SmartShop 2 Pro Owner's Manual



LAGUNA

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Scope of This Manual

This manual outlines the basic procedures for the SmartShop 2 Pro with the Syntech Controller.

For detailed instructions and videos, please go to www.lagunatools.com

Customer Service

For technical support, please contact Laguna Tools Customer Service by phone at 1-800-332-4094, or email Customer Service at customer_service@lagunatools.com. Please note the machine type in the subject line.

In the space provided, record the serial number, model number, and install date of the machine.

Serial No.	
Model No.	
Install Date:	

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DISCLAIMER

Laguna Tools is not responsible for errors or omissions. Specifications subject to change. Machines may be shown with optional accessories.

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Table of Contents

1.0 GENERAL INFORMATION AND SAFETY 7

1.1 Overview 7

1.2 Safety Signs and Call-Outs 7

1.3 Safety Warnings 8

1.4 Additional Safety Information 9

1.5 Proposition 65 Warning of Harmful Exposure 10

2.0 RECEIVING THE MACHINE 11

3.0 SMARTSHOP 2 PRO OVERVIEW 13

3.1 Features of the SmartShop 2 Pro 13

3.2 Components 14

3.3 Electrical Cabinet and Control Panel 15

3.4 Manual Pulse Generator 16

4.0 MACHINE PLACEMENT 17

4.1 Placement 17

4.2 Dust Collection 17

4.3 Leveling the Machine 18

4.4 Lighting 18

4.5 Unpacking the Machine 18

5.0 ASSEMBLY AND SETUP 20

5.1 Electrical Requirements 20

5.2 Electrical Connections 20
5.3 Compressed Air connection 21
5.4 Connecting the Vacuum Pump 22
5.5 Fitting the Dust Hose 23
5.6 Switching Out the Tooling 23
5.7 Vacuum Table and Spoil Boards 24
5.8 Spoil Board Preparation 25
6.0 OPERATION 27
6.1 Power On 27
6.2 Main Interface 27
6.3 Homing the Machine 28
6.4 Tool Touch Off (TTO) Setup Procedures 28
6.5 External Shift & Spoil Board Setup 30
6.6 Feed Rate & Speed Adjustment 32
6.7 Power Off 32
6.8 Emergency Stop 33
6.9 Methods 33
6.10 Multiple Pulse Generator (MPG) Handwheel 35
6.11 Auto Mode 36
6.12 Part Program Selection 37
6.13 Job Origin Preset 37

7.0 RUNNING A PROGRAM 39

7.1 Transferring a Program from a Flash Drive 39

7.2 Running the Program 40

8.0 MAINTENANCE AND TROUBLESHOOTING 42

8.1 Cleaning the Helical Racks 43

8.2 Cleaning the Spindle Tray 43

8.3 Lubrication 44

8.4 Common Error Codes 44

9.0 WARRANTIES 79

NOTES:

1.0 General Information and Safety

1.1 Overview

SAVE THIS MANUAL

Please read and understand all warnings and operation instructions before using any tool or equipment. Always follow basic safety precautions to reduce the risk of personal injury. Improper operation, maintenance, or modification of tools or equipment could result in serious injury property damage. There are certain applications for which tools and equipment are designed. This product should not be modified and/or used for any application other than for which it was designed.

PERSONAL SAFETY IS THE RESPONSIBILITY OF THE OPERATOR.

1.2 Safety Signs and Call-Outs

⚠ DANGER

An imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

A potentially hazardous situation which, if not avoided, may result in death or serious injury.

⚠ CAUTION

A potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTE

A helpful tip from Laguna Tools staff.

1.3 Safety Warnings

1. Failure to comply with safety instructions may lead to personal injury and/or damage to the equipment. Do not operate the machine unless familiar with all safety instructions, warnings, and signs.
2. Do not operate the machine with the electrical cabinet door open–High Voltage Supply Inside.
3. The machine must be properly electrically grounded. The power supply must be connected with a permanently fixed electrical wire.
4. Keep children and non-operators away from the machine.
5. Operators must be familiar with the installation, operation, and service of the machine. Only proper operation can ensure the safe and smooth running of the machine.

⚠ WARNING

Automated machinery involves moving parts which pose a potential hazard to personnel. Be aware of machine movement at all times.

⚠ WARNING

Only allow qualified service personnel to do electrical installation or repair work, and always disconnect power before accessing or exposing electrical equipment to reduce risks.

⚠ CAUTION

Machine bits are sharp and pose a cutting hazard. Do not handle without gloves or while machine is in operation.

1.4 Additional Safety Information

1. All motion parameters have been set up by Laguna Tools. If any modifications are required, please have a professional operator perform the changes.
2. Safety Signs should be attached to places that are easy to spot.
3. Use the machine only in clean areas free from excessive moisture or flammable objects.
4. The machine must be level. Level the machine if the ground is uneven.
5. Keep the machine, electrical cabinet, and surrounding area clear of obstructions and free from excessive moisture.
6. Keep the machine, electrical cabinet, and cables away from excessive heat, flammable substances, and sharp objects.
7. Do not attempt to exceed the limits of the machine.
8. Disconnect power to all system components when not in use, when changing accessories, and before servicing. Remove the switch keys or lock-out the machine to prevent unauthorized use and child-proof the workshop.
9. Exercise care with machine controls and around keypad to avoid unintentional start-up.
10. Keep cutting tools clean and sharp.
11. Lubricate and change accessories when necessary.
12. Cables and cords should be inspected regularly.
13. Keep controls clean and dry.
14. Keep a copy of this manual for future reference.
15. Perform daily inspection of the machine for damaged, loose, or improperly adjusted parts or any condition that could affect safe operation. For your own safety, do not operate the machine with damaged parts.
16. Stay alert at all times while operating the machine.
17. Always wear safety glasses and hearing protection.
18. Know where the emergency stop switch is located.
19. Never operate machinery under the influence of drugs or alcohol, when tired, or when distracted.

20. Do not wear clothing, apparel, or jewelry that can become entangled in moving parts. Always tie back or cover long hair. Wear non-slip footwear to reduce the risk of slipping and losing control or accidentally contacting cutting tool or moving parts.
21. Never stand on the machine. Serious injury may occur if the machine is tipped or if the cutting tool is unintentionally contacted.
22. Consult the Owner's Manual or Laguna Tools for recommended accessories. Using improper accessories will increase the risk of serious injury or damage.

1.5 Proposition 65 Warning of Harmful Exposure

Some dust created by power sanding, sawing, grinding, drilling, and other construction activities contains chemicals known to the state of California to cause cancer, birth defects, or other reproductive harm. Some examples of these chemicals are:

- Lead from lead-based paint.
- Crystalline silica from bricks, cement, and other masonry products.
- Arsenic and chromium from chemically treated lumber.

⚠ DANGER

Fire Warning

Use extreme caution when cutting flammable materials such as wood or acrylic. Keep the machine clean by following the supplied maintenance schedule and always have a fire extinguisher ready to extinguish a fire. Take extreme caution when cutting acrylic materials as they are more volatile than other materials.

Never leave the machine running unattended.

The tools sold by Laguna Tools are safe when used properly, as described by the American National Safety Institute, the UL Standards of safe tool use, and the IEC standards of safe tool use. Laguna Tools is in no way responsible for injury or death that occurs while using this product.

The risk of exposure varies depending on frequency of use. To reduce exposure to these chemicals, work in a well-ventilated area and work with approved safety equipment, such as face or dust masks that are specifically designed to filter out microscopic particles.

For more information go to https://www.p65warnings.ca.gov/.

2.0 Receiving the Machine

Following delivery and before the driver and riggers have left, inspect the packing, invoice, and shipping documents. Next, ensure there is no visible damage to the packaging or the machine. All damage must be noted on the delivery documents and signed by the receiver and the delivery driver. Contact Laguna Tools Customer Service as soon as possible in case of damage. It is advisable to photograph and document any shipping damage. The original packaging is required to return damaged equipment to Laguna Tools.

NOTE

Sawdust may be found in the machine upon arrival. This is because the machine has been tested prior to shipment from the factory and/or Laguna Tools. Laguna Tools tests all machines prior to shipping, but some adjustments may have to be undertaken by the customer. These adjustments are covered in the various sections of this manual.

Most large machinery will be delivered on a tractor trailer 48 to 53 feet long. Please notify a Sales Representative with any Delivery Restrictions. The customer is required to have a forklift (6000 lbs. or larger is recommended) with 72-inch forks or fork extensions.

NOTES:

3.0 SmartShop 2 Pro Overview

The award-winning Smartshop 2 Pro has been the workhorse of the Laguna line of CNC machines. Designed to cut everything from wood to non-ferrous metals, the Smartshop 2 Pro is dependable and built to last. Constructed with an all-steel frame featuring helical rack and pinion, the Smartshop 2 Pro excels at giving the precision you need with a cut quality rivaling any machine on the market.

3.1 Features of the SmartShop 2 Pro

- 12HP HSD Spindle 5,000-24,000 RPM
- Available In 4′ x 8′, 5′ x 10′, 5′ x 12′ Table Sizes
- 8 Position ISO 30 Automatic Tool Changing System
- Yaskawa AC Servos Drive Motors
- Up To 1,800 IPM Rapid Speed
- Planetary Gear Box Drive System
- 12″ Z-Clearance
- 13″ Z Travel
- 6 Zone Vacuum Table
- Syntec Industrial Control System
- Helical Rack & Pinion X,Y Axis, Ball Screw Z Axis
- Heavy-Duty One-Piece All-Steel Frame



3.2 Components

1. **Electrical Cabinet** – The electrical cabinet will be located on the side of the machine.
2. **Spindle** – The tool plate houses a 12 HP HSD Air-Cooled Spindle 5,000-24,000 RPM
3. **Gantry** – The gantry straddles the table. It is moved along the length of the table by a helical rack and pinion.
4. **Automatic Tool Changer (ATC) Rack** – The tool changer features eight (8) tool positions to accommodate a large range of tools. Each of the positions includes an ISO-30 tool clip. Tool positions are controlled by the CNC controller.
5. **Vacuum Table** – The bed of the machine consists of a sturdy steel frame with a composite worktable that enables holding projects securely with vacuum.
6. **Vacuum Control Valves** – The machine has six (6) vacuum control valves that can be used to restrict vacuum to the desired vacuum table zones.
7. **Material Locator Pins** – The pins guide the positioning of a workpiece before turning on the vacuum pressure. The pins should be lowered before the machining process begins.

3.3 Electrical Cabinet and Control Panel



1. **Main Disconnect Switch** – Turn clockwise to turn on the machine power. Turn counterclockwise to turn off power to the machine.
2. **Control Display Screen** – The operator's screen, soft keys, and keypad.
3. **Control Panel** – Machine controls including the USB port, the EMERGENCY STOP (E-STOP) button, and the SWITCH ON/OFF.
4. **Manual Pulse Generator (MPG)** – A remote allowing the operator to manually control the tool gantry and spindle.

