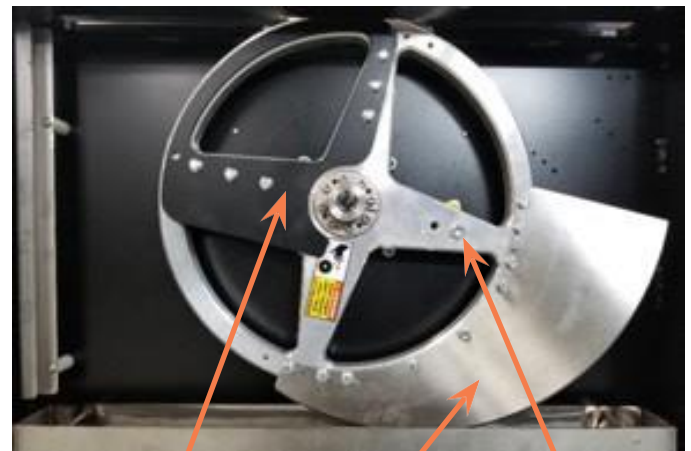
Blade Counterweight   **Homing Flag Nut**

Scimitar Blade

Single Sharkfin Blade

No Blade Counterweight

Sharkfin Blade

Homing Flag Nut

2 Sharkfin Blades

Sharkfin Blades

Homing Flag Nut

No Blade Counterweight

7.2 The Bushing

Ensure the cutter has stopped rotating; rotate the key switch clockwise to "UNLOCK" (2 o'clock) and waiting for the door to unlock before opening the bushing guard (yellow cover). Loosen the bushing by loosening the 12mm socket head set screw located on the top of each 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.

7.3 Bushing Sensors

⚠ **Each bushing sensor must be checked to ensure proper operation. With the blade removed, power the machine on and rotate the key switch clockwise (to 2 o'clock) to allow opening of the** bushing guard, Verify that the lights on the proximity sensor are on. Remove each bushing and verify that the lights on the proximity sensor go off. This is an important check as you are verifying that the sensors are properly adjusted sensing the absence of a bushing. Reinstall blade and readjust bushings as indicated in the previous sections.

7.0 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.

1. Use shielded cable for communications wiring.

2. 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.

3. 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.

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.

⚠ **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.

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.

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.

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

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

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

4. 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.

5. Solid Green – Cutter is Running Production
The system is cutting production/good parts.

6. Flashing Green/Orange – Cutter is Cutting Scrap
The system is cutting scrap/bad parts.

Note: A piezoelectric horn is provided and can be configured to activate on warnings, faults or when counts reach certain points. See the machine setup section for detailed information on how to set up the horn. It may be disabled completely as well.

9.0 SYSTEM SETUP

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.

Splash Screen

While the system is booting up the screen will first be blue with a few icons and then a splash screen will appear until the communications between the equipment devices has been established. This screen typically only shows up for about 5 seconds. If it doesn't go away after 30 seconds, there is a problem with the equipment and it should be looked at by maintenance. The indicator light will turn red when the main processor program starts running.

The system will then lead the operator through a guided startup or Wizard. It will monitor sensors, safety interlocks, system status, buttons and switches to quickly start production. The operator will only be shown the information and instructions required to get production running. Following is the screens that might appear depending on the monitored items.

9.1 Wait for Servo to Connect

This screen will almost never be seen by the operator. Typically, the servo has established communication with the main processor by the time the display is ready. When the main processor connects to the servo, the Servo Offline will change to Servo Online and it will turn green. Once the servo has established it's connection the program will be evaluated for compatibility and the Servo OK will turn green.

9.2 Verifying Motor and Drive

Verifying Motor and Drive

The servo will be queried about the components and the program chip installed and compare it with that stored in the main processor to ensure that he correct components are installed and are operating properly. The progress bar will turn blue as each of the communications is completed.

Note: To speed up the startup, this step may be skipped by overriding it in the servo settings.

9.3 Bushing Check

Both Bushings Must be Installed

BUSHING 1   BUSHING 2

Green When Installed

If the bushings are installed and the sensors are working properly, this step will be skipped. If the bushing sensors are on, the field will turn green.

Note: If the customer specifies permanently installed bushings, there will be no bushing sensors and this step is skipped.

9.4 Release Emergency Stop

EMERGENCY STOP ONLY

Rotate the Emergency Stop Switch Clockwise to Release.
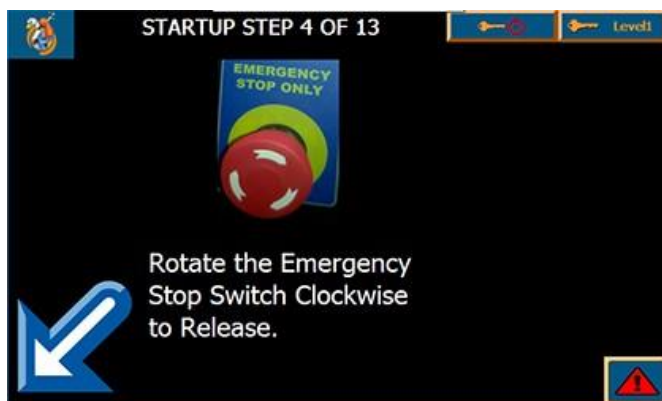
If the Emergency Stop is Pressed, the operator must release it by turning it clockwise.

9.5 Lock the Knife Guard

KNIFE GUARD LOCK/UNLOCK

Turn the Knife Guard Key Switch to the Locked Position

If the knife guard switch is in the unlocked position, the operator must turn it counter-clockwise to lock it.

9.6 Check the Knife Guard Interlock

Inspect Safety Interlocks. Make sure they are Engaged and Not Overridden.

EUCHNER

If the system detects that the interlock is not closed, the operator must fully close the interlock and make sure that the interlock override screw switch is in the locked position.

Note: The interlock might sometimes appear closed but may not be fully engaged due to misalignment or debris stuck in the guard. Remove any stuck debris and press down on it to make sure it is engaged.

9.7 Power On the Safety System

Press the Reset Button to
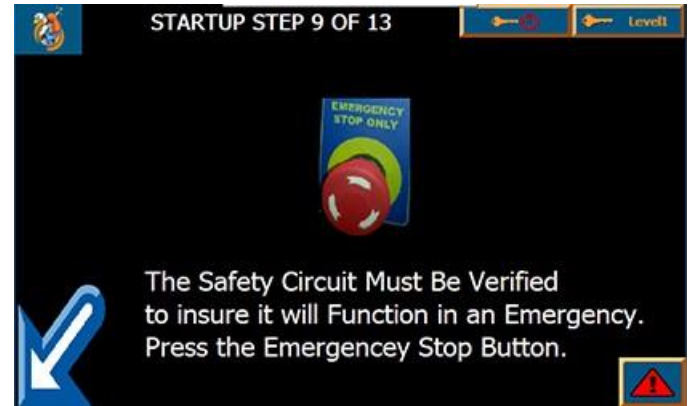Power On the Safety System

RESET E-STOP

Once all of the physical safeties are satisfied, the operator must now press the Reset Button to engage the safety circuit. The Indicator Light will turn orange to indicate the warning condition that the safety system must be verified. If it is still red, a servo fault has occurred and the operator must go to the fault page for details by pressing the button in the bottom right hand corner. The most likely cause is because the safety contactor has not engaged properly.

## 9.8 Wait for Servo Power On

PLEASE WAIT

The operator must now wait for 1 second for the servo system to fully power up. The clock hand will turn clockwise until the time has expired.

9.9 Test the Safety System

EMERGENCY STOP ONLY

The Safety Circuit Must Be Verified
to insure it will Function in an Emergency.
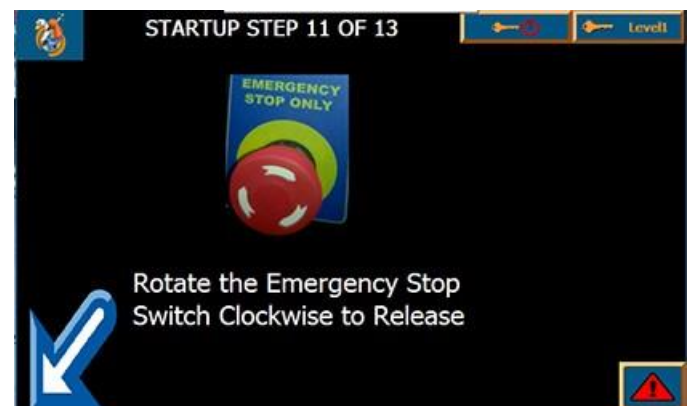Press the Emergencey Stop Button.

The safety electrical components must now be tested to verify that they are all functional to be sure that they will work in the event they are required for a true emergency. The operator must press the Emergency Stop Button. If everything is working properly, the servo and safety contactor before the motor will power down. If this does not occur, something within the electrical components has failed. The red indicator light will turn on in either case.

9.10 Wait for Servo Power Off

PLEASE WAIT
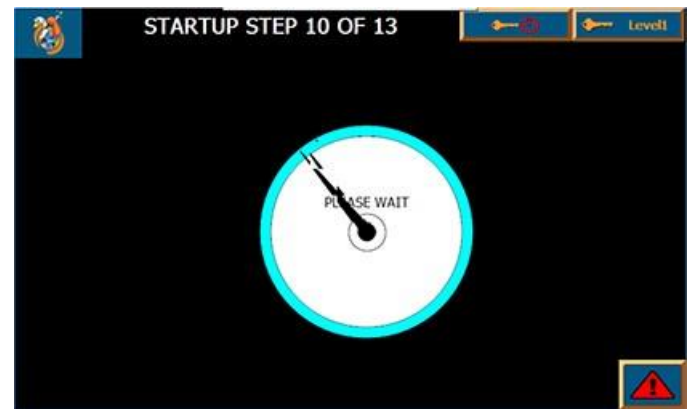
The operator must wait ½ second for the servo to power off and verify that the system is safe.

9.11 Release Emergency Stop

EMERGENCY STOP ONLY

Rotate the Emergency Stop
Switch Clockwise to Release

The emergency stop button must be released again to satisfy the safety system.

9.12 Power On the Safety System

Once all of the physical safeties are satisfied, the operator must now press the Reset Button to engage the safety circuit and start the servo homing process.

9.13 Servo is Homing

The blade will now turn until the blade holder screw lines up with the sensor. The Indicator Light will blink orange to indicate the homing condition. If the light turns red immediately, the servo has faulted. The two typical issues are an obstruction to the blade rotation or the home sensor did not detect the homing flag. When the homing cycle is complete, the Quick Ops page will be displayed.

9.14 Servo Homing Complete

The Quick Ops screen will appear once homing is complete.
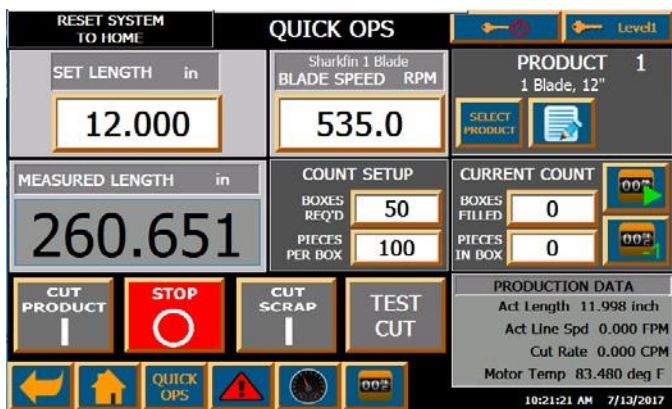
10.0 SCREEN CONVENTIONS AND COMMON ELEMENTS

10.1 Button Borders

 Any item which can be pressed to activate will appear with a border. The buttons will appear bright if they are on or dim if they are off. If the border is gray, then the current user logged on does not have access to activate the operation. Pressing a button with a gray border will show a pop-up screen prompting them to enter a user name and password.

10.2 Greyed Out Button

 A button or field with a gray background cannot be activated. Pressing it will show a message pop-up explaining what is required to allow the button to become active.

10.3. Screen Template

Every Screen will have the items shown above for consistency, quick status information and quick navigation to the major screens. The body of each page will be in the blank area.

10.4 Logout/Logon

 These two buttons will appear in the top right corner of every screen. The left button is used to log out and will return the system to the default logon state set in the machine settings. The right button will display the current user logged on or it will say "Logon" to indicate that no one is logged on. Pressing this button will show a pop-up for the operator to enter a user name and password.

10.5 Screen Title/Quick Help

HOME The screen title is in the top center of every screen. Pressing the title will show green question marks, ??, over every field on the screen. Press on one of the ?? to bring up help information specific to the field. Press the title again to make them disappear.

The Quick Help information is in .pdf files on the HMI SD card and can be customized by the end user.

10.6 Machine Status

RESET SYSTEM TO HOME In the top right hand of every screen will be the current running status of the machine.

10.7 Standard Navigation Buttons

These 5 buttons appear on the bottom of every screen for quick navigation to other screens.

10.8 0p Bullet Text

Returns the operator to previous screen. Will store up to 10 screens.

- Home Button – Goes to a home screen to access all machine functions.
- Quick Ops Button - Goes to the main operations page to load product and make adjustments.
- Alarm Button - Goes to the alarm page where current and past alarms can be viewed.
- Dashboard Button - Goes to the product over-view screen to monitor the running production.
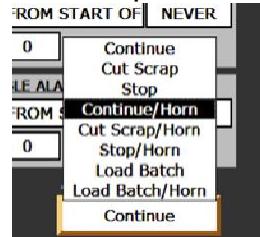
10.9 System Date and Time

10:21:21 AM 7/13/2017 Appears in bottom right of every screen

10.10 Toggle Buttons
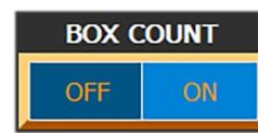
BOX COUNT OFF ON Toggle buttons will be shown with both choices. The current condition will always be the brighter blue box. Press the bull blue box to change the state.

10.11 Drop Down Selectors

Used when there are multiple choices for a setting. Pressing the field creates a list of items to choose from. Typically the choices will be below the field, unless it doesn't fit on the page, and then they are shown above the field. In order to make a selection, press on the text and not on the white space around it. These boxes are often difficult to activate properly with you finger and may require a soft, blunt object like a stylus. If there are more items to choose from than will fit in the list area, a scroll bar will appear on the right of the list. You can scroll by dragging your finger anywhere in the box area.

10.12 Recipe Editor Screens

The editor screens follow a common format which uses Selection Tabs on the left side of the screen to access related fields. Press on the tab to open the screen with fields for that item. The selected tab will be highlighted with black text on a light gray background. Some tabs may not be visible depending on installed options. All of the edit fields will appear inside the central gray square with the colored border. The colored border is an indi-cator of the safe nature of the items in the edit field. A green border indicates that changing the items will not adversely affect anything if improper changes are made. An orange border indicates that the items can affect the performance of the machine if not properly set. A red border indicates that the items, if changed improperly, can cause the machine to not function at all.

- **Save Button** - This button is grayed out until a change is made. If the background is blue, pressing the button will save the changes.

- **Download Button** – Press this button to send the changes to the main processor and activate the changes. This button may be greyed out if the changes cannot be executed due to the machines current operating status.

10.13 Recipe Select Screens

Whenever you must choose a recipe from a list, this screen is displayed. When it first comes up. A "Please Wait" message will obscure the selection field while the recipe data is loading. This usually only lasts about 2 seconds but may take up to 15 seconds if all 449 recipes are being used.

