

Plasma Level 3 Laser:
Metal Cutting -
Owner's Manual-

Features:

- Adjustable Water Table
- Heavy-duty Support Spikes
- Massive Tubular Frame
- 25mm HIWIN square rails on X and Y axes
- Thermal Dynamics ICNC Servo Control System
- ICNC Z Axis Lifter with Automatic Height Control
- ICNC Laser Alignment System
- Built-in WI-FI for file transfers
- Victor CAM Software to run on machine and/or office PC



Additional Features:

Available Table Sizes-

- 4' x 4'
- 4' X 8'
- 5' X 10'

Explore The Plasma Level 3



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Laguna Tools: 744 Refuge Way
Grand Prairie, TX 75050
U.S.A. Service: +1 (800) 234-1976 or E-Mail:
customerservice@lagunatools.com
Fiber Maker Laser Machine © 2021 Laguna Tools



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SAFETY INTRODUCTION-

Read this chapter on safety and the sections of vendor components manuals on safety before beginning to operate the Plasma Cutting Table. *****Do not become complacent about Safety or completely dependent on Safety Devices.**

Note: Please make sure if your Facility possesses Quality Systems Management Certification (QS-ISO 9001/TS 16949/ISO 13485, Etc.) to incorporate all suggested Safety and Maintenance parameters that are documented in this manual into your own documentation system pertaining to Safety, Preventive Maintenance within your facility.

SUPERVISORS-It is very important that a safe and appropriate working environment is provided for this equipment and in compliance with applicable federal and local industry standards.

It is imperative that programmers, machine operators and maintenance personnel be trained adequately in the use and care of the equipment. These employees should receive the proper instruction to have a complete understanding of the operation of this machine before beginning to program, operate or service it.

Careful programming and debugging of new programs are essential for successful operation of this machine. Use Program Stop Codes to stop machine motion for operator removal of parts or scrap. Never allow operators to place any part of their body into the machine while the machine is active. Ensure that all personnel understand the function and use of **EMERGENCY STOP** and **CYCLE STOP Button**.

MAINTENANCE PERSONNEL-

Only qualified personnel should make repairs on this equipment. Use caution and follow procedures when working on the machine. Be sure to observe the following guidelines:

- 1.) Before performing maintenance or repair, turn the power OFF and follow lock out/tag out (zero energy shutdown) procedures. Also, follow any lock out/tag out procedures applicable to your specific plant requirements.
- 2.) Wear safety glasses and other personal protective equipment as required by applicable federal, local industry, and plant safety program standards.
- 3.) Wear proper clothing. Do not wear watches, rings, jewelry, or loose-fitting clothes.
- 4.) Read and review the manual carefully.
- 5.) Be familiar with the operation of the machine.
- 6.) Practice preventative maintenance. Inspect the equipment regularly and repair or replace worn components and tooling. Read the vendor components manuals for any additional preventative maintenance.
- 7.) Always replace safety guards and other safety devices removed for service and make sure that they are fully functional before operating the equipment.
- 8.) Never remove, jumper out or bypass a safety device to permit machine production.
- 9.) Never place yourself in a hazardous situation to observe a problem and ask someone else to operate the machine. This could be a very dangerous and life-threatening situation.

OPERATOR-

This equipment has been designed with operator safety in mind (when used under normal operating conditions). The user must always be alert to the possibility of dangerous situations. Always exercise care and caution. Report any minor problems immediately, so that they can be corrected before becoming major difficulties. Only qualified personnel should make repairs on the machine.

- 1.) Be familiar with the machine. Read and review the manuals carefully.
- 2.) Be alert regarding the significance of the various warning indicators and be conscious of the functions of pushbuttons and other controls. Use the controls properly. Review and understand the operation of the **EMERGENCY STOP Function** and the **CYCLE STOP Function**.
3. Never operate the equipment unless it is in good working order.
4. Wear safety glasses and other personal protective equipment as required by applicable federal, local industry and plant safety program standards.
5. Wear proper clothing. Do not wear watches, rings, jewelry, or loose-fitting clothes.
6. Avoid all moving parts of the machine or workpiece when setting up or operating the equipment. Never reach into the machine while it is active.

OPERATOR (Cont'd.)-

Use the **EMERGENCY STOP** or **CYCLE STOP Function** to stop machine motion. Never use the machine DWELL time code for parts removal or other operator intervention activities that puts the operator in a hazardous position.

7. Recognize and avoid unsafe operating conditions.

8. Maintain a clean work area. Avoid accidents by keeping work areas clean and neat.

9. Never leave the machine in an unsafe condition.

10. Never leave a machine running unattended.

11. Never remove or bypass safety devices.

12. Report any unsafe conditions, personal injury, or machine problems immediately to your appropriate supervisor(s) and safety manager(s). In case of personal injury notify Service Department giving a brief description and date reported injury occurred.

*****Never Operate the Machine with someone within a Hazardous Area.**

RISK OF ELECTRIC SHOCK-



DANGER

Always verify that ALL electrical supplies are isolated before undertaking any service or maintenance work. The machine may have more than one electrical supply.

Plasma cutting equipment uses high open circuit voltages to initiate the plasma arc. Normal load voltages are higher than experienced with other types of welding equipment. **Extreme CAUTION** must be exercised when operating or servicing this equipment.



WARNING

Plasma arc can cause injury and burns.

Verify that no person is in the proximity of the plasma torch at any time that the plasma system is switched on. Serious burn and electrical shock hazards exist, even when the plasma cutting system is not active.

PERSONAL PROTECTION-

Keep the Operator's Body and Clothing Dry.

- Do not stand, sit, or lie in/on any wet surfaces when using this equipment.
- Never work in a damp or wet area without proper insulation against electric shock.
- **Disconnect Main Power** before servicing the torch, power supply or service connections to the plasma arc system, or any part of the machine bed.
- Wear adequate personal equipment (overalls, gloves, safety boots etc.) when operating the machine.
- Remove or secure articles of clothing, such as ties and loose sleeves, which may catch or be drawn into moving machinery.

Eye Protection-



WARNING

The plasma arc cutting process produces rays that can burn eyes and skin. Always wear eye protection with appropriate lens shades.

Arc Current	LENS SHADE	
	AWS (USA)	ISO 4850
Up to 100A	No. 8	No. 11
100 – 200A	No. 10	No. 11 – 12
200 – 400A	No. 12	No. 13
Above 400A	No. 14	No. 14

Medical treatment facilities and a qualified first aid person should be available for immediate treatment of flash burns to the eyes and skin.

It is recommended that the **cutting area be prepared** in such a way as to **minimize the reflection and transmission of ultra-violet radiation.** Walls and other surface areas should be painted in dark colors to reduce reflection. **Protective Screens or Curtains** should be installed to avoid unnecessary **Ultra-Violet Transmission (UVT).**

Definitions-

Ultra-Violet Transmission (UVT): Is the measurement of the amount of ultraviolet light (commonly at 254 nm due to its germicidal effect) that passes through a water sample compared to the amount of light that passes through a pure water sample. The measurement is expressed as a percentage, % UVT.

Protective Screens or Curtains:



Portable Welding Curtains

INPUT CONNECTIONS-

1.) **A Wall Mounted Line Isolating Switch**, fused as required by local electrical codes, must be fitted as close as possible to the plasma arc power supply.



2.) **Three-Phase Input Conductors** must be sized to carry the rated current of the plasma arc power supply.



3.) Primary power cable must be provided with a **Minimum 600v (Volt) Rating**.



WARNING

Frequently inspect the cable for damage or cracking of the cover.
Bare wiring can kill. Replace damaged cable immediately.

GROUNDING-

Input Power-

1.) Connect the ground lead of the four-conductor / three phase input cable to the electrical system ground in the disconnect box and the ground stud provided in the plasma arc supply.



2.) Be sure all ground lugs are of adequate size to carry the rated current load.

3.) Make all connections tight to avoid resistance heating.

Output-

1.) Connect all positive output ground leads to the material grid of the worktable.

2.) Connect the material grid of the worktable to a good earth ground.

BURN PREVENTION-

High intensity ultraviolet and infrared radiation is produced by the plasma arc and is of similar intensity to typical high current welding arcs. This radiation is damaging to the eyes and skin. As the operator comes closer to the torch, the level of exposure increases rapidly.



WARNING

The operator and any other persons working in the vicinity of the arc must wear proper protective clothing and equipment.

Toxic Fumes-

Proper precautions must be exercised to prevent the exposure of others in the vicinity to toxic fumes that may be generated while plasma cutting.

Certain chlorinated solvents such a perchloroethylene and trichlorethylene will decompose under ultra-violet radiation to form phosgene and other gasses. Care must be taken to avoid the use of these solvents on materials being cut with plasma arc cutting equipment. Containers of these solvents and other degreasing agents should be removed from the immediate area around the plasma arc.

Metals coated with or containing significant amounts of lead, cadmium, zinc, mercury, or beryllium can produce harmful concentrations of toxic fumes when the plasma arc cuts. Adequate local exhaust ventilation must be used, or the operator must be supplied with special equipment to guarantee a supply of fresh air such as a respirator or air supplied helmet.

Metals coated with materials that emit toxic fumes must not be cut unless:

- 1.) The coating is removed prior to cutting.
- 2.) The area is adequately ventilated.
- 3.) The operator is supplied with fresh air breathing equipment.

AIR CONTAMINATION-

The plasma cutting process generates large quantities of hot metal dust and fumes that would be hazardous if uncontrolled.

A blower pulls a vacuum through the fume extraction assembly in the bed of the machine. The blower pulls the dust-laden air through a customer supplied filter before exhausting the air to the environment.

The Gases Listed either are produced normally during plasma arc cutting or can form under certain conditions:

Ozone-

Ozone is produced by the reaction of the plasma arc's ultraviolet radiation with oxygen in the air. Uncontrolled, excessive levels of ozone can constitute a hazard. When there is proper venting to the outside and the machine's internal ventilation system is functioning properly, there is adequate control of ozone during torch cutting.

Nitrogen Dioxide-

Nitrogen dioxide gas is produced when nitrogen and oxygen in the air pass through the electric arc. A hazard may exist if uncontrolled, excessive levels of nitrogen dioxide are formed. With proper venting to the outside, the machine's internal ventilation system is adequate to control nitrogen dioxide during torch cutting, if the system is functioning normally.

AIR CONTAMINATION (Cont'd.)-

Acetyl Chloride-

Acetyl chloride gases form in the air surrounding the plasma arc when the airborne vapors of chlorinated solvents or degreasers decompose upon being exposed to the ultraviolet radiation of the arc. A hazard may exist if uncontrolled, excessive levels of acetyl chlorides are formed. A pungent "sweetish" aroma like chlorine bleach is the first sign that these gases are being produced. Shut down the plasma arc cutting system immediately, if you detect the acetyl chloride odor. Do not resume cutting until you locate and control the source of the vapors.

Various cleaning solvents and vapor degreasers contain chemicals that decompose rapidly when exposed to ultraviolet radiation. If the solvents, cleaning solutions, or vapor degreasers used in the shop contain any of the following chemicals, do not use them near the plasma arc cutting system:

- 1.) Trichloroethylene
- 2.) Trichloroethane
- 3.) perchloroethylene
- 4.) Per-Chloroethane
- 5.) Trifluoro-Trichloroethane (Fluorocarbon-113).

These chemicals also decompose into small amounts of the toxic gas's phosgene and chlorine. You will notice the acetyl chloride odor long before phosgene or chlorine levels become harmful. **The vapors can decompose up to several feet away from the arc, do not rely on the machine's internal ventilation system to control solvent vapors and their products.**

AIR CONTAMINATION (Cont'd.)-

Do not use or store chlorinated solvents, cleaning solutions, and vapor degreasers close to the machine, where the vapors can enter the torch-cutting area.

NOTE: It may prove advisable to provide separate ventilation for the solvent/degreaser storage area.

Metal Fumes-

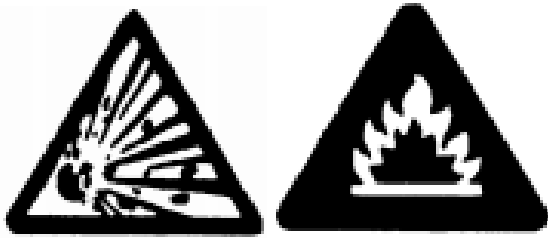
Metal fumes are produced when the plasma arc vaporizes the metal. A hazard may exist when uncontrolled, excessive levels of metal fumes are produced some vaporized metals form toxic gases. These metals may be in their pure metallic state, in an alloy, or in a coating such as paint or plating. Metals that are known to produce toxic fumes include beryllium, cadmium, lead, manganese, mercury, and zinc. Beryllium products require particular care because their fumes are highly toxic. If there is proper venting to the outside and the machine's internal ventilation system is functioning normally, there should be adequate control of metal fumes during torch cutting.

Metal Dust-

Metal dust is formed as metal vaporizes during torch cutting. A hazard may exist when uncontrolled, excessive levels of metal dust are produced. If there is proper venting to the outside and the machine's internal ventilation system is functioning normally, there should be adequate control of metal dust during torch cutting. For proper ventilation, at least 90% of the worktable should be covered by the workpiece (or other sheet metal covers).

See Dust Collector Vendor Installation and Operation Manual for additional precautions.

FIRE PREVENTION-



WARNING

Since plasma arc cutting produces hot metal, sparks, and slag, precautions must be taken to prevent fire or explosions.

All combustible materials must be removed from the immediate cutting area to at least 35 feet away. Appropriate fire extinguishing equipment must be available in the immediate cutting area.

After cutting, be sure to allow the metal to cool sufficiently before handling or before allowing contact with combustible materials.

Never plasma cut empty containers that have held toxic or potentially explosive materials. Those containers must be thoroughly cleaned according to national standards prior to cutting or welding.

Never plasma cut in an atmosphere that contains heavy concentrations of Dust, Flammable Gas, or Combustible Liquids (such as Petrol/Gasoline).

COMPRESSED GAS EQUIPMENT-

Gas cylinders should be mounted securely to a wall or other stable supporting device.

Cylinders-

Compressed gas cylinders must be handled and used in accordance with appropriate national safety standards.

- Never use a cylinder that is physically damaged or leaks.
- Never move or transport a cylinder without the protective valve cover in place.
- Never use a gas cylinder or its contents for any other purpose than that for which it is intended.
- Never lubricate cylinder valves with oil or grease.
- Never allow electrical contact such as welding arcs with cylinders.
- Never expose cylinders to excessive heat, sparks, slag, or open flames, which may cause rupture.
- Never use hammers, wrenches, or other tools to open stuck valves. Send these cylinders back to the supplier.

Pressure Regulators-

All regulators used to operate plasma equipment must be maintained in proper working condition. Faulty equipment can cause equipment damage or operator injury. Faulty equipment must be serviced at the manufacturers designated facility by trained repair technicians.

- Never use a regulator for any other gas than that for which it is intended.
- Never use a regulator that leaks, excessively creeps, or is physically damaged in any way.
- Never attempt to lubricate a regulator with oil or grease.

HOSES-

Gas hoses used for plasma arc cutting systems adhere to the following color coding:

Red **Acetylene.**

Orange **LPG-Liquefied Petroleum Gas (LPG, LP Gas, or Condensate)**, is a Flammable mixture of Hydrocarbon Gases such as Propane and Butane.

Blue..... **Oxygen.**

Black **Inert Gases and Air.**

Replace any hose that is damaged by physical abuse or from sparks, heat, or open flame.

Lay hoses out straight to prevent kinks.

Coil excess hose and place out of the way to prevent loose connections, or other damage.

Pressure Regulators (Cont'd.)-

Keep hose lengths to a minimum to prevent damage, reduce pressure drop and prevent possible volume flow restriction.

Please refer to national standards for more information on hoses.

SAFETY DEVICES-

Plasma arc units are provided with certain safety interlocks designed to prevent equipment damage and/or personal injury. Never short out or in any way attempt to defeat the safety interlock devices.



WARNING

Never attempt to operate the plasma unit with any of the power supply covers not in place. This is extremely hazardous to the operator and any other person in the area. It also prevents the equipment from properly cooling critical components and could result in equipment damage.

All exposed electrical connections must be covered with the proper insulation material. Safety devices must be regularly checked for proper operation and replaced immediately if found to be inoperative.

HOT SURFACES-



WARNING

Components may remain hot for a considerable period of time.
Always wear gloves to remove components and scrap from the bed.



WARNING

During prolonged periods of cutting, parts of the machine bed may become hot to the touch.



WARNING

Moving machinery can be dangerous.

Assure that the bed is free of obstructions and no person or articles of clothing are in the proximity of moving parts when the machine is in operation. This safety precaution also applies when the machine is manually moved and when the plasma system is off.

HOT SURFACES (Cont'd.)-

IMPORTANT-

Read this manual thoroughly before operating the machine.

Read the Torch Height Control Manual before operating the machine.

Read the CNC Control Operator Manual before operating the machine.

Sparks-

Sparks form as the plasma arc torch vaporizes metal. These sparks are tiny droplets of extremely hot molten metal and are a possible fire hazard. The volume of sparks formed and the area over which they are scattered depend on several variables. These variables include the type and thickness of the material being cut, the cutting current, and the feed rate. **Where practical, keep all combustible material at least 35 ft. (10.7 m) away from the plasma arc work area.** Where this is not practical, protect all combustible materials with close fitting, flame proof covers or shields. Protect wooden or other combustible floors by covering them with sand or installing fire-resistant shields. **Shield any wall openings, floor openings, cracks, ducts, or conveyors within 35 ft. (10.7 m) of the torch to prevent sparks from passing into adjacent areas.**

HOT SURFACES (Cont'd.)-



WARNING

Sparks from the cutting process may ignite flammable items in the machine bed which may then be drawn into the extraction unit, possibly causing a fire.

NOTE: Be sure to use an approved facemask and approved eye protection when cleaning or servicing the dust collector.

NOTE: Plasma arc cutting systems can produce large volumes of fumes. If you exhaust fumes to the outside atmosphere, additional air pollution control devices may be to conform to local, state, and federal government ordinances. Air pollution control devices are the responsibility of each individual user.

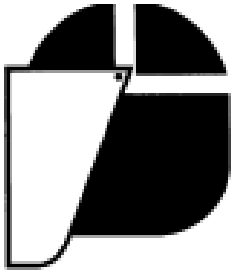
Internal Ventilation System-

Due to the noxious and toxic nature of many torch cutting by-products, 3KRHQL[recommends venting the machine's internal ventilation system (**referred to as the "Dust Collector"**) to the outside atmosphere. This recommendation is especially important when the shop has one of the following:

- 1.) **Low ceilings and/or confined area.**
- 2.) **Large amount of welding and/or torch cutting near the plasma system.**
- 3.) **Poor Cross Plant Ventilation.**

LIGHT AND RADIANT ENERGY-

When it is necessary to look directly at the arc for diagnostic purposes, do so briefly. Use shade #10 Welding Glass (for up to 200 Amps) or Shade #12 (for 200 amps). During operation, use a shade not less than #8.



WARNING

Do not look directly at the arc without proper eye protection.

NOTE: During plasma arc cutting, clothing worn should conform to the instructions presented in the General Safety Requirements section of this manual.

Ultraviolet rays and other radiant energy reflected off the workpiece can produce sunburn. Therefore, when plasma arc cutting is being performed, anyone working within 25 feet (7.5M) of the arc should wear an approved, protective full-face mask, a long-sleeved shirt, gloves, and long pants.

Operations, such as edge cutting, that can cause the arc to be exposed to view should be avoided, because they can increase exposure to radiant energy.

LIGHT AND RADIANT ENERGY (Cont'd.)-

Shield personnel at nearby workstations from accidental exposure to radiant energy using non-reflective, fireproof enclosures, open at the top and at floor level to allow air to circulate freely.

The pilot arc in the plasma cutting systems is initiated and stabilized by a high-voltage signal. This signal can create electromagnetic interference.

As with any equipment that can create such interference (e.g., microwave ovens and TIG welders), people who have implanted heart pacemakers must exercise caution when working near the equipment. Laguna Tools recommends that a person with a pacemaker who works near where plasma arc cutting is being performed should wear a Holter monitor for one day of work to record the existence of electromagnetic fields. A qualified doctor should review the recorded data with the pacemaker manufacturer to determine whether the worker can safely continue working in the area on which the study is based.

NOTE: There is no history of problems caused to pacemakers by the plasma arc cutting equipment that have been reported to Laguna Tools Customer Service area.

HEAT-

Plasma Arc Cutting creates a **Heat-Affected Zone (HAZ)** around the cut edge of the workpiece. Until the hot edges cool, the **HAZ** will burn an unprotected hand severely.

1.) When removing produced parts or skeletons from the machine, operators should wear heat-resistant, gauntlet-type gloves.

2.) The torch, cutter bars, ducting, and dust collector become hot during torch cutting. Avoid contact with these components unless you are wearing heat-resistant gloves.

NOISE-

The noise levels generated during plasma arc cutting may be as high as **105 dB (Decibels)**. This depends on the distance from the machine, arc, plasma torch nozzle design, gas velocity, material type, and plate thickness. Laguna Tools recommends that each user check the sound levels in his own shop under normal operating conditions. Based on those findings, provide adequate ear protection to all personnel who must work near the machine, in accordance with applicable local, state, and federal industry standards.



WARNING

Exposure to noise from the cutting process can damage hearing. Wear appropriate ear protection when operating the machine or when working in the proximity of the machine.

NOISE (Cont'd.)-

NOTE: Noise levels that can cause discomfort or damage to hearing will vary greatly from one individual to another. Laguna Tools recommends that ear protection be furnished to any worker who requests it, regardless of applicable industrial standards or tested noise levels.

ADDITIONAL SAFETY INFORMATION-

The general safety information presented in this chapter does not constitute a complete list of safety instructions for any configuration of the Laguna Tools Cutting Table. Warnings and other safety information related to operations described in this manual are presented in the chapters in which those operations are explained. Specific equipment being used by the customer and its application in the customer's factory may require supplementary safety information. NOTE: It is the responsibility of the customer's company to make sure safety information covering the equipment being used and its application is available to personnel operating and maintaining the equipment and is read by them.

SAFETY STANDARDS PUBLICATIONS-

It is recommended that companies using the kind of equipment covered in this manual consult the applicable Safety Standards publications available from the agencies and the authority having jurisdiction listed below:

OSHA Superintendent of Documents

U. S. Government Printing Office

Washington, DC 20402-9371,

USA Tel: (202) 512-2457

Occupational Safety & Health Administration

200 Constitution Ave NW

Washington, DC 20210

USA Tel: (800) 321-6742

ANSI American National Standards Institute

11 West 42nd Street 13th Floor

New York, NY 10036-8002,

USA Tel: (212) 642-4900

Fax: (212) 398-0023

SAFETY STANDARDS PUBLICATIONS (Cont'd.)-

NFPA-National Fire Protection Association

P.O. Box 9101 1 Battery-March Park
Quincy, MA 02269-9101,

Telephone:

+1 800 344-3555 (U.S. & Canada)
+1 855 274-8525 (U.S. & Canada)
+1 617 770-3000 (International)

Fax:

+1 800-593-NFPA (U.S. & Canada)
+1 508 895-8301 (International)
+1 617-984-7055 (confidential/Human Resources)

The preceding safety instructions are advisory, general in scope, and not necessarily complete. Specific Safety Information for the Laguna Tools Cutting Machine appears throughout this manual.

WARNING: In keeping with standard safety practices, the manufacturer recommends the use of eye protective equipment, with side shields, during the operation of this machine.

SPECIFICATIONS-

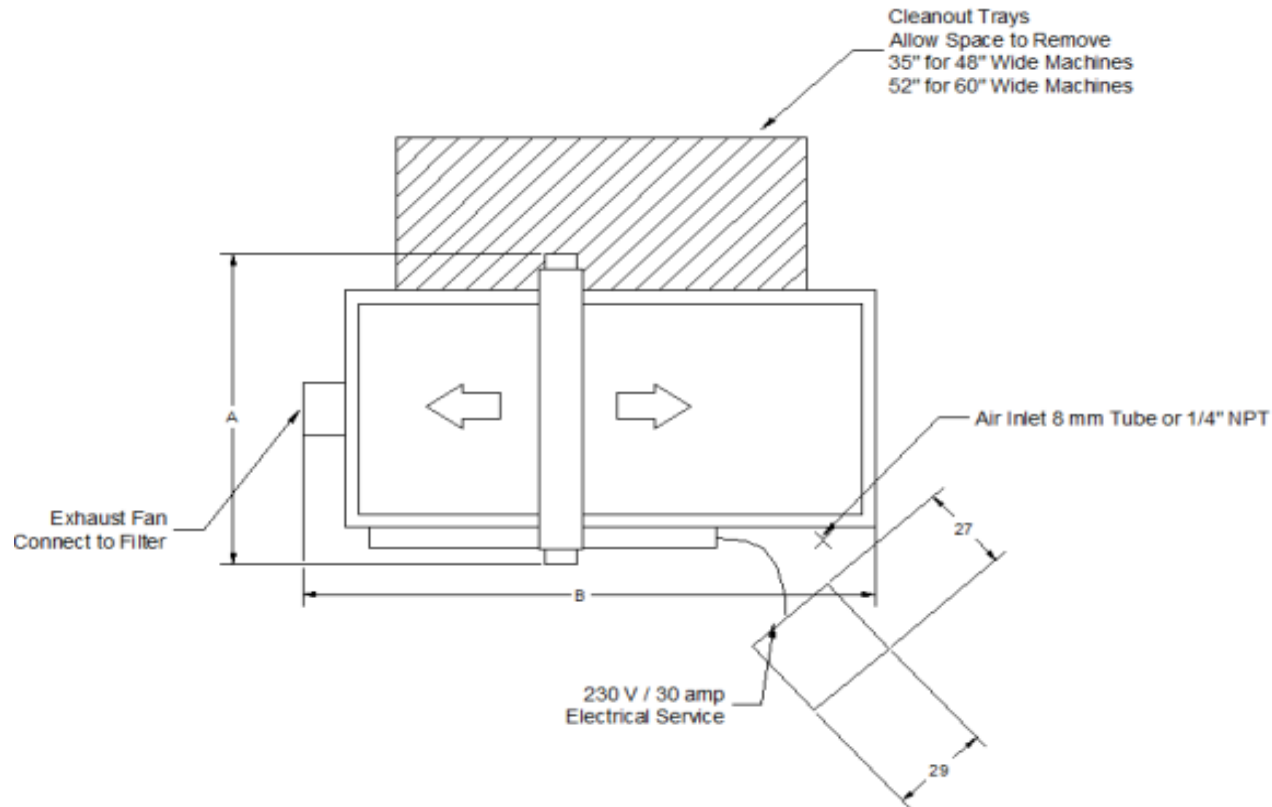
Specification's for the Plasma 3 Type CNC Machines			
Machine	C404-4'X4' (82"X 92") 1,500 lbs.	C408-4'X8' (138"X92") 2000 lbs.	C510-5'X10' (158"X102") 2500 lbs.
X-Axis Travel	49.0"	49.0"	61.0"
Y-Axis Travel	49.0"	97.0"	121.0"
Approximate Dimensions (in)	82L x 92W x 60H	138L x 92W x 60H	158L x 102W x 60H
Approximate Weight (lbs.)	1500	2000	2500
Maximum Rapid Speed	393 inches/min		
CNC Control	Starfire		
Frame Construction	Welded Tubular Steel		
Bridge Construction	Welded Tubular Steel		
Drive Motors	X-Axis – Two Servo Motors Y-Axis – Servo Motor Torch Height Control – Stepper Motor		
Mechanical Drive System	X-Axis – Rack & Pinion (2) Y-Axis – Rack & Pinion Z-Axis – Ball Screw		
Available Plasma Torches	Hypertherm Powermax 45XP Hypertherm Powermax 65 Hypertherm Powermax 85		
Maximum Amperage	85 amps		
Torch Control	Arc Voltage with Initial Height Sensing		
Torch Protection	Pneumatic Breakaway Design		
Exhaust Fan	1200 cfm @ 3" H2O		
Available Options	Pipe Cutting Attachment Water Mist Chiller		

Installation-

1.) Introduction: Location-

The following drawing shows the required space for the C-Series Plasma Cutting Table:

2.) Space Conditions-



	"A"	"B"	WEIGHT
4'X4'	82"	92"	1,500 lbs.
4'X8'	138"	92"	2,000 lbs.
5'X10'	158"	102"	2,500 lbs.