3.4 Manual Pulse Generator



1. **Axis Select** – Turning this knob clockwise and counterclockwise selects the axis to be moved.
2. **Speed Select** – Turning this knob clockwise and counterclockwise selects the movement speed of the tool gantry and spindle.
3. **Handwheel** – Moving this knob clockwise and counterclockwise manually moves the selected axis.

4.0 Machine Placement

When unpacking the SmartShop 2 Pro, separate all enclosed items from the packing materials and inspect each for damage. Save the packaging materials until all issues concerning missing or damaged items have been resolved.

4.1 Placement

⚠ CAUTION

When determining location, verify there is sufficient room around the machine. If you cannot fully open all the doors around the machine, it cannot be installed or serviced in the future if necessary.

Select the area where the SmartShop 2 Pro will be operated. The physical environment where the SmartShop 2 Pro is located is important to safe assembly and operation. Before removing the SmartShop 2 Pro from its packaging, consider the weight load, electrical installation requirements, lighting, dust collection, and space allocation available for the machine and accompanying materials.

Guidelines for properly placing the machine follow:

1. There should be sufficient area around the machine to facilitate easy access to the workpiece, perform maintenance, and provide safe egress in the event of an emergency.
2. Select a solid level floor rated to hold the weight of the SmartShop 2 Pro and workpieces under both static and dynamic loads. Laguna Tools recommends concrete flooring. Consult a licensed and experienced professional if in doubt.
3. Locate the SmartShop 2 Pro near a power source and dust collector.
4. Allow an area for the storage of workpiece materials, finished products, and tools.
5. Leave ample space around the machine for the operator to handle both the equipment and the materials being cut.
6. Leave enough space around the machine to open or remove doors/covers as required by the maintenance described in the Owner's Manual.

4.2 Dust Collection

Allow enough space for proper dust collection from the SmartShop 2 Pro. For optimal operation, ensure that the machine is located in a dry environment free from excessive moisture, extreme weather conditions, hazardous chemicals, or airborne abrasives.

4.3 Leveling the Machine

Laguna Tools supplies leveling pads, bolts, and nuts with your SmartShop 2 Pro. Before placing the machine on the floor, insert one (1) and one (1) nut into the six (6) locations for the leveling pads. The bolt head will face upward toward the worktable. The leveling pads will be centered beneath each bolt. Ensure the machine is level by adjusting the height of each bolt as necessary.



Figure 4–1: Leveling Feet with Leveling Pad

4.4 Lighting

Ensure that the lighting your machine is placed under is sufficient to safely perform regular operation and maintenance. Any glares, shadows, or strobe lighting which may distract or prevent the operator from safely operating the machinery should be removed from the working area.

4.5 Unpacking the Machine

NOTE

All shipping related claims for loss or damaged goods must be made to Laguna Tools within 24 hours of delivery.
Contact Laguna Tools customer service department to make claims for any damaged items/parts.
The original packaging is required to return damaged goods within the warranty period.

⚠ WARNING

The customer is required to have a forklift (6000 lbs. or larger is recommended) with 72-inch forks or fork extensions.

⚠ WARNING

Unload the machine with care. DO NOT pinch, crush, or damage any components that are on/around the machine.
This machine is heavy. Seek assistance from an experienced professional if you have any doubt about the following unboxing or set up procedures.
DO NOT attempt any procedure that you feel is unsafe or you believe you do not have the physical capability of achieving.

Unpacking the SmartShop 2 Pro will require tin snips, a knife, and a wrench.

1. Using the tin snips, cut the banding that is securing the SmartShop 2 Pro to the pallet.
2. Ordered parts will be packed on the machine.
3. Approach the machine from the long side and lift the machine by the frame, taking care that there are no cables or pipes around the forklift forks. The caterpillar track tray, vacuum hoses, air lines, and cables under the SmartShop 2 Pro are very susceptible to pinch and crush damage.
4. Lower the machine gently to the floor.

5.0 Assembly and Setup

Once the SmartShop 2 Pro has been properly placed on the floor, the machine is ready for leveling, the placing of the vacuum pump(s), and connections to electricity and air.

5.1 Electrical Requirements

The SmartShop 2 Pro requires permanent, direct power installed by a qualified electrician familiar with industrial best practices. Ensure that all power cords are protected from traffic, moisture, chemicals, or other hazards. For safety, always have a qualified electrician assess grounding and any further electrical needs.

5.2 Electrical Connections

The main power cable (not supplied) must be connected to the main disconnect switch on the front of the electrical cabinet. Power cables must also be connected to the vacuum pump(s). A qualified electrician must carry out the electrical installation of the SmartShop 2 Pro.

⚠ CAUTION

A qualified electrician is required to perform the electrical installation.

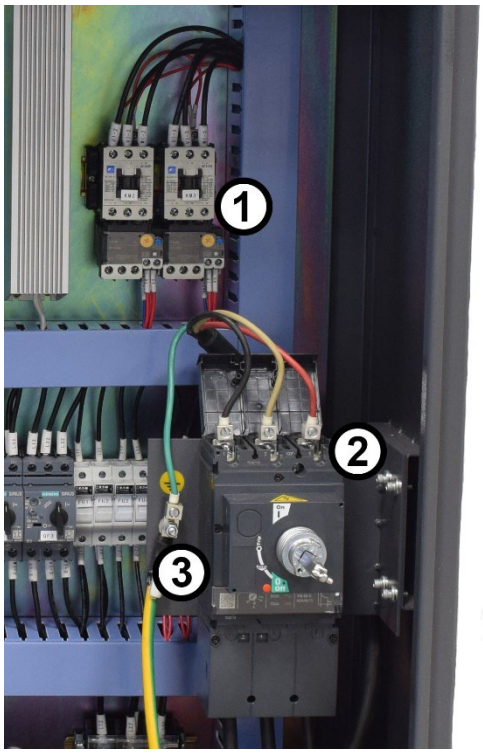


Figure 5–1: Electrical Connections

1. Contactors to vacuum pumps
2. Main Power (Main Disconnect) incoming power connections
3. Vacuum pump and Main Power grounds

⚠ CAUTION

Laguna Tools does not supply electrical cables. Ensure wires are properly sized according to local codes for the main power and vacuum pump(s).

5.3 Compressed Air connection

The machine is supplied with an air regulator. The input air regulator will need to be adjusted to 101 psi (7 Bar) once the machine has been connected to the air supply (an air pipe is not supplied). This will ensure the machine always has the minimum required air pressure.



Figure 5–2: Air Regulator

To adjust the air pressure, pull the cap down and rotate until the gauge reads the correct pressure. Once the pressure is adjusted, push the cap up.

It is important that the air supplied to the machine is CLEAN DRY AIR. The machine will not perform consistently if the air is damp or dirty; dirt and moisture will block the valves. Damp or dirty air will damage the machine and dramatically shorten the service life of the machine.

The bowls (refer to Figure 5-2) on the air inlets provide backup protection against contamination in the pneumatic system and spindle. If there is water or oil present in the bowl then contamination may have occurred. Water or oil contamination can void the warranty on your machine. The bowl must be emptied if more than 1/3 full or stagnant.

The best way to prevent water is refrigerant air dryer and a two-stage filter.

NOTE

We recommend attaching an air dryer to the compressed air system to help reduce moisture in the lines.

Moisture in the lines can cause damage to the machine and reduce the air quality.

⚠ CAUTION

If conducting repair on the pneumatic system, close the air valve.

NOTE

Airline poly connection (refer to Figure 5-3) may be removed to install quick disconnect airline fittings.



Figure 5–3: Poly Connection and Air Inlet Bowls

5.4 Connecting the Vacuum Pump

The machine is provided with a 2-inch pipe for the hose connection to the vacuum pump. Connect the other end to a vacuum pump(s). Vacuum pump(s) are typically placed at the rear of the machine.

Figure 5-4 illustrates a typical 208 to 240 volt vacuum pump wiring.

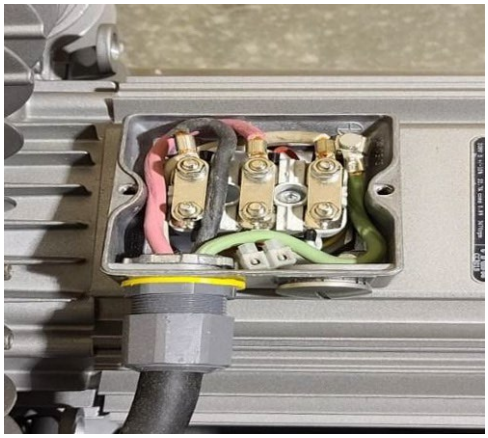


Figure 5–4: Vacuum Pump Wiring Example

⚠ CAUTION

DO NOT place vacuum pumps under the machine. Vacuum pumps run hot and may warp the machine frame or damage the worktable.

5.5 Fitting the Dust Hose

1. Fit a 6-inch dust hose (not supplied) to the dust collection port located at the top of the machine and secure using a hose clamp. Verify the clamp is tight.
2. The dust hose will follow the spindle head across the entire worktable. If there is insufficient slack, the hose may be damaged or broken. It is recommended that the hose be suspended from the ceiling of the shop with sufficient slack so as not to restrict movement. This will prevent the dust collection hose from becoming a tripping hazard or interfering with the machine during operation and causing damage.

5.6 Switching Out the Tooling

1. Select the desired router bit and a collet of correct size.
2. Fit the collet into the spindle nut. Press the collet into the spindle nut until it snaps into place.

NOTE

The router bit must not be fitted into the collet until the collet has been fitted into the spindle nut. With the router bit fitted in the collet, the collet cannot compress and snap into the spindle nut.

The face of the collet and the face of the spindle nut will be close to flush.

3. Thread the collet and nut assembly on the tool cone and thread by hand.
4. Press the bit into the collet. The flute of the router bit should be a minimum of 1/16 inch outside the collet. The bit should not bottom out in the tool cone.
5. Tighten the collet nut with the supplied wrench until snug. Do not overtighten.



Figure 5–5: Assembled Tool Cone

5.7 Vacuum Table and Spoil Boards



Figure 5–6: Vacuum Table

The Spoil Board has three (3) functions:

1. **Protects the vacuum table from the router bits** - Set the depth of the router bit set to exact spoil board height. Without a spoil board, the machine would cut into the vacuum table.
2. **Transfers vacuum between the table and the workpiece** - Inexpensive Medium-Density Fiberboard (MDF) is the best material for this function.
3. **Provides a cheap, disposable work surface** – Unlike a wooden table, a disposable spoil board can be resurfaced without impacting the life of the machine.

5.8 Spoil Board Preparation

The spoil board should not be less than ¾ of an inch thick.

The MDF that you purchase will not be perfectly flat. The SmartShop 2 Pro will be cutting to accuracy in the order of a few thousandths of an inch so the spoil board will need to be machined to ensure a flat surface. Over time, when the spoil board has been skimmed many times and has been reduced to ½ inch thick or less, discard it and start a new spoil board.