- **Selection Bar** – The selected item is highlighted with the arrow pointing to the recipe and the grey box surrounding the text. Pressing any of the text on another line will move the selection to that location.

- **Scroll Up/Scroll Down Buttons** – These buttons are used to display the next or previous recipes in the series. The number printed on it is the number of items that it will be scrolled up or down. The list wraps around if the list is at its end or beginning.

- **Load/Select Recipe Button** – The blue circle with the down arrow is used to load the selected recipe which means that the information is sent to the main processor to run. The select button (check mark) may appear instead of the download button to select the item without it being downloaded.

- **Copy Recipe Button** – Copies the selected recipe to an internal butter to be able to paste it at another location.

- **Paste Recipe Button** - Will copy the contents of the internal buffer to the selected recipe. If no recipe has been copied, the button will appear gray and will not do anything.

- **Edit Recipe Button** – Will open the editor with the selected recipe. This will not affect the running recipe.

Delete Recipe – This will remove all data from the selected recipe and replace it with the User Default Recipe. The default recipe is used because loading an empty recipe would cause the machine to not be operational. The border is gray because only a setup user can delete recipes.

11.0 UNDERSTANDING MACHINE OPERATION

11.1 Cut Modes

- Length – Sets the length of the part to be cut. For lower cut rates, it will activate in On Demand operation. If the cut rate increases beyond the ability of the blade to execute the On Demand cut, it will transition into Continuous operation where the blade will run at a calculated speed to cut the part length required. If the line speed changes or the operator changes the length, the system will automatically adjust the continuous speed or transition between On Demand and Continuous operation to cut the part at the specified length. The line speed and accumulated length are typically read by an encoder but can also be changed in the settings to be read by a tachometer, an analog signal, via communications, or calculated by the operator setting an estimated speed.

- End Sensor – An external signal activates the On Demand cut cycle. The signal is a positive 24VDC signal and is typically from a PNP sensor that detects the end of the extrusion but it can also be from a simple switch or from another piece of equipment. The On Demand cut can be delayed from the signal by setting the Delay Time. This is useful so that the sensor does not need to be precisely placed or to make sure that the cut is made at a certain point away from a part feature. Other features such as masking, skipping cuts, and filtering of the input are available in the recipe and settings.

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- **Time** – In time mode, a cut is executed based on the Cycle time entered. This is typically an On Demand cut but can also be executed in Continuous operation when the time span gets too low for the On Demand cut to be executed at the specified blade speed.

- **Flywheel Mode** – This mode will run the blade at a constant RPM at the specified blade speed. This is mainly for compatibility to old processes or if there is no line speed reference. It does not have the ability to adjust based on the line speed.

11.2 Servo Operation Modes

- **On Demand** – When the cut cycle is activated, the blade quickly accelerates to the set Blade Speed and then decelerates back to a stop within the rotation of the blade.

- **Continuous** – The blade runs at a velocity calculated by the system or specified by the operator.

11.3 Multiple Blade Operation

The cutter will work with multiple blades installed if it is mechanically configured to do so. The allowable number of blades is 1,2,3,4,5,6,8,9,10 or 12 and they must be evenly spaced. When in continuous mode, the part length can be made much smaller and a higher CPM can be realized for a set RPM. When in length mode, the system will maintain the select length by calculating the required blade speed based on the length setting and the current line speed. When in On Demand mode, each time a cut is required, the blade holder will rotate 360 divided by the number of blades installed. The On Demand max blade speed and CPM performance is severely reduced when running more than 4 blades. It is also much more difficult to align multiple blades to get the same precision as with one blade. It is therefore preferable to run a single blade at higher RPM if the machine and product can handle the higher speed.

11.4 Calculating Cuts per Minute (CPM)

When running in Time or Length mode, the system must calculate the CPM that will be required by the system to determine the servo running mode.

The CPM is calculated as follows:

- Length Mode: CPM =
$$\frac{\text{Actual Line Speed (ft/min)}*12(\text{in/ft})}{\text{Cut Length (in/cut)}}$$

- Time Mode: CPM =
$$\frac{60(\text{sec/min})}{\text{Cut Time(sec/cut)}}$$

11.5 Switching Servo Modes

The cutter servo can switch seamlessly between running in On Demand and Continuous mode depending on the Cuts per minute required and the blade speed. In both length and time mode, the unit can be allowed to switch into continuous mode if the CPM for on Demand mode is exceeded. The ability to run in Continuous Mode can be turned on or off in the machine settings. When the cutter transitions between cutting product and cutting scrap and the mode changes, the unit will transition to On Demand or Continuous as required by that mode and the parameters. In order to avoid rapid switching between modes when the line speed is close to the switch over point a hysteresis value can be entered that will require a significant change in CPM before it transitions back from Continuous to On Demand mode. The following graph is generated by Novatec through experimentation and can be found in the blade recipe. It is unique for every blade and every machine.

6. **Measuring Cuts per minute**

The machine measures the cuts per minute by calculating the time between cuts. A signal is sent to the main processor each time the blade reaches the cut position as defined in the blade recipe or by using a blade sensor(optional). This is the seconds per cut. CPM = 60 Seconds per Cut

7. **Calculating Blade Speed and Estimated Length**

In Continuous operation, the blade speed is determined by the following equation:

$$\text{In Length Mode: Blade Speed(rot/min)} = \frac{\text{Line Speed (ft/min)}}{\text{Set Length(in)} *12(\text{in/ft}) *\text{Number of Blades}}$$

$$\text{Or in Time Mode: Blade Speed(rot/min)} = \frac{60 \text{ (secs/min)}}{\text{Cyclic Time (secs)} * \text{Number of Blades}}$$

$$\text{In Flywheel mode, the estimated length will be calculated as: Set Length(in)} = \frac{\text{Line Speed (ft/min)}}{\text{Blade Speed(rot/min)} * 12(\text{in/ft}) * \text{Number of Blades}}$$

12.0 OPERATION SCREENS

12.1 Home Screen

The Home screen is used to navigate to all of the other screens and give some basic information. In the center is a picture of the model of machine. This is the view for a Level 1 User. They have view only access to the counters and help screens.

1. Machine Type

This text is set during commissioning and determines the major operating characteristics of the machine.

2. Machine Name|

This is default set to match the machine type on commissioning but can be changed by the customer to distinguish between different machines.

3. Machine Graphic

Defaults to a picture of the standard machine of that type. The file can be changed in the setup by the end user to show a logo or anything that can be put into a .pdf file.

4. Machine Status

Shows the current running status of the machine same as in the top left corner.

5. Program Version

Useful information for troubleshooting with Novatec over the phone.

6. Count/Batch Button

Opens the count manager screen to view or change the production amounts for the running recipe. A level2 or higher user can also access the batching system from this screen.

7. Help and Instructions Button

All users can access the help which contains this instruction manual and other standard operation procedures. Maintenance and Setup level users also have access to electrical and mechanical drawings and PM procedures.

8. Choose Language

The flag button is used to set the basic language of the operator interface. A level 2 or higher user can change the language settings for all of the textual descriptions.

Pressing the flag button will display a pop-up towards the top left of the screen. Select the flag of the country for the language of the interface. Setting the language from this page will only be temporary and will last until the machine is powered down. To change the language permanently, it must be set in the settings and downloaded.

*The language for the help files, manuals and any text that can be changed by the operator in the program, are not translated and will need to be manually changed by the end user.

This is the view for a Level 2 User. They, additionally, have access to the Product Recipe Editor and view only authorization to the Setup Editor and Diagnostics screens and can change the language.

A level 3 user can access the same screens but can also make changes to the diagnostics and some of the Settings.

9. Product Recipe Editor Button

A level2 or higher user can access the Product Recipe Editor to load a recipe or to edit recipes.

10. System Settings Button

A level2 user can view the settings. A level3 user can edit some of the fields that may be useful for troubleshooting and calibrations. (Note: This Icon used to be a picture of a wrench)

11. Diagnostics and Utilities Button
Level2 users can view system diagnostics and Level3 users can also create diagnostic traces. Maintenance and setup users can also access utilities for backing up, restoring and troubleshooting the equipment.

The above view of the home screen for the Setup User. They have full access to the Count/Batch System, Product Recipe Editor, Settings Editor, Blade Recipe Editor, User/Password screen and Diagnostic Functions. There are a few servo setup features that are view only for the setup user as changing them has a high potential to make the machine not operational.

12. Blade Editor Button
Only a setup user has access to the Blade Recipe Editor. It is used to define the number of blades, homing position, motion, tuning parameters and Max CPM vs. RPM characteristics. Creation of new blade profiles can be complicated and are typically performed by Novatec.

13. User/Password Button
A level2 or higher user can add new users, edit existing users or change passwords.

12.2 Quick Ops Screen**
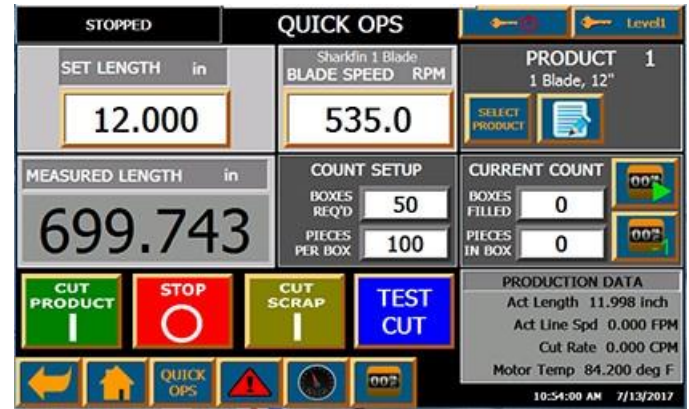
This is the screen activated after the system is homed. It can also be accessed with the Quick Ops button on the bottom of every screen. It is an overview of the current running operation and is used to initially set up the process and tweak values during running. The view will change look based on operating conditions and user setup selections. In this view, the operation buttons are greyed out because the system has not yet been reset.

** This is the default Quick Ops screen. It is recommended for most cutter applications. Up to 10 different quick ops screens can be chosen in the Setup for operations that diverge significantly from what is standard. The optional screens will be shown in Appendix D.
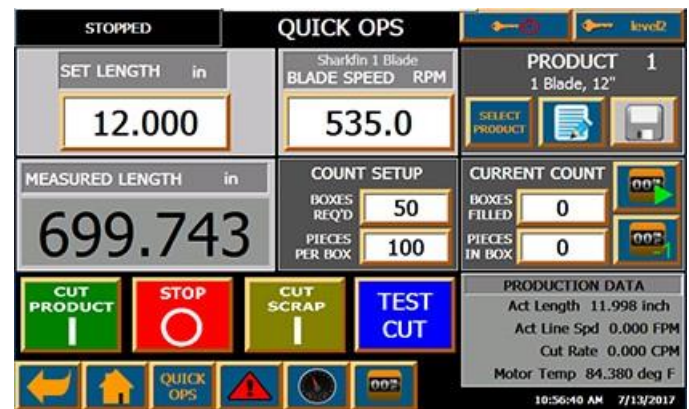

Resetting the system will allow the user to start and test cut the system. Logging on as level 2 will allow program changes to be saved to file. The save button is currently greyed out because there have been no changes to the recipe.
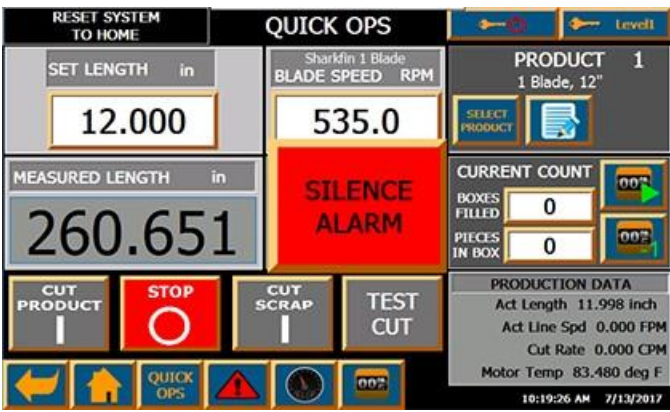
This is the view of the Quick Ops when the user is logged on as level1 authority but there is an alarm that has caused the system to shut down. If the alarm horn is enabled, the red Silence Alarm button appears in the middle of the screen. Notice that the Cut buttons are grey because they are no longer functional.
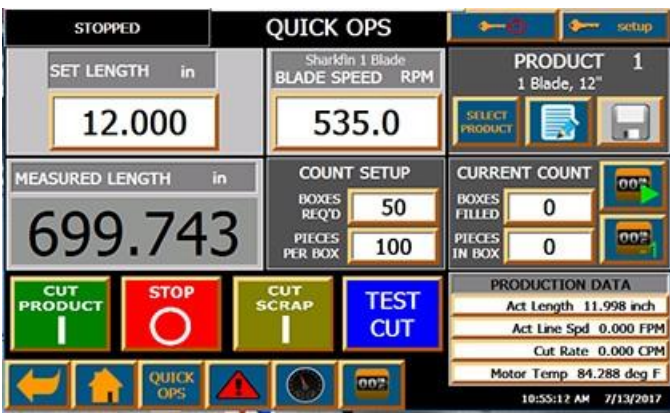
A setup user has logged in this view. They now have access to change the items to be displayed in the production data.

In this view, the operator pressed one of the greyed out cut buttons but the system cannot execute because the guard switch is unlocked. A message pops up to explain what is required to operate the cutter. This quick ops screen is not the default.

Several product recipe fields are place on the Quick Ops page for easy access. These are the items commonly used to start up and maintain the running product and may require frequent changes. Changes to these items are immediately activated on the running product.

1. Cut Control Parameter

Enter the value that controls the cutter activation. The parameter shown is dependent on the cut mode set on the recipe screen. It always shows the product cut values when the system is stopped. If the unit is in flywheel mode, the background will be greyed out it will show the estimated length calculated based on the set blade speed and current line speed.

Cut Mode	Parameter	Units	Blade Op
Length	Set Length	in/mm	On Demand/Continuous
End Sensor	Delay Time	Sec.	On Demand
Time	Cycle Time	Sec.	On Demand/Continuous
Flywheel	Est. Length	in/mm	On Demand

2. Blade Speed

The blade speed can be set when running in On Demand or Flywheel mode. In On Demand operation, the set blade speed will determine the maximum speed when the blade is ½ way through its rotation. In Continuous operation, while running in length or encoder mode, the background will be greyed out and it will display the actual blade speed be commanded to the motor. The description of the installed blade type appears above the speed setting.

3. Measured Length reference

This is the length between cuts typically measured from the encoder. The servo sends a signal to the PLC whenever the blade is in position to cut the product. It is possible to use a sensor to sense the blade to get a definite indication of the part being cut. If the encoder is not specified in the settings for length reference, the speed reference value will be used and the length calculated as precisely as possible.

Note: This field is for reference only. Even using the encoder for reference and with everything calibrated properly, the value shown may vary slightly with the actual cut length due to processing time and/or mechanical inconsistencies associated with encoder mounting and puller operation. A secondary inspection must be made to ensure the correct, precise length.

4. Product File Controls

In the top right corner is the product controls which determines the recipe settings for the running product. The Product number is shown in the top line with the description in the line below it.