2.2.) Floor Condition-

Laguna Tools suggests a concrete floor, in good condition, level to within +/- 0.500" (12.7mm).

2.3.) Electrical Services-

The electrical supply to the machine and the plasma arc cutting system must be stable, with no spikes or electrical noise (interference) from other machinery.

2.3.1.) CNC Control-

- A dedicated 230V / 30A single phase service is required for the CNC control.

2.3.2.) Plasma System-

- Refer to the specific plasma system manual for available voltages.
- Use a separate, wall mounted, fused, quick disconnect electrical box in a convenient location near the machine for the plasma system.

2.3.3.) Earth Ground-

The machine foundation area must have an adequate ground rod to reduce electrical noise problems. Excess electrical noise will interfere with automated control functions and plasma arc cutting performance. Proper grounding is essential for reasons of personal safety and machine operation.

NOTE: Installation must be inspected by a qualified electrician and meet state and local regulations.

- Use 5/8" (16.0 mm) copper rod, 8 ft. long (2.5 m) minimum or per State requirements.
- Install the primary ground rod next to the main electric enclosure (within 8 feet or 2.5 meters of the plasma table).

2.4. Compressed Air & Gas-

The plasma torch requires clean, dry, oil free air, i.e., it must be filtered. Poor quality air will reduce cutting speeds, produce poor cut quality, and reduce torch parts life. Ensure that adequate air supply is available for stable operation. Air must be delivered at the pressure and flow rate specified.

CAUTION: Do not use any quick disconnects in the air supply line to the machine as these have small flow areas that will restrict the air flow rate to the machine.

2.4.1. Gas Supply Requirements-

Gas Supply: Clean, Dry, Oil-Free Air.

psi: Pounds per Square Inch.

Air Inlet Pressure for Machine: 80-110 psi

Gas Inlet Flow Rate/Pressure for Hypertherm Plasma Systems:

scfh: Standard Cubic Foot Per Hour (Unit of Measurement of Fluid Flow).

scfm: Standard Cubic Foot Per Minute (Unit of Measurement of Fluid Flow).

Powermax 45: 360 scfh; 6.0 scfm @ 80 psi

Powermax 65: 400 scfh, 6.7 scfm @ 85 psi

Powermax 85: 400 scfh, 6.7 scfm @ 85 psi

2.4.2.) Option A: Air Dryer Unit (Phoenix Plasma Part Number 230579 or Equivalent)-

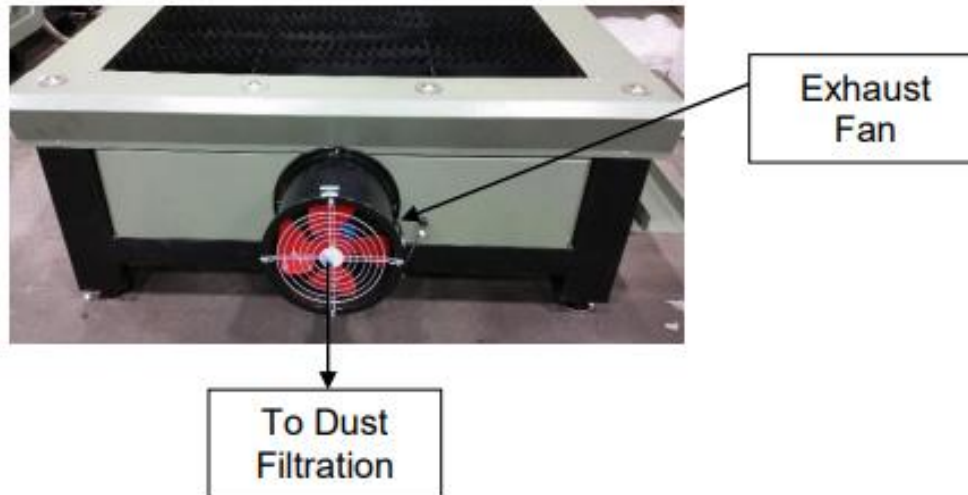
Laguna Tools recommends using a stand-alone air dryer unit that consists of a water-oil-separator and a post filter for the plasma system to protect your machine.

Laguna Tools offers a Dryer/ Filter Combination.

2.4.3.) Option B: 3 (Three)-Stage Filter System (Phoenix Plasma Part Number 230578 or Equivalent)-This option uses a series of three different filters to remove moisture, oil, and particulate. The filtration should be located as close to the machine as possible. An outlet valve should be installed to isolate the air supply. Using this option requires more maintenance than the air dryer option since there are three different filters to monitor and maintain.

2.5.) Fumes/Smoke Extraction Plan-

The machine will come pre-installed with a 3000 m³/h (Cubic Meters per Hour) exhaust fan. Customer is responsible for providing further ductwork and filtration to meet federal, state, and local codes. Proper ventilation is required for operator safety and health – refer to the SAFETY section of this manual.



2.6.) Required Equipment/Tools-

The following tools will be required for the installation and handling of the plasma table:

- 1.) Metric Allen Wrenches Set.
- 2.) Two Adjustable Crescent Wrenches for adjusting the Leveling Pads.
- 3.) Minimum of 3 ft. Bubble Level for Leveling the Machine on the Floor.
- 4.) Phillips Head Screwdriver.
- 5.) Forklift with 8 ft. forks to lift or overhead crane with 20 ft. Slings/Chains to unload and move the machine as desired to the designated area (you may also need machinery skates).

3.) AFTER RECEIVING-

Unpacking the Machine:

Unpacking the machine will require tin snips (to cut banding), a knife and an adjustable wrench. Follow the steps below:

- 1.) Using the tin snips, cut the banding that is securing the machine to the pallet (if fitted).
- 2.) **WARNING:** EXTREME CAUTION MUST BE USED BECAUSE THE BANDING CAN SPRING AND COULD CAUSE INJURY.

3.) AFTER RECEIVING (Cont'd.)-

3.) Remove the box from the CNC machine (if fitted) and any other packaging material. The parts ordered with the machine will be packed on or inside the machine. (Please note, the machine is heavy, and it is recommended that professional assistance [rigging] be used for unloading and placing the machine.).

4.) Use a forklift with sufficient lifting capacity and forks that are long enough to reach the complete width of the machine before attempting to lift the machine. 5.) Remove the securing bolts that attach the machine to the pallet (if fitted).

6.) Approaching the machine from the side, lift the machine on the frame, taking care that there are no cables or pipes around the forks.

7.) Move the machine to the required position and install the leveling feet.

8.) Then lower the machine gently to the floor.

9.) Level the machine so that all the supporting feet are taking the weight of the machine and no rocking is taking place.

4.) Unloading Requirements-

- 1.) When the Crate containing your newly purchased Smartshop® MT is delivered, it will be delivered “Curbside”, in other words the Machine will be delivered in front of the Driveway of one’s Garage/Shop or Workspace. (****It is the Purchasers responsibility of moving the Machine into His or Hers Garage/Shop or Workspace.****)
- 2.) One should obtain a Crane: Hydraulic crane / crane (10T or above, 4 groups of 10T rings, 2 10M long, 10T straps).
- 3.) One should obtain a Forklift: The forklift can fork items weighing 10T or more.
- 4.) To Open Crate-Acquire some standard tools for taking apart the Crate.

a.) Hammer.



b.) Pry Bar.



4.) Unloading Requirements (Cont'd.)-

c.) Wire Cutters.



d.) Cordless Drill.



5.) Cut all straps only on the Crate.



5.1.) Unloading-

CAUTION: Extreme care must be taken when lifting and moving the machine. Obtain the weight of the machine from Paragraph 2.1 of the Installation Manual.

NOTE:

It is the responsibility of the customer to verify that the forklift truck and/or crane is of adequate lifting capacity, and that any maneuver is undertaken safely. Damage caused to the machine through incorrect or careless maneuvers is not covered under the machine warranty. Laguna Tools is not responsible for personal injury to any person while this machine is transported, unloaded, or installed.

- 1.) It is important that the machine is lifted only at the specified lifting points.
- 2.) Verify that the machine is balanced and stable before and during lifting/moving.
- 3.) Verify that no person is in a position where they may become trapped or injured. The machine is shipped with the gantry installed and CNC control as one unit. The CNC control and the gantry will be secured off-centered on the cutting table bed.

The machine is shipped with the gantry installed and CNC control as one unit. The CNC control and the gantry will be secured off-centered on the cutting table bed.

CAUTION: Make sure the load is always lifted about the center of gravity to prevent from any tipping and accidents.

5.1.1.) Lifting with Crane (Recommended)-

- 1.) Remove securing straps/chains attached to the truck bed.
- 2.) Obtain two straps of 20 feet length that are rated for the weight of the load (dependent on the size of machine).

NOTE: Longer lifting straps may be required if the crane does not have hoist chains attached.

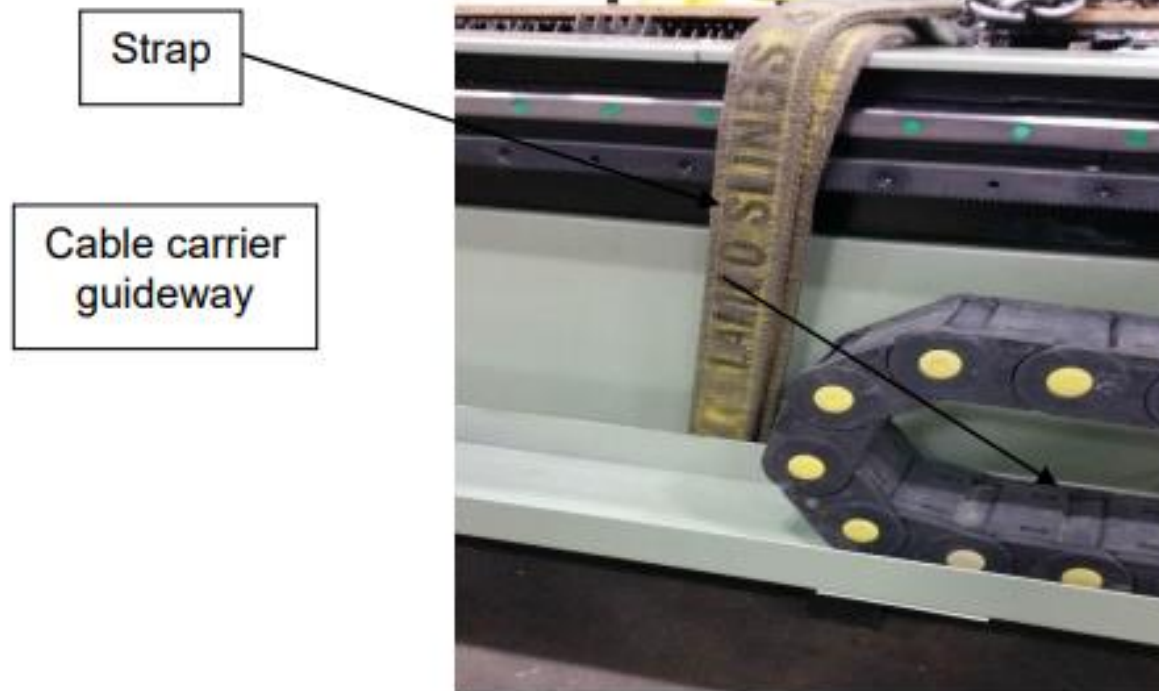
- 3.) Slide one of the lifting strap under the machine base close to the gantry side as shown on the picture below.



5.1.1.) Lifting with Crane (Recommended-Cont'd.)-

4.) Slide the other lifting strap under the machine base off-centered of machine length.

NOTE: Ensure both straps are between the cable carrier guideway and frame so lifting the machine will not cause damage to the cable carrier.



5.1.1.) Lifting with Crane (Recommended-Cont'd.)-

- 5.) Take each end of the strap and put chain through them and attach the eye hook back to the hoist chains.
- 6.) Before lifting, make sure straps are even on both sides of the machine and tight underneath the machine and up against the table leg.
- 7.) Move crane close to the center of gravity of load.
- 8.) Use protection (i.e., cardboard/heavy blanket) if you feel any scratches or damage could result to machine components while lifting.
- 9.) Begin to lift the machine above the truck bed and confirm that load is not tipping in either direction by doing a complete walkaround.
- 10.) Reposition straps and crane as necessary to keep load stable and balanced.
- 11.) Once the load is balanced and stable, lift the machine clear of the vehicle.

CAUTION: Before moving the machine into position, it is essential to plan for the path of travel to ensure that no hazards exist in the path that could result in any damage.

- 12.) Lower the machine to floor level and place it firmly on the ground at the designated area of operation.

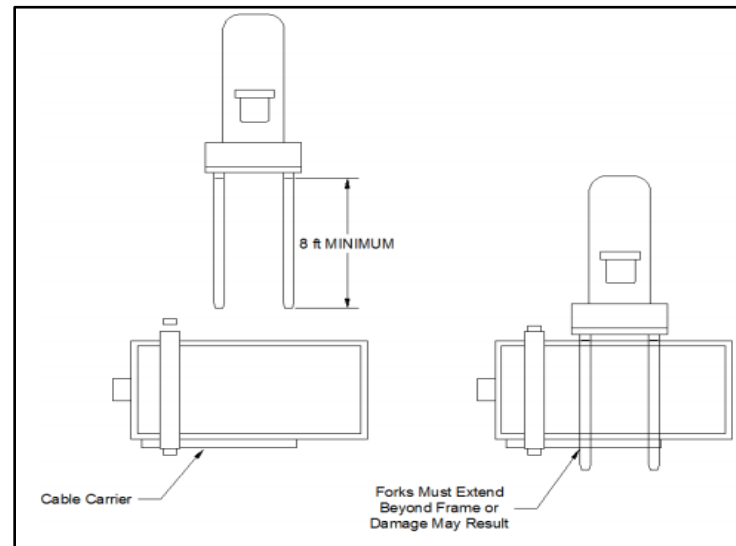
NOTE: Ensure machinery skates are placed in all four corners of the machine base if they are used.

5.2.) Lifting with Forklift-

CAUTION: A forklift of adequate fork length (8 ft. minimum) is required to lift the machine otherwise the frame will get damaged.

- 1.) Remove securing straps/chains attached to the truck bed.
- 2.) Drive the forklift to the side of the truck at the lifting points shown in the picture below.

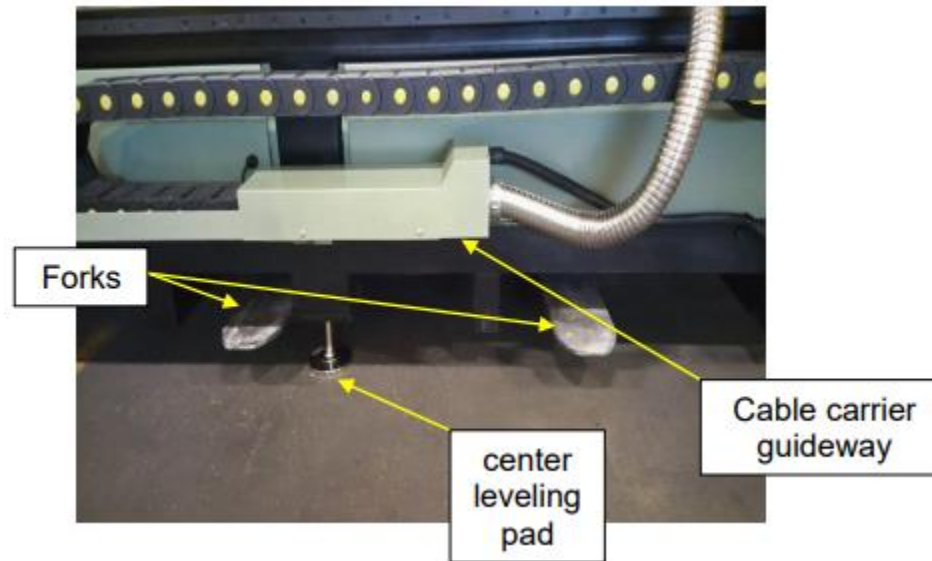
NOTE: The forklift must not lift the machine from the cable carrier side, instead lifting must be done from opposite side to prevent damage to the track and guideway.



- 3.) Before lifting, move the forklift close to the frame. You may want to put padding between the forklift and frame to protect the machine from any scratches or damage.

5.2.) Lifting with Forklift (Cont'd.)-

4.) Ensure that forks extend all the way through the machine base to the opposite side.



5.) Begin to lift the machine above the truck bed and confirm that load is not tipping in either direction.

6.) Reposition forks as necessary to keep load stable and balanced, ensure load is picked up as close to the center of gravity as possible.

7.) Once the load is balanced and stable, lift the machine clear of the vehicle.

CAUTION: Before moving the machine into position, it is essential to plan for the path of travel to ensure that no hazards exist in the path that could result in any damage.

5.2.) Lifting with Forklift (Cont'd.)-

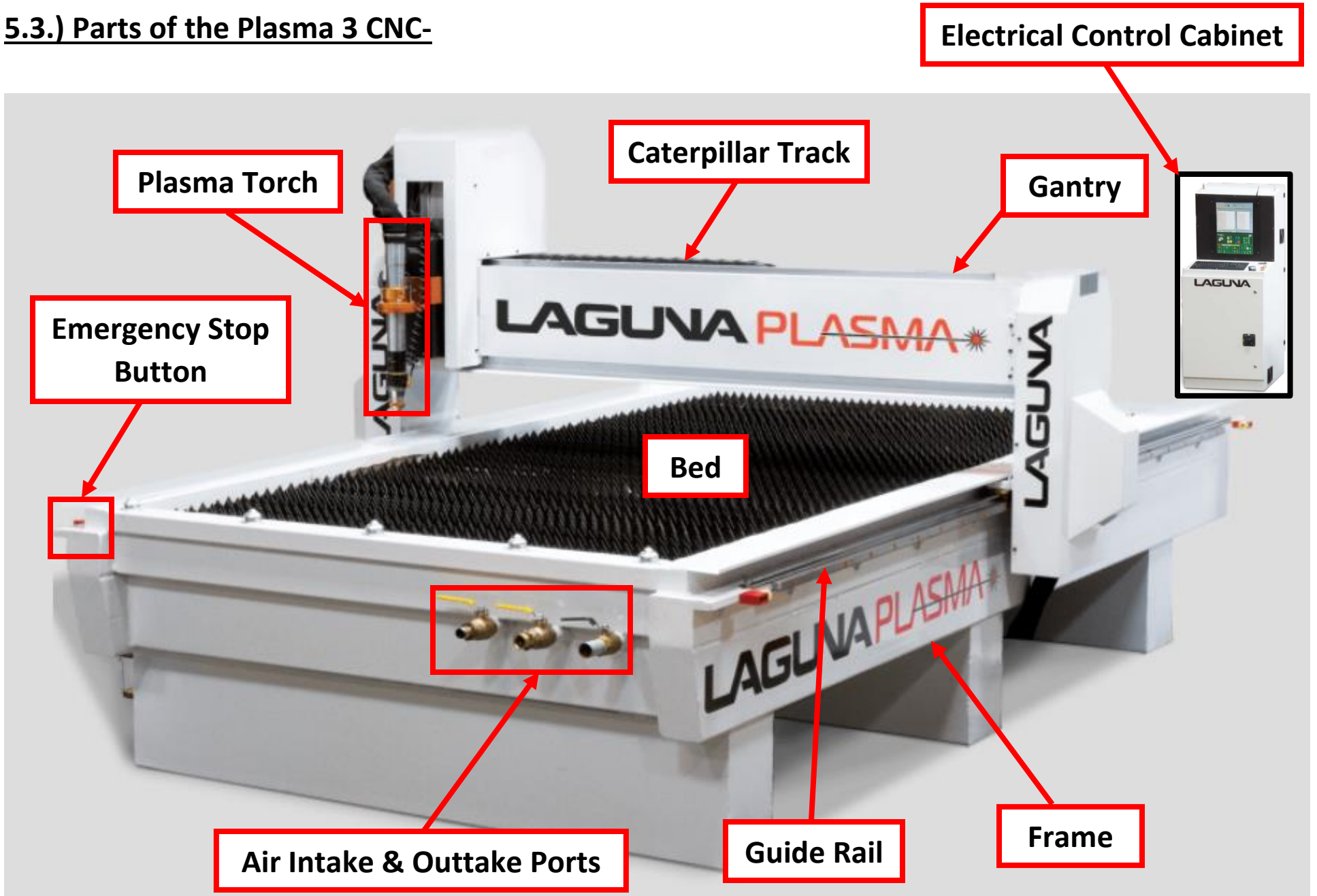
8.) Travel with forks close to the ground so the machine is not suspended very high in the air. This will reduce damage to the machine if accidentally dropped.



9.) Lower the machine to floor level and place it firmly on the ground at the designated area of operation.

NOTE: Ensure machinery skates are placed in all four corners of the machine base if they are used.

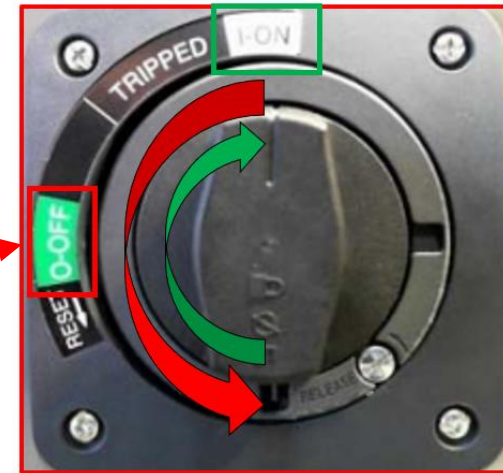
5.3.) Parts of the Plasma 3 CNC-



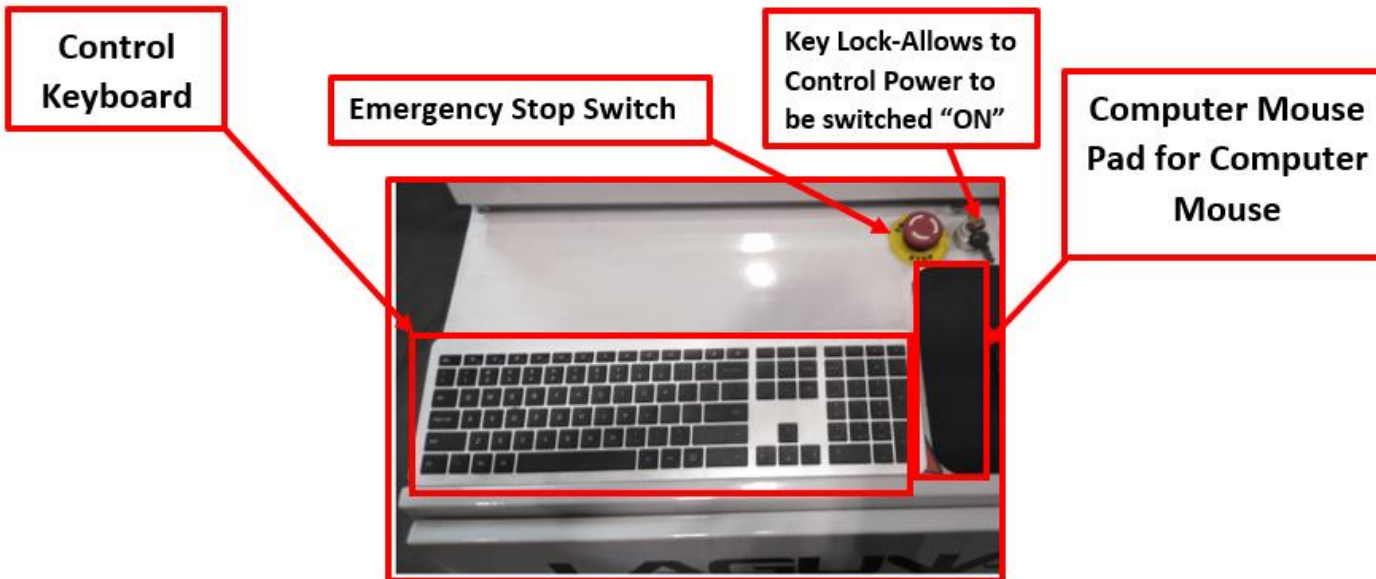
5.3.) Power On-

Once all the cables are plugged in, the machine can now be powered on.

1.) Power on the circuit breaker from the supply line.



2.) Turn On the CNC Control disconnect.



5.3.) Power On (Cont'd.)-

3.) Ensure all E-Stops are out.