1. Cut your spoil board to the size of the bed of the machine.
2. Prior to placing the spoil board onto the vacuum table, verify the table is perfectly clean and free from sawdust and dirt. If there is sawdust etc. on the table, it will change the height of the spoil board and it will not be flat. It is strongly recommended that you do not wipe or brush the table clean.
3. Turn on the vacuum.
4. Fly cut the total surface of the spoil board. Only cut the minimum needed to achieve a flat surface over the entire board. Skim the surface several times during the life of the spoil board to clean it up and skim only the minimum off the surface.
5. Once the face is flat, remove the vacuum, turn the spoil board over, and repeat the process for the other face of the spoil board.

Spoil boards are porous and will absorb moisture. Over time, the absorption of moisture will change the dimensions of the board. Day-to-day changes are normally insignificant and will occur across the entire board evenly. However, if liquids are spilled on the board, it will be absorbed and cause the board to grow in the affected area. Do not allow the board to get wet. If an accident should happen, remove the board from the machine and allow it to dry. Drying may take several days. Meanwhile, use a new board. Once the wet board has completely dried it may be possible to recut and re-use. If the board cannot be cut flat, it should be scrapped.

NOTES:

6.0 Operation

6.1 Power On

1. Turn on the circuit breaker knob on the electric cabinet door clockwise to switch on the power.
2. Release the **EMERGENCY STOP** (E-STOP) button and switch on the PC. The main interface opens following the auto check.

6.2 Main Interface

Figure 6-1 illustrates the Main interface screen and some commonly used buttons.



Figure 6–1: Main Screen

1. **MDI** – Selects Manual Data Input mode.
2. **Jog** – Select to jog the machine manually.
3. **MPG** – Select to operate the machine with the Manual Pulse Generator.
4. **Home** – Select and click CycleStart to home the machine.
5. **Main** – Navigates to the Main screen.
6. **Reset** – Resets the software.
7. **Feed Hold** – Click to pause the current program.
8. **Cycle Start** – Executes the selected program or process.

6.3 Homing the Machine

1. To home the machine, click **Home**.
2. Click **Cycle Start**.

6.4 Tool Touch Off (TTO) Setup Procedures

6.4.1 TTO Setup with TTO Switch

To automatically measure the tool length using the TTO Switch:

1. Click **MDI**.
2. Click **F4 Monitor**.



Figure 6–2: F4 Monitor Screen

3. Click **F3 MDI Input.**
4. **Click F1 Confirm.**
5. Type in the Tool number.
   a. Example: **T1** for tool number 1. The "T" **must** be capitalized , or you will get an alarm.
6. Click **Main**.
7. Click on **AutoTool**.
8. Click **Cycle Start.**
9. Repeat with each tool as necessary.

6.4.2 Manual TTO Setup with the Worktable

1. Switch to the tool number you would like to touch off.
2. Move the spoil board out of the way so a section of the black phenolic vacuum table is visible.
3. Jog the bit down until it just barely touches the black phenolic table.
4. From the home page of the machine, click **F3 Offset/Setting.**
5. Click **F2 Tool Set**.



Figure 6–3: Tool Set Screen

5. Input the Z value for your "Machine" into the "Length(H)" "Geometry" of your specific tool.
   a. To input the value, click the number in the "Length(H) "Geometry" of the tool that you want to touch off.
   b. Type in the new Machine Z value
   c. Press Enter
6. The tool is now manually touched off.

⚠ DANGER

DO NOT turn the router bit by hand as it is sharp and could cause injury.

NOTE

The machine "B" parameter setting will not be present unless it is selected

NOTE

Do not delete the disk C and network on the D disk.

6.5 External Shift & Spoil Board Setup

The purpose of this section is to provide clear instructions on the spoil board thickness setup for the Smartshop 2 Pro.

The External Shift Parameter allows the user to shift the X, Y, or Z axis in the positive or negative direction. This is commonly used for inputting the spoil board thickness. Although it is less common, it can be used to shift the X and Y axes over as well.

6.5.1 Setting the Spoil Board Thickness

Measure the spoil board with calipers or a tape measure and record the measurement.

1. Measure the thickness of the spoil board in millimeters.

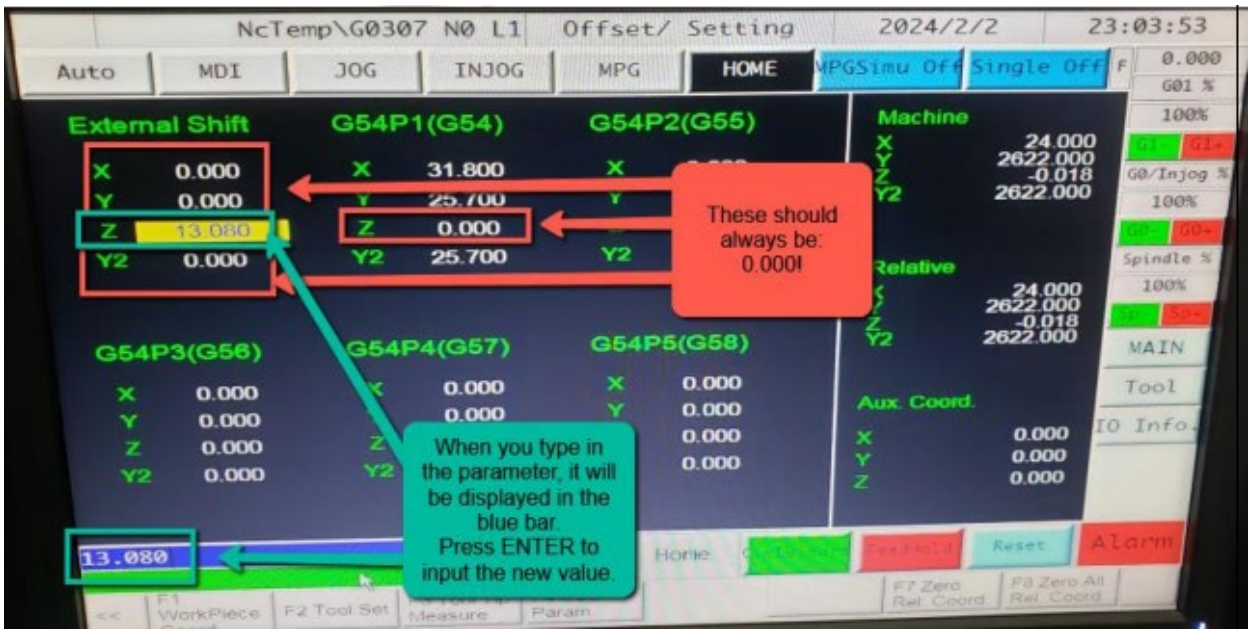


2. Click **F3 Offset/Settings**



Figure 6–4: F3 Offset/Settings Screen

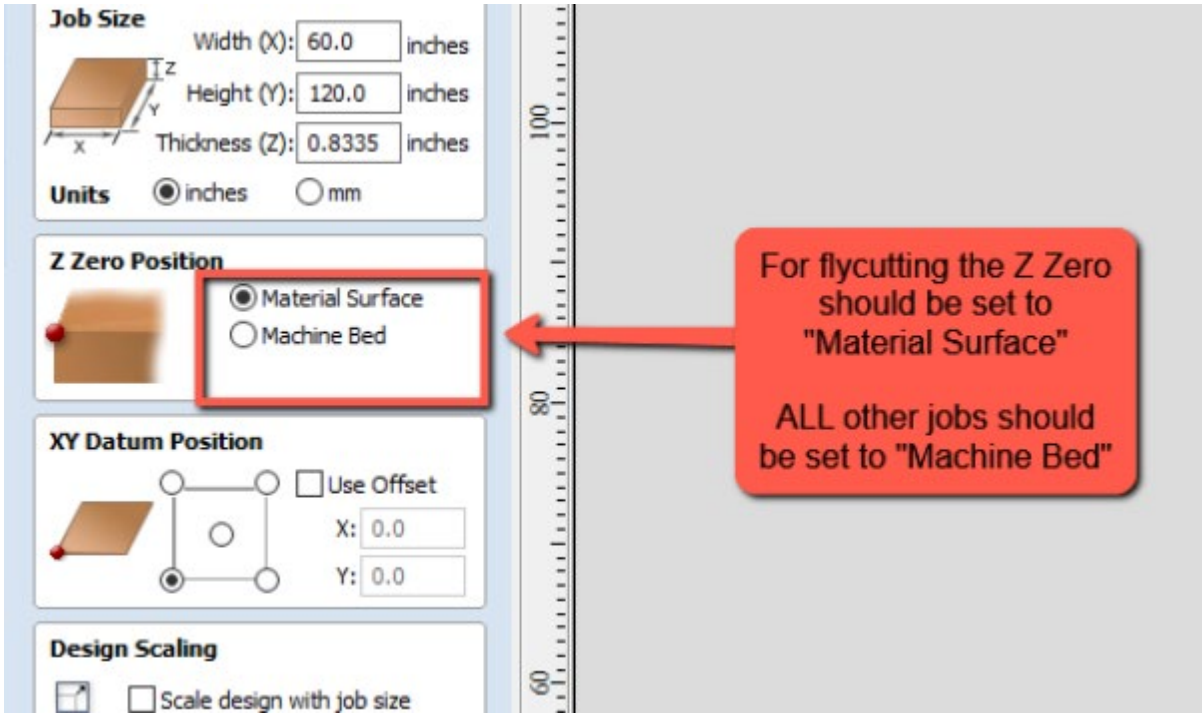
3. Click and highlight the Z "External Shift." Type in the measured thickness . Then, press ENTER.



4. The spoil board thickness is now set.

6.5.2 Flycutting the Spoil Board

1. When flycutting the spoil board, your Z-Zero position should always be set to "Material Surface" or "Top Of material". On ALL other jobs, the Z-Zero position should be set to "Machine Bed" or "Bottom of Material.
   Below is a photo example setting the Z0 position in Vectric Software's material setup.



2. Whenever you flycut the spoil board, you will have to go back and readjust the thickness of the spoil board in the Z External shift.
3. Repeat this process as many times as needed if you would like to flycut multiple passes.

6.6 Feed Rate & Speed Adjustment

Press **G1-** or **G1+** to reduce and increase the processing feed rate.

Press **G0-** or **G0+** to decrease and increase the Spindle rapid adjustment.

Press **SP-** or **SP+** to decrease and increase the rotation speed of the spindle.

6.7 Power Off

1. Before the machine stops, press the **E-Stop** button.
2. Exit the System Operation Interface.
3. Shut down the personal computer (PC) off by pressing the POWER OFF button.
4. Turn the Power Switch on the electric cabinet door counterclockwise.

6.8 Emergency Stop

In case of a safety emergency, press the **Emergency Stop** button and all the machine parts except for the controller will be disconnected from the power supply to ensure individual and machine safety.

6.9 Methods

After the system self-check is complete, it will open to the main screen. Release the **Emergency Stop** switch (1/4 turn clockwise to the right). The system will prompt navigating to **Home**. **All Axis** must be homed before beginning to operate the machine.

Click on the **Auto Go Home** button and **Cycle Start** button, the Z-Axis will go home.