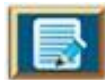● **Select Product Button** - Opens a window where the recipe can be selected from a list of products. A new recipe cannot be loaded while one is currently running. Select the product using the scroll buttons and pressing the line item and then the download button.

● **Select Product By Code** – The select product button will appear this way if the Primary Product setting is set to select by product by code. Pressing this will bring up a pop-up that allows the user to search the recipe product code with text entered using the on screen keyboard or using a bar code scanner.
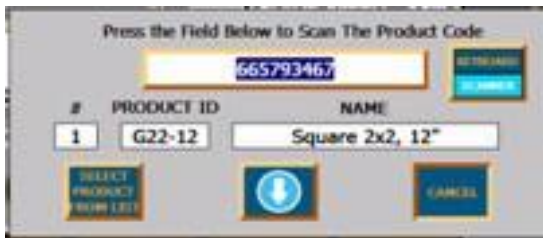
Note: If you want to use an external keyboard use the scanner setting and connect the keyboard to the USB port.

● **Edit Run Product Button** – Opens the product recipe editor with the currently running product. Changes can be made while the product is running and will take place when the edited product is downloaded. The parameters shown on the Quick Ops page are also part of the running product recipe but are activated immediately when they are changed.

● **Product Save Recipe** – This button only appears for a level 2 or higher user. It allows the operator to save the changes made on the quick ops page to a recipe. The background will be greyed out if no changes have been made and will turn blue when a change is made.

You will be given the choice to update the current recipe or to save it as a new recipe or cancel the operation.

Note: In the event of a power outage, the currently running product parameters with all of the recent changes will be restored when the power turns back on. It is not necessary to save the parameters unless they need to be used when the product loads the next time.

5. Count Control
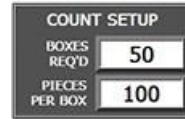
These fields are used to count products and to separate them into boxes. These are the major fields used for counting. More detailed information can be obtained on the Count page by pressing the button at the bottom of the Quick Ops page. If Box Count is Enabled on the count page, the Count Control will appear as on the right, otherwise it will appear as on the left.

● **Count Setup** – Determines how production will run

>**Pieces per Box** - Number of pieces to put in each box

>**Boxes Req'd** - Number of completed boxes are required for the production run

>**Pieces Req'd** - Number of pieces required for the entire production run

Note: Setting Boxes Req'd or Pieces Req'd to 0 will allow the production to run forever.

Important: The system cannot count if the Pieces per Box is 0.

● **Current Count**
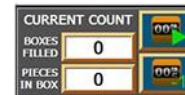
Tracks the number of parts cut. Only parts that are cut for production are counted. If a test cut is executed the cut part will not be counted. Parts will not be counted when cutting scrap.

>**Boxes Filled Number of boxes completed.** Can be changed by a level2 user.

>**Pieces In Box Number of parts in the current box.** Can be changed by a level 2 user.

>**Piece Count Number of parts in the current production run.** Can be changed by a level 2 user.

>**Count/Pause Button** - This button is used to start or pause counting.

When the button is a green arrow, it will not be counting and pressing it will start counting and the image will change to the brown pause button. Pressing the brown pause button will stop counting and the green arrow will reappear.

> **Remove Part Button** If a single part is removed, press this button to subtract it.

6. Cut Buttons

These buttons control the starting and stopping of the cutter and the mode of operation.

● Cut Product

> If the button is greyed out, there is a machine condition that is preventing it from operating. Pressing the button will show a pop-up explaining what condition is preventing the operation.

> If the button is the darker green color, pressing the button will start running the cutter with the production mode and settings.

> If the button is bright green, the cutter is cutting using the production mode settings.

> If there is a box in the bottom right corner with a number, there are that many items waiting in the batch que. Pressing the start button will run the current product if the production is not complete. If the current production run is complete, a pop-up will ask how you want to proceed.

● Stop

If the system is cutting product or scrap this button will appear dark red. Pressing it will stop the machine and the button will turn bright red.

● Cut Scrap

> If the button is greyed out, scrap cut is disabled due to the machine condition. Pressing it will show a pop-up indicating what is preventing it from running.

> If the button is the dark khaki, the unit is not cutting scrap.

> Pressing the button when it is dark will run the cutter with the scrap mode and settings and the button will appear the light khaki.

● Test Cut

The test cut button will be greyed out when it is not available. It is not available when the cutter is running in continuous mode. Pressing the button when blue will execute a On Demand cut at the set blade speed and will interrupt both on demand product or scrap cuts and will also cut while the machine is stopped.

7. Production Data

User configurable items can be displayed on the Quick Ops screen to monitor critical parameters. The values are updated every second.

They will be converted to their metric equivalent, where applicable, when running in metric mode. The view on the left is how it looks during normal operation. The view on the bottom is how it appears when a setup user is logged in. Pressing one of the buttons will bring up a scrolling menu to pick from various preprogrammed cutter information such as current recipe parameters, process values and servo information. The text that appears in front of the values can be changed by a setup user in the Diagnostics section to present the information however the end user is accustomed to seeing it. The product recipe user defined value can be displayed here as well.

12.3 Dashboard Screen**

Pressing the Dashboard button on the navigation bar brings up the following screen.

The dashboard screen is intended to be used to glance at the production progress once everything is running smoothly. It provides the basic overview while running the product.

**This is the default Dashboard screen. Other dashboards for different applications or preferences are available in the settings. You can browse through them and select the one that works best for your application. Any of the recipe and statistics data can appear live on a customized Dashboard screen.

Contact Novatec sales if none of the existing Dashboards fit your needs to have a custom screen built.

13.0 ALARM SYSTEM

13.1 Alarm Activation

The machine monitors several functions to inform the operator when something goes wrong. In the event that a condition occurs that needs the operator attention an alarm is issued. This will cause the background of the alarm screen button on the navigation bar to blink. If an alarm audible is also set to activate, a large Silence Alarm button will appear in the center of the page.
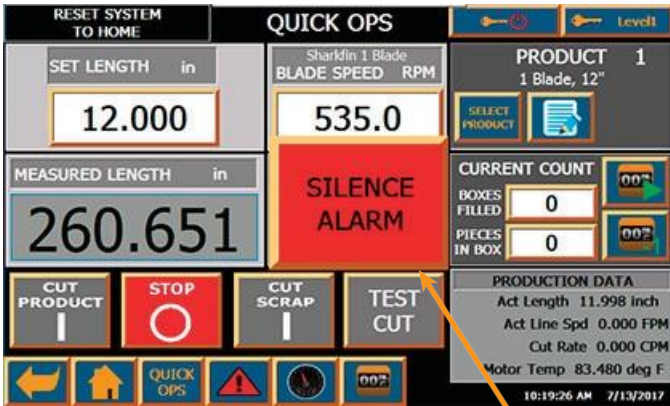
Alarm Screen Button   Silence Alarm Button

- **Silence Alarm Button**

  Pressing the Silence Alarm button will stop the noise from the alarm horn but will not clear the alarm.

- **Alarm Screen Butto**n

  To view the information about what caused the alarm, press the Alarm Screen button. The following screen will appear:

13.2 Viewing Alarms

13.2.1 Current Alarms

All of the currently active alarms will appear on this screen. There may be several text entries on the alarm page depending on the system condition. Some may be related to others.

The Silence Alarm button is now at the bottom on the Navigation Bar.

13.2.2 Alarm View Headings

The headings are in the blue background at the top of the view space.

- **No. –** A unique number that identifies each alarm
- **Time –** The time that the alarm was initiated, removed or acted on
- **Date –** The date that the alarm was initiated, removed or acted on
- **Status –** The current condition of the alarm

  >I – Incoming, the alarm was activated

  >O – Outgoing, the alarm was deactivated

  >A – The alarm was acknowledged

- **Text –** The alarm details to guide the operator

13.3 Alarm Types

There are 3 types of alarms that might be displayed and they will show up in different colors.

- **Fault –** Faults are displayed in red. They are alarms that are critical to the operation of the equipment and need to be addressed by the operator immediately. By default, the audible alarm announces in a manner that will get the operators attention to address it quickly.

- **Warning –** Warnings are displayed in amber. These alarms are to notify the operator that something is out of specification. They warn of impending problems that should be looked into before they become critical. The default alarm for this is typically to note that there is an alarm but not be so annoying that the operator can ignore it while finishing some other task.

- **N**otice **–** Notice alarms are displayed with white text. These alarms don't require the operator to do anything. They are to confirm and record that an operation has taken place mainly for trouble-shooting purposes. They will appear momentarily on the current alarm screen.

13.4 Alarm View Buttons

The alarm that is selected is highlighted with a black background. You select an alarm by touching the text that makes up the alarm. There are three buttons at the bottom of the alarm field that will act on the selected alarm.
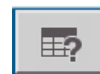
- Pressing the Info-Text button will give additional information about the condition of the highlighted alarm. A pop-up will appear with preprogrammed text information about that alarm, its possible causes, possible solutions and sometimes maintenance troubleshooting information.

the help pop-up with extended information about the alarm. Not all alarms will have extended information. The information on these alarms exists in .pdf files on the HMI SD card and can be customized by the end user.

• Pressing the Acknowledge Button will turn the alarm text color Grey to indicate that the alarm has been seen and the issue is being addressed. Not all alarms are able to be acknowledged. Most faults require that the system stop and the alarm must be resolved before operation can continue. Warnings are typically able to be acknowledged because the machine does not stop when they are issued.

13.5 Alarm History Button

Located in the bottom right hand corner of the Current Alarms screen. Pressing it will show the Alarm History screen. The button will toggle the screen between the two alarm views.

In this view, all of the currently active and resolved alarms are shown. This can be useful for troubleshooting problems that are no longer present.

• It may be necessary to clear the alarms at some point due to the number of entries that can be generated. All alarms are recorded into a file on the HMI SD card and can be accessed from the Utilities menu if information about past operations is required.

14.0 USER SYSTEM

The user system is provided to give access to specific operations for appropriately trained operators. The higher the level of the user, the more access they have into the system. It provides a method to prevent the unauthorized changes to the recipes or equipment and to prevent accidental changes by lower level users. The default user names and passwords are show in the parenthesis.

14.1 User Levels

1. **None**

   When a system is powered on, there is no user logged in. There is limited ability for the operator to move around through the screens and they are not allowed to start the machine. This level will prevent an untrained passerby from operating the equipment.

2. **Operator (Level1, 1111)**

   A level1 user typically has minimal training and is only given rudimentary instruction. They have access to loading product recipes, running the machine and tweaking the running product. They cannot save recipe changes.

3. **Supervisor (Level2, 2222)**

   A level2 operator has some familiarity with the machinery and is typically more familiar with the process. They have access to the full recipe editor and can save recipes. They can view the system settings and have limited access to the diagnostics screens.

4. **Maintenance (Level3, 3333)**

   A level 3 operator is typically in maintenance or a troubleshooter. They have access to change some of the settings and have full access to diagnostics screen.

5. **Manager (Setup, Change Password)**

   A setup user has full access to all system settings. They have had extensive training and experience running the equipment. Because they have access to fields which could damage the equipment or make it unusable, it is imperative that the end user change the password upon starting up the system at the customer location.

14.2 Entering User Name and Passwords

14.2.1 Logoff/Logon

 These two buttons will appear in the top right corner of every screen. The left button is used to log out and will return the system to the default logon state set in the machine settings. The right button will display the current user name logged on or it will say "Logon" to indicate that no one is logged on. Pressing this button will show a pop-up for the operator to enter a user name and password.
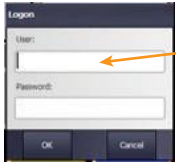
2. Enter User Name

Press the white field for the User to bring up a keyboard for the operator to enter their user name.
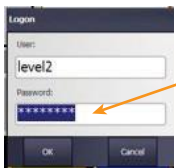
3. Enter Password

Next, press the white field for the Password to bring up the keyboard and enter their password. The password appears as asterisks to prevent onlookers from learning the password.

Press enter when done

14.2.2 Users Screen

This is the screen view for a setup user. A lower level user would be limited to users at their level and less.


Users and passwords can be created or changed from this screen. Press the field that you wish to change and enter the new information. To create a new use, press the empty field at the bottom of the page. The fields with light grey text cannot be changed.

- **User –** Enter the User Name in this field. The username should be limited to 7 characters in order to be displayed in the log on field in the upper right hand corner. If it is more than 7 characters, it will appear as asterisks.

- **Password –** Enter the password for the user. It will always appear as 8 asterisks to prevent others from knowing how many letters are required.

- **Group –** The group determines the level of access a user has. Press the field to bring up a drop down box for you to select from those available. A operator only has access to his group and groups that have lower level access.

- **Log-off time –** The system will automatically log off a user after the specified time(in minutes) shown in this field. Setting it to 0 will leave the user logged on forever or until they press the Log-off Button.

15.0 PRODUCT RECIPE EDITOR

15.1 Edit the Running Product

From the Quick Ops screen, Press the Edit Recipe button which shows a piece of paper with a pencil. Level1 users are able to access the recipe and make changes to the cut settings but cannot save their changes. They can view all of the recipe settings.
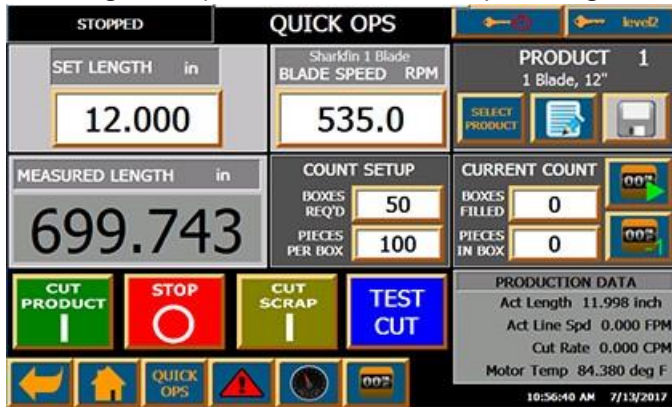

1 The title will indicate the recipe file number that the run time recipe was downloaded from.

2 Making changes to the recipe will not change the stored file unless the operator presses the **save button.** The button will turn blue if any changes are made.

3 For the changes to take effect, the operator must press the download button when finished with the edits. If they forget and leave the editor, they can return to the screen using the back button.

4 The selection tabs on the left are used to navigate to different grouped recipe settings.

15.2 Cut Settings Product Recipe Screen

When the recipe is accessed from the Quick Ops screen, this screen is displayed first even though it is the second screen in the product recipe. The items on this page are accessed more often than any others during normal operation.

On Demand Blade Speed –
All On Demand cuts (length, end sensor and time) will be executed at this blade speed measured in rotations per minute
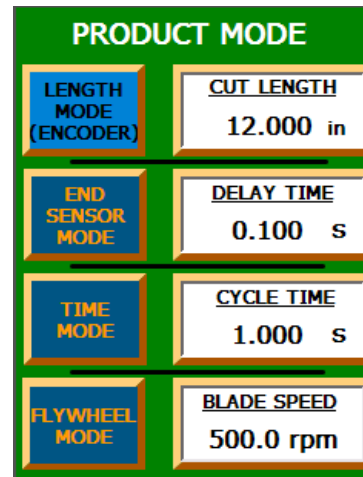
Estimated Line Speed – Enter the expected speed of the product in feet per minute to use as a manual speed reference. You must also select estimated line speed as the length or speed reference in the settings.