Emergency Stop Switch

Key Lock-Allows to Control Power to be switched "ON"



NOTE: It is important that all the "Emergency Stop Buttons" are disengaged before switching on the power, otherwise errors will be produced, and machine will not function.

4.) Turn "On" the Power Switch of iCNC Controller.



Push the button and keep it pressed in for five seconds and it will turn on power to the CNC.

The only way to switch power OFF is using Windows shutdown. This will switch off all power in the controller.

6.) iCNC PERFORMANCE/iCNC CONTROLLER Operations-

6.1.) System Description-



iCNC Performance is intended for shape cutting control. iCNC Performance has motion control, I/O, user interface and an optional plasma height control built all in one package. These units are not field repairable. Unauthorized opening of the unit will void the warranty.

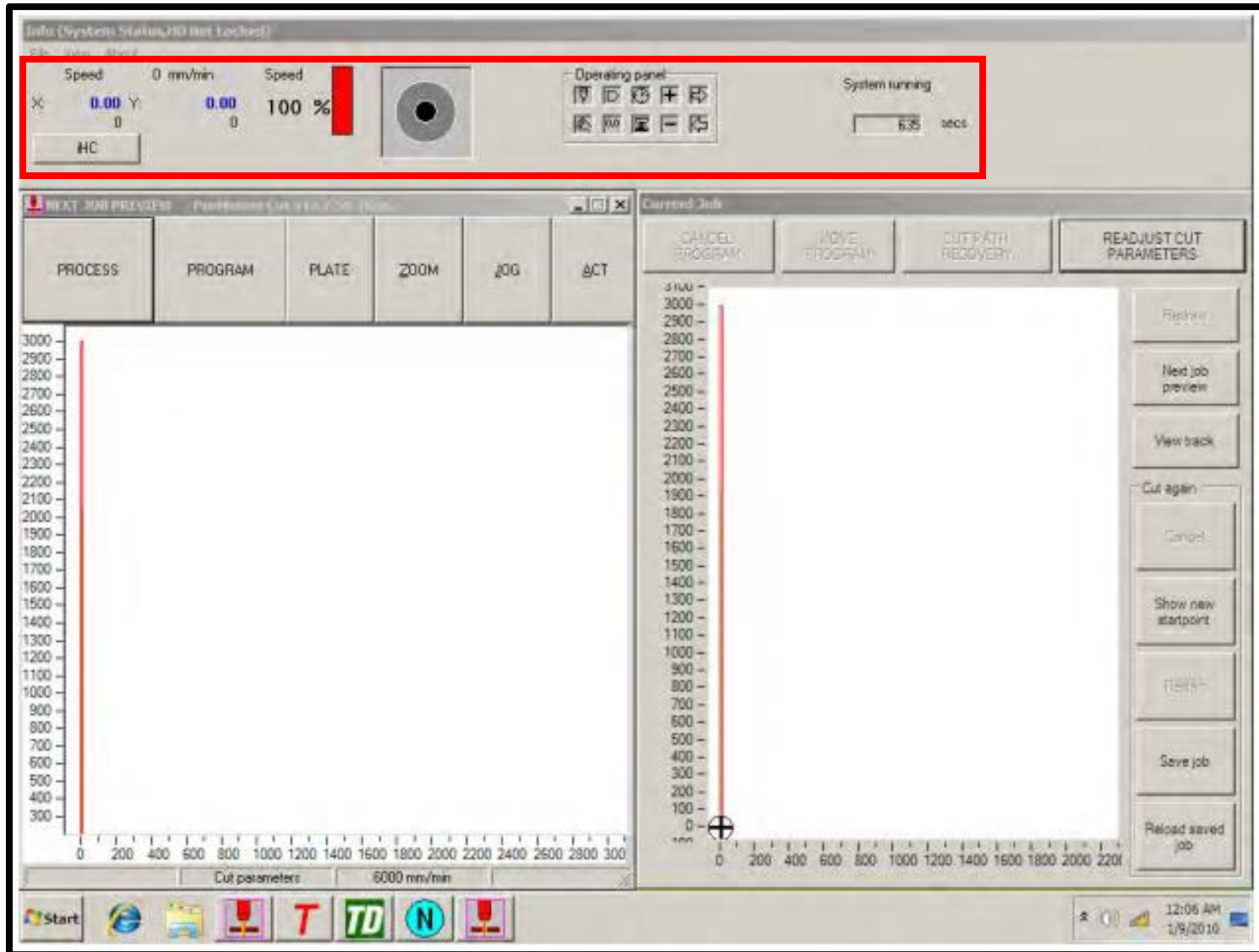
6.2.) iCNC Specifications –

Processor	2, Intel (secondary processor for motion & I/O)
Operating system	Windows 7 Embedded
Ram	2GB
Ethernet ports	1 RJ-45 and 1 WLAN
USB ports	2, 1 On back wall (USB2.0) + 1 On door (USB2.0)
Serial ports	1 RS-422/485 port on d-sub 9 pin
Hard drive	120GB SATA SSD
Operating console	Total of 35 buttons and a digital potentiometer
Display	15" With touch panel (resistive)
Number of I/O	20 outputs and 16 inputs
I/O type	Outputs and inputs are grounding
Axes available	1-2 Y, 1 X, optional 1Z (iHC)
Default drives interface	Analog +-10V speed signal, step/direction, incremental encoder inputs
Integrated plasma height control	Optional iHC height control
CNC input power volts (amps)	24VDC (5A), with optional iHC 24VDC 6A.
CNC protection device	Automatic fuse

6.3.) Overview Main Screen-

The Main Screen is divided into 3-three parts.

- Info (Systems Status).
- Promotion Cut – Next Job Preview.
- Current Job.



6.3.1.) Info (System Status)-

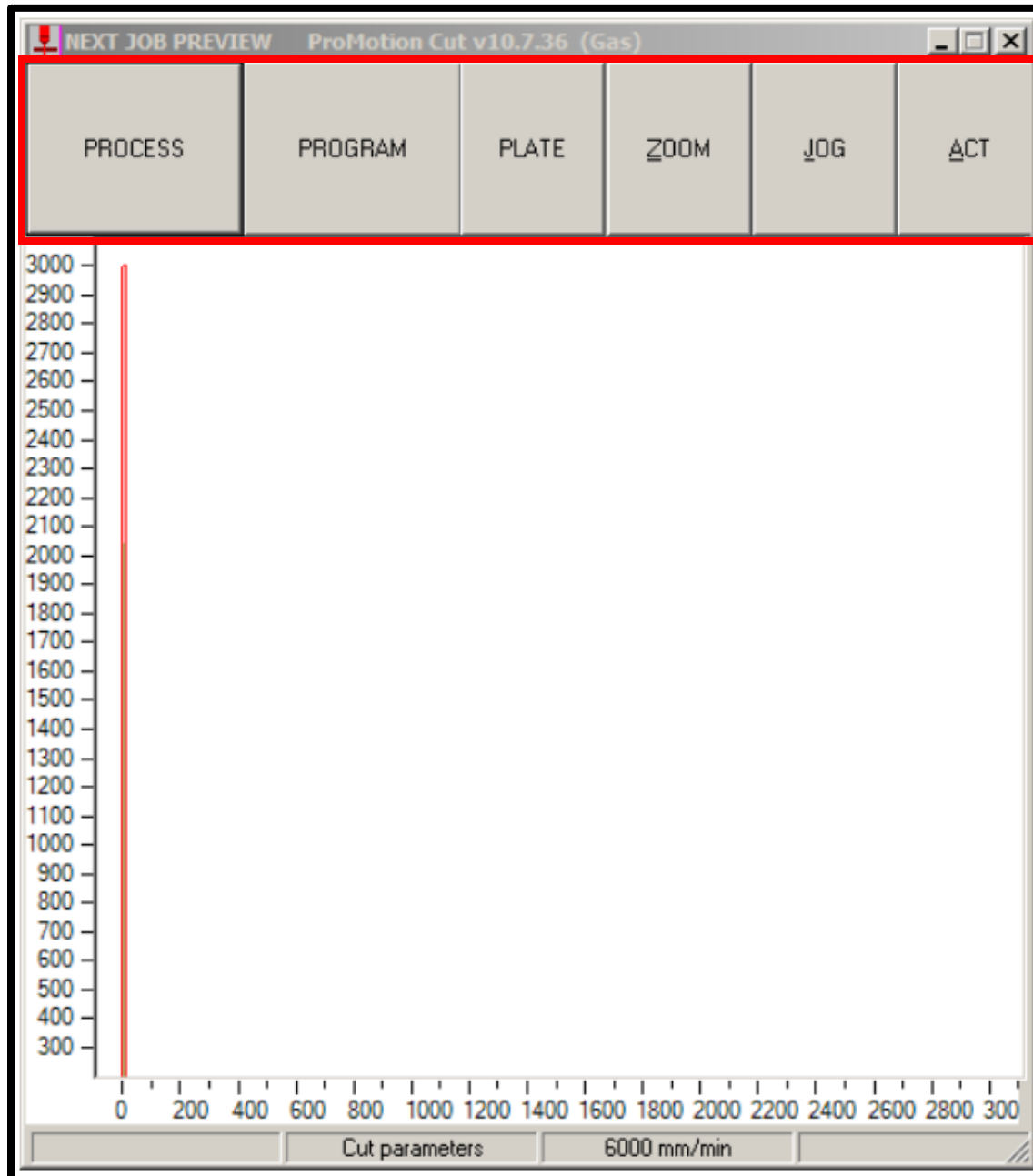
This is located on top of the screen. The info screen shows system information and is used for diagnostics and troubleshooting.



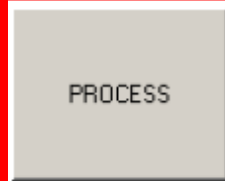
- **Speed IPM (or Metric)-** indicates machine speed.
- **X & Y Readouts-** indicates absolute position of the cutting tool.
- **Speed Bar in %-** This is interfaced directly with the Speed Potentiometer and will reflect the speed pot setting.
- **Jogging Direction Indicator-** Monitors and shows which direction/jogging key is pressed.
- **Operational Panel –** Interfaced with the 9 push buttons. Monitors which button is pressed or activated.
- **System Running –** Indicates that the second CPU is activated and functionally properly.

6.3.2.) Promotion Cut – Next Job-

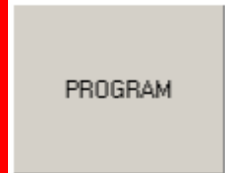
Located on the left-hand side of the screen, the Promotion Cut Screen is the starting point to navigate throughout the different screens.



6.3.2.) Promotion Cut – Next Job (Cont'd.)-



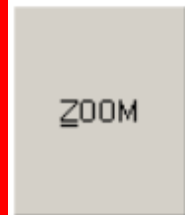
Opens the process selection window.



Selecting the Program button will open the selection to Macro Shape Library or download in ProMotion Nest.



Plate button open the plate alignment window.



Zoom button opens the zoom window. This lets you take a closer look at the parts.



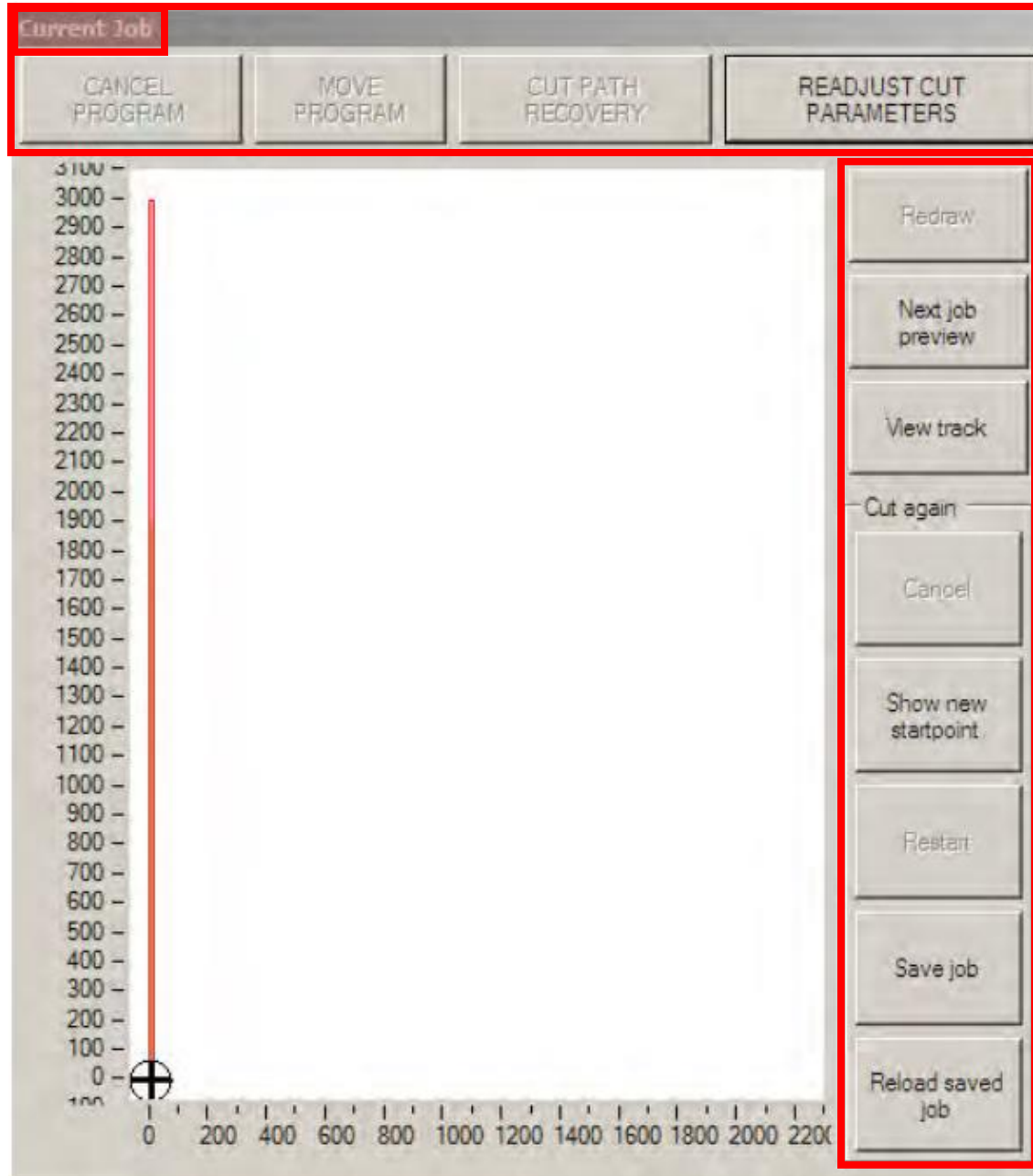
Opens to the jog screen dialog box. Functions like Drive machine to and Rip cut are located under this jog dialog box.



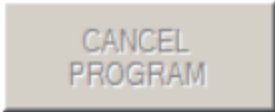
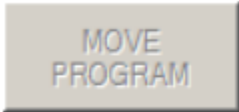

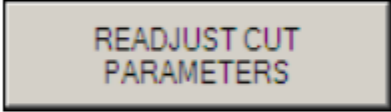
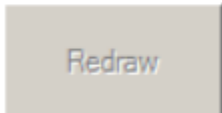
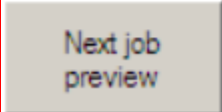
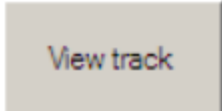
Selecting on the Act button will allow you to do a trial run of the program, select on board manual, and the options to open the menu bar on Promotion Cut - Next Job Screen.

6.3.3.) Current Job-

Located on the right-hand side of the screen, the **“Current Job” Window** displays the current job being cut with real time tracking.

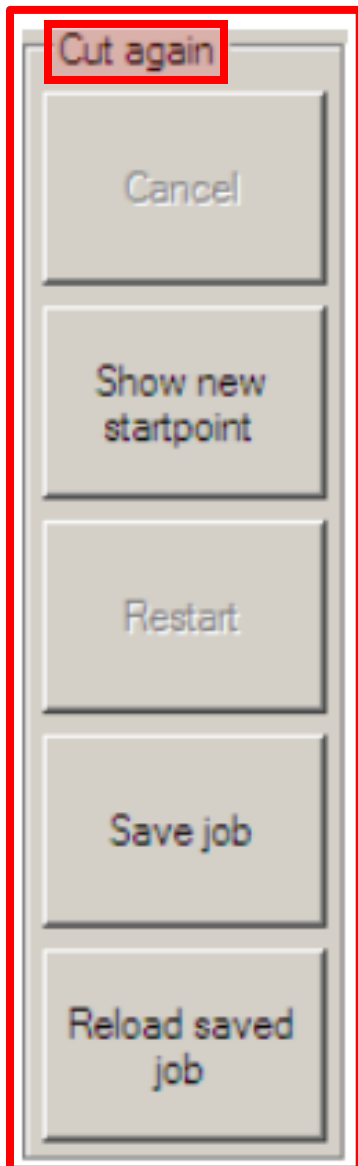


6.3.3.) Current Job (Cont'd.)-

	Normally grayed out. Activated when a cutting program is stopped by pressing the Torch On/Off or the Backup button located on the front panel of the controller. Selecting Cancel Program will terminate the current
	Normally grayed out, it becomes activated when a cutting program is stopped and the Manual Mode button is selected. When confirming if a part program fits on a plate, i.e. in Trial Run mode, it will re-position the program the same distance as the torch movement.
	Normally grayed out. Activated when a current program is stopped and the Manual Mode button is selected. Selecting Cut Path Recovery will re-start the pierce cycle at the point the torch is located and will allow travel back to the original program path.
	Selecting the Readjust Cut Parameters button will allow the operator to change certain parameters i.e. cutting speeds, creep speed/time, and delays, to the cutting program on the fly. This will eliminate the need for stopping the machine to make these changes.
	Refresh the current job screen.
	Selecting the Next job preview will transfer the next program from the Next Job Preview screen without activating the cutting sequence. This is grayed out during cutting.
	Selecting the view track during cutting will zoom in on the cutting path.

6.3.3.) Current Job (Cont'd.)-

The "Cut again Box" allows the opportunity to suspend and save a current job and restart a saved job.



- **Cancel** – Cancel any selected functions under the Cut again box.

- **Show new start point** – Selecting this function allows the user to point the pierce point that will start the cut. Parts before the selection will be ignored.

- **Restart** - After locating a new pierce point, select Restart to start cutting cycle.

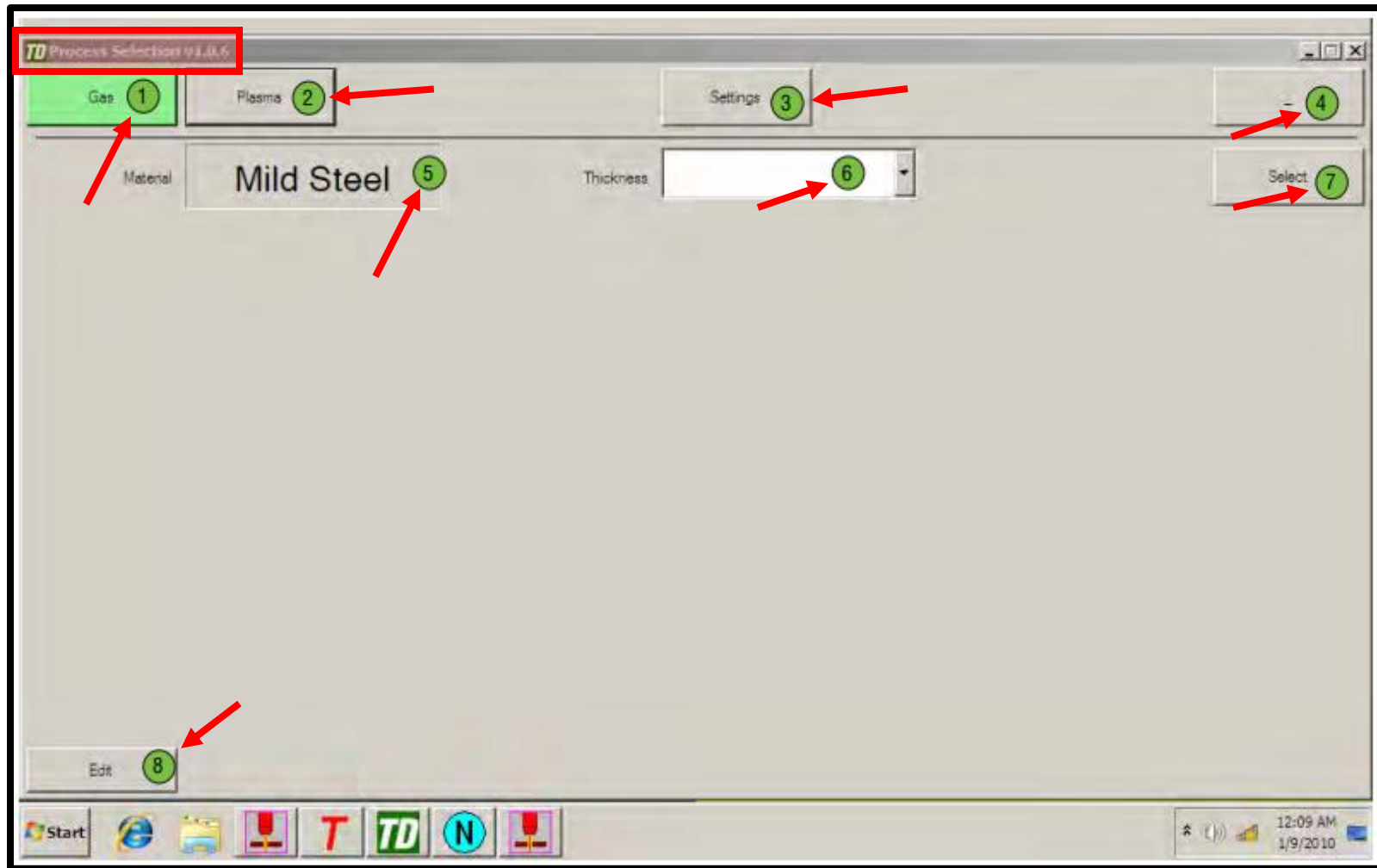
- **Save job** – Will store existing suspended program to a temporary file.

- **Reload saved job** – Brings back the suspended saved program from the temporary file.

- **Zoom** – Allows easier pierce point location on a nest by zooming-in on a part.

6.3.4.) Process Selection/Plasma and Gas-

In this window you can select the process used to cut or edit existing processes.



1.) Clicking “Gas” will open the gas parameter set selection.

2.) Clicking “Plasma” will open the plasma process window.

3.) Clicking “Settings” opens common setting like tool offsets, rapid speed etc.

4.) Clicking (-) Minimizes the window.

5.) Shows the material. If there are more than one material you can change between materials.

6.) Select thickness.

7.) Clicking “Select” Applies the selected process and sets all cutting parameters.

8.) Let us you edit the selected process.

6.3.5.) Plasma Setup-

Definition of areas under the **“Cut Process Tab”** are shown on the bottom of the **“Thermal Screen”**.



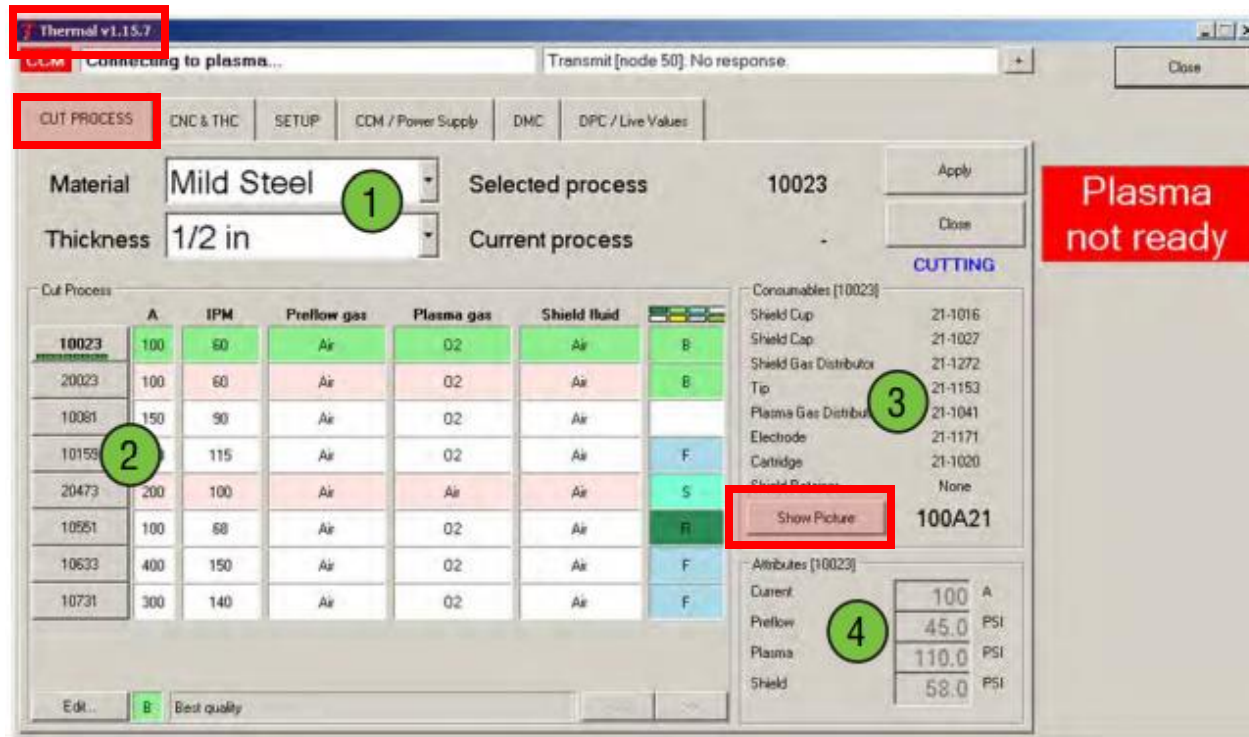
1.) Use the drop-down boxes to select the material and thickness to be cut.

2.) The available cut processes for the selected material and thickness will be displayed along with information indicating which process is **“B” for best cut quality**. **“F” for Fastest cut speed**.

“R” using the robotic consumables for beveling. **“M” indicating maximum piercing thickness**. Select the desired process by clicking on the **Cut Process number** and clicking the **“Apply”** button. When **“Current process”** equals **“Selected process”** the plasma is ready to cut. If **“Red”**, **“Plasma not ready”** is on check that the plasma is enabled via a switch located on the CNC panel.