6.9.1 Jog

To access the jog screen, press **MAIN.**

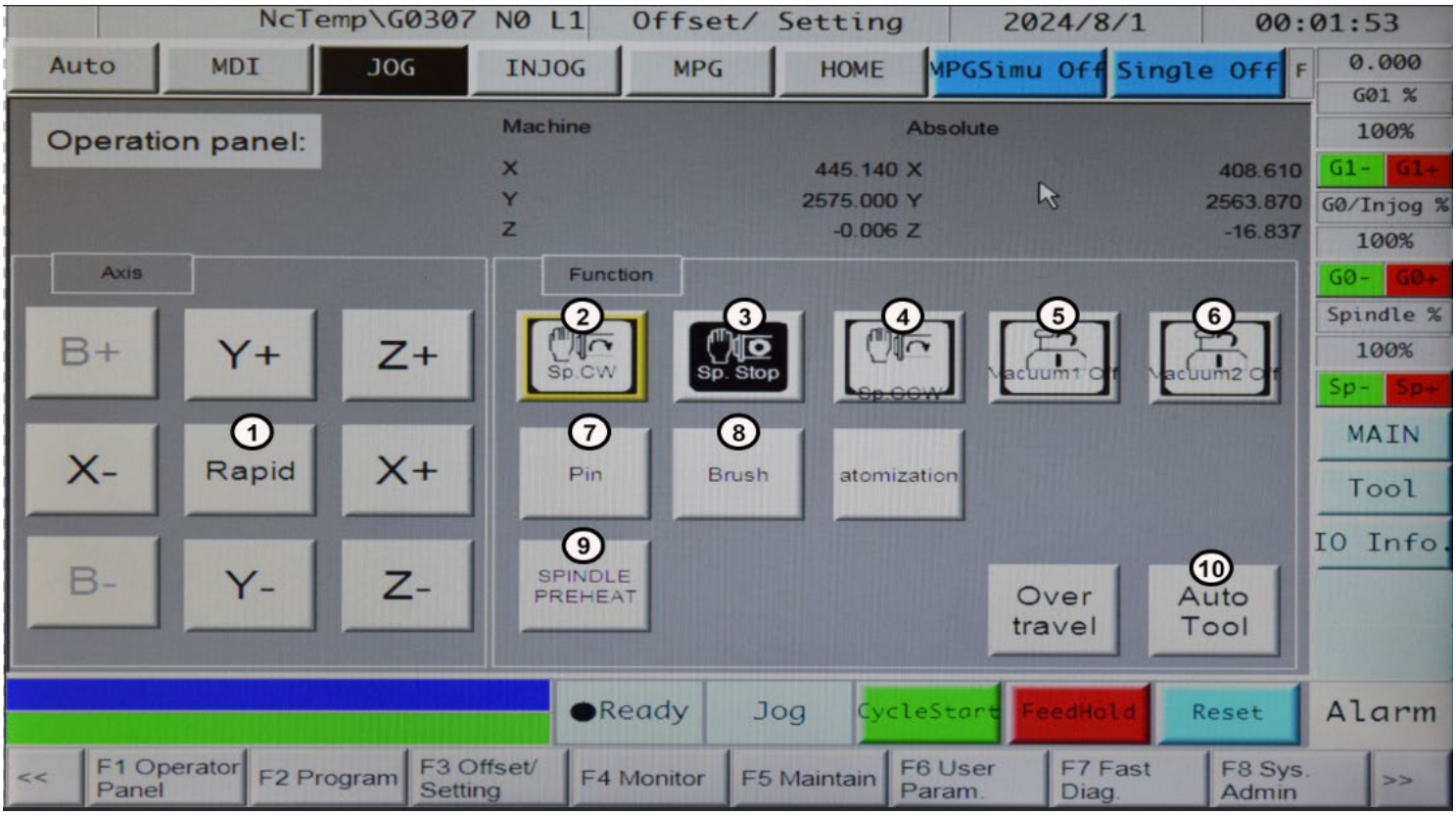
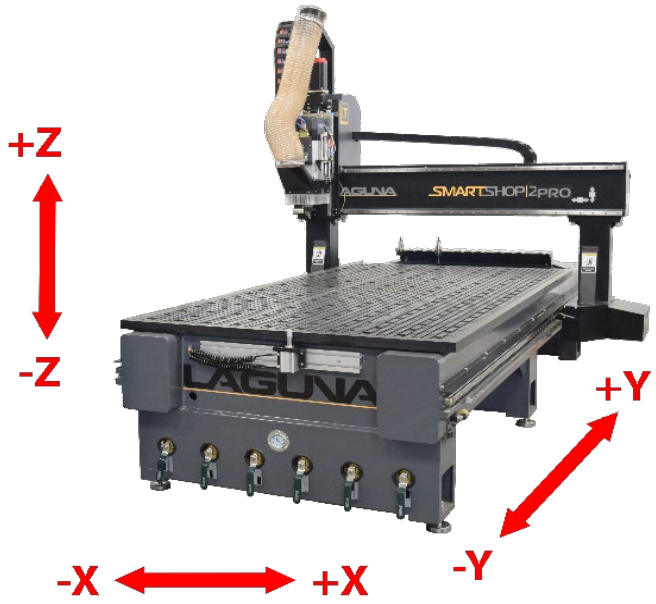


Figure 6–5: Jog Screen

1. **Rapid** – Move the machine rapidly along the different axes X+Y+Z+ X-Y-Z-: In **Jog** mode, move the machine manually.
2. **SP. CW** – Spindle Clockwise.
3. **SP. Stop** – Spindle Stop.
4. **SP. CCW** – Spindle Counter-Clockwise
5. **Vacuum1** – Vacuum Pump1 On. Press again to turn off the pump.
6. **Vacuum2** – Vacuum Pump2 On. Press again to turn off the pump.
7. **Pin** – Pop up pin(s)
8. **Brush** – Move the Spindle Brush Up and Down.
9. **Spindle Preheating** – Preheat the spindle. This may be necessary if the machine has not been in use for a significant period of time.
10. **Auto Tool** – Select to enter the appropriate tool number in MDI mode.

The operator can jog the machine in the desired direction.

1. Click on the **Machine Jog** button to enter.
2. Control the movement with axes directional keys -- X+,X-,Y+, Y-, Z+,Z-



⚠ CAUTION

Click on the G0- key or reduce the speed before entering this mode. If it is safe, use the G0+ button to increase the speed.

6.10 Multiple Pulse Generator (MPG) Handwheel

The operator can move the axes by spinning the MPG Handwheel.

Select the **MPG Mode** to define the axis, direction, and speed.

1. Turn the handwheel in the clockwise (CW) direction, the machine will move in the positive direction.
2. Turn the handwheel in the counterclockwise (CCW) direction, the machine will move in the negative direction. The speed is determined by the selected speed value.

6.11 Auto Mode

The operator can process a job under this mode. The machine will automatically run the NC program.

1. Select the program file to process.
2. Set the job origin and tool length offset value, then press then press **Auto Mode** button. This mode is only available after all axes have been homed.
3. Press the **Auto Mode** button and the system will begin the process of the selected file.

⚠ CAUTION

All axes must be homed after the power is on.

As the tool setting and job coordinate setting must be done based on the mechanical reference point, after the CNC is switched on, reference point must be confirmed with all axes going back Home.

1. Release the emergency switch. The system will display "READY".
2. Click **HOME**.
3. Click **Cycle Start**.

NOTE

Home Z-Axis before other X, Y Axis to avoid interference.

NOTE

The direction can be set in the CNC parameters.

NOTE

The homing function homes all three (3) axes together.

NOTE

After homing, the mechanical coordinates are all "0".

NOTE

The software limit switches of the machine are not enabled until all axes are reset.

Do not engage the machine in movement too fast until the axes are reset.

1. Select **F2 Program**
2. Select **F1 Operator Panel.**
3. Select **Program**, select **F2 Program**.
4. Then select **F3 File Manager**.

6.12 Part Program Selection

Select the processing file, to **F1 Execute**.

1. Select **File for Execution**.
2. Select **F2 Copy File for Execution**.
3. Select **F1 File Import for Execution**.
4. Select **F1 Copy File for Execution**.
5. Select **F1 Execute – To Execute File**.

6.13 Job Origin Preset

1. Click on the **F3 Offset/Setting** softkey on the bottom menu of the main interface.
2. Use G54 as the 0 Point of Processing.
3. Press the Handwheel mode to control and move the X/Y/Z axis to material processing surface, (for irregular materials, users need to set a center, and the workpiece origin should be benchmarked on the zero (0) surface on which the tool is aligned with the workpiece).

4. **ENTER** – When the yellow cursor has been moved to X, press F1 on the panel (Latch Machine cord). Choose **Yes** and press **Enter** on the panel.
5. Set Workpiece – choose F5 **Set Workpiece**.
6. Spindle tool length measurement using auto tool sensor.
7. Press the **AutoTool** button to enter the **tool** number to be measured in **MDI** mode.
8. Click **F1 OK** and the machine will automatically measure the tool length.

   After the measurement is completed, the machine will automatically enter the tool length into the system.
9. Click **F3 Offset/Settings.**
10. Click **F2 Tool Set.**

7.0 Running a Program

Secure project material to the worktable. The SmartShop 2 Pro is ready to load and run a program.

7.1 Transferring a Program from a Flash Drive

1. Insert a Flash Drive.
2. Click **F2 Program.**
3. Click **F8 File Manager.**
4. Click **F4 File Transfer**.
5. Highlight the file.
6. Click **F1 File Import**.
7. Highlight the file and click **F2 Select**.
8. Click **F1 Copy**.
9. Click **F8 Exit**.



Figure 7–1: File Manager Screen

7.2 Running the Program

⚠ CAUTION

Before performing a fly cut program, AutoTool must be turned off or damage to the project material, worktable, or machine may result.

1. Click **Auto**
2. Click **F2 Program.**
3. Click **F8 File Manager.**
4. Highlight and click the program file from the list.
5. Click **F5 Execute**.
6. Click **Cycle Start** to run the program.
7. Click **F4 Monitor** to monitor the execution of the program on the screen

7.2.1 Running a Flycut Program

Before beginning this operation, load a flycut bit into the spindle (see Section 5.6). Refer to Figure 6-1: Main Screen Interface for button locations below.

1. Click **Home**.
2. Click **Cycle Start**.
3. Click **Jog**.
4. Press **Vacuum 1** and **Vacuum 2** to tun on the vacuums.
5. Click **MPG**.
6. Click **Brush** to raise the dust hood.
7. On the MPG controller, select the "Z" axis and X10 speed (refer to Section 6.10).
8. Complete a manual Tool Touch Off (Refer to Section 6.4)
9. Click **F3 Offset/Setting** (refer to Figure 6-4).
10. Click **F2 Toolset**.
11. Highlight the corresponding Tool # length geometry.
12. Click **F2 Set Tool Mach Coord**.
13. Click **F1**.
14. Highlight the Z-Axis of the External Shift coordinates. Enter "0" for the flycut operation.
15. Ensure the Origin is set according to the program.
16. Click **Brusher** to lower the dust hood.