Product Mode Selection/Settings – Press any of the four mode buttons to select the operation mode when the Cut Product button is pressed. The brighter blue button is the current mode that is running. The value to the right is the parameter that determines how the unit will cut. The changes will not take place until the download button is pressed

Length Mode (Encoder) – Press the button to activate the cut every time the length specified to the right is measured. The units are either in inches or millimeters if metric units are selected. The length is typically measured using an encoder on the product or the puller feeding the cutter. There are four other options in the machine settings that are available if an encoder is not available or feasible. The set input method is shown in parenthesis on the button.

(Est Speed) – The estimated speed is used to determine the timing between cuts. A very steady line speed is required for this to work.
estimated speed is used to determine the timing between cuts. A very steady line speed is required for this to work.

(Analog) – The analog voltage input is used to determine the speed of the line to determine when to cut.

(Comms) – A cummunication must be set up with other equipment (typically a puller) to transmit a speed signal which is used to activate the cut.

(Tach) – A tachometer or pulse train signal is input to the PLC for a speed reference which is used to calculate the cut activation.

End Sensor Mode – This mode uses an input to the main processor to trigger a cut. Typically, a sensor is placed on the output of the cutter and when the end of the product moves in front of it, it triggers the cut after the specified time delay. The time delay can be used to fine tune the cut without needing to do micro movements of the sensor. The input can also be activated by another piece of equipment.

Time Mode – In this mode, the cut activates continuously based on the cyclic time setting. It is typically for line setup, to cut scrap but can be used for product runs as well. Running in length mode using estimated line speed is more practical because the operator can input the line speed and cut length and the system will calculate the time required to cut the product the correct length.

Flywheel Mode – In this mode, the blade will spin at the RPM specified. The length of the part is dependent on the line speed. This mode is useful if you want to cut scrap in tiny pieces for easy recycling. For production, it is better to run in length mode using estimated speed so that the system can automatically calculate the correct blade speed for the required part length.

Scrap Mode Settings – The scrap mode has all of the same modes and setting abilities as Product Mode. It is provided to allow the operator to quickly switch to a mode that will cut parts at an obviously different length than the good product. Customers may want to use the flywheel mode to cut very tiny parts that will drop into a receptacle between the cutter bushing and the takeaway conveyor to make it easy to regrind. If they are already cutting tiny parts, they may want to use time mode to cut a larger part to make sure it doesn't fall into the parts bin. The scrap mode can also be set to cut parts at a common length for a product with loose specifications. There are two supplied outputs that can be set up to activate based on being in scrap mode or every time a scrap part is cut.

15.3 General Product Recipe Screen

User Value

Provides general product information and blade assignment and the user value field. The user must be at least level2 to make changes to all the field except the user value which can be changed by a level 1 operator. A please wait message will appear briefly while the blade recipe information is loaded.

Product ID - Typically used for an internal alphanumeric reference for the product. It appears on the recipe select screen. The value does not affect the running of the machine. (Max length 6 characters)

Name – Description of the product to be displayed on Quick Ops and recipe select screens. (Max Length 20 characters)

Product Code – A unique alpha-numeric product code can be entered here to search products instead of picking them from a list. If Primary Product Select Mode is set to Code, the user must enter the code using a bar code scanner or external keyboard. (max 20 characters)

Blade Type – Pressing this button will bring up the select screen to choose a different blade or number of blades for the recipe.

User Value – This is a user configurable recipe value. The screen below shows how a setup user can edit the description(max 12 characters) and units or they can hide it if it is not being used. This value can be shown on the Quick Ops page to tell the operator how to set an external component or it can be used with the analog output, communications, PWM or PTO to automatically set external equipment. The setup descriptions and values are stored independently for each recipe.

15.4 Count Product Recipe Screen
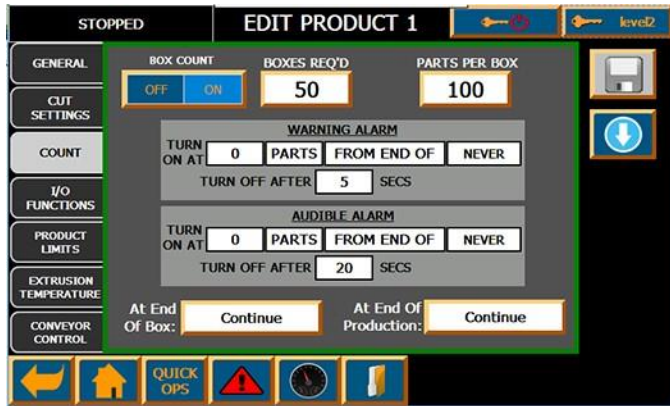
This screen is replicated for the running product and can be accessed from the Quick Ops screen. Products that are not running can be edited here.
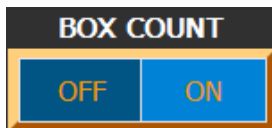
• Box Count On/Off
This toggle button determines if the counter will count parts into multiple boxes or a single production run. When box count is off, the Boxes Req'd and At End of Box fields will disappear. And the screen will appear as below.
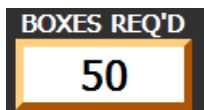
• Boxes Req'd
Enter the number of boxes required for the production run. If this is set to 0, it will keep making boxes and the production will run indefinitely.
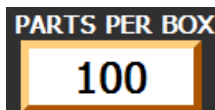

• Parts Per Box
Enter the number of parts for a single box. When the counter reaches this count, the Boxes filled will increase and the Pieces in Box field will start at 0 again.
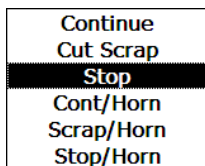
This value can never be set to 0 otherwise it cannot calculate the count.

• Pieces Required
Enter the total number of parts for the entire production run. Setting this value to 0 will allow production to run indefinitely.
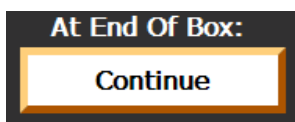
• At End Of Box:
This field allows the operator to choose how the cutter will operate when it reaches the end of a box.
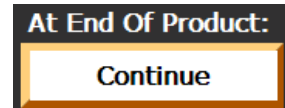

— **Continue** will just start counting into the next box.

— **Cut Scrap** will cause the cutter to switch to the scrap settings.
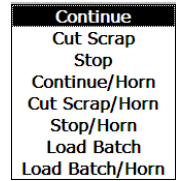
— **Stop** will stop cutting.

—The other 3 are the came except that they also activate the counter audible horn.

• At End Of Product:

This field determines what will happen when the product run finishes. It has the same fields as End Of Box but adds the 2 batch loading features at the bottom.

• Load Batch – This will cause the system to stop the current product, load the next recipe and then start cutting. If there is no product in the batch table, it will stop.

• Load Batch/Horn – The next product will be loaded and the counter audible will sound.

• Counter Progress Alarms
There are 2 alarms available for the counter and multiple ways to set trigger them.

— **Warning Alarm –** Activates a warning message to the alarm system. The yellow alarm indicator and the warning audible will turn on. This is usually used to notify the operator that they will need to attend to the machine soon.

— **Audible Alarm –** This alarm is separate from the alarm system. It will make a distinctly different sound to indicate that it is only counting related. All of the sounds can be made different in the settings so that the operator can distinguish which machine needs attention.

— **Trigger Settings -** Both of the alarms can be triggered individually by the condition in the fields below them. They both have the same choices.

- Enter a value in the first field to set the number of parts or time for the activation.

- In the second field, choose whether you want to activate at a number of parts, seconds or minutes. You must choose parts when operating in End Sensor mode because the system has no way to calculate the time differential.

- In the 3rd field set whether you want to activate after the start of production or before the end of the last field.

- In the last field, you enter the trigger event. You can set it to Never turn on or at the start or finish of the product or box.

- The count alarm will stay active for the time in the setting below or until the operator acknowledges it with the Silence Alarm button. Setting it to zero will prevent it from timing out.

TURN OFF AFTER `0` **SECS**

15.5 Digital I/O Product Recipe Screen

There are 2 Relay protected outputs available to activate based on many conditions and a non-isolated digital input available for tasks related to the end sensor. Use this screen to set them up specific to each product.

- Production Output 1 is labeled CR Q1.1
- Production Output 2 is labeled CR Q1.0

   You can wire directly to CR Q1.0 and 1.1 or you can purchase the output option NP8007 to wire to a quick connect plug.
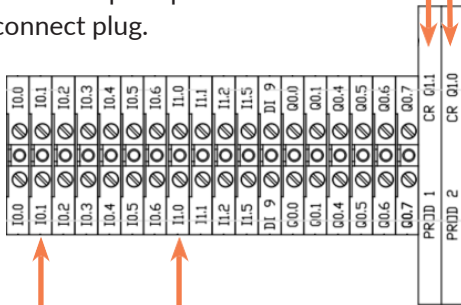
- The end sensor Input is labeled I0.3
- End Sensor Mask Input is labeled I1.0

   The end sensor input I0.3 is available on the supplied input quick connect.

A level2 user has access to change the timing or outputs turning on, the reset time for the end sensor mask and the end sensor skip cut signals. A level 1 user does not have access to make changes to items on this page.
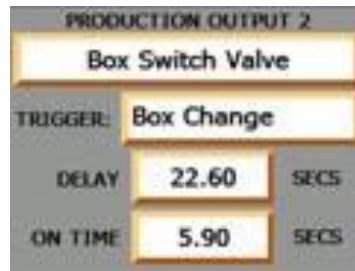

 Production output description

A setup user can edit the production output description, select the output trigger and the end sensor mask reset condition.

● **Production Output 1,2**

Description – The field below the production output title is a user editable description. Typically, it will be named after the item that is being activated. (max 20 characters)

> **Trigger –** Use the drop down list to select the machine condition or operation that will activate the output. Following are the available choices:

- **Part Cut** (delayed) activated each time a cut is made
- **Box Change** (delayed) activated each time a box is finished
- **Even Part Cut, Odd Part Cut** (delayed) activated when an even/odd product cut is made
- **Even Box Change, Odd Box Change** (delayed) activated when an even/odd box is finished

- **Production Done** (immediate) activated when the production run is completed

- **Product Cut** (delayed) activated only when part is cut when running in Cut Product mode

- **Scrap Cut** (delayed) activated only when part is cut when running in Cut Scrap mode

- **Running** (immediate) on when cutting product or scrap

- **Run Product** (immediate) on when cutting product

- **Run Scrap** (immediate) on when cutting scrap

- **Stopped** (immediate) on when not cutting

- **Faulted** (immediate) on when there is a system fault

- **Warning** (immediate) on when there is a warning message

- **Alarm** (immediate) on when there is either a warning or fault active

- **Low Temp Limit** (immediate) activated when the temperature goes below the set limit

- **High Temp Limit** (immediate) activated when the temperature goes above the set limit

> **Delay and On Time**
  If the output uses a trigger that requires delay, these two field will be visible.

- **Delay –** Set the delay time from the time when the cut occurs to the time when the activation turns on. The cut signals are buffered so that there can be multiple cuts and each activation will be timed from the cut that started it.

- **On Time –** Set the length of time for the output to be turned on. The time cannot be longer than the spacing between parts or it will never turn off.

- **End Sensor Mask**
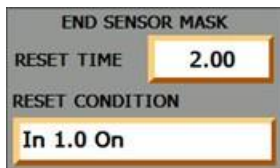
The end sensor mask is used to deactivate the end sensor once a signal is detected. This is used typically to prevent accidental reactivation when the part is cut or to give the part time to move out of the way by some external activation. The mask will turn on immediately after the end sensor is activated and will wait for the reset time or reset condition to occur before it reactivates.

> **Reset Time –** Time to wait after the end sensor is activated before it will accept another activation.

> **Reset Condition** – Set the condition that will reactivate the end sensor signal.

- **None** – Turns off the conditional mask reset.

- **Out 1 On, Out 2 On** – Resets the end sensor mask to enable the end sensor when the output turns on.

- **In 1.0 On** – Resets the end sensor mask to enable the end sensor when the input turns on.

- **Out 1 Off, Out 2 Off** - Resets the end sensor mask to enable the end sensor when the output turns off.

- **In 1.0 Off** – Resets the end sensor mask to enable the end sensor when the input turns off.

- **Skip Cut Signals**

This will cause the end sensor to be ignored this many times before a cut will be activated. The mask is still activated each time the end sensor is activated. If Outputs are used as the reset condition for the end sensor mask, they will not activate without a cut operation.

15.6 Product Limits Product Recipe Screen

A level 2 user can change the blade speed limits. These limits should be set based on product quality. It will prevent the operator or the automatic settings from running the blade at a speed out of the range set. Notice that the Max Continuous Blade Speed is red. This is because the limit is set outside another blade speed limit, in either the blade recipe or settings

15.7 Extrusion Temperature Product Recipe Screen

The extrusion temperature can be measured using the NC8002-1 infrared temperature sensor option or one supplied by the end user. To edit these fields, you must be a level2 or higher user.

- **Low Limit, High Limit** - Sets the boundary for the temperature limits. Going outside the limits will generate a warning message.
- **Action –** The operator can select what action to take when the temperature goes out of range. Each of the choices can also generate a warning alarm.
- > **Continue –** Do nothing and continue cutting.
- > **Cut Scrap –** Switch to Scrap Cutting Mode
- > **Stop –** Stop cutting

15.8 Conveyor Control Product Recipe Screen

Use this screen to control the speed, start and stopping of an external conveyor attached to the cutter.

B. Edit A Previously Saved Product

1 **Open Product Recipe Editor**

A level 2 user can access the Product list from the Home screen to edit saved recipes without affecting the running recipe. They can also create new recipes.
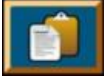

2 **Select Product to Edit**

Select the product from the list or press the Select Product By Code button to use the bar code scanner.

3 **Copy, Edit, Load or Delete**

You can now act on the product by pressing one of the buttons.

Load Recipe Button – The blue circle with the down arrow is used to load the selected recipe which means that the information is sent to the main processor to run.

Copy Recipe Button – Copies the selected recipe to an internal butter to be able to paste it at another location.

Paste Recipe Button - Will copy the contents of the internal buffer to the selected recipe. If no recipe has been copied, the button will appear grey and will not do anything.

Edit Recipe Button – Will open the editor with the selected recipe. This will not affect the running recipe.

Delete Recipe – This will remove all data from the selected recipe and replace it with the User Default Recipe. The border is grey because only a setup user can delete recipes.

16.0 COUNT/BATCH SYSTEM

The cutter system comes standard with the ability to count each time a part is cut and can display that value or can divide it into boxes according to the user preferences. The initial count setup is part of the product recipe and loaded with the product but it can be altered manually from the running product or from the batch entries. The count setup in the product recipe up is covered in the Product Recipe section that follows this section.

To access the running count setup and batch system, Navigate to the Quick Ops screen and press the Count/Batch button beside the dashboard button.
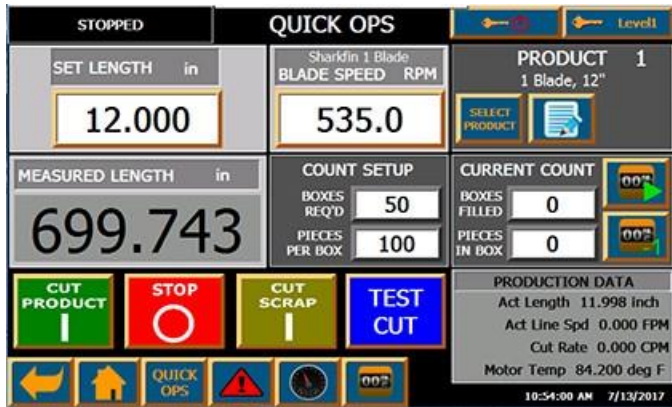
Count/Batch Access Button

Alternatively, you can access the Count/Batch button from the Home screen.