6.3.5.) Plasma Setup (Cont'd.)-

Definition of areas under the **“Cut Process Tab”** are shown on the bottom of the **“Thermal Screen”**.



3.) This area shows the consumable to be used for the selected process. Click on **“Show Picture”** to see a picture of the consumables.

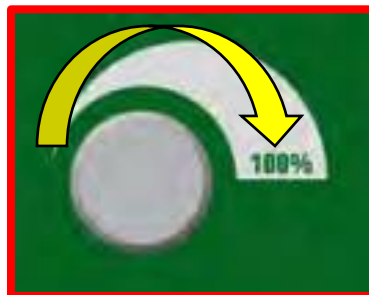
4.) This area shows the cutting current and gas pressures that will be used for the selected cutting process.

7.) Front Panel Buttons and Operational Keys-

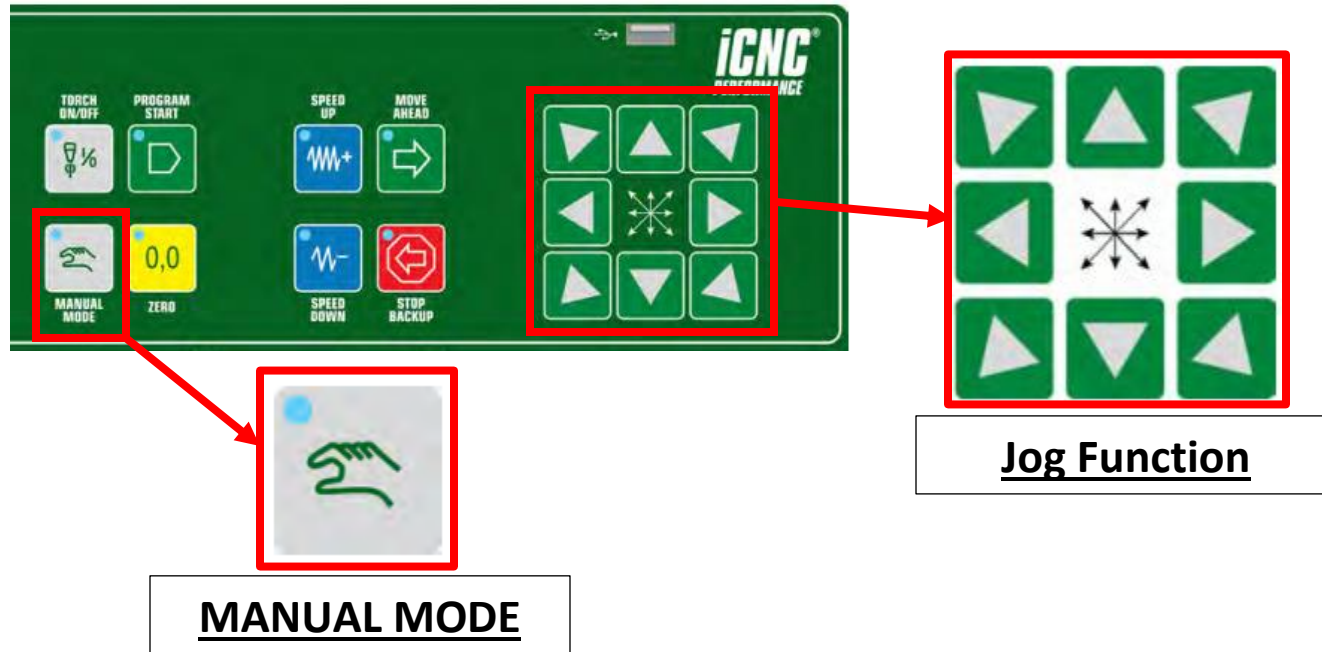
The iCNC Performance operating control panel is located below the LCD graphics screen. Most machine motion and cutting functions are initiated using this operating control panel.



Speed Potentiometer-Turning the potentiometer counterclockwise decreases the actual speed in comparison with the programmed speed. This potentiometer is only used in special cases, such as temporarily slowing down the cutting speed. Turning the dial down below 100 % causes the Torch Hold / Corner signal to be activated, which freezes the automatic torch height control at that height. In most cases the speed potentiometer is set at 100% clockwise.



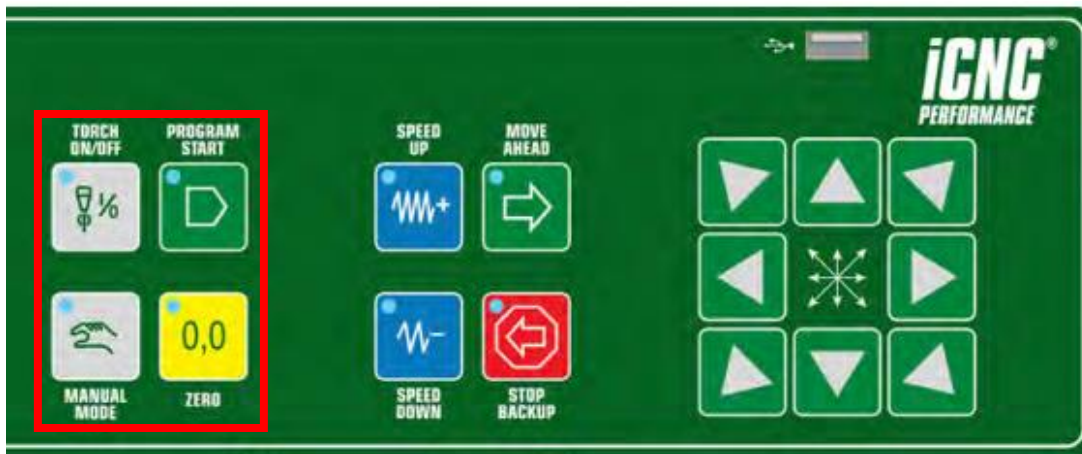
Direction Jog Keys-



MANUAL MODE must be activated **before** using the Jog Function.

- Press and hold a Directional Button and the machine will move in that direction.
- Releasing the Button will cause the machine to stop.
- Pressing and holding two adjoining directional Buttons will move both axis simultaneously in a 45-degree direction.

Operational Buttons-



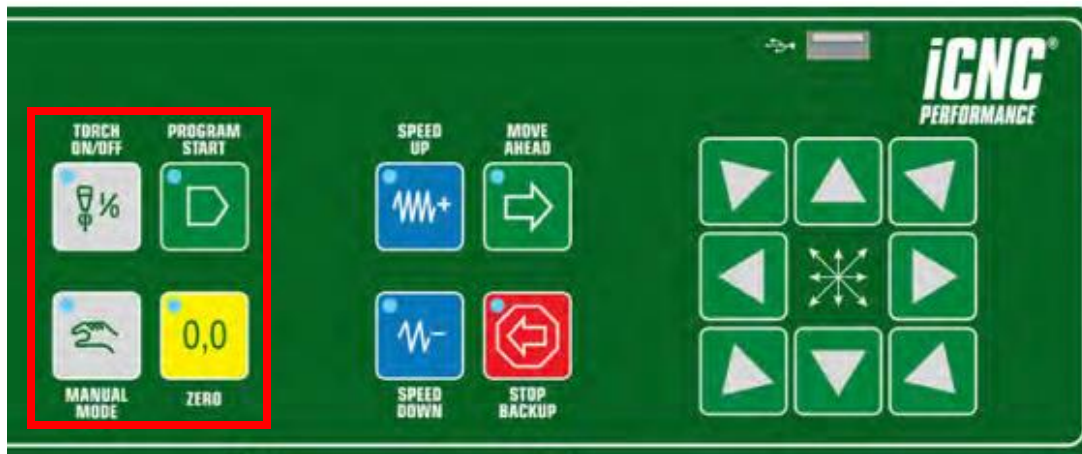
CAUTION: Pressing the “MANUAL MODE” button again will turn off the manual mode and will ask if you want to return the machine to the last known parked position.

Manual Mode Button-Pressing the “MANUAL MODE” button activates the capability to jog and reposition the machine.



Zero Button-Resets the X & Y counters to “ZERO” after locating a new starting point on the table using the jog function keys. HINT: Pressing the “Zero Button” will automatically turn off the “Manual Mode Button” if it was activated on.

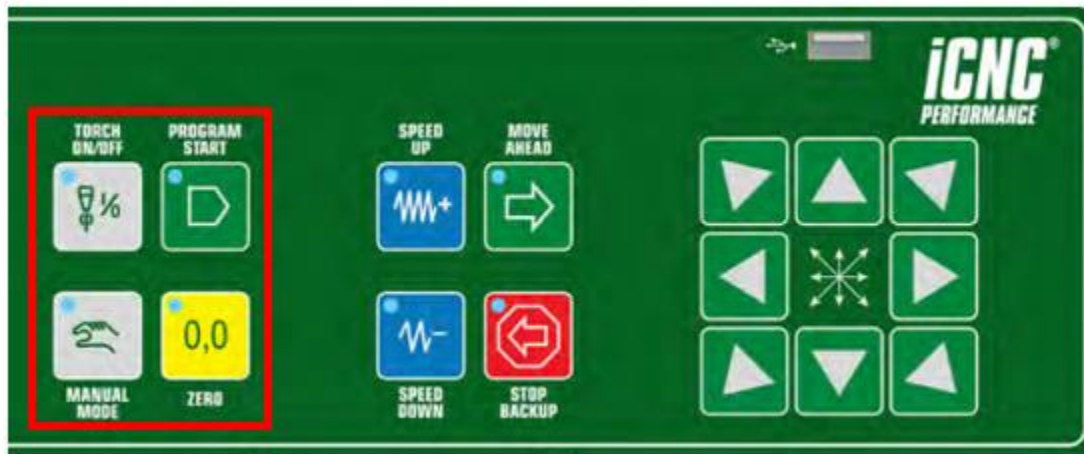
Operational Buttons (Cont'd.)-



Start Button- Sends the cutting program from the **“next job preview”** screen to the **“current job”** screen to be executed and starts the cutting cycle sequence. The **“START Button”** illuminates and is on during the entire execution of the program. No programs can be transferred to the current job screen if the **“START Button”** is on.

HINT: If this button is pressed during a programmed delay, the delay is terminated at once without memorizing the interrupted time of the delay in cutting parameters.

Operational Buttons (Cont'd.)-

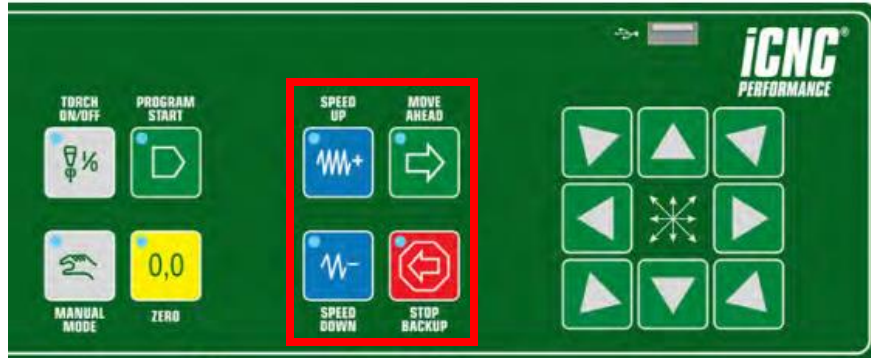


Torch ON/OFF Button- Pressing the **“TORCH ON / OFF Button”** when manual mode is activated, will either manually start, or turn off the cutting process.

CAUTION: When the start button is activated, and the cutting sequence is initiated, the TORCH ON/OFF button will automatically illuminate indicating the torch is on and the cutting sequence has started. When the program ends, the light will go out automatically indicating end of cut. If TORCH ON/OFF is pressed and released during the cutting process, machine motion and cutting stops. Pressing this button again starts machine motion and the cutting sequence with any programmed delays.

HINT: You cannot use **TORCH ON/OFF Button** for manual cutting, e.g., scrap lines. **Manual Button** on pushes the **TORCH ON** and the pierce sequence will begin. Immediately after pushing **TORCH**, you can start pushing a directional button, the machine will not start to move before the pierce sequence has ended.

Operational Buttons (Cont'd.)-



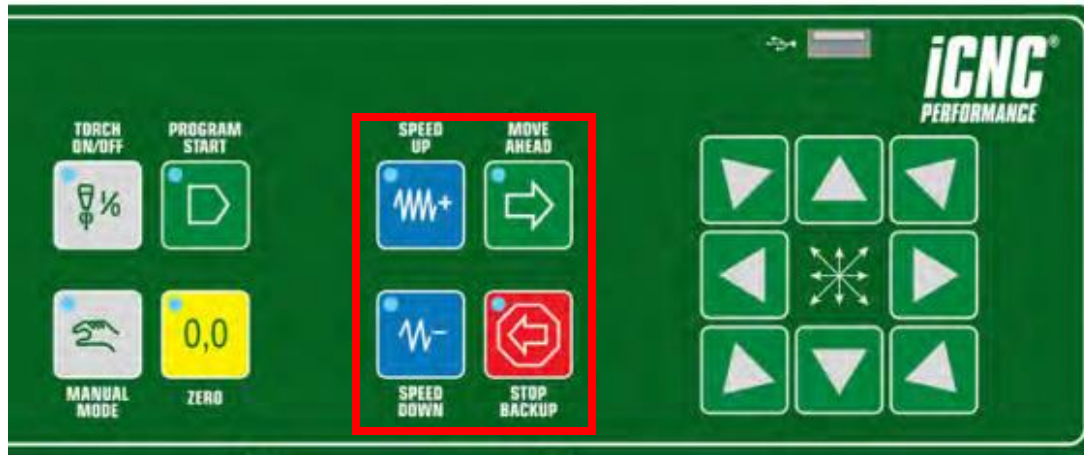
Speed Up & Speed Down Buttons-Short pushes increase or decrease the actual and set speed in small steps. Long lasting pushes change the speeds at a faster rate. The push buttons will illuminate during automatic corner acceleration and deceleration, respectively.



Move Ahead Button-The MOVE AHEAD button is illuminated whenever a program is running. Pressing the Torch On/Off button will stop the machine and the Move Ahead button will turn off. At this point, pressing the MOVE AHEAD button will cause the machine to move forward on programmed path without cutting. Pressing the MOVE AHEAD button again will stop machine motion.

HINT: Turn speed potentiometer counterclockwise when using the Move Ahead feature for more precise control.

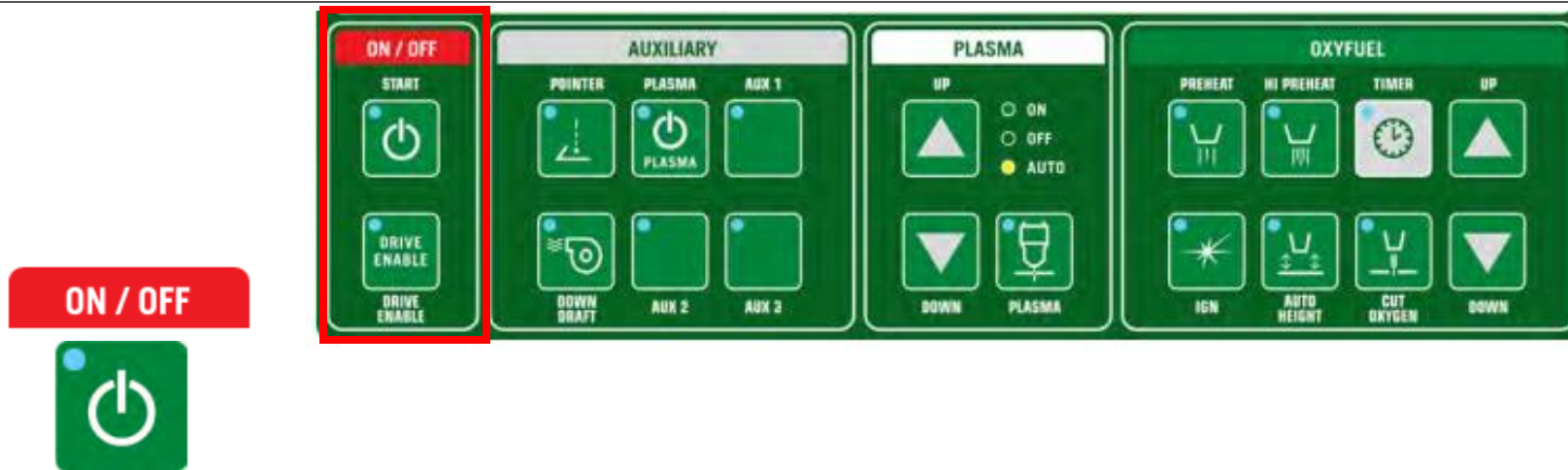
Operational Buttons (Cont'd.)-



Stop / Backup Button-Press and release the **“STOP BACKUP Button”** once during the cutting process to stop the cutting sequence and halt machine motion. Press and release the **“STOP BACKUP Button”** again to move the machine in reverse, or backup on path. Pressing **“STOP BACKUP Button”** again will stop motion.

“ON/OFF Button” Descriptions and Functions-

CAUTION! Most buttons have 2 functions, different color LEDs indicate the state. Pressing a button will toggle the function **“ON/OFF”** and keeping the button pressed in for 3 seconds will toggle the function to **“AUTO”**. **Green LED** indicates **ON** state and **Orange** indicates **“AUTO”** state. If both LEDs are **“OFF”** then the state is **“OFF”**.



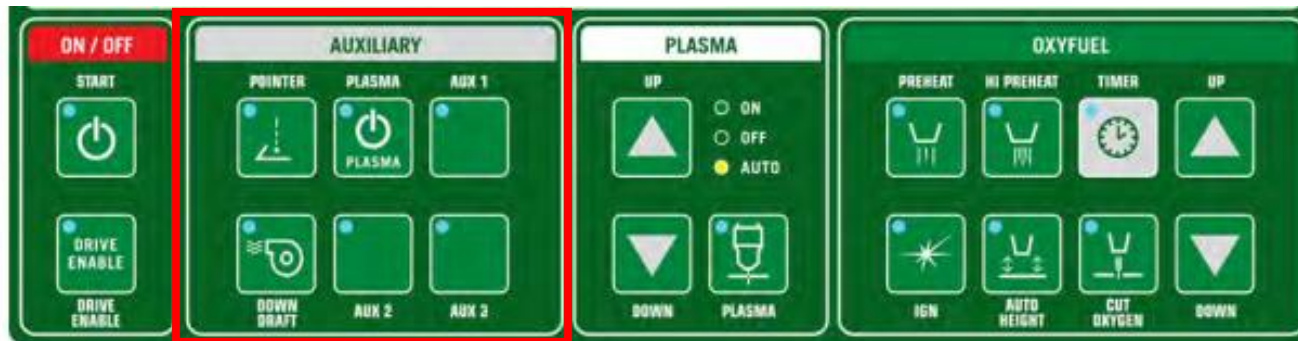
Input Power Switch- Push the button and keep it pressed in for 5-five seconds and it will turn on power to the CNC. **The only way to switch power “OFF” is using Windows shutdown.** This will switch off all power in the controller.



Drive Switch- • **“ON”** will turn servo enable **“ON”** and allow machine motion. • **“OFF”** will prevent machine motion. **HINT:** When drive enable **LED is Green** the drives are enabled. When the **LED is Orange**, button has been pressed but the software restricts the output to activate.

Auxiliary Button Descriptions and Functions-

CAUTION! Most buttons have 2 functions and the different color LEDs indicate the state. Pressing a button will toggle the function **ON/OFF** and keeping the button pressed in for 3 seconds will toggle the function to **AUTO**. **Green LED** indicates **ON** state and **Orange** indicates **AUTO** state. If both LEDs are **OFF** then the state is **OFF**.



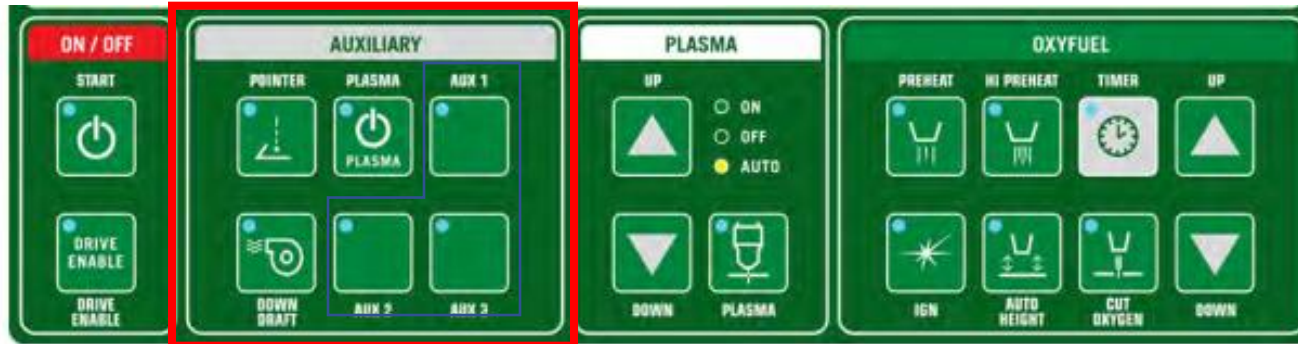
AUXILIARY



Pointer-

- ON position will activate the Pointer output.
- OFF position will prevent activating the Pointer output.

Auxiliary Button Descriptions and Functions (Cont'd.)-



Plasma ON/OFF-

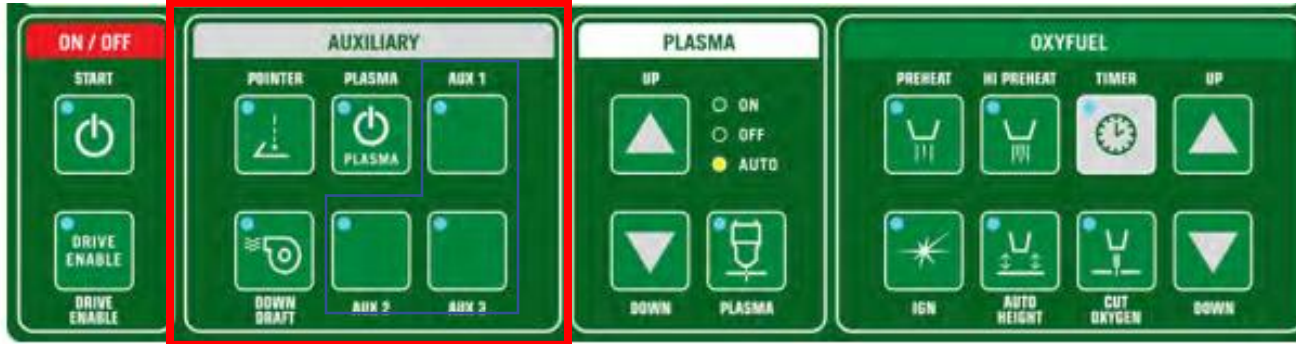
- ON position will turn on the plasma power supply.
- OFF position will turn off the plasma power supply.



AUX 1-3 On/Off/Auto-

- ON position will activate the auxiliary device, example water table.
- AUTO position will activate the auxiliary device, example water table when a cutting program is active.
- OFF position will turn off the auxiliary device, example water table).

Auxiliary Button Descriptions and Functions (Cont'd.)-

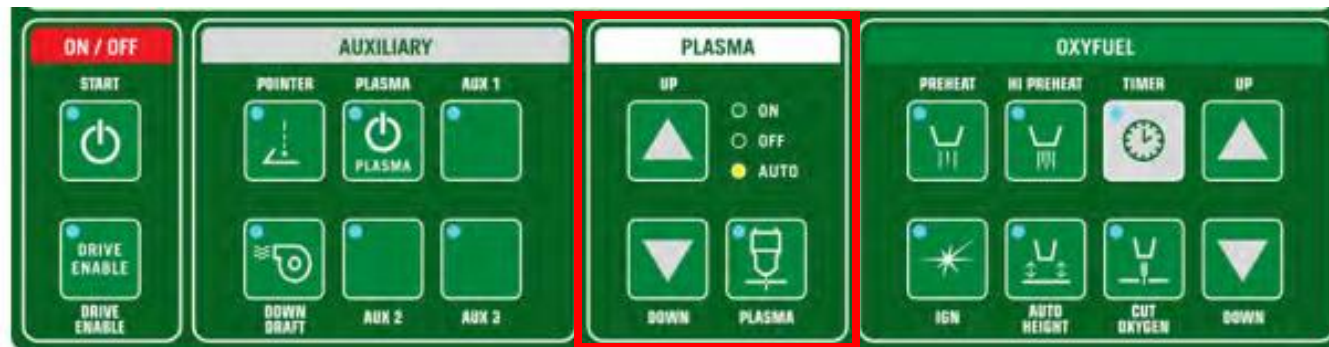


Down Draft On/Off/Auto—

- ON position will activate the fume extractor.
- AUTO position will activate the fume extractor when a cutting program is active.
- OFF position will turn off the fume extractor.

Plasma Button Descriptions and Functions-

CAUTION! Most buttons have 2 functions and the different color LEDs indicate the state. Pressing a button will toggle the function **ON/OFF** and keeping the button pressed in for 3 seconds will toggle the function to **AUTO**. Green LED indicates **ON** state and orange indicates **AUTO** state. If both LEDs are **OFF**, then the state is **OFF**.



PLASMA



Up / Down Button-will move the plasma torch Up/Down.

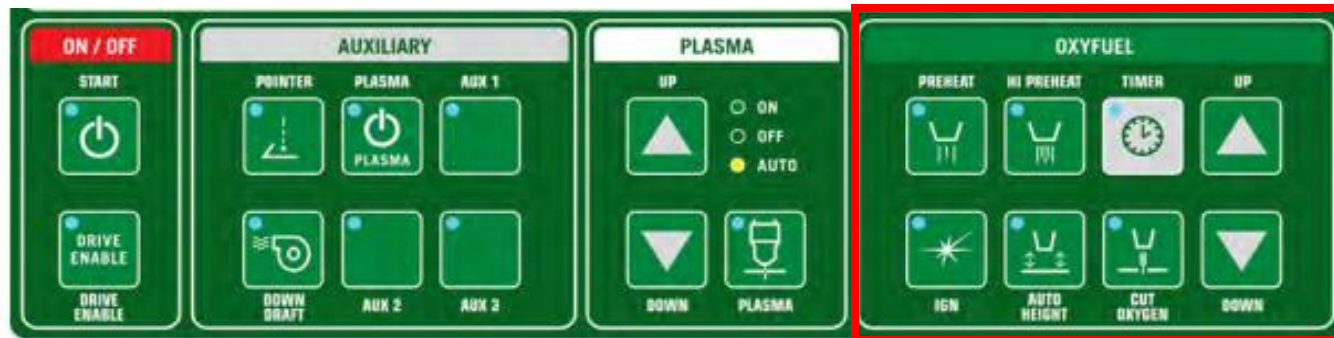


Plasma On/Off/Auto-

- **ON** position will activate the plasma start output.
- **AUTO** position will activate the plasma start output when a cutting program is active.
- **OFF** position will turn off the plasma start output.