NOTES:

8.0 Maintenance and Troubleshooting

Performing regular maintenance will ensure optimal performance of the machine. Please follow these maintenance procedures.

Failure to follow maintenance procedures will void the warranty.

Table is based on 30 hours of use a week						
	Daily	**Weekly**	**Monthly**	**Every Three Months**	**Every Six Months**	**Yearly**
Clean the machine and lubricate unpainted surfaces with a 30wt oil lubricant. Wipe off excess oil and buff the surface dry with a soft rag. Regular cleaning and lubrication will reduce the likelihood of rust forming on the machine	X					
Remove all tooling from the spindle at the end of the day. Do not leave any tooling in the spindle overnight. This includes tool cones, collets, router bits, etc. Leaving any tooling in the spindle overnight can cause the tooling to get dirty, stuck, rust, and cause damage to the spindle.	X					
Check the tool blades for chips and dullness	X					
Inspect the overall machine for damage and loose or worn parts	X					
Clean the x and y-axis and the z-axis axis screw guides						

Regularly clean the collets and spindle holes. Uncleaned spindle holes may affect cut quality and may pose a safety hazard if significantly dirty	X					
Clean the router bits.	X					
Inspect the tool blades for chips and dullness	X					
Clean all surface dust	X					
Check the dust extraction for blockages, as large pieces could cause blockages						
Verify the electrical connectors are fitted tightly and correctly		X				

8.1 Cleaning the Helical Racks

The helical racks on the SmartShop 2 Pro may collect dust and debris which can interfere with the smooth operation of the gantry and spindle. Clean with a plastic brush following the angle of the grooves. Lubricate with a thin layer of lithium grease; gently wipe away excess.

8.2 Cleaning the Spindle Tray

The spindle tray will accumulate oil and may drip onto the worktable or project if not kept clean. To clean the tray, remove the four (4) Allen screws.

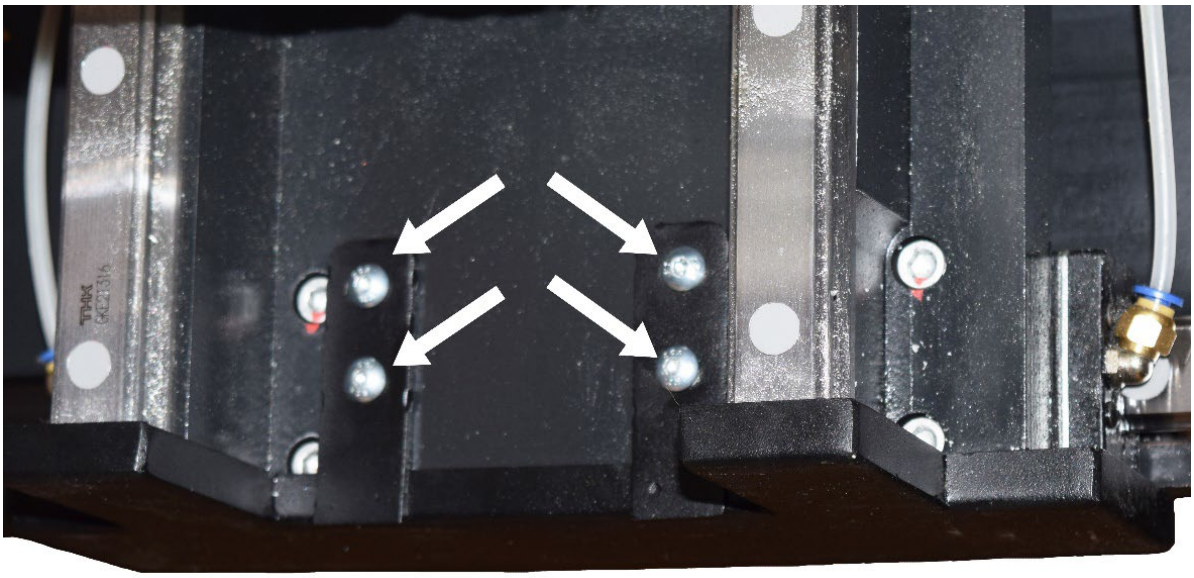


Figure 8–1: Allen Screws

Replace and tighten Allen screws until snug; do not over-tighten.

8.3 Lubrication

The pneumatic system does not need any type of lubricant. Some types of lubricant can damage the machine and compromise its functionality.

8.4 Common Error Codes

Error Code	Potential Issue(s)	Resolution(s)
(R44.4) Spindle stop failure alarm	Spindle stop fault	Check PLC and VFD alarm info
(R44.5) Busying, spindle start or stop button can not Alarm	Working Issue	Don't press spindle ON/OFF button.

(R44.9) Spindle unclamp failure Alarm	Unclamp Tool Fault	Check spindle tool and unclamp signal
(R44.10) Spindle clamp failure Alarm	Clamp tool fault	Check spindle tool and clamp signal
(R44.14) Insufficient air pressure alarm	1. Air pressure failure 2. Air pressure is below the threshold 101 psi (7 bar)	1. Check air pressure and input signal 2. Verify the air is turned on 3. Verify all air lines are securely connected
(R44.15) Vacuum pump overload	Vacuum pump failure	Check current and protection switch
(R44.19)30. System 30s no operation,	Enters standby mode	
Error Code	**Potential Issue(s)**	**Resolution(s)**
(R45.0) No Tool Warning	No tool on the spindle	Load a tool in the spindle
(R45.1) Double driven search origin master-slave excessive error alarm	Y1,Y2 axis back home error value exceeds system limit	1. Check the squareness of motors. 2. Check diagonal distance

(R45.5) Brusher up not in place Alarm	1. Brush rise in wrong position 2. The airlines are swapped. 3. The dust head sensor is out of place. 4. The dust head is down.	1. check cylinder sensor 2. Verify the airline connections. 3. Properly reposition the dust head sensor. 4. Raise the dust head.
(R45.6) Tool Sensor Overtravel Alarm	1. Auto tool sensor limit 2. The spindle has moved beyond the parameters of the project program.	1. Check sensor height 2. Verify the machine is homed. 3. Verify the proper program has been selected.
(R45.10) Emergency stop Alarm	3. Emergency stop button has been pressed and not reset.	4. Reset the Emergency Stop button by turning it clockwise.
(R45.13) VACUUM 1 OVERLOAD TRIPPED Alarm	Vacuum pump 1 startup exception	Check pump and contactor wires are wired correctly
Error Code	**Potential Issue(s)**	**Resolution(s)**
(R45.14)VACUUM 2 OVERLOAD TRIPPED Alarm	Vacuum pump 2 startup exception	Check pump and contactor wires are wired correctly

(R45.15) Clamp tool signal lost	1. Spindle stops 2. Feed hold 3. Faulty wiring 4. No Startup	If tool cone is inserted, verify that the #2 on the HSD Spindle has 24 volts.
(R45.16) The spindle no tool clamp signal	1. Spindle stops 2. Feed hold 3. Faulty wiring 4. No Startup	If tool cone is inserted, verify that the #2 on the HSD Spindle has 24 volts.
(R46.2) Spindle run low speed alarm	Spindle speed is too low	Check program S code setting
Error Code	**Potential Issue(s)**	**Resolution(s)**
(R46.10) The equipment has been running for a long time, please carry out oil maintenance	The equipment has been run continuously for too long.	Manual lubricate the machine. After completion, press 3s to reset

(R591.0)	Table no vacuum or positioning cylinder not dropped	Check pump and contactor wires are wired correctly
(R590.8) After Tool change, Auto Tool Open Hint	Tool length measurement function ON	
(R590.4) Change tool reset, please check No.1 ATC tool No. Hint	Dust hood up/down button not working	1. Press reset during tool change 2. Check tool number
Error Code	**Potential Issue(s)**	**Resolution(s)**
(R590.17) The equipment has been running for a long time, please carry out oil maintenance	The equipment has been run continuously for too long.	Lubricate and maintain the machine.

(R591.1)	Magazine has been reset	Check magazine and spindle tool NO. is T1
(R591.4)	Spindle stopped during tool change	Check spindle tool number
Error Code	**Potential Issue(s)**	**Resolution(s)**
Spindle 1 brusher rise is not in place alarm	1. The airlines are swapped. 2. The dust head sensor is out of place. The dust head is down.	1. Verify the airline connections. 2. Properly reposition the dust head sensor. 3. Raise the dust head.

Syntax Error	Programming error.	Check program syntax according to symbol appears on the screen.
X, Y, or Z not yet back home	The machine is not homed.	Home the machine.
Invalid axis board setting, IO will not work	1. Controllers parameters are set wrong. 2. CUP BIOS sets wrong. 3. Axis card error or jump setting error. 4. Axis card and ISA SLOT have poor contact or axis card represses ISA SLOT.	1. Check whether the setting parameter Pr1 of the controller is suitable for the corresponding hardware specifications (see application handbook-parameter explanation). 2. Check whether IRQ11 setting of BIOS is Legacy ISA. 3. Check jump of axis card. 4. Check whether discontinuity signal ISR of the first card is disconnected (other axis cards must open). 5. Replacement the Axis card to avoid the poor contact between axis card and ISA slot.
Error Code	**Potential Issue(s)**	**Resolution(s)**
Parameter storage access failure, system halt	The first CF card error	1. Take the first CF card out, insert into CF card reader, connect to the PC and repair CF card on PC, after the recopy backup parameters to C:\CNC\APP

		(file of backup parameter is PARAM.LKN). 2. Replace the first CF card (please note that the first CF card needs DOS boot system and CNC kernel software).
Parameter storage access failure, system halt	The second CF card error.	Once this case happens, back up the machining data of user to new CF card and then replace the second CF card.
Machining data loss, re-calibrate machining	1. Shut down controller or power when controller state is busy. 2. The second CF card error. 3. File REGISTRY.DAT is damaged.	Once this case happens, back up the machining data of user to new CF card, and then replace the second CF card.
I/O transmission error	1. Motherboard is too hot. 2. PIO5 error 3. Motherboard error 4. Ground wire of controller is interfered.	1. Check whether the fan turns correctly. 2. Change the PIO5. 3. Change the motherboard. 4. Check whether the machine touches the ground properly.

Error Code	Potential Issue(s)	Resolution(s)
Permanent storage data CRC check failure, re-calibrate before machining	1. PIO5 error 2. Fram CRC error 3. Fram doesn't initialize	1. For the first and the second reason, change PIO5. 2. For the third reason, using software version which is from 10.112.95 or 10.114.29 on.
Low memory, memory space is less than 1M	Users design too many texts and pictures when they design CE human-machine interface and make the capacity of system memory less than 1M.	Human-machine interface of controller should simplify components, only design effective variables and scripts to avoid the low memory phenomenon.
Fatal low memory, memory space is less than 100K	Users design too many texts and pictures when they design CE human-machine interface and make the capacity of system memory less than 100k.	Human-machine interface of controller should simplify components, only design effective variables and scripts to avoid the low memory phenomenon.
The number of interpolation loss times is bigger than 100	1. Axis card is damaged. 2. System resource is exhausted. 3. The setting of interpolation time interval (Pr3203) is too small.	1. Replace the hardware of axis card. 2. Replace a better motherboard. 3. Set longer interpolation time interval.