All of the count settings are done in the big box with the green outline on the right. You can monitor, start, stop, adjust and reset the current count in the box at the bottom right. The button on the top right opens the batch setup page. The button below it is used to save the count changes to the product recipe.
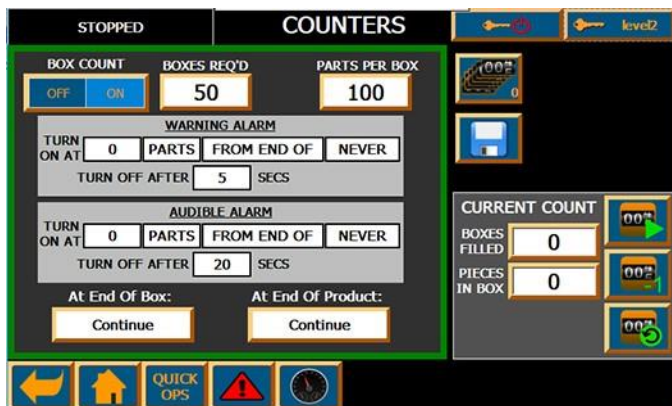

16.1 Count Setup

The counter setup is an exact copy of that in the Product Recipe. It is supplied here for easy access to change parameters on the running product.


1. Box Count On/Off

This toggle button determines if the counter will count parts into multiple boxes or a single production run. When box count is off, the Boxes Req'd and At End of Box fields will disappear. And the screen will appear as below.
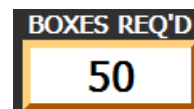
2. Boxes Req'd

Enter the number of boxes required for the production run. If this is set to 0, it will keep making boxes and the production will run indefinitely.
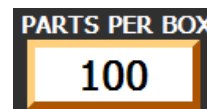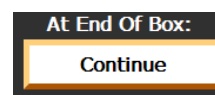

3. Parts Per Box

Enter the number of parts for a single box. When the counter reaches this count, the Boxes filled will increase and the Pieces in Box field will start at 0 again.

This value can never be set to 0 otherwise it cannot calculate the count.

4. Pieces Required

Enter the total number of parts for the entire production run. Setting this value to 0 will allow production to run indefinitely.

5. At End Of Box:

This field allows the operator to choose how the cutter will operate when it reaches the end of a box.

Continue will just start counting into the next box.

• **Cut Scrap** will cause the cutter to switch to the scrap settings.

• **Stop** will stop cutting.

The other 3 are the came except that they also activate the counter audible horn.

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At End Of Product:

Continue

6. At End Of Product:

This field determines what will happen when the product run finishes. It has the same fields as End Of Box but adds the 2 batch loading features at the bottom.

Continue
Cut Scrap
Stop
Continue/Horn
Cut Scrap/Horn
Stop/Horn
Load Batch
Load Batch/Horn

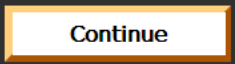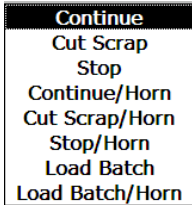- **Load Batch –** This will cause the system to stop the current product, load the next recipe and then start cutting. If there is no product in the batch table, it will stop.
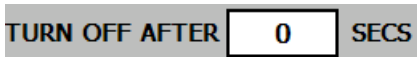- **Load Batch/Horn** – The next product will be loaded and the counter audible will sound.

7. Counter Progress Alarms

There are 2 alarms available for the counter and multiple ways to set trigger them.

- **Warning Alarm –** Activates a warning message to the alarm system. The yellow alarm indicator and the warning audible will turn on. This is usually used to notify the operator that they will need to attend to the machine soon.
- **Audible Alarm –** This alarm is separate from the alarm system. It will make a distinctly different sound to indicate that it is only counting related. All of the sounds can be made different in the settings so that the operator can distinguish which machine needs attention.
- **Trigger Settings -** Both of the alarms can be triggered individually by the condition in the fields below them. They both have the same choices.
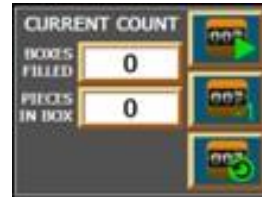
TURN ON AT	0	PARTS	FROM END OF	NEVER
		PARTS	FROM START OF	NEVER
		SECS		PRODUCT
		MINS		BOX

— Enter a value in the first field to set the number of parts or time for the activation.

— In the second field, choose whether you want to activate at a number of parts, seconds or minutes. You must choose parts when operating in End Sensor mode because the system has no way to calculate the time differential.

— In the 3rd field set whether you want to activate after the start of production or before the end of the last field.

— In the last field, you enter the trigger event. You can set it to Never turn on or at the start or finish of the product or box.
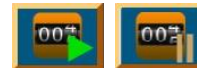
TURN OFF AFTER 0 **SECS** — The count alarm will stay active for the time in the setting below or until the operator acknowledges it with the Silence Alarm button. Setting it to zero will prevent it from timing out.

8. Current Count

CURRENT COUNT
BOXES FILLED 0
PIECES IN BOX 0

Tracks the number of parts cut. Only parts that are cut for production are counted. If a test cut is executed the cut part will not be counted. Parts will not be counted when cutting scrap.

- **Boxes Filled** Number of boxes completed. Can be changed by a level2 user.
- **Pieces In Box** Number of parts in the current box. Can be changed by a level 2 user.
- **Piece Count** Number of parts in the current production run. Can be changed by a level 2 user.

- **Count/Pause Button** This button is used to start or pause counting.

CURRENT COUNT
PIECE COUNT
0

When the button is a green arrow, it will not be counting and pressing it will start counting and the image will change to the brown pause button. Pressing the brown pause button will stop counting and the green arrow will reappear.

- **Remove Part Button** If a single part is removed, press this button to subtract it.

- **Reset Part Count** Zeros the current count

16.2 Batch Setup

A batch system is available to plan a production run of a series of products or to automate the switching of products. A supervisor can set up a list of products to run and the specify number of parts that need to be run so that the operator only needs to press the start button to run the next product. The transition to a next product can also be made so that operator intervention is not required though additional automation via the production outputs would likely be required to handle the changing of external devices.

1. Starting a Batch Product

• Batch Indicator

CUT PRODUCT

If there are any products waiting in the batch que, an indicator will appear in the bottom right hand corner of the Cut Product button. The number on the indicator is how many products are in the batch que. If the current product count is finished or is set to run forever, pressing the button will allow you to load and start the next product in the que.
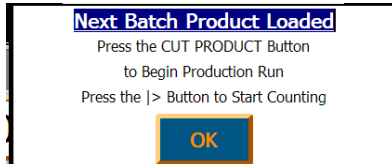
Start Next Batch Product?
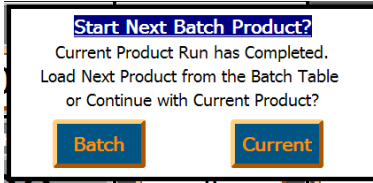
Pressing the Cut Product button will bring up a pop-up to ask the operator how to proceed.

— Batch – Select this if you want to run the next product in the batch que.

— Current - Select this to continue running the current product.

● Next Batch Product Loaded

If the operator selected Batch, the product and count settings of the next product will be loaded and another pop-up will appear to remind the operator to press the CUT PRODUCT button to start running and the play button to start counting.

2. Batch Setup Screen Button 1

The batch setup screen is accessed from the counter screen with this button. It is similar to the count button but shows multiple counter displays and shows the number of recipes waiting in the batch table in the bottom right corner. It is the same as the batch indicator that appears on the Cut Product button. A level1 operator can access the Batch Setup Screen but can only view what products are to be executed. A level2 operator can add and edit the batch que.

3. Batch Setup Screen

This is the view of the batch setup screen when there are no entries. There are four buttons at the bottom but only the ADD BATCH PRODUCT is available because all of the others act on a selected product in the list.

4. Add Batch Product Button 1

Pressing this button will open the Select Batch Product screen where you can select a product to run from those available.

5. Select Batch Product

Select the product that you want to add to the batch table by pressing on the line of text for that item and then pressing the green check box on the left. You can scroll up and down the list with the arrows on the left. You cannot drag the list. Pressing the batch window button at the bottom will take you back to the batch window without making a selection

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6. Select End of Production mode
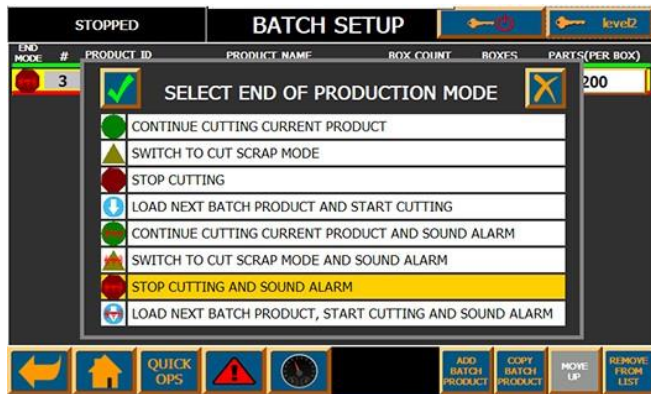
Once the product is selected, you will be returned to the batch setup screen and the product will be entered into the list with the recipe default values. A pop-up will appear for you to select the end of production mode. You can change it later if you need.

7. Batch Setup Editing

After a product is loaded, you will typically want to change the count methods or values to coincide with the product run. You can also change the End of Production mode, copy, delete and rearrange changing the order. You cannot change the greyed fields from the batch setup. To select a product, press on the line of text for that product. The background will turn yellow to show that it has been selected.

• **End Mode –** This symbol determines what the system will do when the product run is complete. Pressing the symbol will bring up the selection list shown on the previous page. A colored bar will appear beneath each selection echoing the End mode selected. The color of the bar at the top shows the End Mode of the currently running product. Any selection with the Red Bell Symbol will notify the operator with the count audible when production is complete.

Select this end mode to do nothing when the count has finished. The operator will need to stop the production or switch to scrap mode and then restart with the Cut Product button to allow the next batch product to be loaded.

Select this mode to cause the cutter to automatically switch to cut scrap mode when the production run is done. When the operator presses the Cut Product button, they will be prompted to load the next product on the batch list.

The cutter will stop when the end of production is reached in this mode. The operator will be required to press the Cut Product button to switch to the next product on the batch list.

Select this mode to automatically load the next product and start cutting. This mode does not require operator intervention so great care must be taken to automatically handle all of the external product requirements. If the next product on the list requires a blade change, it is impossible for the next product to be loaded without operator intervention and the cutter will be stopped. The symbol will be shown crossed out and the bar below it will blink between blue and red to indicate the error.

• **#–** This is the number assigned to the product when it was created.

• **Product ID –** The product ID is an alphanumerical identifier assigned in the recipe by the end user. It is typically the company's internal reference for their product.

• **Product Name – T**he product name is typically a brand name or a unique identifier that the operator can easily understand.

• **Batch Count Setup**

Box Count - Use this button to toggle the Box Count On and Off.

Boxes – Enter the number of boxes require for the production run. If Box Count is off this field will not appear.

Parts(Per Box) – If Box Count is on, enter the number of parts that are required to fill one box. If Box Count is off, enter the number of parts required for the entire production run.

END MODE	#	PRODUCT ID	PRODUCT NAME	BOX COUNT	BOXES	PARTS(PER BOX)
	3	2B657	1 Straight, 12"	ON OFF	50	200
	4	C2/3S	2 Straight Blades	ON OFF		500
	4	C2/3S	2 Straight Blades	ON OFF		600
	5	C2/3S	4 Blades	ON OFF		800
	5	C2/3S	4 Blades	ON OFF		500

Logging into the above screen as a setup user will make 2 more buttons appear on the task bar to import and export the batch list. This can be useful if the same sequence is done several times or to copy the sequence from one machine to another.

- **Copy Batch Product** – Use this button to duplicate the selected batch product. The new entry will be placed at the bottom of the list.

- **Move Up** – Pressing this button will move up the order of the selected batch product to the line above trading places with it.

- **Remove From List** – Press this button to remove the selected batch item from the batch list. All remaining items on the list will be moved up to replace it.

- **Export Batch List –** Copies all of the products and count settings to a file on the SD card (batch.csv).

- **Import Batch List –** Imports the products and count settings from the file on the SD card (batch.csv).

17. SYSTEM DIAGNOSTICS

The system diagnostics pages can be accessed by pressing the [ ] button on the Home page. Diagnostics are useful for troubleshooting and monitoring the equipment and process. The screens are accessible by a level2 user but the user must be maintenance or setup level user to make changes.

17.1 PLC I/O (Monitoring only)
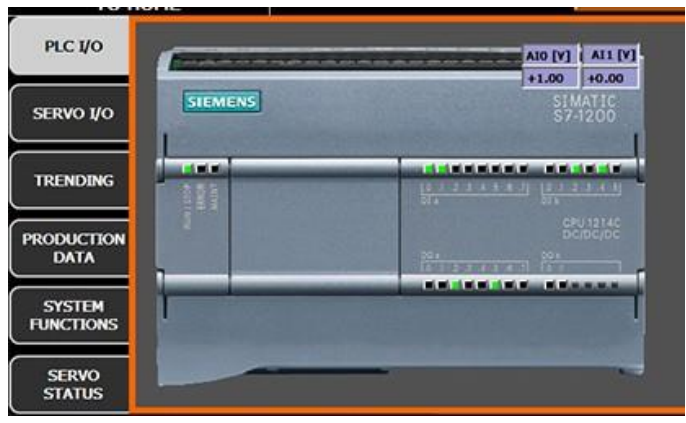
This page is useful to diagnose hardware problems with the PLC or other equipment. It shows the logical state that should be present on all of the inputs and outputs of the PLC. Comparison with measured values can be used to determine if there is a hardware failure. The analog inputs are always available but not always used.

The analog output is only shown if the option was purchased and set in the settings. Some of the input and output signals are extremely fast and cannot be seen on the display or even most meters. The web page access can be used to get more detailed diagnostic information and to read or set PLC tags for troubleshooting.

17.2. Servo I/O (Monitoring only)
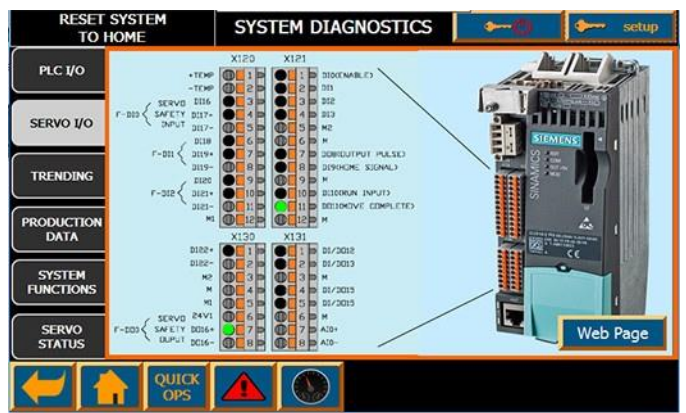
This page is similar to the PLC monitoring page but is for the servo controller signals. All of the I/O either interfaces with the PLC or is related to the safety circuit. You can access the web page for detailed fault information.