Oxyfuel Button Descriptions and Functions-

CAUTION! Most buttons have 2 functions and the different color LEDs indicate the state. Pressing a button will toggle the function **ON/OFF** and keeping the button pressed in for 3 seconds will toggle the function to **AUTO**. **Green LED** indicates **ON** state and orange indicates **AUTO** state. If both LEDs are **OFF** then the state is **OFF**.



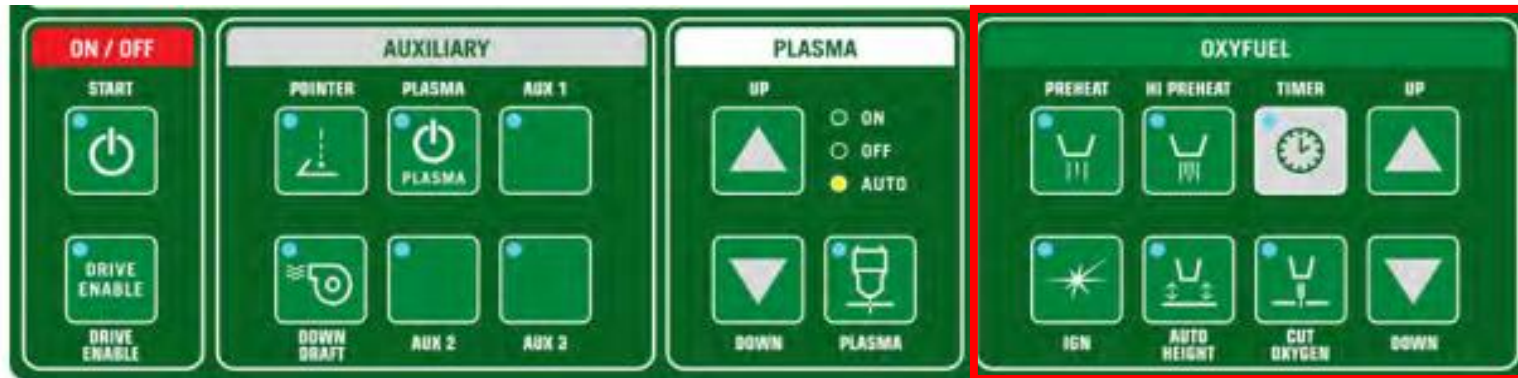
OXYFUEL



Preheat On/Off/Auto-This switch handles the Oxy Fuel Low Preheat gases.

- **ON** position will open the low preheat solenoid valve.
- Switch the gases **OFF** by pressing the button once.
- **AUTO** position will allow the cutting program to open the High Preheat solenoid when necessary.
- **OFF** position will prevent a cutting program from opening the Preheat solenoid valve

Oxyfuel Button Descriptions and Functions (Cont'd.)-



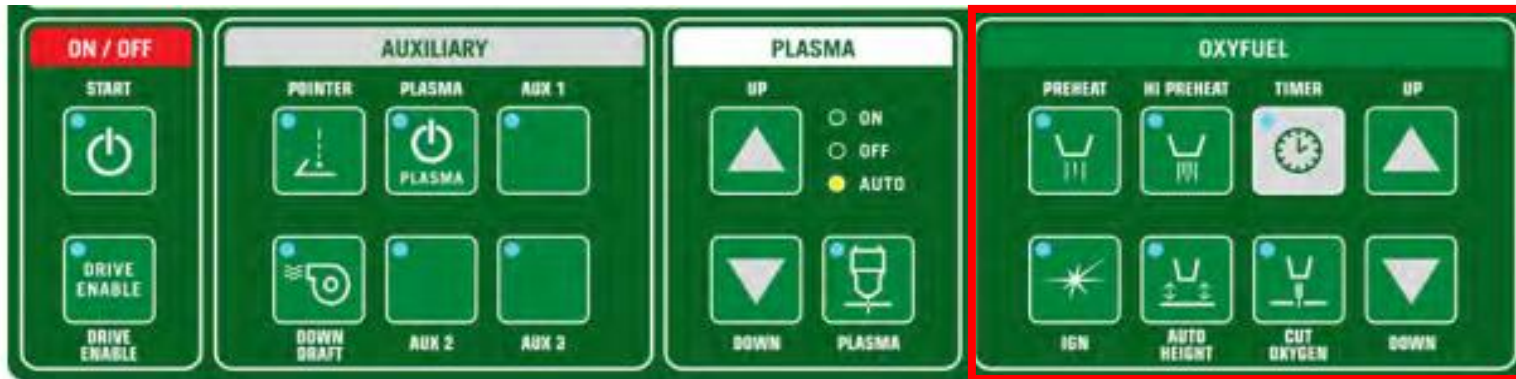
OXYFUEL



High Preheat On/Off/Auto-This switch handles the Oxy Fuel High Preheat gases.

- ON position will open the Hi Preheat solenoid valve.
- Switch the gases OFF by pressing the button once.
- AUTO position will allow the cutting program to open the High Preheat solenoid when necessary.
- OFF position will prevent a cutting program from opening the High Preheat solenoid valve.

Oxyfuel Button Descriptions and Functions (Cont'd.)-

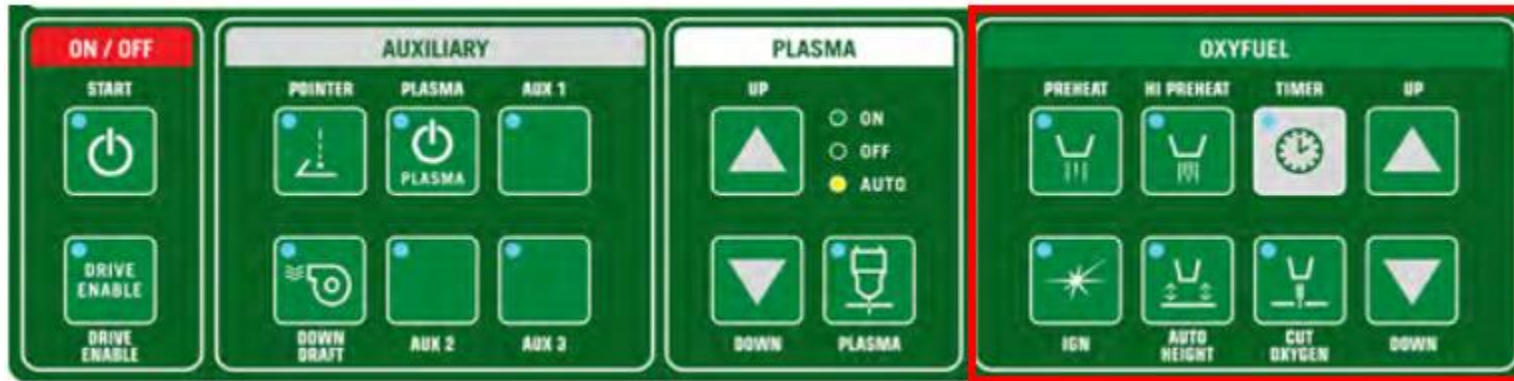


Record Time- During any start or end delay of the cutting process you will see this button light up. At the same time a counter on the screen counts down remaining seconds for current delay. If this button is pressed during a programmed delay, the delay is terminated at once. The system memorizes the interrupted time of the delay and uses this new delay time in next pierces.



Up/Down- Up / Down button will move the oxyfuel torch Up/Down.

Oxyfuel Button Descriptions and Functions (Cont'd.)-



Ignition On/Off/Auto-

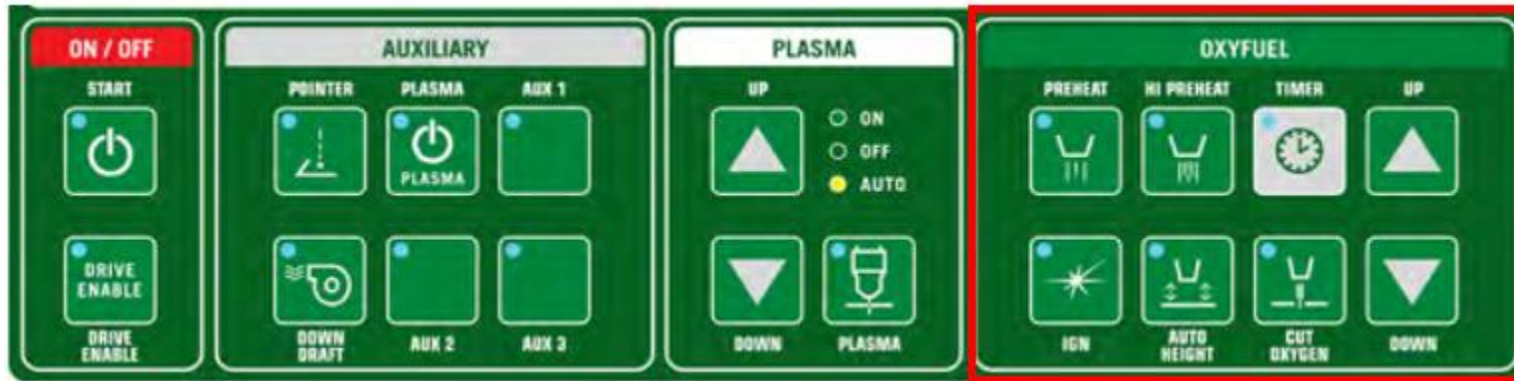
- ON position will activate the igniter.
- AUTO position will allow the cutting program to activate the igniter when necessary.
- OFF position will prevent the cutting program from activating the igniter.



Auto Height On/Off/Auto-

- ON position will activate the capacitive height sensing.
- AUTO position will allow the cutting program to activate the capacitive height sensing when necessary.
- OFF position will prevent the cutting program from activating the capacitive height sensing.

Oxyfuel Button Descriptions and Functions (Cont'd.)-



Cutting Oxygen (Cut Oxygen) On/Off/Auto-

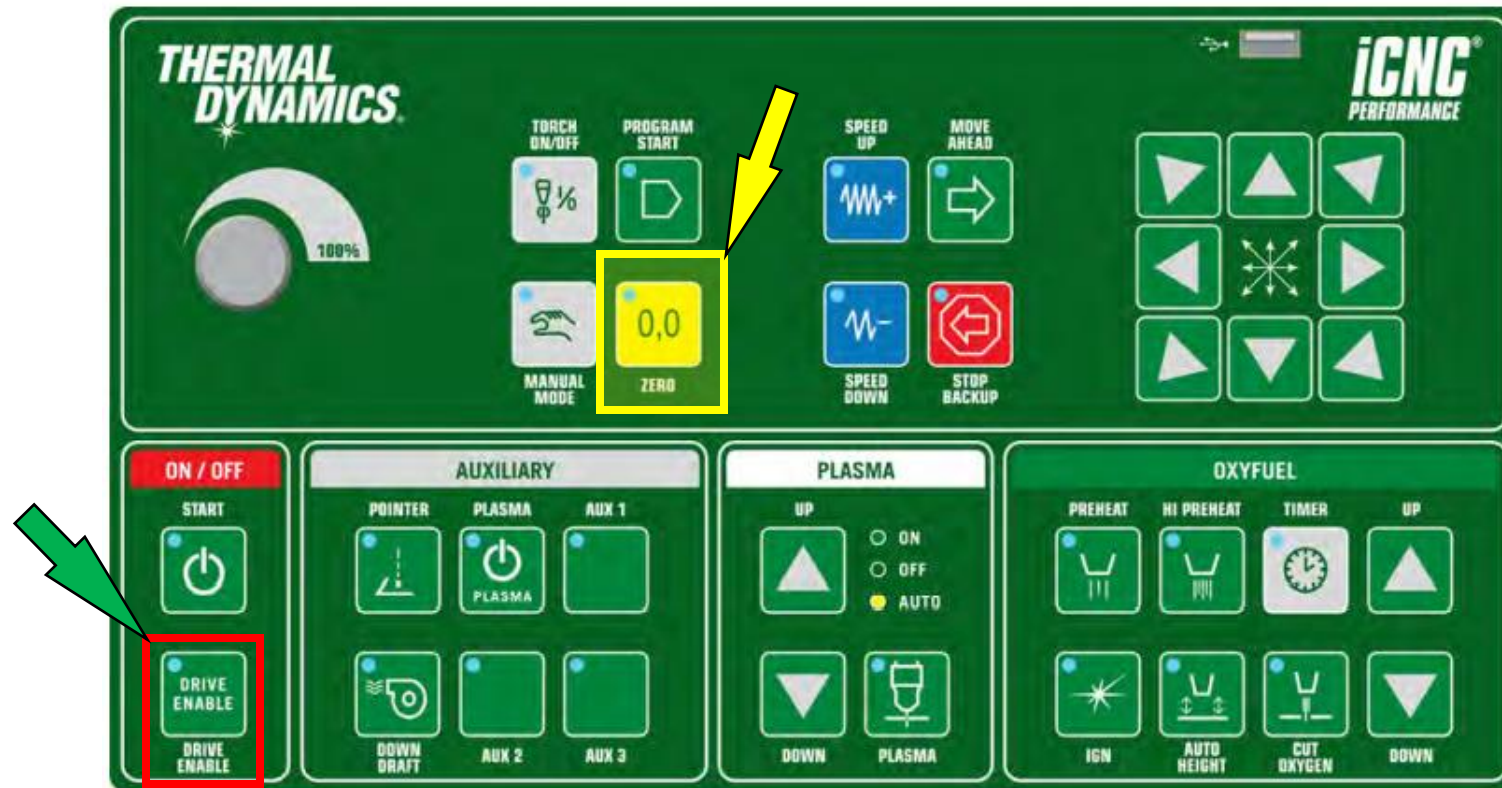
- ON position will open the cutting oxygen solenoid
- AUTO position will allow the cutting program to open the cutting oxygen solenoid when necessary
- OFF position will prevent the cutting program from opening the cutting oxygen solenoid valve.

8.) Starting Procedure-



8.1.) Switch on the system by “Pressing the Power Button located on the far-left hand side of the unit for 5 seconds”. When power is applied, the iCNC Performance will take approximately 1-2 minutes to go through internal diagnostics and fully boot up.

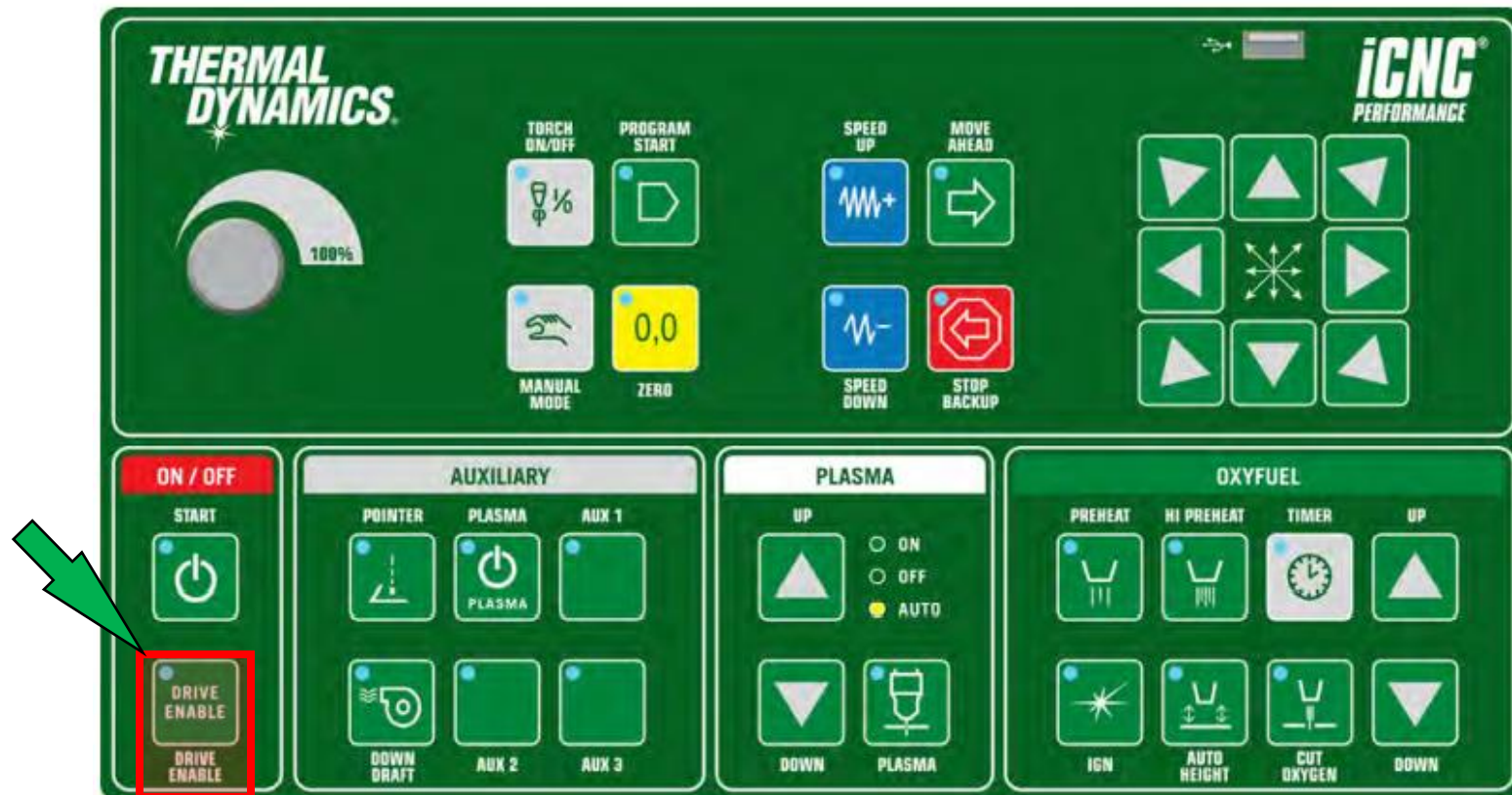
8.) Starting Procedure (Cont'd.)-



8.2.) After full power up, the Promotion Work Screen displaying Promotion Cut, Next Job Preview and Current Job along with Info (System Status) will be displayed. In addition, you will see the **“Yellow Zero Button Flashing”**. This will stop automatically.

HINT: The **“Flashing Zero Button”** indicates that the second CPU (used for machine motion) has booted up correctly. **The Zero Button flashes 41 times.** Turn **ON** the **“Drive Enable Operation”** the drive enables to enable the drives. A dialog box may appear **“START HOMING PROCEDURE”**.

8.3.) Shutting Off / Removing Power-



After locating a safe parked position, disable the drives by turning the “Drive Enable” to OFF. Turn off the controller using the normal Windows shutdown method.

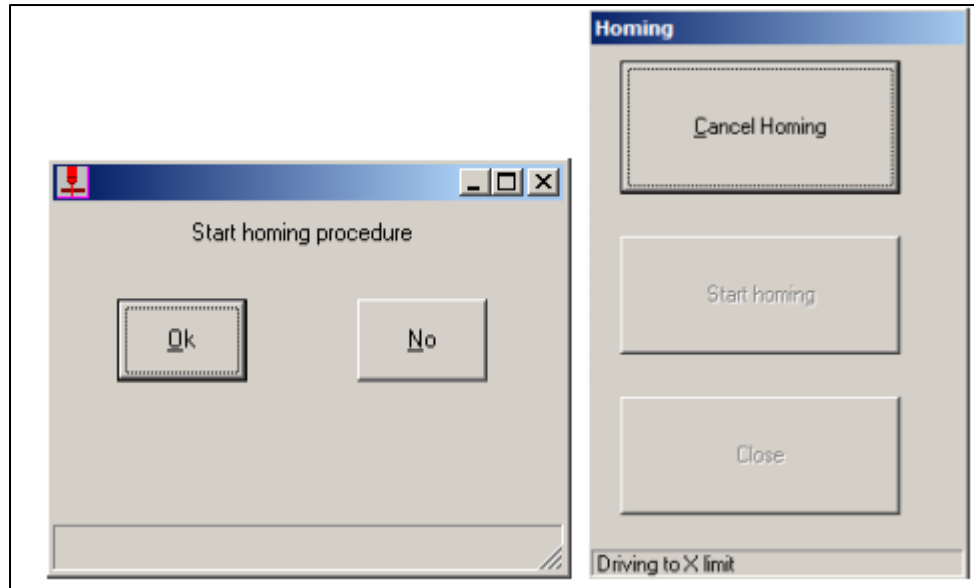
Click on Start (bottom left-hand corner) on Window’s Task Bar, then “Click Shut Down”.

After the controller goes through a proper cycle down procedure the controller will turn off.

HINT: If applicable, parking the machine near the homing switches will make Machine Homing Quick and easy when the iCNC Performance is powered up again.

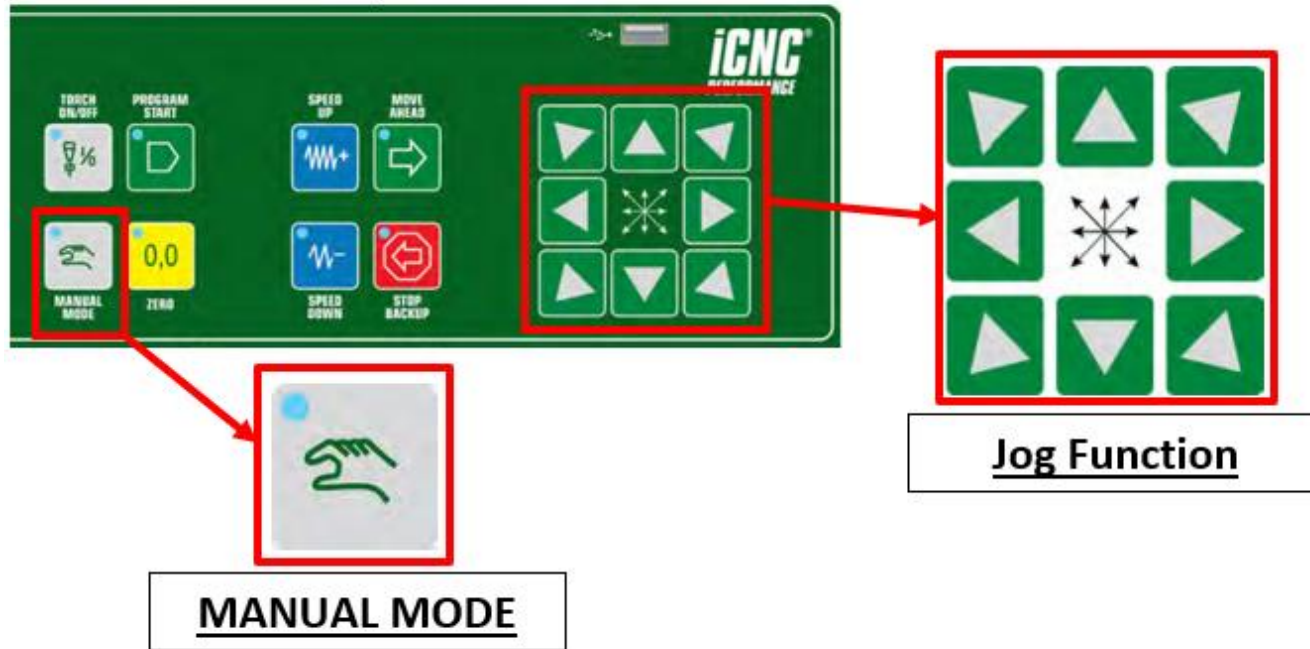
8.4.) Homing Procedure-

During initial power up, the iCNC Performance may display a **Start Homing Procedure Dialog Box**. If you **select Yes**, the machine will automatically locate the absolute zero home location. As a default, this is normally set at the bottom left corner of the cutting table, however this is selectable in the set-up parameters. If you **select No**, the dialog box disappears, and no movement is executed.



8.5.) Jog-

Direction Jog Keys-

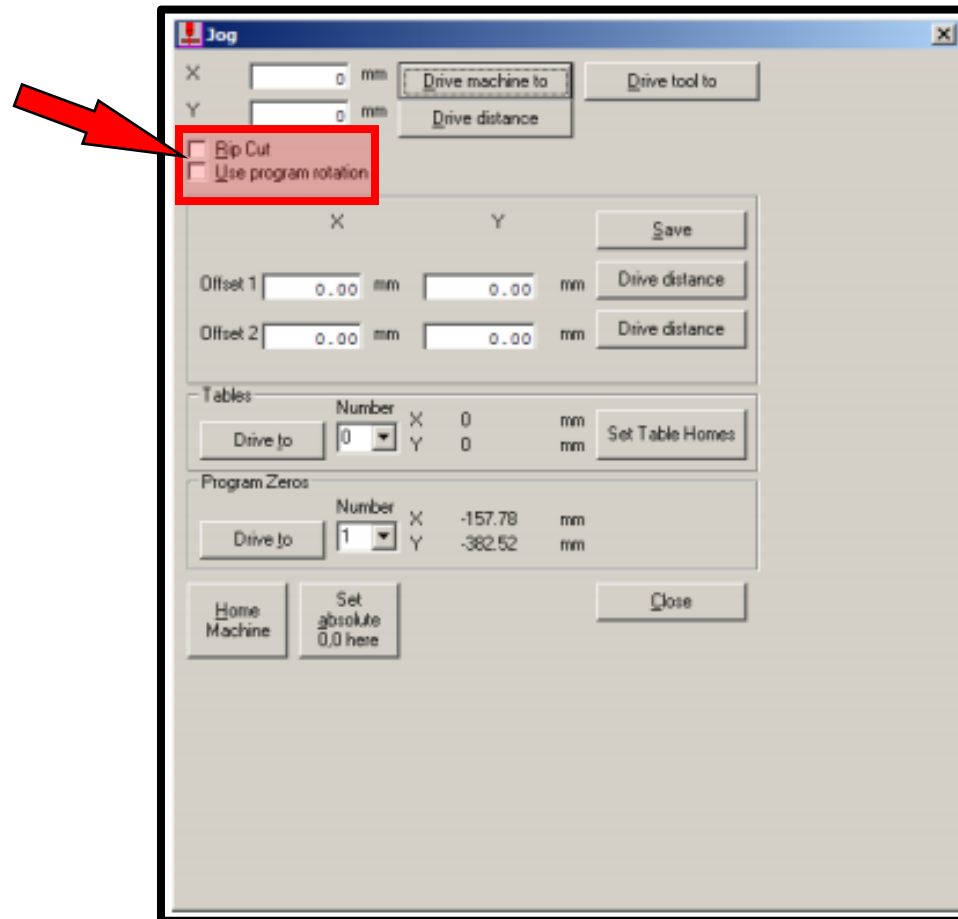


MANUAL MODE must be activated **before** using the Jog Function.