Error Code	Potential Issue(s)	Resolution(s)
Axis Group setting error	Parameter setting error. Ex: Assume the machine exists XYZ axes, each associated axis group is set as follows: Pr701 = Pr702 = Pr703 =5(XYZ axes belong to the 1st group + 3rd group) Suppose that Pr731 = 3(axis groups in CNC are the 1st spindle group the 2nd spindle group, and the 3rd spindle group). It means that the 2nd axis group is not covered by an axes and one alarm will appear.	Please check the matching between Pr701 ~ Pr716 and Pr731.
CF card set by Pr3219 is error, check CF card or system setting value	1. The system doesn't have the 2nd CF or cannot read the 2nd CF card. 2. The system has two (2) CF cards, but only one CF card is partition.	1. Check whether the 2nd CF card exists or there is CF card reading error. 2. Set the first card to the default state, have two (2) partition states. 3. Set parameters 3219 equal to 0 to use C: all.

Error Code	Potential Issue(s)	Resolution(s)
Software version and model can't driver hardware, call your vender	1. The hardware doesn't support software version set on the controller, ex: EZ milling setups 10.114 software version. 2. In the controller, the motherboard, or IO card and CF card are replaced and software version doesn't support new hardware.	1. Install the software version that supports the machine model, ex: EZ type uses 9.242 software version. Or open the option, ex: option1 "EZ2/3/4 upgrade 10A software function". 2. Ask Syntec for the password to solve the incompatible hardware problem. 3. Super Controller doesn't have this error.
WinCE option not enabled, call your vender	The Option 2 of controller "Controller upgrades WindCE system" is not opened.	1. Install DOS version. 2. Ask Syntec for the password and open Option 2 "Controller upgrades WinCE system". 3. Super controller doesn't have this error.
NC Vile name is different with backup name, re-calibrate before machining	1. The system drove that writing registry.dat and registry.mir are written unsuccessfully leads to two (2) file names inconsistent. 2. Install or replace registry .dat file. 3. Rename file name when downloading file.	1. Scan CF card disk. 2. Reselect machining file name. 3. Check whether machining date setting is correct. 4. Reboot.

Error Code	Potential Issue(s)	Resolution(s)
Use last known data, re-calibrate before machining	CF card is damaged, so registry.dat and regisrty.mir files are also damaged.	1. Scan CF card disk. 2. Try setting again or check whether machining data setting is correct. 3. Reboot.
Machine data rebuild, re-calibrate before machining	1. Replace CF card. 2. Format CF card.	1. Reset machining data. 2. Reboot.
Power break in machining, re-calibrate before machining	Discontinue power in machining process.	1. Scan CF card disk. 2. Check whether machining data setting is correct. 3. Reboot.
Machine data file write fail, re-calibrate before machining	1. CF card is damaged. 2. Registry.dat or registry.mir files are set read-only. 3. System file cannot handle system resource, lead to writing file unsuccessfully.	1. Scan CF card. 2. Check whether machining setting is correct. 3. Reboot.
Machine date file write fail many times, re-calibrate before machining	1. CF card may be seriously damaged and CF card should be processed soon. 2. Registry.dat or registry.mir file is set to read-only. 3. System file cannot handle resource well, lead to writing file unsuccessfully.	1. Scan CF card. 2. Check whether the machining setting is correct. 3. Reboot.

Error Code	Potential Issue(s)	Resolution(s)
Machine data file fault error, re-calibrate before machining and do scandisk	1. CF card may be seriously damaged and CF card should be processed soon. 2. Registry.dat or registry.mir file is set to read-only. 3. System file cannot handle resource well, lead to writing file unsuccessfully.	1. Scan CF card. 2. Check whether the machining setting is correct. 3. Reboot.
A,B feedback signal error	When servo type is set EMP2, internal axis card will automatically detect the A, B encoder signals, if signal error or have A-phase signal, but no B-phase signal, this alarm will appear.	Check the servo cable or replace the axis card.
Error counter overflow	When servo type is set 0(EMP2), 4(PMC4), 5(SERVO6), internal axis card will automatically detect the A, B encoder signals, if signal error or too much input signal, counter overflow will appear.	Check the servo cable or replace the axis card.

Error Code	Potential Issue(s)	Resolution(s)
DDA command overflow	1. DDA software time setting value (interpolation time interval, parameter Pr3293) is too long. 2. Motion velocity is too fast. 3. Servo resolution is set too high. 4. Backlash compensation or pitch compensation is too large. 5. Compensation is enabled before booting.	1. Recommend that low interpolation time interval setting (parameter 3203) is not less than 2000. 2. Reduce the velocity to do the test if max rapid travel federate is too high (Pr462-Pr480). 3. Reduce the servo resolution setting to do test (encoder and CNC Pr61-Pr80). 4. If mechanical compensation time constant is set (parameter 1401-1420), cancel the mechanical compensation setting to do test and find the best setting. 5. If system had set feed forward (parameter 581-600), cancel feed forward setting to do test and find the best setting. 6. Please contact staff of machinery manufacturer to solve problem.

Error Code	Potential Issue(s)	Resolution(s)
Loss Pulse	1. Kinetic occurs obstruction phenomenon. 2. Servo drive occurs unexpected Servo ON / OFF. 3. CPU board send the data to axis card unsuccessfully (CPU board or axis card has problem, the contact between CPU and axis card is not good). 4. The cable that sends command from controller to servo driver has poor quality or is disconnected. 5. Controller doesn't set servo drive alarm check, controller continues to send motion command although the drive is abnormal. 6. Local interference.	1. Do not shut down the controller when alarm occurs. Please check whether the value of No 8, 9, 10 in diagnose function is zero (0). 2. Check whether the mechanical lubrication system is good. 3. Open the cover of axial to check whether foreign matter blocks the motion of axial. 4. Rotate screw to check whether machine is stuck (loading of driver). 5. Check the drive servo-on and the servo-off of power or cable signal. 6. If the setting value of No 8, 9, 10 in diagnostic function do not change, please take home search action (don't need to reboot), after that check whether parameters 24, 25, 26, 40, 41, 42 are equal to zero (0), if the parameters 24, 25,26 are not equal to zero (0), the feedback loop has problems. 7. If all parameters 24, 25, 40, 41, 42 are not zero (0), then the interference signal is relatively large, specifically in the machining process, the setting value of parameters 8, 9 , 10 gradually become large. The reason is the contact point between CPU board and axis card is not good. Try to replace CPU board and axis card.

Error Code	Potential Issue(s)	Resolution(s)
Servo Driver Alarm	Servo driver alarm is typically because of external causes. Ex: High temperature, connecting wire error, internal parameters is set wrong, servo motor is unsuitable, driver is error, etc.	Follow the steps in driver's application manual to solve alarm.
Servo position command comm. error	1. There is only one (1) axis card, but parameter sets two (2) axis cards, and servo axis points to the second axis card. 2. One (1) axis card has errors in case controller has two (2) more axis cards. 3. Two (2) or more axis cards, IRQ11 Jump is plugged. In diagnosis function, number 23 is not equal to 100. 4. Servo board clock source parameter (Pr11) is set incorrectly.	1. Check whether the parameter setting Pr11, Pr13 consistent with the hardware feature. 2. Check jump axis card setting. 3. Change axis card to do test.
Drive communication error	External reason like wire problem or noise interference	Check wire connection of drive and checking whether controller is connected with ground correctly or noise interference.
Driver homing error	Home search method is set incorrectly (Pr961) or drive doesn't support home search function.	Check whether home search method is correct or drive supports home search function.

First Positive software limit exceed	Stroke movement of machine table exceeds the setting value	Remove alarm and let axis moves to negative movement out of the stroke protection software.
Error Code	**Potential Issue(s)**	**Resolution(s)**
First Negative software limit exceed	Stroke movement of machine table exceeds the setting value	Remove alarm and let axis move to positive movement out of the stroke protective software
Following error exceed	1. Movement mechanism is not smooth. 2. Contact wire has poor quality. 3. Setting values of acceleration and deceleration time are too small. 4. Servo on off Relay is interfered. 5. Inner loop gain of driver is set too small. 6. Encoder solution and electric gear ratio is set wrong. 7. Drive or motor is damaged. 8. Encoder or line between encoder and controller is abnormal. 9. On diagnosis screen, number 23 is not equal to 100.	1. Add lubricating oil to machine. 2. Use electric meter to check whether wire connecting is correct. When controller runs dry run mode, open case to check whether servo on off of relay pulses abnormally. 3. Increase acceleration and deceleration time (parameter 401). 4. Inner loop gain of driver is set too small. For Mitsubishi driver, check Pr37. 5. Contact machinery manufacturer for help.

Cannot back control mode when move	1. Cancel instantly movement of machine by hand. 2. Drive gain is set poorly. Therefore, when cancelling instantly, motor will be trembled.	1. Avoid man-made movement. 2. Check the driver's position loop gain and speed loop gain setting.
Error Code	**Potential Issue(s)**	**Resolution(s)**
Must re-homing	MOT -002[Cannot back control mode when move] or MOT -0022[Home position inaccurate] is triggered	See MOT -0020 or MOT – 0022-alarm
Home position inaccurate	1. Homing signal of motor is abnormal. 2. Stopper, coupling or bearings is not locked tightly.	1. Move motor in the same direction and observe to check whether position counter index changes normally. 2. Check whether the mechanism components are fixed properly.

Fatal following error exceed	1. Servo motor doesn't receive control due to external force. 2. Parameter of drive – inner loop gain is too small. 3. Parameters of acceleration and deceleration time is set too short. 4. Encoder is abnormal or connecting encoder to controller is abnormal.	1. Check the external motion of machine table. 2. Check the setting parameter of drive. 3. Check the acceleration and deceleration setting of each axis, parameters 401,541-560. 4. Maintain the connection between encoder and servo drives.
Error Code	**Potential Issue(s)**	**Resolution(s)**
Fatal dual feedback error exceed	1. Servo motor doesn't receive control due to movement caused by external force. 2. External encoder signal is unusual. 3. External encoder parameters are set wrong.	1. Check external motion mechanism. 2. Check whether external encoder wire is normal. 3. Check whether external encoder corresponding to mechanical axis (Pr241~260), resolution (parameter 261~280) and feedback scaling factor (301~320) are set correctly. 4. Contact machinery manufactures in case no solution is found.

Positive hardware limit exceed	1. Machine table exceeds protection point. 2. Hardware stroke switches are damaged or broken. 3. Input signal has error.	1. Use MPG mode to move machine table to opposite direction once discovering that machine table stops on the switch. 2. If machine table is not on the switch, check IO terminal blocks, 24V power supply terminal blocks, connecting wire and components of switch. 3. Check whether IO card is abnormal.
Error Code	**Potential Issue(s)**	**Resolution(s)**
Negative hardware limit exceed	1. Machine table exceeds protection point. 2. Hardware stroke switches are damaged or broken. 3. Input signal has errors.	1. Use MPG mode to move machine table in opposite direction once discovering that machine table stops on the switch. 2. If machine table is not on the switch, check IO terminal blocks, 24V power supply terminal blocks, connecting wire and components of switch. 3. Check whether IO card is abnormal.