17.3 Trending
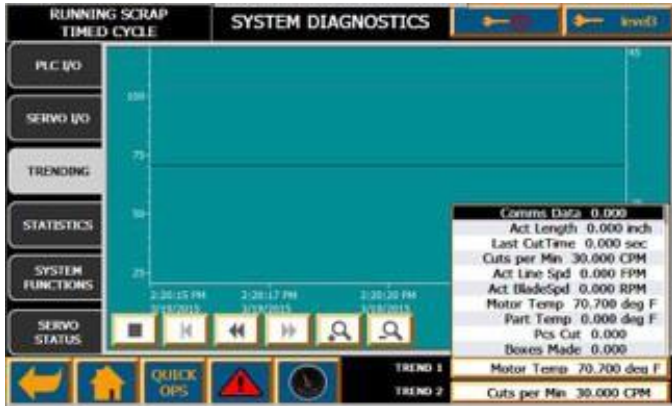
Two independent data points can be monitored and recorded from this page. They are sampled every 1/10th of a second. A level2 operator can only view the information. A level 3 operator can select which items to view from the list of available data points. The scale for Trend 1 will appear on the left and Trend 2, on the right. The span of the scale is automatically adjusted according to the data points shown.

17.4 Production Data

All of the available data are available for monitoring on these screens. These are the same production data that are available on the Quick Ops screen and the Trending. They are updated every second. A setup user can change the descriptions to coincide with the nomenclature used by the company. There are 100 available values. you can scroll through the pages with the arrow buttons at the bottom of the tab area.

17.5 System Functions
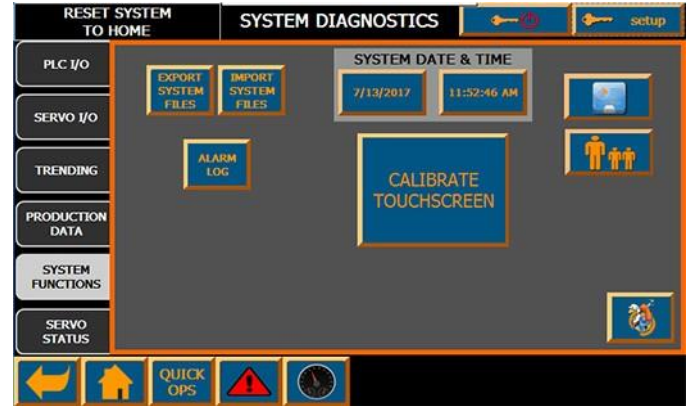
This screen contains various system functions that may be useful for maintenance and setup users. They are accessible by level3 users.

1. Export and Import Files

These buttons are useful for backing up and restoring the entire system. It will save the settings, all of the product recipes, the blade types, any batching information and the usernames and passwords. You can duplicate a machine using these buttons. The import button is not available while the cutter is running.

2. System Date and Time

Press the button for the date and time and enter the new values in the format shown. It is not required to enter the number of seconds. If AM or PM is omitted, the system will assume AM.

3. Exit to OS

This button is used to stop the runtime program. Stopping the runtime will make controlling the machine impossible and only the Emergency Stop is available. The OS is Windows CE and you can calibrate the touchscreen, backup the runtime program and several other functions. See Cutter Setup manual for more details.

4. Alarm Log

A continuous log of all alarm information along with other operation information is recorded in a file on the SD card. The log will contain the last 500,000 events that occurred and can be useful for troubleshooting purposes. It cannot be cleared by the operator.

5. User/Password Button

This button is also located on the Home screen. A level2 or higher user can add new users, edit existing users or change passwords. Pressing this button shows the user management screen. See the User Administration section for more information.

6. Setup Wizard

 Only press this if you want to reset the entire machine. It will execute the machine factory setup procedure and will overwrite all of the current data. It requires in depth understanding of the entire machine.

17.6 Servo Status
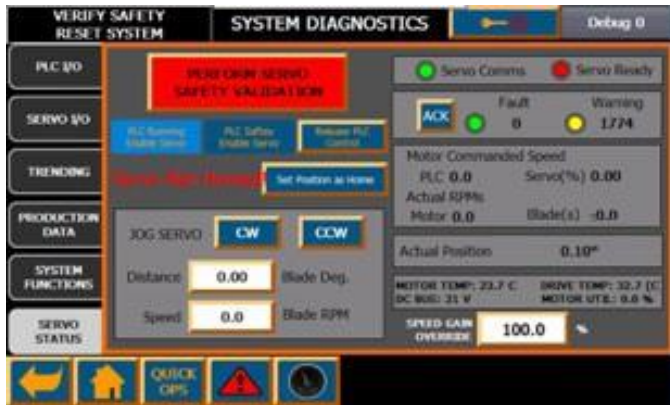
The servo status is for monitoring purposes and to perform the safety validation procedure in case of a motor exchange.

1. Safety Validation

 Whenever a motor is changed or a new drive CF card is used, the safety validation procedure must be executed for the system to evaluate the motor, encoder and program to ensure they are sufficient and compatible.

2. PLC Enables

 These indicators are to show that the PLC is running and that it is sending the safety enable signal through communications.

3. Home Status

 Shows the home status of the servo. It will either be Homed, Not Homed, Homing or Moving to 0.

4. Indicators
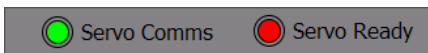
 Show the status of the indicators on the drive controller. The Comms shows that the servo is communicating with the servo and the Ready turns green when the electrical enable signal and the STO (safety torque off) are enabled.

5. Blade Speed Information

 Gives information about the speed signal being sent by the PLC and the corresponding % value it represents. It also shows the current speed of the motor and blade.

6. Actual Position

 Shows the current position of the blade.

7. Motor/Drive Information

 General performance information. The Motor Temp must never exceed 130°C and the Utilization must never exceed 95%.

8. Speed Gain Override

 Overrides the tuning gain factor for all blades and products. It can be used to tweak the tuning as the machine wears or for tuning new blade setups.

18.0 SYSTEM SETTINGS

The system settings screens can be accessed from the home page with the gear button ![gear] on the Home page. A level 2 user to access the screens but only for viewing the settings. A level 3 user can make changes to some settings. A setup user can make changes to all settings. **Note:** The gear Icon used to be a wrench on older machines.

18.1 Side Buttons

1. Save Settings – Press this to save the settings to the SD card. Pressing this does not activate the changes. It is grey(inactive) when no changes have been made and is blue(active) after changes have been made.

2. Download Settings - Pressing this button downloads changes to the currently running product but does not save the values to file. The system will run with the changes and will keep the changes after power cycle. It will be grey if there are no changes or the unit must be E-Stopped before the download can take place.

3. Restore Settings - Press this button to load the settings previously saved. You will still need to download the settings after they are loaded.
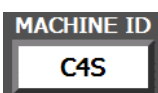
4. Restore Factory Settings – This will load the settings that were in the machine when it was first set up in the factory. This is useful if the settings have been corrupted to the point that the unit will not operate properly.

18.2 General

Use this tab to set General operation settings.
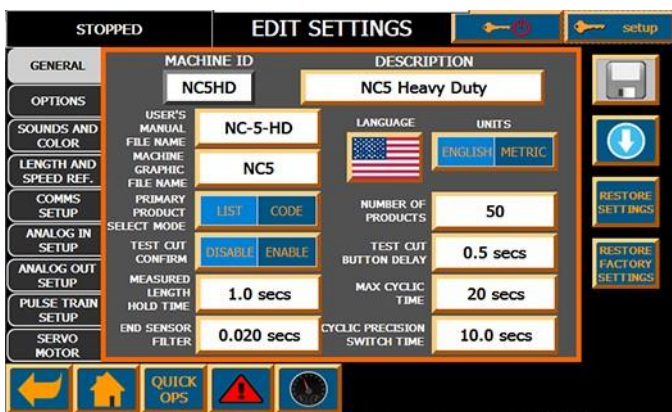
1. Machine ID

The machine ID is a unique identifier for the machine type which is determined by the hardware installed in the machine. It is determined when the machine is originally commissioned at Novatec and cannot be changed without a full recommissioning.

2. Description

The description is used to distinguish this machine from others for user identification. If it is networked, this name will appear on the network screens to identify it. It can be up to 20 Characters long and can only be changed by a Setup level user.

3. User's Manual File Name

This is the .pdf file name of the user's manual for this machine that is included in the Help directory on the HMI SD card. The file can be printed or edited by any .pdf editor. It determines the document that will load when the User's Manual button is pressed on the help screen.

4. Machine Graphic File Name

This is the .pdf file name for the picture that appears on the main machine in the middle. It can be change to anything you wish but it must be sized appropriately so that it doesn't require scrolling.

5. Language

The Flag shown is representative of the current language chosen. To change the language, press this button and select the flag for the country of the language you wish to use. You will need to press the download button for the changes to permanent so that it starts in the same language when powered up the next time.

6. Units
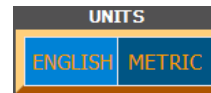
This field determines the type of units that all values will show up in on the screens. The values will automatically be converted between the two defaulted types.

7. Primary Product Selection Mode

This selection determines how the user selects the product when they either push the product select button on the Quick Ops page or enter the product editor from the Home screen. A Product Code can be entered for each product in the product editor. The product can be either selected by picking it from the list or by entering the product code text.

8. Number of Products

The default number of product is 50. The system can handle up to 449 products. If the Selection Mode is List and you set a very larger number of products it will take longer for the list to appear and scrolling through the list can become annoying. You can expand the number of products as you need but the new products will have no default information and you will need to load them via copy/paste with the default product.

9. Test Cut Confirm

If this is Enabled a pop-up will appear asking the user to confirm that you wish to make a test cut. If it is disabled, the user will need to hold the test cut button for the time set in the Test Cut Button Delay.
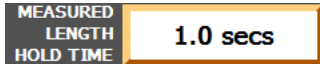
10. Test Cut Button Delay

Set the delay time for when the Test Cut button is pressed. Setting it too low could cause inadvertent activation and too high could make the user think it is not working.

11. Test Cut Button Delay

The Measured Length indicator on the Quick Ops Screen is continuously updated is it reads the line encoder. When a cut executes, the display freezes for the amount of time set in this display. To make the display always show the last cut length, set this value to 0.

12. Max Cyclic Time
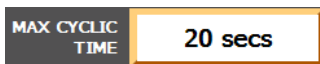
This sets the maximum time that can be set for cyclic(-time) cut mode. It is set to a default of 20 seconds. Setting it very large can be considered dangerous because it might activate when the machine is thought to be not running.

13. End Sensor Filter
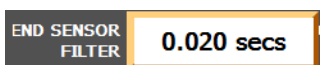
Use this setting to filter out noise that might appear on the end sensor cut signal. Be careful not to set it near or above the amount of time that the signal is turned on by the external device or it will mask the cut signal completely and not activate.

14. Cyclic Precision Switch Time

The system uses interrupt timers to activate the cyclic(-timed) cuts to get better precision but this prevents the system from being able to change timed cuts until the next cycle occurs. This value determines at what time the system will switch from using 1ms precision interrupts to not so precise internal timers running with a resolution of 20ms.

18.3 Options

The items in the Options Tab are related to different installed options and are basically and extension to those in the General Tab.
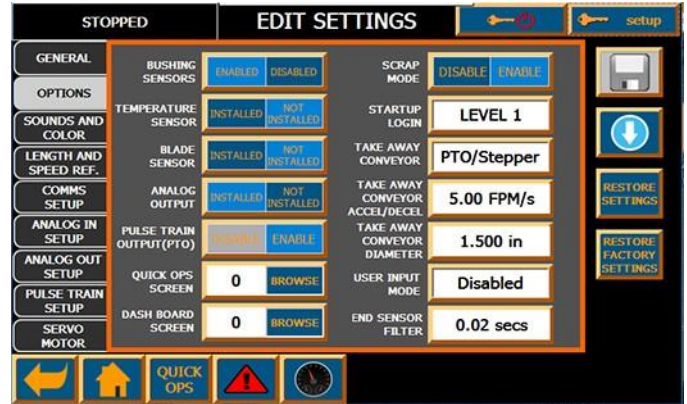
1. Bushing Sensors

The bushings may be permanently installed and would therefore not require sensors to determine that they are installed so they can be disabled here.

2. Temperature Sensor

An optional infrared temperature sensor can be installed to read the temperature of the incoming part to alarm and/or stop the cutter.

3. Blade Sensor

An optional high speed sensor can be installed to detect the blade as it goes through the bushing. It can then determine if the correct number of blades are installed or if a blade has been broken. The blade angle must be set appropriately in the blade recipe for proper blade detection to determine if it is broken.

4. Analog Output

An optional 0-10V volt, 2 channel analog output module can be purchased to communicate parameters to other equipment. The parameter to be output and the scaling of the item is set in the Analog Out Setup.

5. Pulse Train Output

The pulse train output can be enabled to communicate information to other equipment or to run a stepper driven conveyor.

6. Quick Ops Screen

The user can choose from 10 different Quick Ops screens that are specific to their production setup needs. Press the Browse button to preview what is currently available. If you do not find a screen that is sufficient and the process warrants a specific screen, Novatec can provide the specially made screen upon request.

7. Dash Board Screen

 The user can choose from 100 unique Dash Board screens that are specific to monitoring the running operation. Press the Browse button to preview what is currently available. If you don't see what you want on the screens already shown, contact Novatec for one that fits your needs.

8. Scrap Mode

 The ability to use Scrap Mode can be disabled to make the operation screens less crowded.

9. Startup Login

 The user level for the machine can be changed so that it starts at a higher level so that it does not require the user to login for higher level functions.

10. Take Away Conveyor

 An optional take away conveyor can be controlled by the cutter system. Select the mode of control for the conveyor. It can start and stop when the cutter is running, use the stepper output to control speed and positioning or use the analog output to control the speed. PTO/Stepper is only available if it is enabled. Analog Speed is only available if the option is installed.

11. Take Away Conveyor Parameters

 Depending on the Take Away Conveyor mode selected above, additional settings may appear. If the setting for analog speed is selected, the Accel/Decel setting will appear. The Diameter setting is only for when running in stepper mode to determine the conversion factors.

12. User Input Mode

 A user input has been provided for various functions. Select the field to determine the function. A transition from false to true can cause the cutter to switch to Scrap Mode or Stop the cutter or it can be used as a tachometer input for the speed reference.

13. End Sensor Filter

 The end sensor filter is used to filter out unwanted noise preventing accidental cutting. The signal must be present at the input for the set time to activate the cut.

18.4 Sounds and Colors

Use this screen to customize the audible signals from the machine and to set the background color. This can be useful to differentiate between machines when there are multiple near each other.
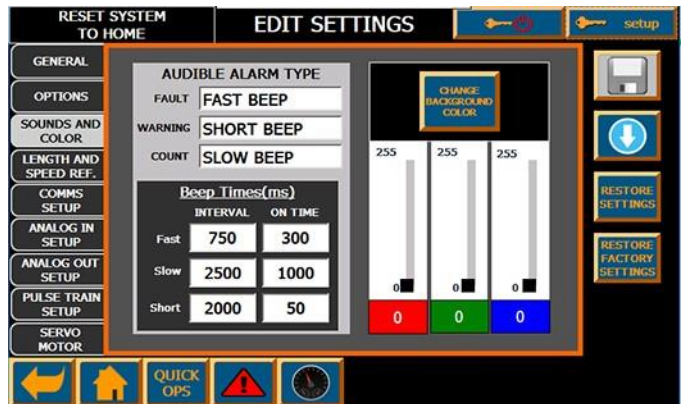
1. Audible Alarms

In order to differentiate the alarms they can be set with different on and off times. You can select the alarms to be Fast, Slow, Short, Continuous or Off. You can then customize the timing of the sounds. The Interval is the time between beeps and the On Time determines how long it will make noise.