- Press and hold a Directional Button and the machine will move in that direction.
- Releasing the Button will cause the machine to stop.
- Pressing and holding two adjoining directional Buttons will move both axis simultaneously in a 45-degree direction.

8.5.) Jog (Cont'd.)-

When selecting the “Jog Button”, the Jog dialog box will appear.



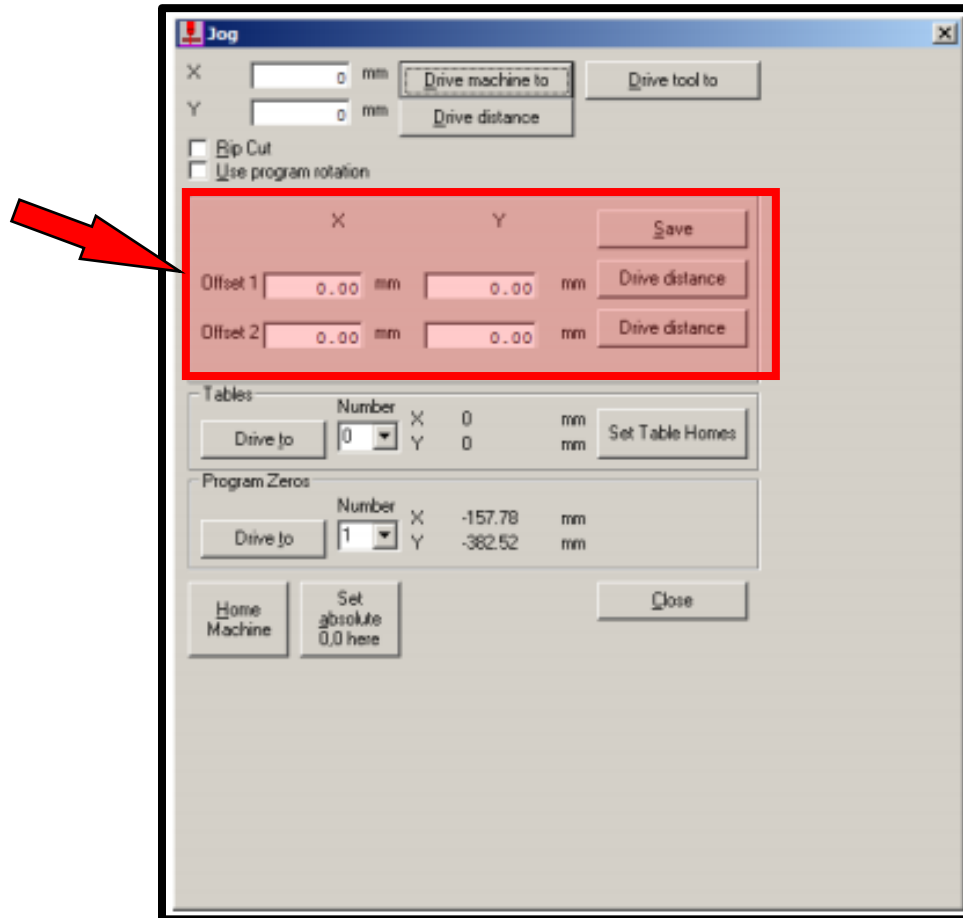
You can use the Jog tool only when a cutting program is not running, and the controller is not in **“Manual Mode”**. Use this tool to drive the machine to a position (X,Y) or to drive a distance (X,Y) from the current position. Driving is usually done in rapid speed. It is also possible to cut with this tool, if you have **“Checked the Rip Cut Box”**.

If **“Use Program Rotation is checked”**, the coordinates where you drive are corrected according to the program rotation. The program rotation is set in the parameter quick view screen.

8.5.) Jog (Cont'd.)-

Offsets-

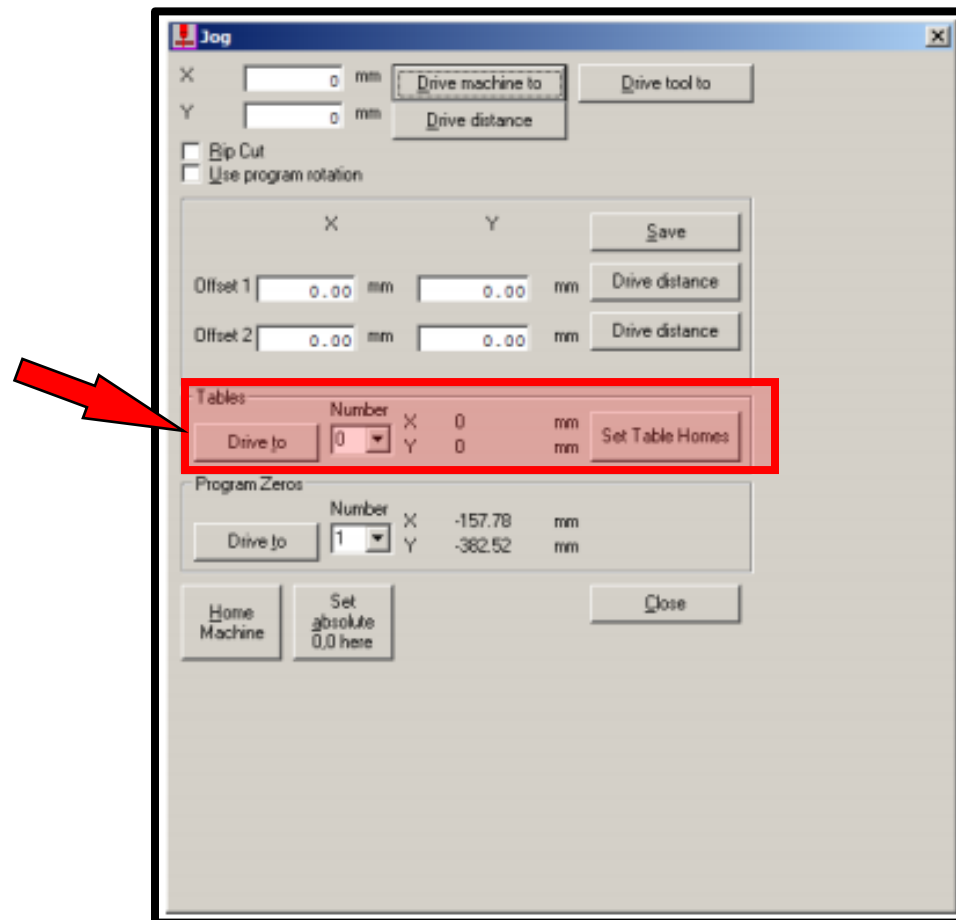
If there is a need to drive the same distance often (i.e., plasma torch to the same position where gas torch was) it is useful to save these kinds of distances as default offsets (offset 1 and 2). This way you can drive the default offset by just clicking one button.



8.5.) Jog (Cont'd.)-

Tables-

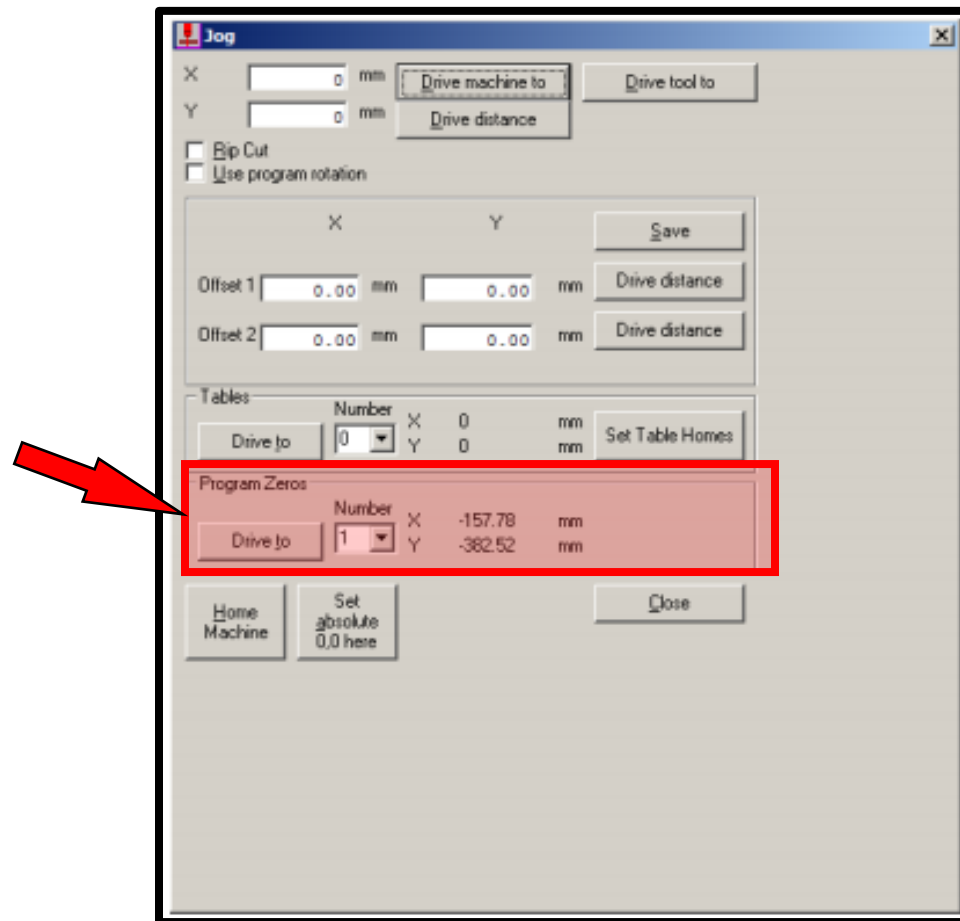
It is possible to define several different home positions. These can be used to define the home positions of different plates on the cutting table, or different cutting tables. Select the Table Number from the list and click the Drive to Button. The machine drives to the defined home position of the selected table.



8.5.) Jog (Cont'd.)-

Program Zeros-

The parameter quick view screen opens automatically when a program is sent to cutting from Promotion Nest or when the Setup button is clicked. The quick view screen allows the operator to change the most used variable parameters quickly. It also provides options for plate alignment and advanced set up.



8.6.) Parameter Quick View-

The parameter quick view screen opens automatically when a program is sent to cutting from Promotion Nest or when the Setup button is clicked. The quick view screen allows the operator to change the most used variable parameters quickly. It also provides options for plate alignment and advanced set up.

Parameter quick view

Kerf width	<input type="text" value="0.35"/>	mm	
Cutting speed	<input type="text" value="3200"/>	mm/min	
Program rotation	<input type="text" value="0.00"/>	°	<input type="button" value="Zero"/>
IHS Start Plasma	<input type="text" value="20.00"/>	s	<input type="button" value="+90"/>
Pierce Delay	<input type="text" value="0.40"/>	s	

Process 10030

Material	Mild Steel	<input type="button" value="Edit"/>
Thickness	10mm	
Tool	100/O2/Air	

8.6.) Parameter Quick View (Cont'd.)-

Kerf Width-

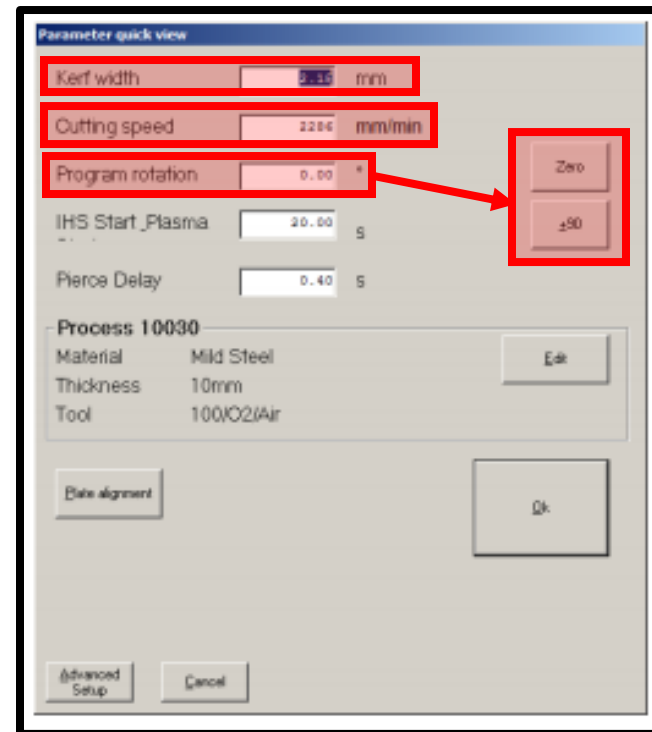
Specifies the amount of kerf (compensation) that will be applied to the cutting program. Caution should be taken when selecting the amount of kerf. Too high a value can cause the program to be altered, especially when a radius of an arc is smaller than the kerf value.

Cutting Speed-

This is the speed of the cutting process.

Program Rotation-

Any value (degree) will rotate the cutting program. When a plate alignment is performed the rotation of the skewed plate is automatically entered here. Also, by **“Clicking on the +/- 90 Button”** the part program will rotate at 90-degree intervals. **“Clicking on the “Zero Box”** will clear any value of rotation to zero degrees.



8.6.) Parameter Quick View (Cont'd.)-

IHS/Plasma Start-

Time for the torch to go ignition height and ignite the plasma arc. Any excess time will be discarded, and next delay will be performed (**Pierce Delay**).

Pierce Delay-

This is a move delay after the pierce has started.

The screenshot shows a 'Parameter quick view' dialog box with the following fields and values:

Parameter	Value	Unit
Kerf width	3.45	mm
Cutting speed	1206	mm/min
Program rotation	0.00	°
IHS Start_Plasma	20.00	s
Pierce Delay	0.40	s

Additional information shown in the dialog:

- Process: 10030
- Material: Mild Steel
- Thickness: 10mm
- Tool: 100A02/Air

Buttons visible: Zero, ±90, Edit, Plate alignment, Ok, Advanced Setup, Cancel.

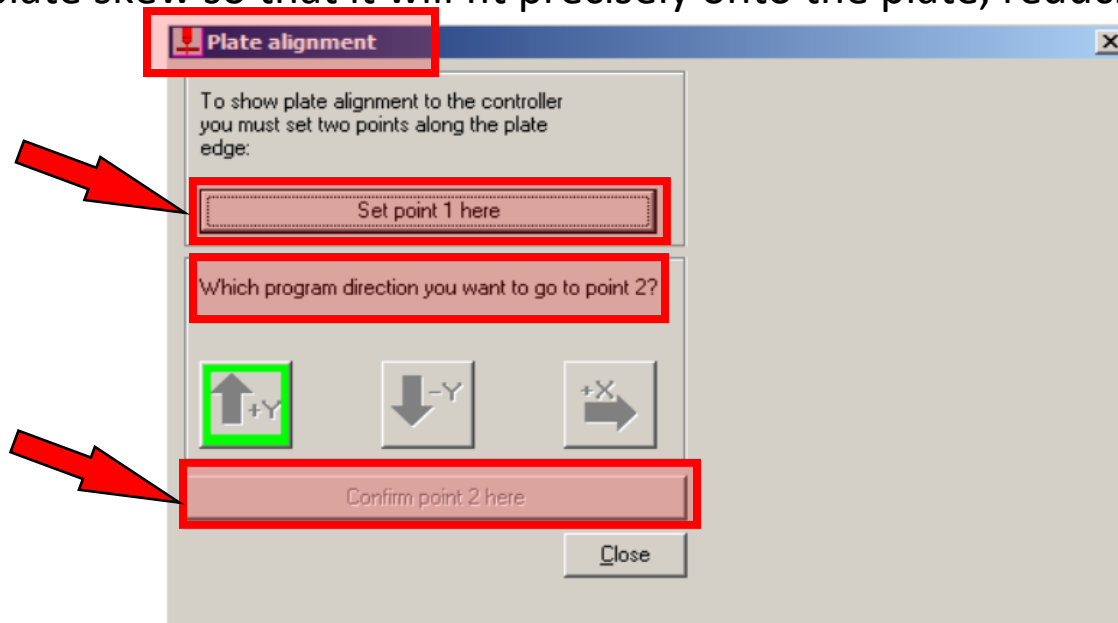
Parameter Set (Plasma)- If selected in the **“Advanced Setup Screen”**, the material type, thickness, and tool used will appear here to guide the operator on the current parameter selection.

8.6.) Parameter Quick View (Cont'd.)-

NOTE! Additional delays or adjustable time dialog boxes may appear, depending on how the controller has been set-up by an OEM or installer.

8.7.) Plate Alignment-

Activating Plate Alignment allows for a quick and easy way to pick two points on the edge of a skewed plate. Performing this exercise will automatically rotate a part or program nest the same amount as the plate skew so that it will fit precisely onto the plate, reducing scrap or manual plate squaring.



To use the Plate Alignment feature, locate a corner or plate edge and **“Click Set point 1 here”**. Select which direction the next point is relative to the first location, travel to the second point and **“Click on Confirm point 2 here”**. This will automatically rotate the program to match the skewed plate.

8.7.) How to Proceed When Something Happens-

How to Cancel a Cutting Program-

1.) Stop the machine movement and cutting by **“Pressing TORCH ON/OFF or STOP BACKUP Button”**.



2.) Use the **“Left Mouse Button”** to **“Click the CANCEL PROGRAM Button”** located at the top of the current job screen.



8.7.) How to Proceed When Something Happens-

How to Cancel a Cutting Program-

3.) Wait until a new dialog box opens saying that the machine must return to 0,0-point. **“Click OK”** and machine runs back to 0,0-point (original starting point of the cancelled program).

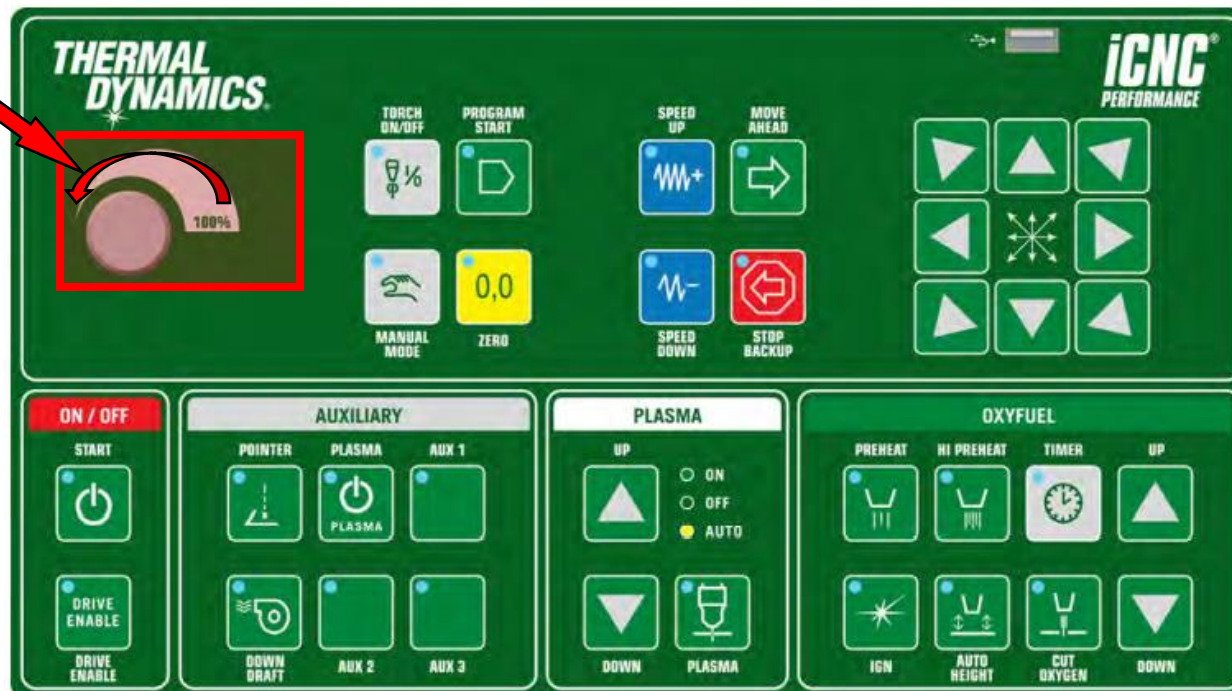
If you want to terminate the program during the rapid movement, the procedure is mainly the same. The only difference is that you stop the machine using **“STOP BACKUP Button”** instead of the **“TORCH ON/OFF”**.

Difficulties While Piercing-

NOTE! If the piercing fails in Plasma Mode, the machine will stop!

1.) Adjust the Speed Slower (Turn Counter-Clockwise) with the **“SPEED Knob”**, if necessary.

Turn Counter-Clockwise for Slower Speed.



Difficulties While Piercing (Cont'd.)-

NOTE! If the piercing fails in Plasma Mode, the machine will stop!

2.) Drive slowly backwards by **“Pressing and Holding “STOP BACKUP”** and the machine will reverse on program path.



3.) Stop the movement after passing the missed piercing point by **“Releasing STOP BACKUP Button”** again.

Difficulties While Piercing (Cont'd.)-

NOTE! If the piercing fails in Plasma Mode, the machine will stop!

4.) Turn the Speed Back (Clockwise) to 100%.

Turn Clockwise to
100% Speed.



5.) Start the program again by “Pressing MOVE AHEAD Button”.



Difficulties While Piercing (Cont'd.)-

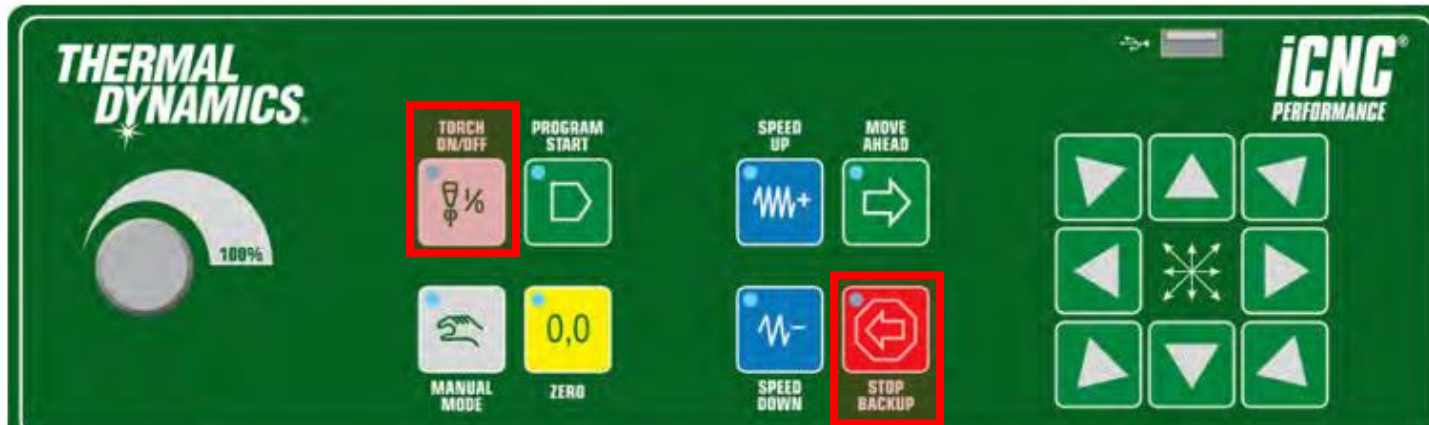
If the piercing fails at the first programmed piercing point, start a new piercing sequence by **“Pressing TORCH ON/OFF”**. Please notice that the movement backwards without cutting may be adjusted so that the speed is automatically reduced.



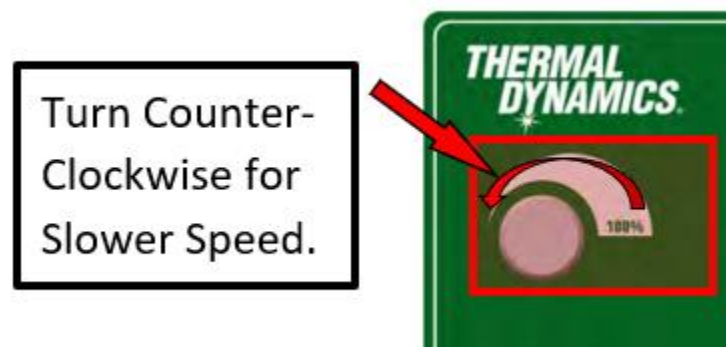
8.8) If the Cutting Fails-

If the cutting is terminated e.g., for too high speed:

1.) Stop the movement and cutting by **“Pressing TORCH ON/OFF Button”** or **“STOP BACKUP Button”**.

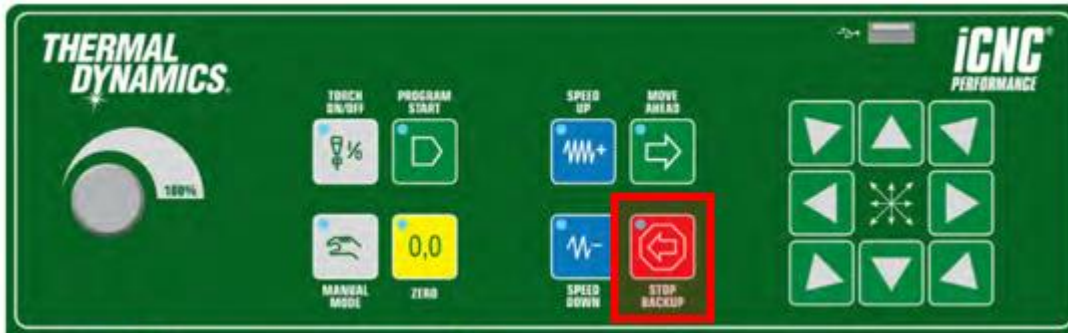


2.) Adjust the speed slower with the SPEED knob, if necessary.