Program error in PLC axis	Grammar of PLC axis program error.	Check grammar of PLC axis program.
System memory too low	The matching program switches to PLC axis.	Contact machinery manufacturers.
Error Code	**Potential Issue(s)**	**Resolution(s)**
Miss index in homing	1. Can't read the index signal. 2. The setting of homing 2nd travel feedrate is too fast. 3. The setting of motor reductions ration is too big. 4. The distance between index signal and HomeDog is more than 5 pitches.	1. Check motor index wire connecting; observe diagnostic screen 48(X), 49(Y), 50(Z) to check whether index signal is read. If no, please check whether connecting wire is correct. 2. Reduce setting value of the homing 2nd travel feedrate (Parameter 841~843).
Zero speed timeout in homing	1. Setting drive gain is not good, so it makes motor vibrating.	1. Check the position loop gain and velocity loop gain setting of driver.

	2. Motor running causes resonance phenomenon.	2. Start the resonance frequency inhibition ability of driver. 3. Contact machinery manufacturers for help.
Static dual feedback error exceed	1. Motor encoder is interfered. 2. 2nd encoder loop is interfered. 3. Servo controller is disconnected. 4. Mechanism has a problem. 5. Servo is damaged. 6. The 2nd resolution loop is set wrong.	1. Check whether the connection between the motor and encoder is firm. 2. Remove high-power electromagnetic devices. 3. Check whether the machine table can move smoothly. 4. Replace the servo driver.
Error Code	**Potential Issue(s)**	**Resolution(s)**
(Z-Axis) Following spindle error exceed	Wiring diagram of spindle feedback is inverted.	1. Exchange the position feedback value A+ and A- which frequency transformer sends to the controller. 2. Change parameters related to frequency transformer.
Absolute encoder read error	1. The driver doesn't power on. 2. The communication line between the controller and driver cone is turned off. 3. The absolute transfer board is damaged.	1. Check the power supply of the driver. 2. Check the connecting wire. 3. Exchange the absolute transfer board.

Not set home position. Absolute coder will not work	Do not use C25~to set the home of the machine.	Absolute encoder to search home.
Absolute position battery failure.	The battery of absolute encoder has no power.	Change the battery.
Can't leave home dog	Home Dog is damaged	Use the electrical multimeter to check whether the sensor of Home Dog is damaged or wiring connection is missing.
Second Positive software limit exceed	The motion of machine table exceeds setting value.	Remove alarm. Move axis in negative direction out of stroke protection software.
Second Negative software limit exceed	The motion of machine table exceeds setting value.	Remove alarm. Move axis in positive direction out of stroke protection software.
Error Code	**Potential Issue(s)**	**Resolution(s)**
Inhibit cycle start in moving	Manual command (JOG, INJOG, and MPGJOG) cannot be sent successfully.	Remove alarm. Wait until machine stops, then start machining.
EOF in comment	Programming error	Using symbol "(*" before command and symbol "*)" after command
No end of string character	Programming error	Check PRINT command of program.
Illegal variable	Change error variable	Check program variable and confirm whether system uses that variable.

Expression too complex	Programming error	Check whether logic is clear and connect.
EXIT statement outside loop statement	Programming error	Check whether EXIT command in program is used correctly.
Repeat loop too deep	Programming error	Change MACRO program to avoid too many loop commands.
Absent end of statement character ';'	Programming error	Check MACRO program to confirm whether it has the terminal symbol.
Wrong assignment character ':='	Programming error	Check MACRO program to see whether assigning value to symbolic variable to correct.
Absent right ')'	Programming error	Check MACRO program to confirm whether using "(" and ")" is correct.
Absent right ']'	Programming error	Check MACRO program to confirm whether using "[" and "]" is correct.
Error Code	**Potential Issue(s)**	**Resolution(s)**
Absent 'FOR' keyword in FOR statement	Programming error	Check MACRO program to confirm whether FOR loop uses TO correctly.
Absent 'DO' keyword in FOR statement	Programming error	Check MACRO program to confirm whether FOR loop uses DO correctly.
Absent 'END_FOR' keyword in FOR statement	Programming error	Check MACRO program to confirm whether FOR loop uses END_FOR.
Absent 'UNTIL' keyword in REPEAT statement	Programming error	Check MACRO program to confirm whether using UNTIL in REPEAT loop is correct.

Absent 'END REPEAT' keyword in REPEAT statement	Programming error	Check MACRO program to confirm whether REPEAT loop has END_REPEAT.
Absent 'DO' keyword in WHILE statement	Programming error	Check MACRO program to confirm whether WHILE loop uses DO correctly.
Absent 'END_WHILE' keyword in WHILE statement	Programming error	Check MACRO program to confirm whether WHILE loop has END_WHILE to end.
Absent 'THEN' keyword in IF statement	Programming error	Check MACRO program to confirm whether IF loop use END correctly.
Absent 'END_IF' or 'ELSE' keyword in IF statement	Programming error	Check whether IF loop uses ELSE or END_IF.
Absent 'END_IF' keyword in IF statement	Programming error	Check whether IF loop uses END_IF correctly.
Error Code	**Potential Issue(s)**	**Resolution(s)**
Absent 'OF' keyword in CASE statement	Programming error	Check whether CASE command uses OF correctly.
Absent 'END CASE' or 'ELSE' keyword in CASE statement	Programming error	Check whether CASE loop uses ELSE or END_CASE correctly.
Absent 'END_CASE' keyword in CASE statement	Programming error	Ensure that END_CASE keyword is used before finishing CASE command.

Absent ':' or ',' delimiter in CASE statement	Programming error	Check MACRO program. In CASE statement, ';' or ',' is correct. However, the operator should use ';' when finishing CASE command.
Array Index must be Integer	Programming error	Please check the machining program, the index in MACRO command has to be rounded. Ex; @[ROUND(#1)+1]
File not found	Programming error	Check the machining program to verify the existence of the file.
Divide by zero	Programming error	Check the machining program to ensure that the denominator is not equal to zero (0).
Operand domain error	Programming error	Please check the machining program.
Program loading failure	Programming error	Please check the machining program
Error Code	**Potential Issue(s)**	**Resolution(s)**
Arc not on work plane	Programming error	Check the machining program to ensure that G02 and G03 are used correctly.
Arc radius too short	Programming error	Check the machining program to ensure that the Arc radius G02 and G03 are used correctly.
Arc destination not on arc	Programming error	Check the machining program to ensure that the Arc radius of G02 and G03 are used correctly.

Macro call too deep	Programming error	Check machining program to ensure that G65 calls MACRO subprogram that has less than twelve (12) layers.
Modal macro call too deep	Programming error	Check machining program to ensure that G66 calls MACRO subprogram that has less than four (4) layers.
Subprogram call too deep	Programming error	Check machining program to ensure that M98 calls subprogram that has less than sixteen (16) layers.
Too many modal macro canel, G67	Programming error	Check program to ensure that G66 and G67 are used in pairs.
G65,G66 must be the last one in G code list	Programming error	Please check the machining program.
Absent program number	Programming error	Please check the machining program to ensure the use of G65 and G66.
Error Code	**Potential Issue(s)**	**Resolution(s)**
Too many M code	Programming error	Please check the machining program to ensure that there are equal or less than 3 M codes in a single block.
Illegal variable access	Programming error	
Label not found	Programming error	Please check the machining program.
Line number not found	Programming error	Enter the correct MDI line number.

Sub program no M99	Programming error	Write M99 at the end of subprogram.
Too many G code	Programming error	Dividing that single block into others single block that has less than 10G codes.
Too many (I,J,K) triples	Programming error	Check the machining program.
Use undefined workpiece coordinate	Programming error	Decide the working plane and input G17, G18, or G19.
Invalid are radius value	Programming error	Check the program and recalculate.
Macro stack is full or access fail	1. Storing value in STACK (PUSH) is too much. 2. Arguments in STKTOP[]exceeds the value storing in STACK.	1. Stack is full, no using push command. 2. Input reasonable argument in STKTOP[].
Error Code	**Potential Issue(s)**	**Resolution(s)**
Macro stack is empty	The numbers of Push commands and Pop commands are not the same.	Check the program to ensure that the number of Push commands is the same with that of Pop commands.
Invalid macro arguments	Once Macro finds out the unreasonable situation, machining program will be stopped, and alarm will appear.	According to display content of alarm to find out where error is.

Macro program error	Programming error	Please check the machining program.
Tool length offset change at arc	Programming error	Please check the machining program.
Radius compensation cancel at arc	Programming error	Please check the machining program.
Radius compensation startup at arc	Programming error	Please check the machining program.
Wrong direct draw command usage	Programming error	Check machining program to confirm that whether before and after single block is suitable for specifications.
Zero movement at corner in direct draw	Programming error	1. Check machining program to confirm whether inserted value of rounding or chamfer is suitable for specifications. 2. Check to confirm whether working plane and round plane are the same.
Error Code	**Potential Issue(s)**	**Resolution(s)**
Invalid angle amount, A, in direct draw	Programming error	Check machining program to confirm that whether angle amount A is suitable specifications.
Dot chamfer amount bigger than displacement	Programming error	1. Check machining program to confirm whether inserted value of rounding or chamfer is suitable for specifications.

		2. Check to confirm whether working plane and round plane are the same.
Block end point exceed software limit	Program error	Check the machining program and correct coordinate position.
GOTO label must be integer	Program error	Check the machining program and input integer to GOTO label.
ASIN()/ACOS() operand must between -1.0 and 1.0	Programming error	Check the machining program.
SQRT() operand should not be negative	Programming error	Check the program; enter a positive value in SQRT operand.
L address should be integer	Programming error	Check the program and L address in integer.
O address should be integer	Programming error	Check the program and use O address in integer.
Error Code	**Potential Issue(s)**	**Resolution(s)**
M address should be integer	Programming error	Check the program and use M address in integer.
Spindle speed, S, should be integer	Programming error	Check the program and use the speed S of spindle in integer.
Tool length number, H, should be integer	Programming error	Please check the program and use tool length number H in integer.

Tool radius number, D, should be integer	Programming error	Please check the program and use the tool radius number D in integer.
Tool selection number, T, should be integer	Programming error	Please check the program and use the tool number T in integer.
Sub-program number, P, should be integer	Programming error	Please check the program and use the sub-program number P in integer.
Repeat count, L, should be integer	Programming error	Please check the program and use the repetitive times L in integer.
Incompatible data type	Machining program is not compatible with the Syntec controller	Verify the date format is suitable for controller.
Tool length number, H, over range	Programming error	Verify the tool length number, H, is in the range of tool number.
G10 table index, P, over range	Program error	Use reasonable value P in G01 table index.
Error Code	**Potential Issue(s)**	**Resolution(s)**
Tool radius number, D, over range	Program error	Verify the tool radius number D is in range of the tool number.
Tool nose number over range	Program error	Verify the tool radius number D is in the range of tool number.
Subprogram call sequence num., H, must integer	Program error	Change the number H of subprogram into an integer.