2. Screen Background Color

You can change the background screen to give each cutter a unique look. This is helpful when connecting to the screens remotely. To change the colors, use the sliders or set a number between 0 and 255 for each of the 3 colors. The combined color will appear in the area around the Change Background Color Button. When you have the desired color, press the button and the background of the screen will change to that color.

18.5 Length and Speed Reference

This screen is used to select the method used for measuring the extruded part and to set how the unit will transition between Continuous and On Demand mode.
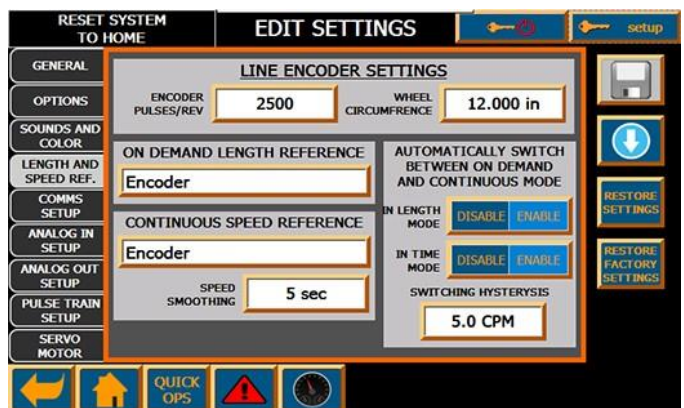
1. Line Encoder Settings

ENCODER PULSES/REV `2500`

If an encoder is used, enter the number of pulses for one full turn of the encoder. This is the value shown on the encoder.

WHEEL CIRCUMFRENCE `12.000 in`

Enter the circumference of the encoder wheel or the equivalent movement of the material for one revolution of the encoder. Adjust this value until the Actual Speed on the Quick Ops screen matches the speed of the actual part.

2. On Demand Length Reference

ON DEMAND LENGTH REFERENCE

- Encoder
- Estimated Speed
- Encoder
- Communications
- Analog

This determines how the part will be measured for cutting.

Estimated Speed – In this mode, the system calculates the time required for the part to cut based on the Estimated Speed setting in the product recipe.

Encoder – Uses an encoder to measure the part length.

Communications – Uses the speed information sent to the cutter via communications channels to determine when the cutter should execute a cut.

Analog - Uses the analog speed reference input to determine when the cutter should execute a cut.

Note: Due to the method used to execute a cut using a speed reference, the best accuracy using a speed reference in On Demand is 1 millisecond or 0.012" at 60 FPM.

3. Continuous Speed Reference

CONTINUOUS SPEED REFERENCE

`Encoder`

SPEED SMOOTHING `5 sec`

You have the same list choices for this as with the On Demand. They should typically be set to the same type. If not, there might be a problem when switching modes if the different methods are not calibrated precisely at the transition point. The speed is read every 0.1 seconds and the smoothing value is used to remove any spikes or valleys that might occur in the reading.

4. Automatically Switch Between On Demand and Continuous Mode

AUTOMATICALLY SWITCH BETWEEN ON DEMAND AND CONTINUOUS MODE

IN LENGTH MODE: DISABLE ENABLE
IN TIME MODE: DISABLE ENABLE
SWITCHING HYSTERYSIS: `5.0 CPM`

- **When Enabled,** the unit will run in On Demand mode until the system determines that the cuts per minute has exceeded the ability of the unit to cut at this rate for extended periods. It will then transition to Continuous mode cutting. The transition point is determined by the CPM chart in the blade recipe.

- **When Disabled,** the unit will not switch into continuous mode and will instead cut at a lesser rate when the CPM limit has been exceeded.

- **Switching Hysteresis,** This determines how much below the max CPM the unit will need to go before switching back to On Demand after running in continuous mode. This is to prevent the unit from stuttering when it switches between modes.

18.6 Comms Setup

UDP COMMUNICATION CONFIG.

SAVE
RESTART | PULLER LINK IP ADDRESS | `192` `168` `2` `255`
SEND | REMOTE PORT `2021` | WATCHDOG `0`
REC

Set the IP address to the subnet of the system with a 255 in the last field to indicate broadcast communications. The port number should be the same as what is set on the puller. Only one device can send to another device on that port but multiple devices can receive from a single port. The watchdog field will change continuously if communications are taking place. Press the Save button to activate the communication changes. If the communications become unstable and quit working, press the Restart button.

When finished with changes, press the back button at the bottom right of the screen to return to the settings editor.

18.7 Analog Inputs

RESET SYSTEM TO HOME | **EDIT SETTINGS** | setup

GENERAL
OPTIONS
SOUNDS AND COLOR
LENGTH AND SPEED REF.
COMMS SETUP
ANALOG IN SETUP
ANALOG OUT SETUP
PULSE TRAIN SETUP
SERVO MOTOR

ANALOG INPUT 0 TEMPERATURE — Volt Ref 0 `1.000 VDC`
LOW VOLTAGE `0.1` >> LOW TEMP. `50.0 degF`
HIGH VOLTAGE `10.0` >> HIGH TEMP. `400.0 degF`
Anlg In0 Val `0.000`

ANALOG INPUT 1 SPEED REFERENCE — Volt Ref 1 `0.000 VDC`
LOW VOLTAGE `0.0` >> LOW SPEED `0.00 FPM`
HIGH VOLTAGE `10.0` >> HIGH SPEED `50.00 FPM`
ZERO SPEED VOLTAGE `0.20` Anlg In1 Val `0.000`

QUICK OPS

This screen is used to set the voltage relationships for the temperature and speed reference analog inputs. Use this to calibrate the devices.

Input 0 scales the voltage to the scaled temperature of the measuring device.

Input 1 scales the voltage to the scaled speed of the measuring device.

1. Input Description - 12 letter description of the voltage input. The actual voltage will appear in the field to the right.

2. Low Voltage - Voltage measured at the Low Temperature setting.

3. Low Temp - Temperature setting for the Low Voltage measurement.

4. High Voltage - Voltage measured at the High Temperature setting.

5. High Temp - Temperature setting for the High Voltage measurement.

6. Temperature Description - 12 letter description of the item being measured. The scaled temperature value will appear in the field to the right.

6. Zero Volt Value - Enter the value at which the output will be 0 volts if the reference item is at or below this value. This can be useful when the item is not able to reach and maintain a true zero when stopped.

7. Output description - 12 Letter Description of the Voltage Output. The actual value is shown to the right of the description.

18.8 Analog Outputs
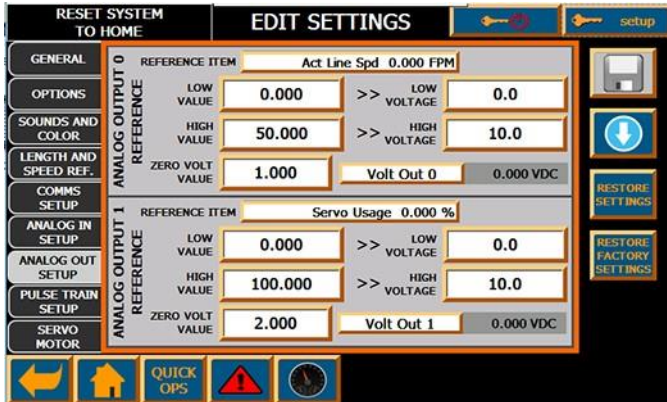
If the analog output module is installed and turned on in the Options, the tab will appear.

Use this to set the voltage relation of any of the Production Data values to output a corresponding voltage.
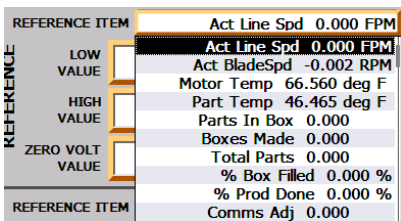
1. Reference Item

Pressing this field will show a drop down list to select from any of the Product Data items. You can use the side bar to see more values. You will then need to scale the value to a corresponding 0-10V output signal.

Use caution when setting up the scaling. The output card is capable of putting out a voltage between -11.7V to 11.7V for overshoot. It is best to set the scaling properly and measure it before connecting any external devices.

2. Low Value - Enter the value for the Product Data item selected that corresponds to the measured low voltage.

3. Low Voltage - Enter the measured voltage that will be output when the low value is displayed.

4. High Value - Enter the value for the Product Data item selected that corresponds to the measured high voltage.

5. High Voltage - Enter the measured voltage that will be output when the low value is displayed.

19.0 PULSE TRAIN OUTPUT

Use this screen to choose and scale the Product Data item for the pulse train output if it is enabled.

1. Reference Item

Pressing this field will show a drop down list to select from any of the Product Data items. You can use the side bar to see more values. You will then need to scale the value to a corresponding pulse per second signal.
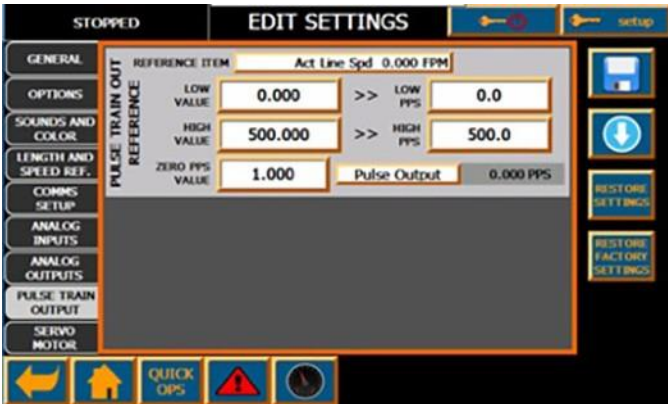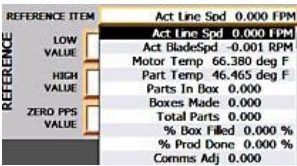
2. Low Value

Enter the value for the Product Data item selected that corresponds to the PPS.

3. Low PPS

Enter the PPS that will be output when the low value is displayed.

4. High Value

Enter the value for the Product Data item selected that corresponds to the PPS.

5. High Voltage

Enter the PPS that will be output when the low value is displayed.

6. Zero Volt Value

Enter the value at which the output will be 0 PPS if the reference item is at or below this value. This can be useful when the item is not able to reach and maintain a true zero when stopped.

7. Output description

12 Letter Description of the PPS Output. The actual value is shown to the right of the description.

20.0 SERVO MOTOR

This screen can be used to setup and view the servo motor parameters. Most of the items can only be set by Novatec. If you need to change any items that are greyed out, please contact Novatec Engineering for guidance. The values on the right in dark Grey are read from the servo motor and drive and cannot be changed.
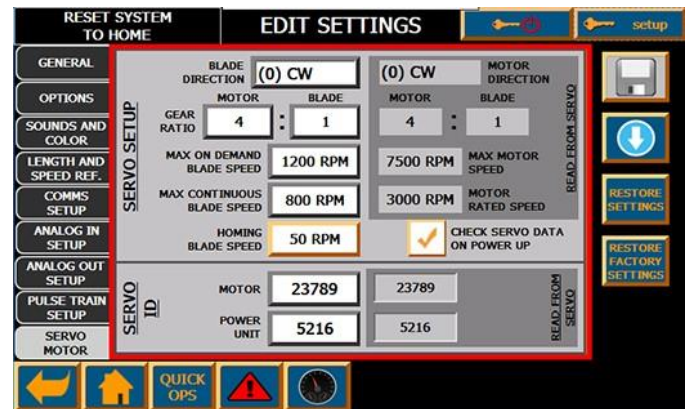
1. Blade Direction

The Blade direction can be changed to account for left and right handed machines. This item can be changed by the operator if, for some reason, it has changed. Changing this value will require that the blade holder be re-machined to operate in the opposite direction.

2. Gear Ratio

The gear ratio is dependent on what gear is actually installed. If the gear box is changed, the ratio can be changed here and downloaded to the servo. This will likely require the servo to be re-tuned which is not something that can be typically done by the end user.

3. Max On Demand Blade Speed
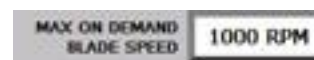
This value is determined from running the equipment with the lightest blade and no parts being cut. The maximum blade speed allowed by the motor is the Max Motor Speed divided by the Gear Ratio. The value shown here is further limited by the inertia of the blade holder and the ability of the equipment to absorb the torque put out by the motor accelerating quickly.

4. Max Continuous Blade Speed
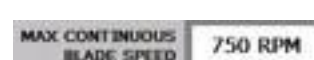
The best possible continuous blade speed that the motor can withstand with no resistance from cutting and run indefinitely is determined by the Rated Motor Speed divided by the Gear Ratio. If there is a load from cutting put on the motor, the maximum speed will be lowered accordingly. It is possible to run in continuous at blade speeds higher than this but the motor will eventually overheat. It might run for 8 hours before overheating or only 30 minutes depending on the speed and the load.

5. Homing Blade Speed

The homing blade speed will determine how repeatable the home position is. Because the blade is set far away from the part a few tenths of degrees of precision is not very important. A slower homing blade speed will take a bit longer for the machine to home. A blade speed of 50 is a good compromise between precision and speed. If you need more precision, lower it. If you want the machine to home faster, raise it.
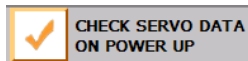
6. Check Servo Data on Power Up

When the system powers up, it requests the motor and drive data from the drive system which shows up in the dark grey boxes to the right. If there is a problem with the motor or encoder or the cabling, this feature will catch that error. In the even the improper motor or drive was installed, this would also be caught by this feature. Checking the motor data requires an additional 5 seconds for the machine to be ready on power up. If you need to power up quicker, you can turn off this feature by pressing the check box.

7. Servo ID
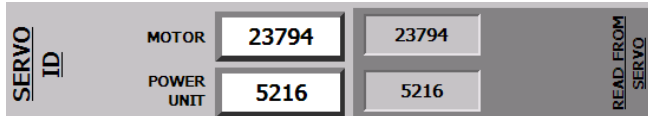
This displays the motor and drive that determine the type of machine setup. If the running values don't match what is read from the servo, the unit setup will not be correct for the motor installed. To change a motor or drive would require the user to obtain the information and then to change the values to the left to match and then create a new setup. This would require retuning of the system and is beyond the capability of most end users.

21.0 BLADE EDITOR

Each product recipe calls out a specific blade to use in the General tab of the product editor. This allows the machine to work with different types of blades and different multi-blade configurations. Each blade is a recipe that determines how the system will run with the configuration.

To access the Blade Editor press the [ ] button On the Home Screen to open the Select Blade screen.

Select the blade to be edited by pressing on the line with the description and pressing the editor button.

New blade recipes can be created by selecting any of the unused selections. It is advisable to always start with an existing blade recipe by copying it and then pasting it to an unused selection.