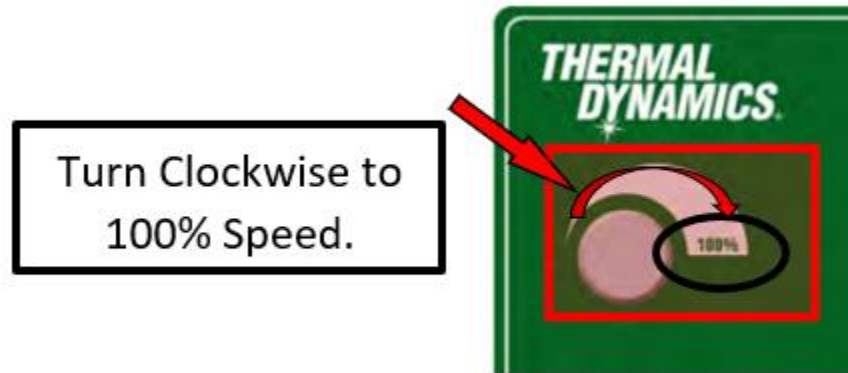
8.8) If the Cutting Fails(Cont'd.)-

3.) Drive slowly backwards by **“Pressing and holding STOP BACKUP Button”** and the machine will reverse.



4.) Stop the movement by releasing **“STOP BACKUP Button”**.

5.) Turn the SPEED back to 100%.

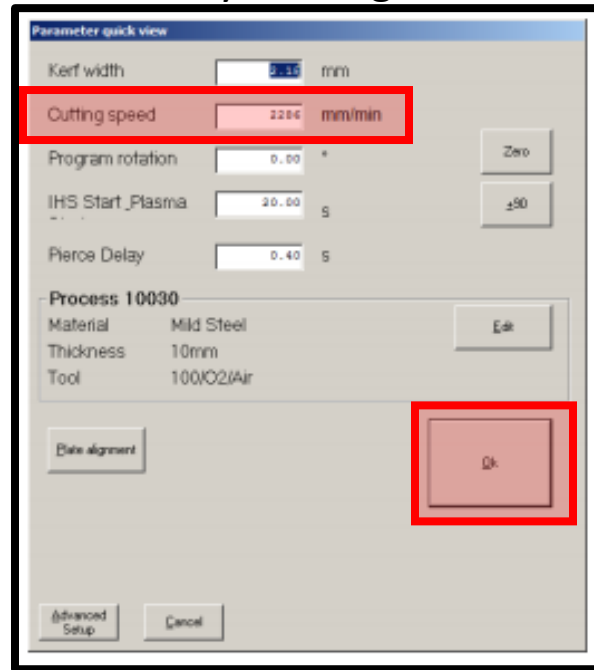


6.) **“Click on READJUST CUT PARAMETERS Button”** on the Current Job Screen.

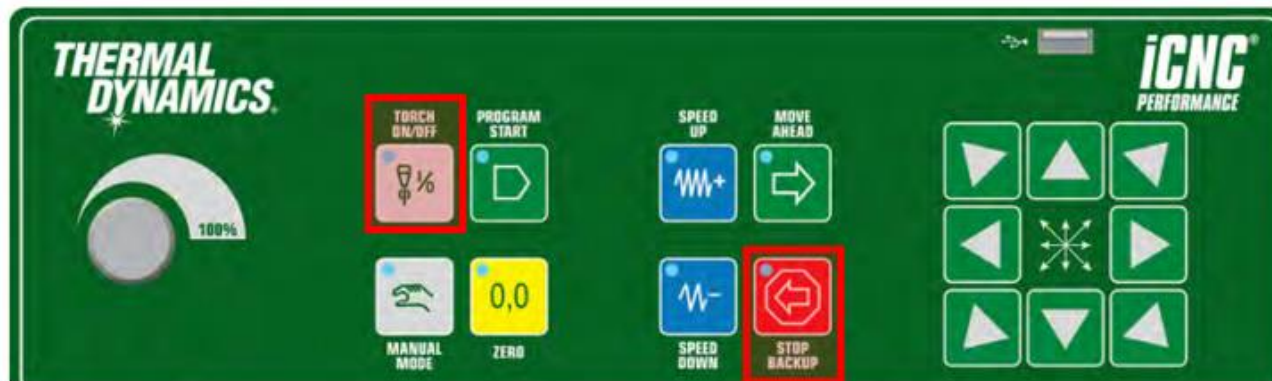


8.8) If the Cutting Fails(Cont'd.)-

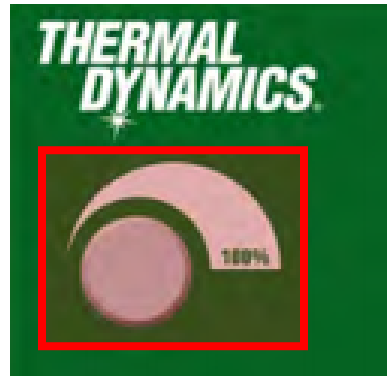
7.) Readjust cutting speed to a lower value by clicking inside the box and use the mouse wheel to enter new value and **“Click OK”**.



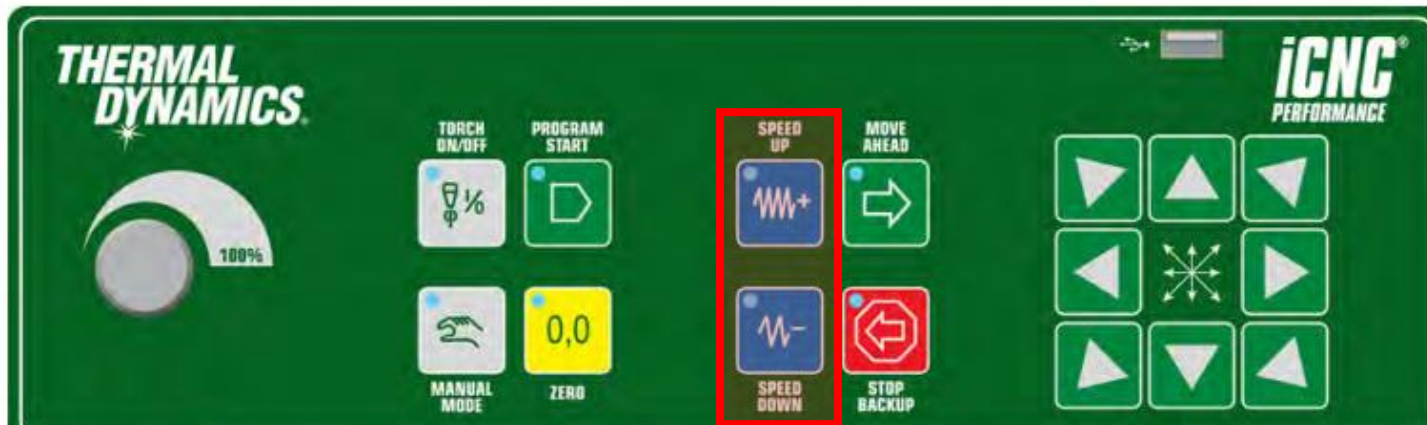
8.) Start the cutting delays and the cutting with **“TORCH ON/OFF Button”**. After the start delays, machine movement starts automatically.



9.) Adjust the starting speed with the SPEED knob if required.

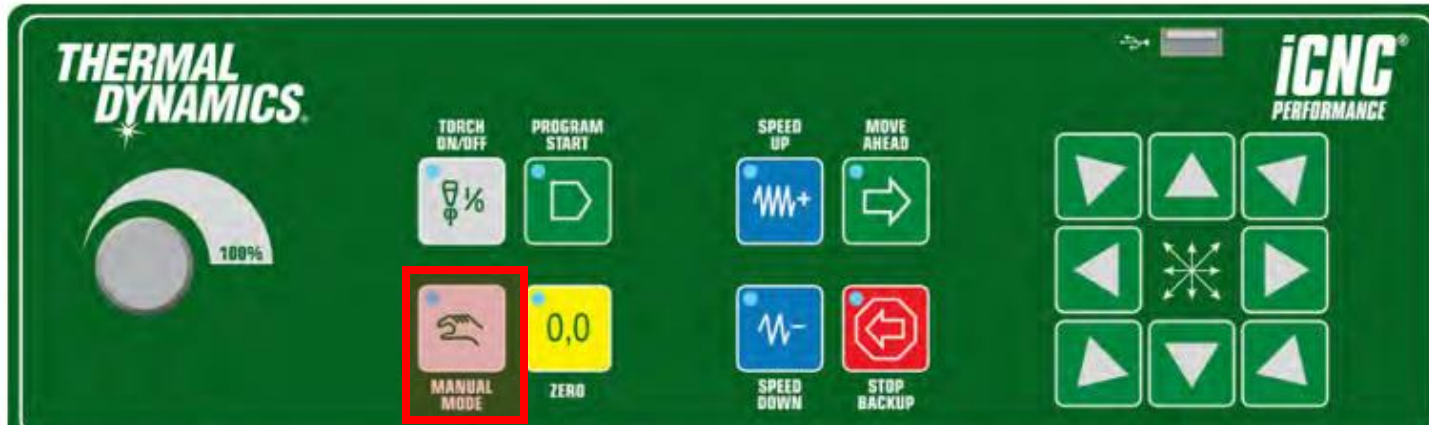


10.) While cutting, the cutting speed can be easily readjusted by pressing the ["Blue SPEED UP/DOWN Buttons"](#). Every short press increases or decreases the speed about $\frac{1}{2}$ " ipm-(ipm=Inches per Minute) or (10 mm/min).

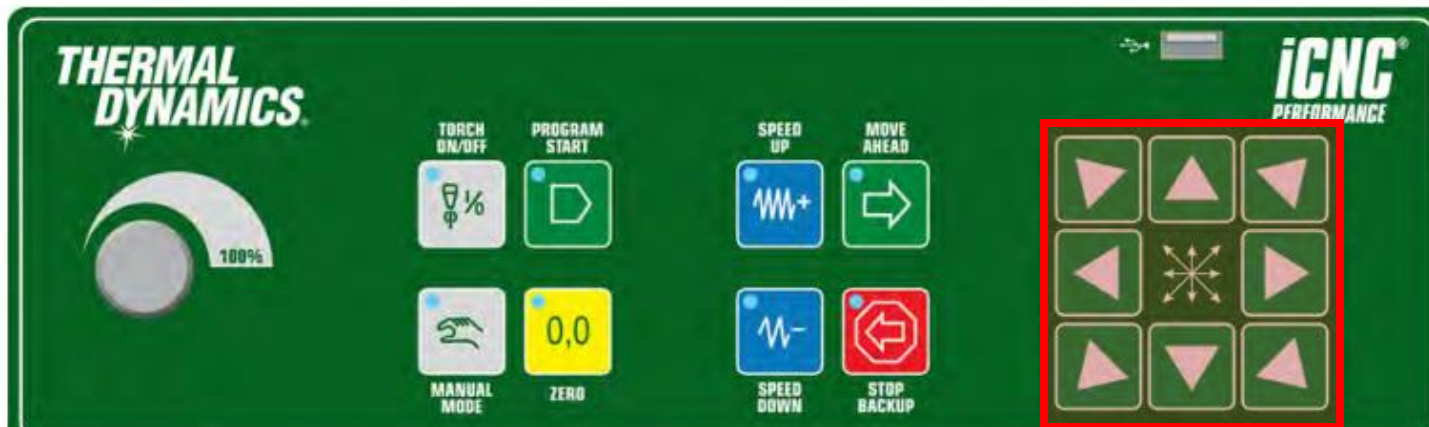


8.9.) Manual Cutting-

1.) Press and release the “MANUAL MODE Button”.

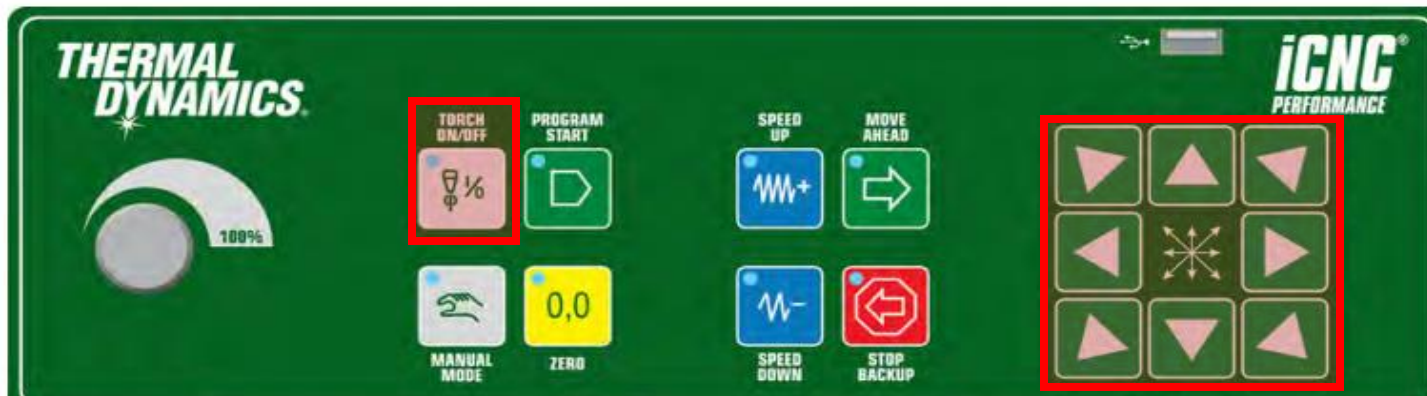


2.) Drive the machine to the wanted piercing point by using the “Jog Buttons”.



8.9.) Manual Cutting (Cont'd.)-

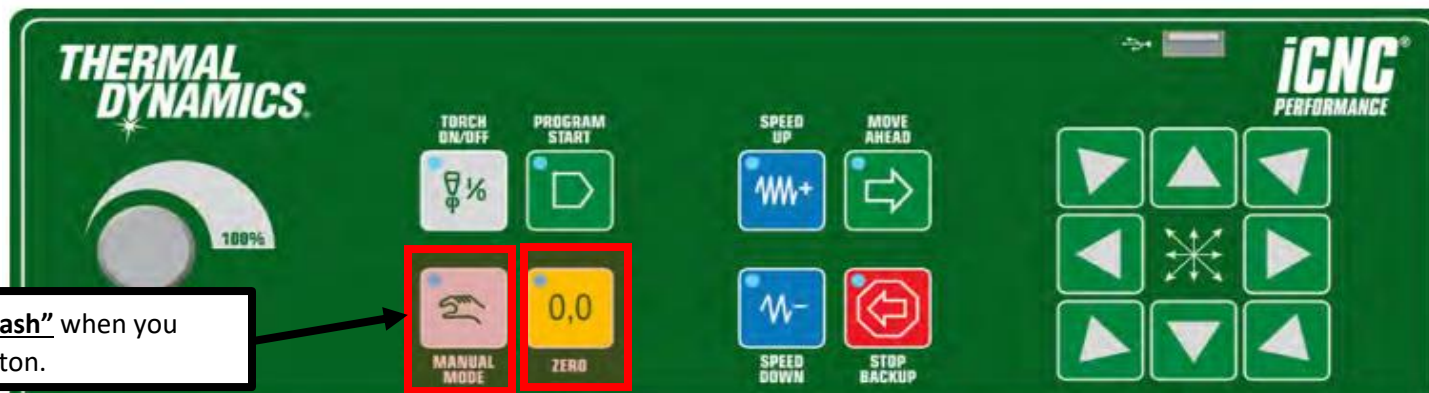
3.) Press and release **"TORCH ON/OFF Button"** to start the cutting cycle.



4.) Press the **"JOG Buttons"** of the desired direction to start the movement.

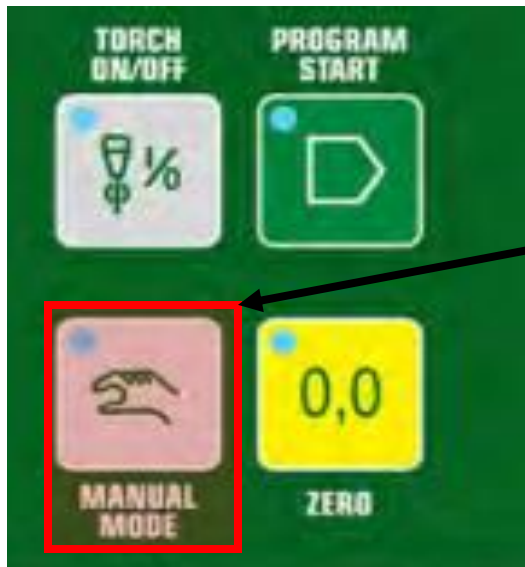
5.) Press **"TORCH ON/OFF Button"** to stop the cutting and release **JOG Button** to stop the movement.

6.) Press and release **"ZERO Button"** if you want to stay in that place. **"MANUAL MODE"** ends automatically. If you want to return to that point where you started the **"MANUAL MODE"**, just **"Press and release the MANUAL MODE Button"**. The button starts to **"Flash"** and machine runs back to that point.



9.) Programmed Manual Cutting-

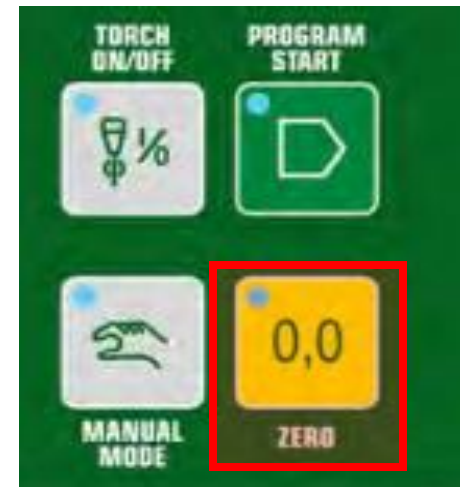
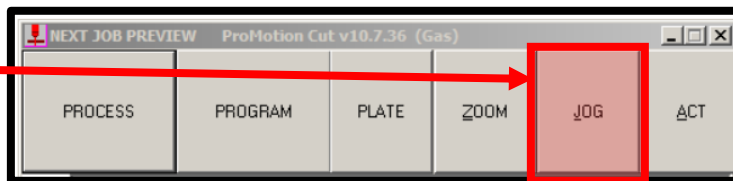
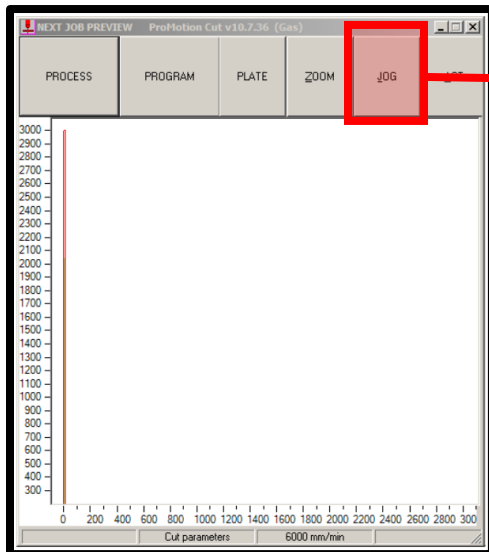
NOTE! The **“MANUAL MODE Button”** must be **“OFF”** when using this procedure.



“MANUAL MODE Button” must be **“OFF”**

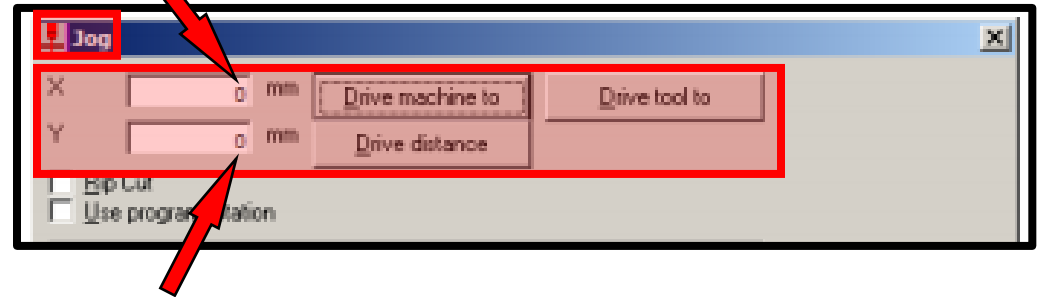
On the Cut Screen, there is a **“JOG Button”** for programmed manual cutting.

1.) Drive the torch to the desired piercing point and press and release the **“ZERO Button”**.

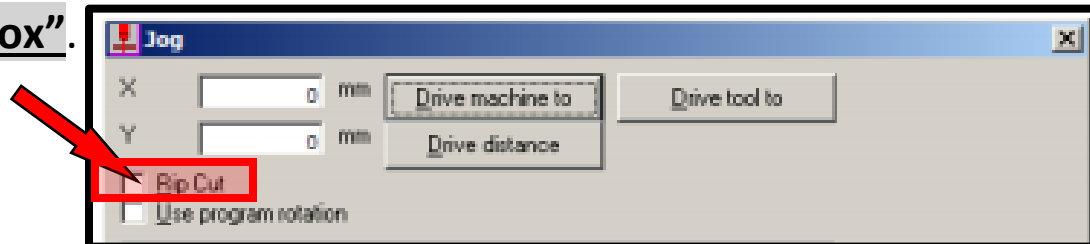


9.) Programmed Manual Cutting (Cont'd.)-

2.) Open the dialog box by **“Clicking JOG Button”**. Use the mouse wheel to enter the exact distance X and Y you want the machine to move.

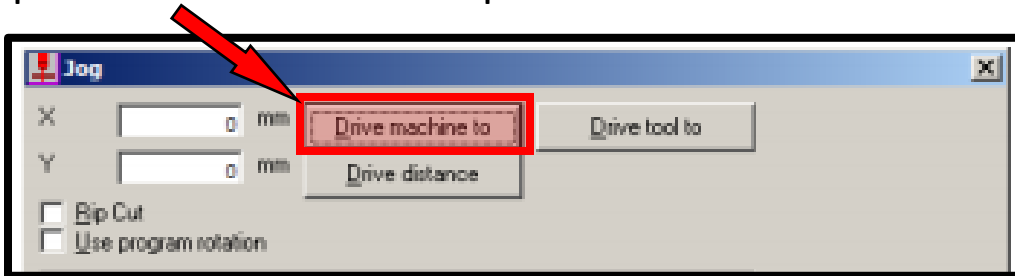


3. **“Check the Rip Cut Box”**.



9.) Programmed Manual Cutting (Cont'd.)-

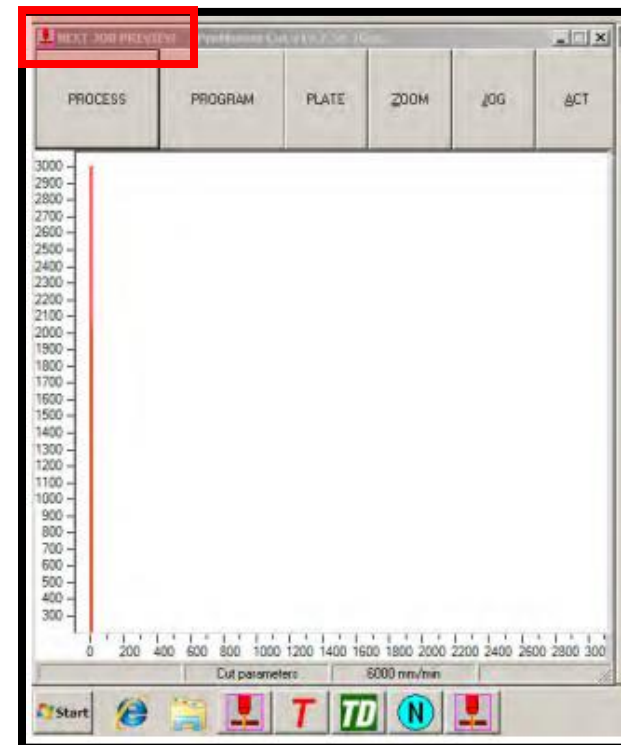
4.) **“Click on Drive Machine to”**. The machine starts the cutting cycle and drives the programmed path. At the end of that path the torch is turned off and the machine stops, both automatically.



9.1.) Trial Run, No Cutting-

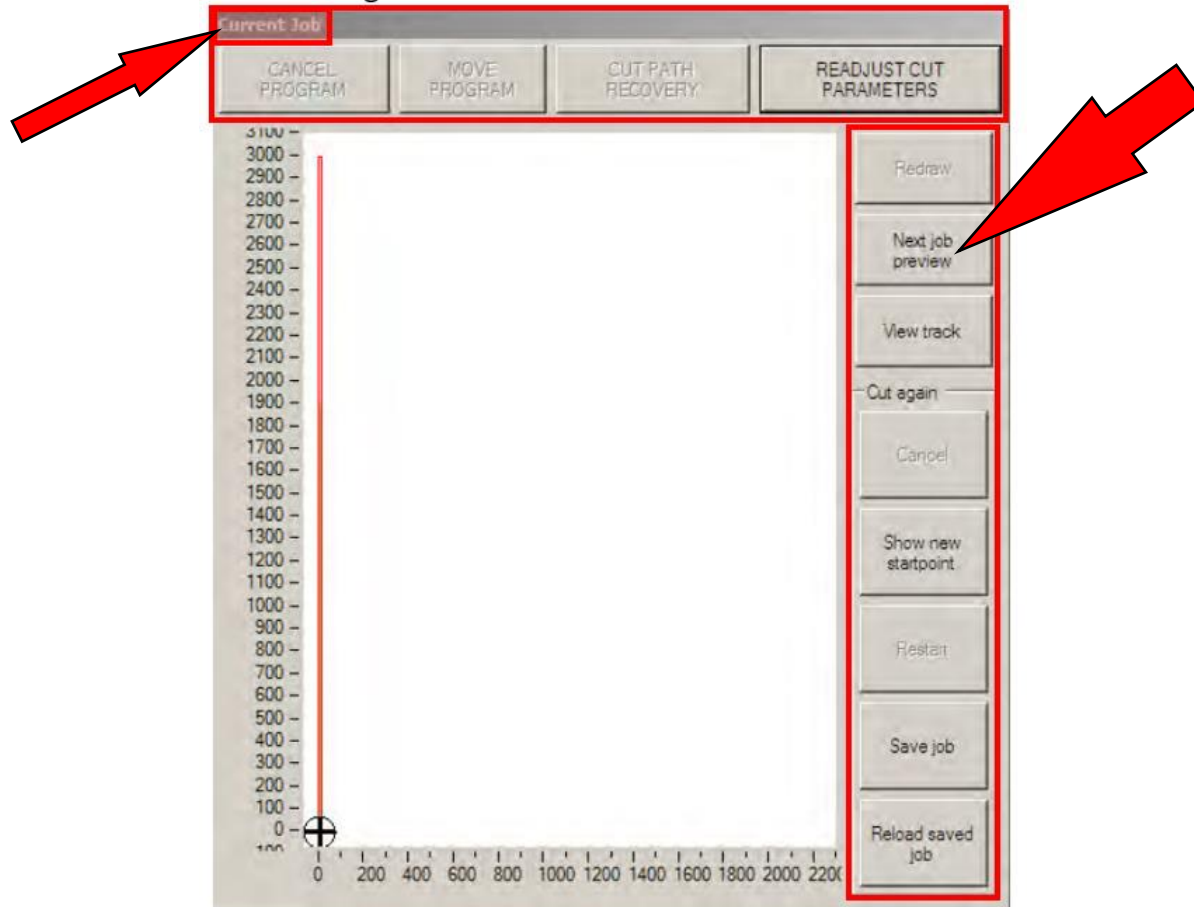
This will allow faster set up to reposition a program on the plate, eliminating the need to reposition the plate.