M99 return sequence number, P, must integer	Program error	Change the return sequence number P of M99 into an integer.
Workpiece number over range	Program error	Verify the number of work pieces in the allowed range of the controller.
Dwell skip source, Q, must be integer	Program error	Change the dwell skip source Q into an integer.
Dwell skip source Q, over range	Program error	Verify the dwell skip source Q in the allowed range.
P address must be integer	Programming error	Change P address into an integer.
Dot angle and axis command conflict	Programming error	Check the machining program.
Inc. axis command and abs. axis command conflict	Programming error	Decide to use incremental or absolute command and enter the correct command.
Arc center vector and radius conflict	Programming error	Check the machining program.
Metric/Inch cmd. not available under quiet mode	Programming error	Please check the machining program.

Error Code	Potential Issue(s)	Resolution(s)
Corner round and chamfer cmd. conflict	Program error	Do not let chamfer command and fillet command exist in the same line.
Invalid G Code	Program error	Enter the valid G-Code.
No main program assignment	The program is not loaded.	Specify the main program.
Threading block feedrate exceed	Program error	Decrease the cutting speed of threading.
Tapping block feedrate exceed	Program error	Decrease the cutting speed of tapping.
Overcut by tool radius too big	Tool compensation causes overcut	Check the machining program to decide whether this part of the machining cancels radius compensation.
Exact stop wait timeout	Servo vibration	1. Servo tuning. 2. Change parameters.
G04 dwell time cannot be negative	Program error	Check the machining program and enter a positive value to G04.
Part program file does not exist		Ensure the program file exists.

Communication link failure		Reconnect a good communication link.
Error Code	**Potential Issue(s)**	**Resolution(s)**
Loading page size too small		Contact with the machinery manufacturer.
File size too large	Program error	Reduce the program size or split program into two (2) subprograms.
File content is empty	Loading program error or CF card damaged	Reload program or replace CF card.
Loading page lock failure		Contact machinery manufacturers.
Sequence number not found	Program error	Use sequence number in the program range.
Cannot use jump statement in sequential file		Do not use jump command to execute sequential file.

NOTES:

9.0 Warranties

Dealer Machinery Warranty

New woodworking machines sold by Laguna Tools carry a two-year warranty effective from the date of dealer invoice to customer/end-user. Machines sold through dealers must be registered with Laguna Tools within thirty (30) days of purchase to be covered by this warranty. Laguna Tools guarantees all new machines sold to be free of manufacturers' defective workmanship, parts, and materials. We will repair or replace, without charge, any parts determined by Laguna Tools, Inc. to be a manufacturer's defect. We require that the defective item/part be returned to Laguna Tools with the complaint. The end-user must request a Return Material Authorization (RMA) number from Customer Service. Include the RMA number with any and all returned parts/components requesting warranty coverage*. Any machines returned to Laguna Tools must be returned with packaging in the same manner in which it was received. A part or blade is being returned must have adequate packaging to ensure it is not damaged during shipping. In the event the item/part is determined to be damaged due to lack of maintenance, cleaning, or misuse/abuse, the customer will be responsible for the cost to replace the item/part, plus all related shipping charges. This limited warranty does not apply to natural disasters, acts of terrorism, normal wear and tear, product failure due to lack of maintenance or cleaning, damage caused by accident, neglect, lack of or inadequate dust collection, misuse/abuse or damage caused where repair or alterations have been made or attempted by others.

* The issue of an RMA number is for reference only; it DOES NOT indicate acceptance of the warranty claim.

CNC Limited Warranty

New CNC machines sold by Laguna Tools carry a one-year warranty effective from the date of shipping. Laguna Tools guarantees all new machines sold to be free of manufacturers' defective workmanship, parts, and materials. We will repair or replace, without charge, any parts determined by Laguna Tools, Inc. to be a manufacturer's defect. If the defective item/part is determined to be damaged due to lack of maintenance, cleaning or misuse/abuse, the customer will be responsible for the cost to replace the item/part, plus all related shipping charges. This limited warranty does not apply to natural disasters, acts of terrorism, normal wear and tear, product failure due to lack of maintenance or cleaning, damage caused by accident, neglect, lack of or inadequate dust collection, misuse/abuse or damage caused where repair or alterations have been made or attempted by others.

Laguna Tools, Inc. is not responsible for additional tools or modifications sold or performed (other than from/by Laguna Tools, Inc.) on any Laguna Tools, Inc. woodworking machine. Warranty may be voided upon the addition of such described tools and/or modifications, determined on a case-by-case basis.

Software purchased through Laguna Tools, Inc., is not covered under this warranty and all technical support must be managed through the software provider. Normal user alignment, adjustment, tuning, and machine settings are not covered by this warranty. It is the responsibility of the user to understand basic woodworking machinery settings and procedures and to properly maintain the equipment in accordance with the standards provided by the manufacturer.

Parts under warranty are shipped at Laguna Tools, Inc.'s cost either by common carrier, FEDEX ground service, or a similar method. Technical support to install replacement parts is primarily provided by phone, fax, e-mail or Laguna Tools Customer Support Website. The labor required to install replacement parts is the responsibility of the user. Laguna Tools is not responsible for damage or loss caused by a freight company or other circumstances not in our control. All claims for loss or damaged goods must be notified to Laguna Tools within twenty-four (24) hours of delivery.

Please contact our Customer Service Department for more information. Only NEW machines sold to the original owner are covered by this warranty.

For warranty repair information, call 1-800-332-4094.

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No Modifications Allowed or Sold

Laguna Tools, Inc. is not responsible for additional tools or modifications sold or performed (other than from/by Laguna Tools, Inc.) on any Laguna Tools, Inc. woodworking machine. Warranty may be voided upon the addition of such described tools and/or modifications, determined on a case-by-case basis. Normal user alignment, adjustment, tuning, and machine settings are not covered by this warranty. It is the responsibility of the user to understand basic woodworking machinery settings and procedures and to properly maintain the equipment in accordance with the standards provided by the manufacturer. Parts, under warranty, are shipped at Laguna Tools, Inc.'s cost either by common carrier, FEDEX ground service or a similar method. Technical support to install replacement parts is primarily provided by phone, fax, e-mail, or Laguna Tools Customer Support Website. The labor required to install replacement parts is the responsibility of the user. Laguna Tools is not responsible for damage or loss caused by a freight company or other circumstances not in our control. All claims for loss or damaged goods must be notified to Laguna Tools within twenty-four (24) hours of delivery. Please contact our Customer Service Department for more information. Only new machines sold to the original owner are covered by this warranty.

For warranty repair information call 1-800-332-4094.

Laguna Tools Warranty

WARRANTY & REGISTRATION

Thank You!

Welcome to the Laguna Tools® group of discriminating industrial machinery owners. We understand that you have a choice of where to purchase your machines and appreciate the confidence you have in the Laguna Tools® brand.

Through hands-on experience, Laguna Tools® is constantly working hard to make innovative, precision products. Products that inspire you to create works of art are a joy to operate and encourage your best work.

Laguna Tools®
Imagination, Innovation, and Invention at Work

Warranty & Registration

Every product sold is warranted to be free of manufacturer's defective workmanship, parts, and materials. For any questions about this produce, the intended use or what it was designed for, customer service, or replacement parts, please contact our customer service department:

Laguna Tools® Customer Service
744 Refuge Way, Grand Prairie, Texas 75050, USA
1-800-234-1976
customerservice@lagunatools.com
www.lagunatools.com/why/customer-service/
8AM. To 5PM PSF. Monday through Friday

For warranty claims or to report damage upon receiving-please reach out to our warranty department:

Laguna Tools® Warranty Service
744 Refuge Way, Grand Prairie, Texas 75050, USA
1-800-234-1976
customerservice@lagunatools.com
www.lagunatools.come/policies/warranty
8AM to 5PM PST, Monday through Friday

Registration

To prevent voiding this warranty, all products sold must be registered within thirty (30) days of receiving the product. Registering the product will enable the original purchaser to receive notifications about important product changes, receive customer service, and be able to file a warranty claim against defective workmanship, parts, or materials.



Who is Covered

The applicable warranty covers only the initial purchaser of the product from the date of receiving the product. To file such claims, the original purchaser must present the original receipt as proof of purchase.

What is Covered

The warranty covers any defects in the workmanship of all parts and materials that make up the machine unless otherwise specified. Any part determined by Laguna Tools® to have a defect will be repaired or replaced (and shipped), without charge. The defective item/part must be returned to Laguna Tools® with the complaint and proof of purchase in the original packaging that it was received in. In the event the item/part is determined to be not covered by this warranty, the customer will be responsible for the cost to replace the item/part and all related shipping charges

Warranty Limitations

This limited warranty does not apply to natural disasters, acts of terrorism, normal wear and tear, product failure due to lack of maintenance or cleaning, damage caused by accident, neglect, or lack-of inadequate dust collection. The warranty may be voided against proof of misuse/abuse, damage caused where repair or alterations have been made or attempted by others, using the product for purposes other than those described as intended use (unless with consent by Laguna Tools®), modification to the product, or use with an accessory that was not designed for the product. It is the responsibility of the user to understand basic woodworking machinery settings and procedures and to properly maintain the equipment in accordance with the standards provided in this manual.

Length of Warranty

All new machines and optional accessories sold through an authorized dealer carry a two-year warranty effective from the date of receiving the product. Machines sold for either commercial or industrial use have a one-year warranty. Wearable parts like throat plates, bandsaw guides, etc., have a ninety-day warranty.

Table A-1 Warranty Lengths

2 Year – New Machines Sold Through an Authorized Dealer
2 Year – Accessories Sold as Machine Options (excluding blades)
1 Year – Machines Sold for Commercial or Industrial Use
1 Year – Blades and Accessories outside or Machine Options
90 Days – Wearable Parts

Aside from being free of defects upon receiving, consumable parts, like cutters and abrasives, are not covered by this warranty unless otherwise stated by Laguna Tools®. These parts are designed to be used at the expense of the operator and are available for replacement or inventory purchase. The determination of a consumable part will be made on a case-by-case basis by Laguna Tools®.

Shipping Damage

Laguna Tools® is not responsible for damage or loss caused by a freight company or other circumstances not in the direct control of Laguna Tools®. All shipping-related claims for loss or damage to goods must be made to Laguna Tools® within twenty-four hours of delivery.

How to Receive Support

To file a warranty claim, please contact the warranty department at 1-800-234-1976. To receive customer service or technical support, please contact the customer service department at 1-800-332-4094. Parts, under warranty, are shipped at the expense of Laguna Tools® either by common carrier, FedEx ground services or similar method. Technical support to install replacement parts is primarily provided by phone, fax, email, or the Laguna Tools® Customer Service Support Website.

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Laguna Tools, Inc.

744 Refuge Way, Suite 200

Grand Prairie, TX 75050

1-800-234-1976

www.lagunatools.com

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