Creating blade recipes requires extensive knowledge of the equipment and a lot of time to determine limits. If the wrong parameters are entered, the machine may not function. It is advisable to contact Novatec engineering for guidance in creating new blade configurations.

21.1 General Tab
The screen gives general information about the blade description and dimensions.

1. Save Blade Recipe Button

When changes have been made this button is no longer greyed out. Pressing it will save the changes for the blade. Blade recipes are typically loaded only when the recipe calling it is changed so you will not see the effects of the change unless you press the Send to Servo button or load a recipe which calls it.

2. Send To Servo button

This button can be used to test how the blade will function or if editing the blade that is currently running. Note that this does not save the blade file and will exit the editor so it is advisable to save first if you wish to return to these edited values. This is a reason why it is a good idea to work on a copy

of a blade file until you are sure of its operations. Be careful that the current recipe references a blade recipe with the same number of blades or there may be strange results. This button only appears on this page.

3. Machine ID

MACHINE ID | **C4S**

The machine ID for the blade must match the machine type that it is intended to be used on. When the list of blades is displayed, only blades with the same ID as the machine will be displayed for selection.

4. Blade Description

BLADE DESCRIPTION | **Sharkfin 2 Blades**

The blade description will appear on the Quick Ops screen so the operator knows which blade(s) to install. It is also show in the product editor. Choose a unique description up to 20 characters so that the operator can easily figure out what to install.

5. Blade Change Help File

BLADE CHANGE HELP FILE

You can create a .pdf file which shows the operator the blades and gives general instructions on how to install the blades. If a blade change is required for the product change, this picture will appear to the operator at the appropriate time when they are changing the blade.

6. Number of Blades

NUMBER OF BLADES | **2**

This determines how many blades need to be installed on the blade holder. The blade holder on the machine must be manufactured to hold the number of blades specified in this field. The acceptable numbers are 1, 2, 3, 4, 5, 6, 8, 9, 10, and 12. If more than one blade is installed, the unit can still operate in On Demand mode but with lesser ability than if one blade is installed. Each time a cut is executed, the blade will attempt to go to the set speed but will only travel a portion of the full circle. The On Demand blade max speed and CPM limits must be set appropriately to allow the cut to function properly. It is not advisable to run production in On Demand mode with more than 1 blade. It is available so that a unit running in continuous mode while running production can switch to On Demand mode when Scrap mode is selected and cut much longer parts.

7. Maximum Continuous Blade Speed

MAXIMUM CONTINUOUS BLADE SPEED | **700.0** RPM

This value is a limit for the capability of the blade. It cannot be set higher than the setting for the Max Blade Speed in the servo setup. Larger blades with higher inertia will limit the ability of the machine to operate at the higher speeds. Smaller blades may need to be speed limited so

that they don't shatter.

8. OnDemand Accel/Decel

ON DEMAND ACCEL/DECEL | **50.0** %

Set this value as high as possible but not so high that the motor faults or the jerk from starting and stopping causes excessive shaking of the machine.

9. Blade Positioning

BLADE POSITIONING

ACTUAL POSITION	0.00	DEG.
MEASURED ARC-LENGTH	5.00	DEG.
HOME OFFSET	17.00	DEG.
HOMING REVERSE POSITION	85.00	DEG.

The Actual Position will show the current position of the blade for reference to set the other values. You can manually move the blade and observe this value to set the other parameters.

The Measured Arc Length can have 2 meanings. If the Blade Sensor Option is installed, the PLC will measure the angle of the blade as it passes it in the bushing holder to determine if it is broken or missing. Otherwise, it tells the servo to turn on a signal to the PLC while the blade traverses the cut area.

The **Home Offset** sets the initial position of the blade. When the machine is powered up, the motor will spin the blade holder until the blade holder activates the homing sensor(if installed) or the a blade crosses in front of the blade sensor. The blade holder will then move the number of degrees set in the Home Offset and set the position as the home position.

The **Home Reversing Position** is used to move the blade back to the home position when the unit restarts. If the blade has not passed the angle set here, it will move backward to the home position. If it has moved passed the angle, it will move forward to the home position. The idea is to prevent the blade from crossing through the product while going to home. The home speed may not be sufficient to cut through the part and may cause the line to back up if it tries to go through. It is typically set at the position where the blade is just through the part or almost through the part. **If a blade sensor is not installed, it is impossible for the unit to home without a blade going through the product on power up. In this instance, the operator should manually move the blade holder so that the homing sensor target is directly in front of the sensor.**

21.2 Tuning
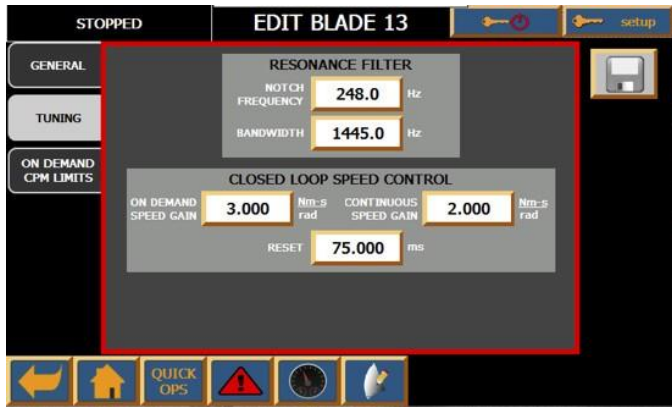
The blade tuning parameters are extremely difficult to determine without the servo software. The values are dependent on the type of motor and the total inertia of the load which includes the blade holder and blades. As a general rule, if the inertia does not change more than 10% from the blade recipe that was copied, these values do not need to be changed. It is difficult to determine the inertia of the blade holder and blade together. The blade holder may weigh much more than the blades but the blades are further from the center and therefore contribute more to the inertia. Adding a single shark fin type blade to a C-style cutter will not affect these parameters because they are already run with a counter weight that has an equivalent inertia to the blade. Just remove the counterweight and add the blade. If the blade is being switched between a shark fin to a scimitar blade or more than one blade is being added, these parameters will likely be changed.

1. Resonance Filter
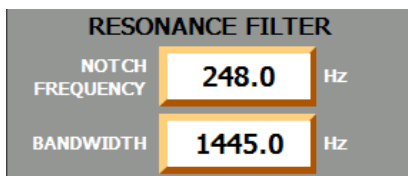
Every machine has a resonance frequency that is based on the motor installed, the load on the motor and friction in the system. Once it is determined, it should be good for most loads and does not need changed. The cutter systems have very little friction so the resonance is mainly from the motor and load. Siemens has supplied a very complicated method of finding these values based on test moves that are performed and plots that are created but it is too involved to explain. If you feel that your machine is not optimized after making blade recipe changes and you think these need changed, contact Novatec engineering for guidance.

2. Closed Loop Speed Control
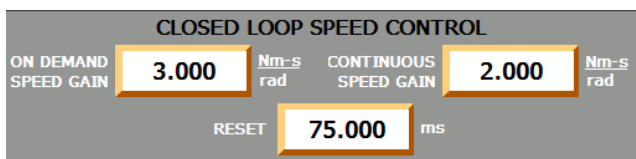
If changes to a blade recipe add more than 10% weight to the system, the Speed Gains for both parameters should be lowered accordingly. The On Demand Speed Gain needs to be higher than the Continuous because it needs to be faster reacting to accelerate to speed quickly and then decelerate to a stop. The continuous speed gain is lower to provide a smoother velocity profile. It cannot be set too low though or it will not be able to come to a quick stop. If the motor is ringing, lower the gain in 10% increments until it stops. Changing the Reset value does not have much affect once the system is tuned in. Lower values will make the system more responsive but also a bit jumpier which could lead to velocity spikes.

21.3 Demand CPM Limits
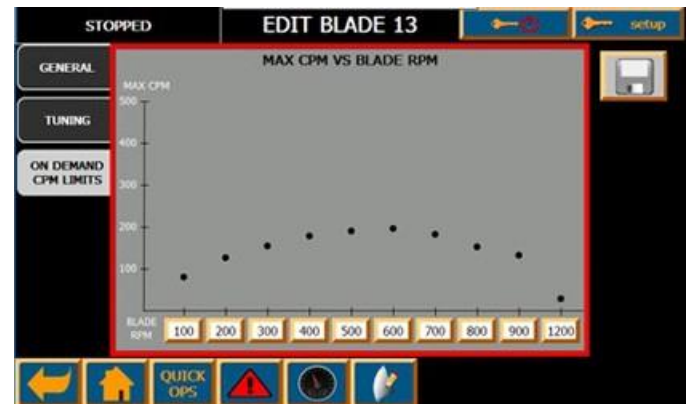
The relationship between the On Demand Blade Speed and Cuts Per Minute must be determined for each new blade and each time tuning parameters are changed. The graph will always look similar to what is shown with low CPM ability on both ends and higher in the middle.

At low blade speeds, the time required for of the blade to accelerate to speed and then come to a stop determines when the next cycle can occur and limits the CPM. As the blade speed gets faster, the number of CPM increases but eventually becomes limited by the amount of heat energy is used by the motor. As the motor accelerates, it dumps current into the motor to create the magnetic field. For the motor to come to a stop, that current must be dumped out of the motor, back into the drive. The drive can only handle a percentage of the motor current coming back to it so a braking resistor is connected to the drive to dump the current into and improve its ability to stop quickly. Both the motor and the resistor need some time to cool down which limits the CPM of the blade at higher speeds.

In order to determine the max CPM values, the system is run at the blade speeds until it reaches its mechanical limit and then it is backed off until it is no longer overheating the motor or resistor. This can take several days as the heating limits of the motion may not be seen for up to 8 hours. When the limit for a given speed has been

determined, you can enter it into the chart by pressing one of the buttons at the bottom of the graph. 100
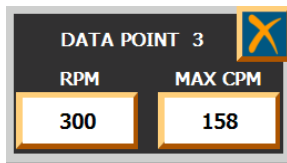
A pop-up will appear to enter the blade speed of the test point and the corresponding Max CPM. When you enter the data point, the dot on the graph will move up or down accordingly. You can enter up to 10 data points and the system will calculate the points between by linear interpolation.

22.0 APPENDICES

Optional Quick Ops Screens Example Setup
Example: Using Scrap Mode, Count Triggers and Alarms, Production Outputs, and End Sensor Mask

A manufacturer has a system which cuts small 2" pieces and utilizes a pneumatic blow off device to put the part in the box and another to push the box out of the way.

The good parts are cut in encoder mode running with the 2" set length and the line is running around 60FPM which will cause the blade to run in continuous mode. The system makes the calculations to achieve the proper blade speed based on the encoder input.

When the box is complete, the system will switch into scrap mode using a proximity based end sensor to cut approximately 4' pieces for easy handling to place in the regrind. The End of Box Trigger is set to switch the system into scrap mode for this operation. No parts are counted in this mode.

There are 2000 pieces in a box which is set in the pieces per box field. It typically requires the operator about 30 seconds to get to the machine to attend the box after a change. The box change warning alarm is set to 1 minute to notify the operator that a box change is eminent. The box change alarm siren is set to 30 seconds to notify the operator to go to the line immediately. The operation will continue to run until the end of their shift so a value of zero is entered into the Boxes Required field.

Production Output 1 is set to activate 2.43 seconds after a part is cut to and stay on for 0.08 of a second to activate the blow off. Production Output 2 is set to activate 6.8 seconds after a box is complete and stay on for 10 seconds to fully extend the air cylinder pushing the box out of the way.

After the system finishes the box, it waits for a signal from the end sensor to make the next cut. The end sensor can get inadvertently activated by the cut scrap so the mask is set at 10 seconds to prevent it from activating a second time.

When the operator arrives at the machine, they press the Alarm Silence button on the center of the Quick Ops screen, place a new box in position and press the Cut Product button to resume cutting good parts at high speed. They retrieve the piece(s) of scrap and place them in the regrind.

23.0 WARRANTY

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

5-YEAR (Except 1-Year on Non-Novatec Buy-Out Items)

Resin Drying to Include:
NovaWheel™ Dryers *
Dual Bed Dryers
NovaDrier *
NDM-5 Membrane Dryer
Gas-Fired Process Heaters
Gas-Fired Regeneration Heaters
Drying Hoppers
Central Drying Hopper Assemblies
Heater/Blower Units and Hot-Air Dryer
Silo Dehumidifiers
NovaVac Dryers *
Nitrodry Nitrogen Dryers
DryTemp Plus

Central System Controls to Include:
FlexTouch™ Series Controls
FlexXpand™ Series Controls
OptiFlex™ Series Controls
PLC Communications Modules
Greenboard Communications Modules
LOGO! Mini PLC
MCS-600 Series Controls – (Distributed I/O)
MCS-400 Series Controls
CL Silo Manager

Moisture Measurement Equipment to Include:
MoistureMaster®

PET Resin Crystallizers

Resin Blending and Feeding to Include:
WSB Blenders, MaxiBatch & Feeders *
Gaylord Sweeper Systems

Downstream Extrusion Equipment to Include:
C and NC Bessemer Series Cutters
NPS Bessemer Series Pullers
NPC Mini Puller/Cutter
All NS Series Servo Saws
Rx SmartMed Extrusion Products
All Cooling and Vacuum Tanks Manufactured by Novatec

Resin Conveying and Systems Components to Include:
GSL Series Vacuum Loaders
GlassVu Loaders, Receivers and Hoppers
VL/VLP Series Loaders
VRH, VR, VR-FL, VRP & VRM Series Receivers
Compressed Air Loaders
AL-B Barrel Loader
Cyclone Dust Collectors
Conveying System Accessories
Surge Bins
Valves and Accessories
Electronic Metal Separators
Quick Select Manifolds
Tilt Tables
Filter Dust Collectors
Drawer Magnets
Velocity Control Valves

3-YEAR

Resin Conveying System Components to Include:
** VPDB Vacuum Positive Displacement Pumps
** SVP Vacuum Pumps
** MVP Vacuum Pumps
** Railcar Unloading Systems

**5-Year Extended Warranty - When a MachineSense® data plan is activated for products with **, Novatec automatically extends the warranty to 5 years. The data plan must be activated within 60 days after product shipment, and remain active through the warranty period to maintain extended warranty eligibility. The first 6-months of data plan usage is free from Novatec.

1-YEAR

Infrared Dryers
UltraVac Vacuum Pumps
Vacuum Regenerative Blower Pumps
Custom Equipment of any kind unless otherwise specified

Exclusions:

Routine maintenance/replacement parts are excluded from the warranty. These include, but are not limited to: hoses, desiccant, filters, filter elements, wiper seals, gaskets, dew point sensors, infrared lamps, 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.

*Specific Exclusions:

1. NovaDrier™ and NITROdry™ warranty is void if coalescing filters are not replaced on a 6-month or yearly basis (per instruction manual) and/or membrane has been exposed to ozone.

2. NovaVac Dryer -The ability of the canisters to hold vacuum will be compromised if the vacuum seal edge is damaged from mishandling. We do not warranty canisters damaged from improper handling. We do, however, warranty the seals.

3. LOAD CELLS on our WSB's are covered by Novatec standard warranty as long as they have not been damaged from improper handling.

4. Desiccant Wheel Warranty will be void if the wheel has been exposed to plasticizer, dust or other contaminants as a result of negligence on the part of the processor.

5. DryTemp+ - We assume no responsibility from equipment failures resulting from untreated or improperly treated water.

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.

Drying > Conveying > Blending > Downstream

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