1.) Call up the wanted program on the **“Next JOB Screen”**.

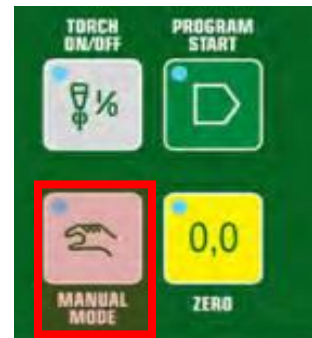


9.1.) Trial Run, No Cutting (Cont'd.)-

2. Bring the cutting program to **"CURRENT JOB"** window by **"Clicking the Next Job Preview Button"**.



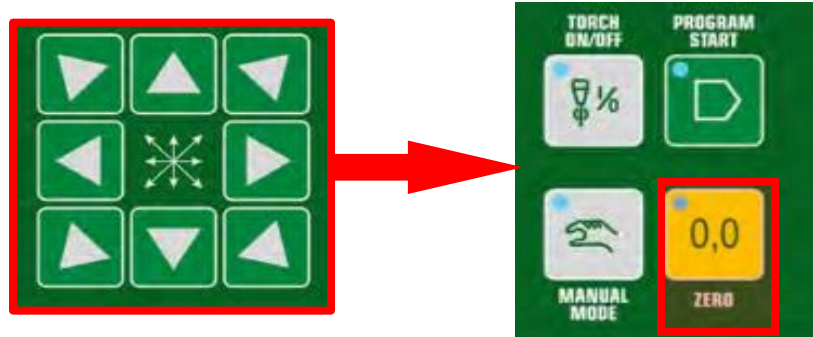
3. **"Press and release the MANUAL MODE Button"**.



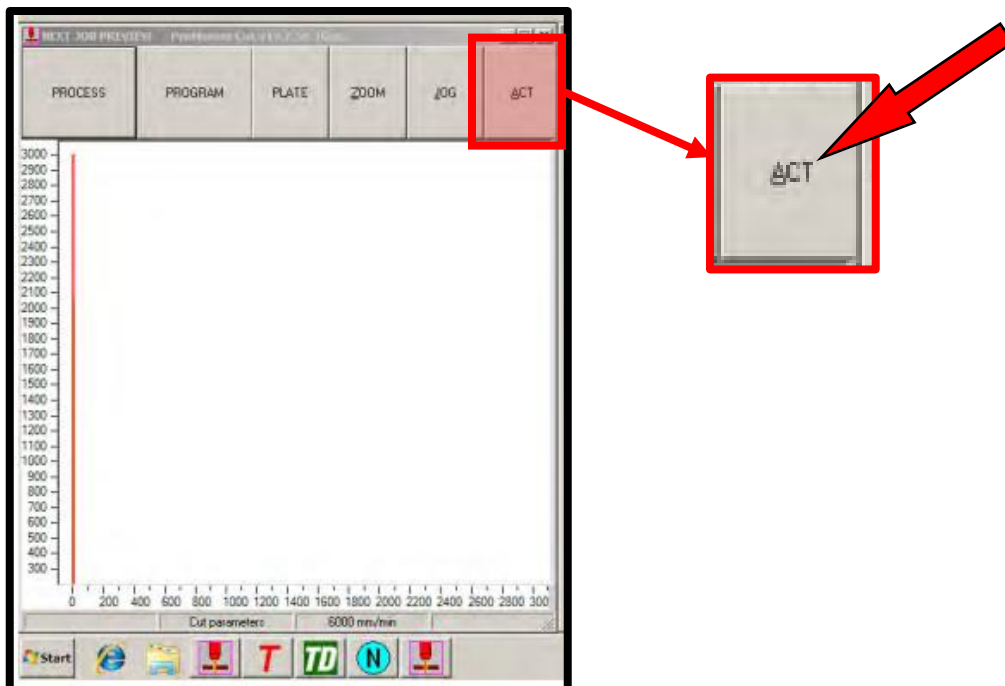
9.1.) Trial Run, No Cutting (Cont'd.)-

4.) Drive the torch to the wanted starting point of the program by using the "Jog Buttons".

Press the "ZERO Button".



5. "Click the ACT Button" on the cut screen and "Click on the Trial Run Box".

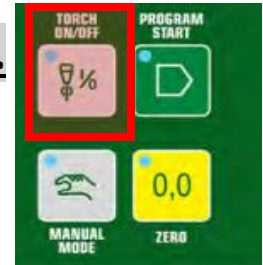


9.1.) Trial Run, No Cutting (Cont'd.)-

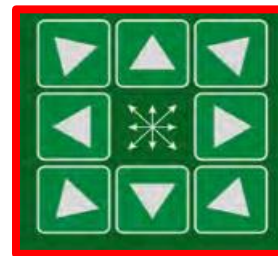
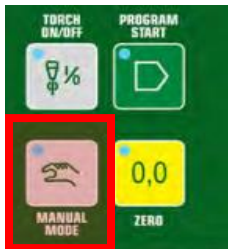
6.) Enter a Trial Mode Speed and “Click GO”.

7.) The machine will perform the programmed path without commanding the plasma on.

8.) If the torch runs off the plate, “Press and release the TORCH ON/OFF Button”.

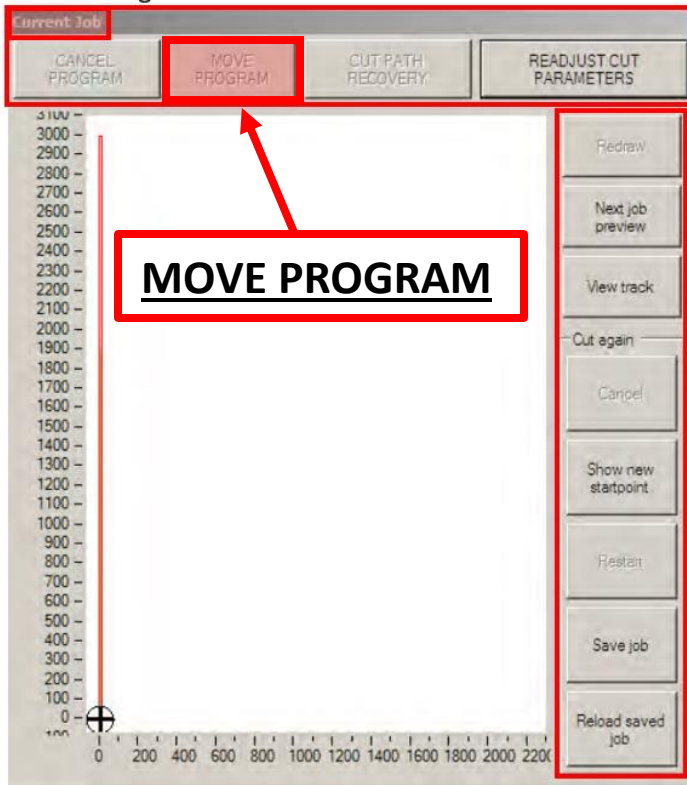


9.) “Turn on the MANUAL MODE by pressing and releasing the MANUAL MODE Button”. Set a slow speed with the “SPEED Knob” and “Use the Jog Key Buttons” to reposition the torch back on the plate.

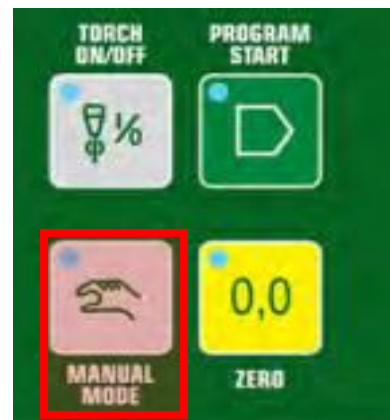


9.1.) Trial Run, No Cutting (Cont'd.)-

10.) **“Click the MOVE PROGRAM”** text on the Current Job Screen.

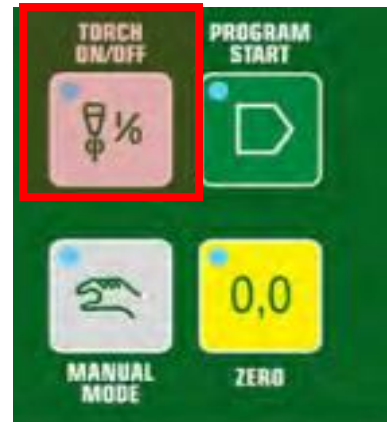


11.) **“Turn Off the MANUAL MODE”** by **“Pressing and releasing the MANUAL MODE Button”**.



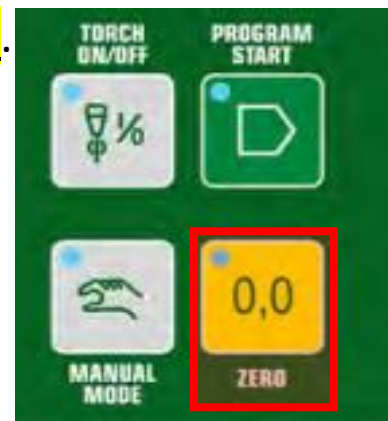
9.1.) Trial Run, No Cutting (Cont'd.)-

12.) Press the **TORCH ON/OFF Button**, again.



13.) Repeat steps 8-12 if the torch runs off the plate again!

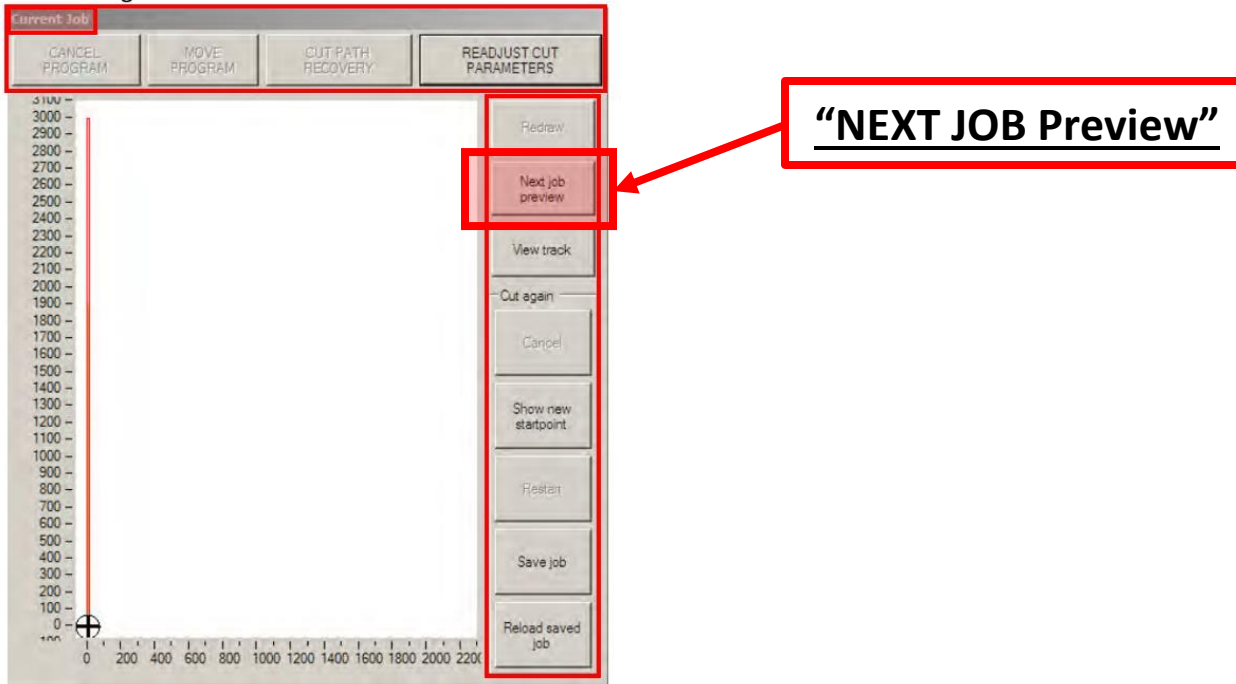
14.) When the trial run is over, return to **ZERO**.



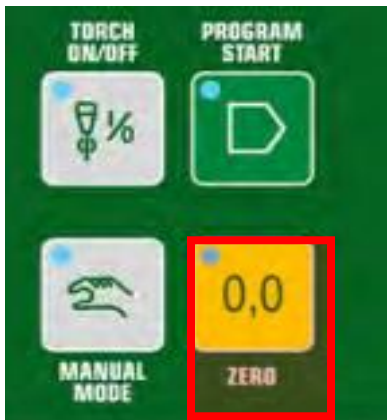
9.2.) Other Way to Check the Cutting Area-

You can check if the next cutting program fits on the plate this way as well.

1.) Bring the cutting program to CURRENT JOB window by **“Clicking the Next Job Preview Button”**.



2.) Set the torch on 0,0 point and press ZERO.



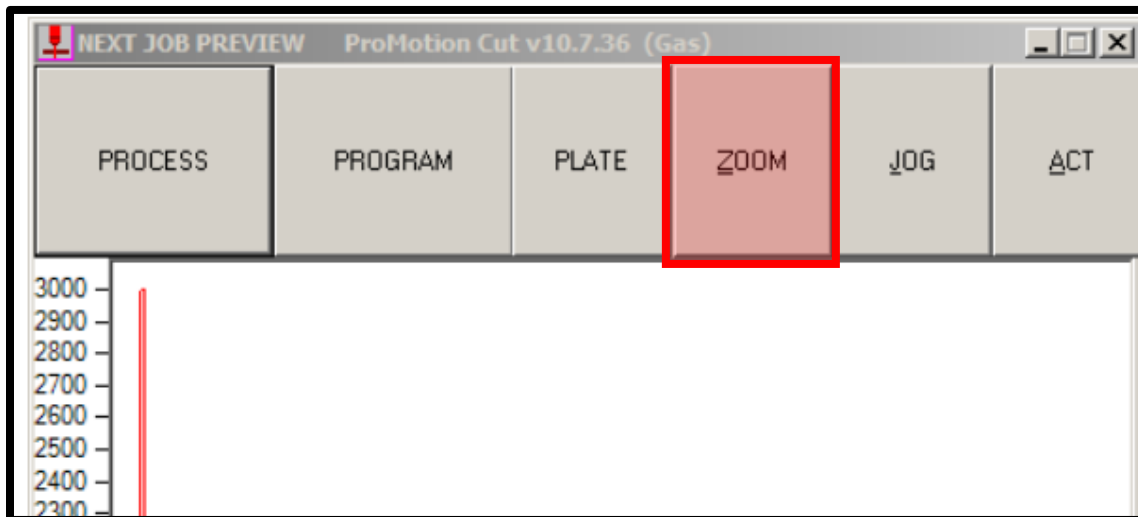
9.2.) Other Way to Check the Cutting Area (Cont'd.)-

3.) Move the mouse on this window and “Click the left Mouse Button. A window appears which shows the torch position with big numbers and the mouse cursor starts to follow the torch position.



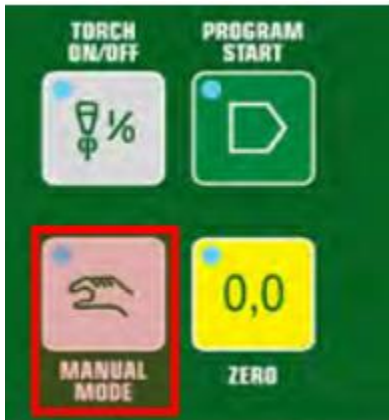
4.) Drive the torch on the critical corner of the program and check if there still is plate under the torch.

5.) Use zoom to check the situation exactly. Zoom window follows the torch automatically.



9.2.) Other Way to Check the Cutting Area (Cont'd.)-

6.) If the program location is "OK", **Press the MANUAL MODE Button** and then select return to the 0,0point.



7.) Free the mouse by pressing the left mouse button on the right screen area again. This also closes the Tool Position window.



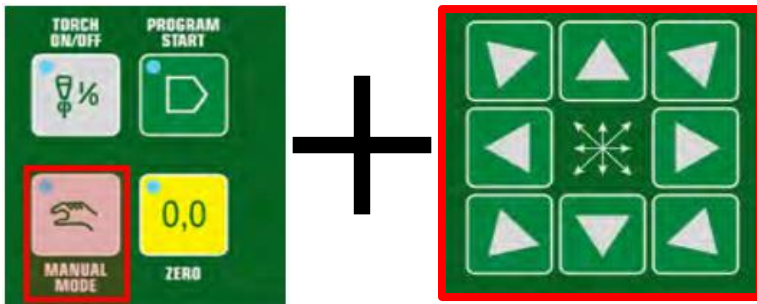
9.3.) Cut Path Recovery-

This tool is used to return to cut path in the event the program was stopped, and the torch was moved from the path.

- 1.) **“Press and release the TORCH ON/OFF Button”** to stop motion and cutting

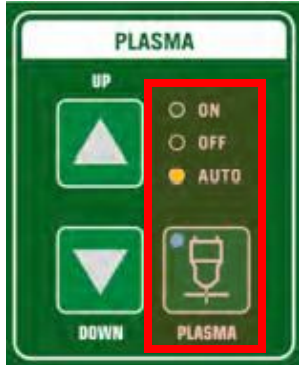


- 2.) **“Turn on the MANUAL MODE by pressing and releasing the MANUAL MODE Button”** and use the Jog key buttons to drive the torch to a convenient place to perform work on the torch.

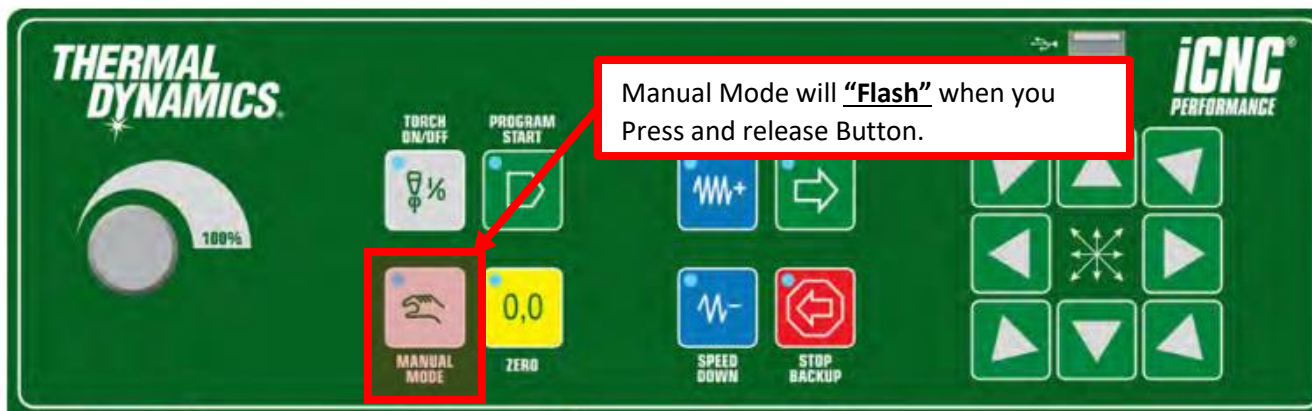


9.3.) Cut Path Recovery (Cont'd.)-

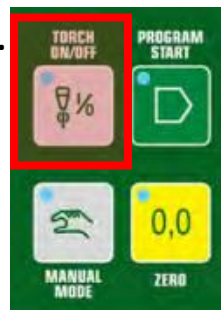
3.) Disable the plasma power supply by **“Pressing the Plasma ON/OFF Button”** and service the torch if needed. After finished enable the plasma power supply by pressing the button again.



4.) **“Turn off the MANUAL MODE by pressing and releasing the MANUAL MODE Button”** - the button starts to flash and the torch travels back to exit point of the program path.

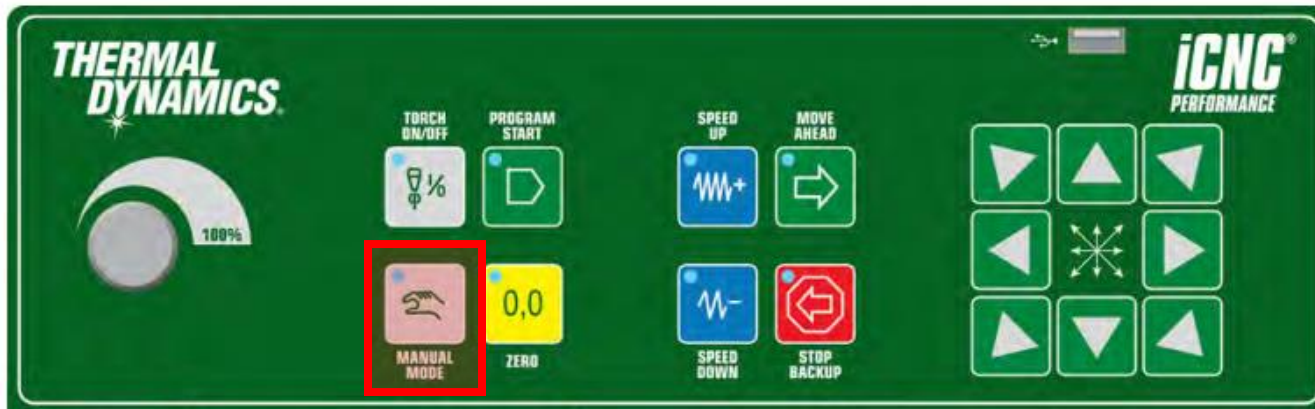


5.) **“Press and release the TORCH ON/OFF Button to ON”** and cutting will start again and continue cutting on programmed path.

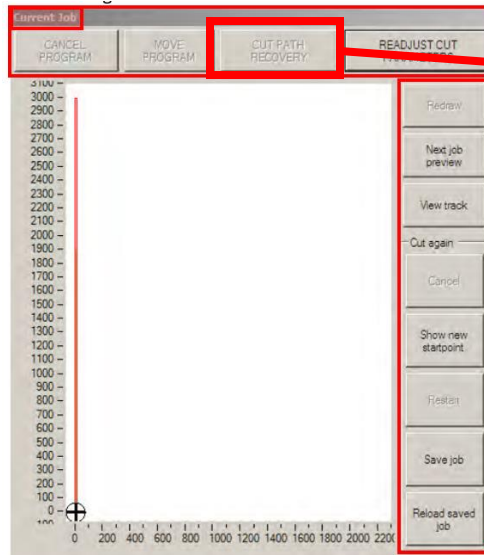


9.4.) How to pierce in the Scrap Area Prior to Finding the Cut Path-

1.) After Step 4 turn on the MANUAL MODE again by “Pressing and releasing the MANUAL MODE Button”.



2.) Use the **Jog Key Buttons** and reposition the torch close to the end of the cut. Stay on the scrap side. “Click on Cut Path Recovery Button” located on the Current Job Screen and machine will automatically start the piercing at this point and pick up the cut path to continue cutting on the programmed path.



9.5.) Advanced Process Selection Features-

The process selection screen allows the operator the flexibility to change more parameters if needed. Process selection has tabs containing different settings. You can get to the different settings by **“Clicking either Settings (1) or Edit (2)”** when a process is selected. You can also build a material database of common materials being cut and save different speeds and kerf values within each profile and for each process you edit.



9.5.) Advanced Process Selection Features (Cont'd.)-

Settings is Described First.

Settings-

Allows changes to tool offsets, rapid speed, point marking and line marking.

Edit-

Allows to change parameters for the selected process (delay times, kerf, speed etc.).

9.6.) Settings-

On the **“Settings Tab”** you can change the general parameters like Rapid Speed, Language, Tool locations and Marking Settings.

The screenshot displays the 'Settings' window for 'Process Selection v1.0.8'. The window has a title bar with standard OS controls. Below the title bar are three tabs: 'Gas', 'Plasma', and 'Settings' (which is highlighted in green). An 'Apply' button is located in the top right corner. The main area is divided into several sections:

- General:** Contains a 'Rapid speed' input field with the value '25400 mm/min'. Below it is a 'Language' dropdown menu currently set to 'English'.
- Line marking and Point marking:** A table of parameters with two columns: 'Line marking' and 'Point marking'.

Parameter	Line marking	Point marking
Marking speed		5080 mm/min
IHS and Plasma Start [SD4]		20.0 s
Move Delay [SD5]		0.1 s
Wait For Arc Off [ED1]		10.0 s
Torch Up [ED3]		1.0 s
- Tool location:** Four input fields for X and Y coordinates in millimeters.

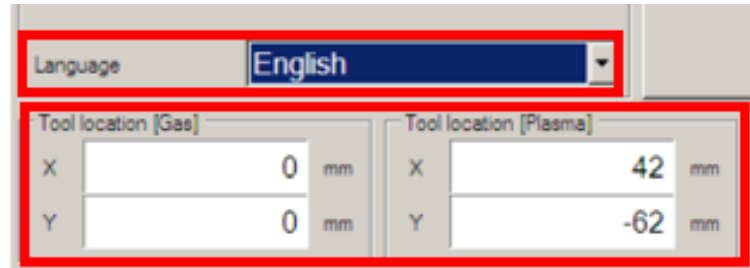
Process	X (mm)	Y (mm)
Gas	0	0
Plasma	42	-62
Line marking	42	-62
Point marking	42	-62

9.6.) Settings (Cont'd.)-

NOTE! Parameter windows may alternate based on the machine setup. See installation/service manual about setting delays and names. **Pictures for Reference Only.**

Language-

Select the language used in process selection.



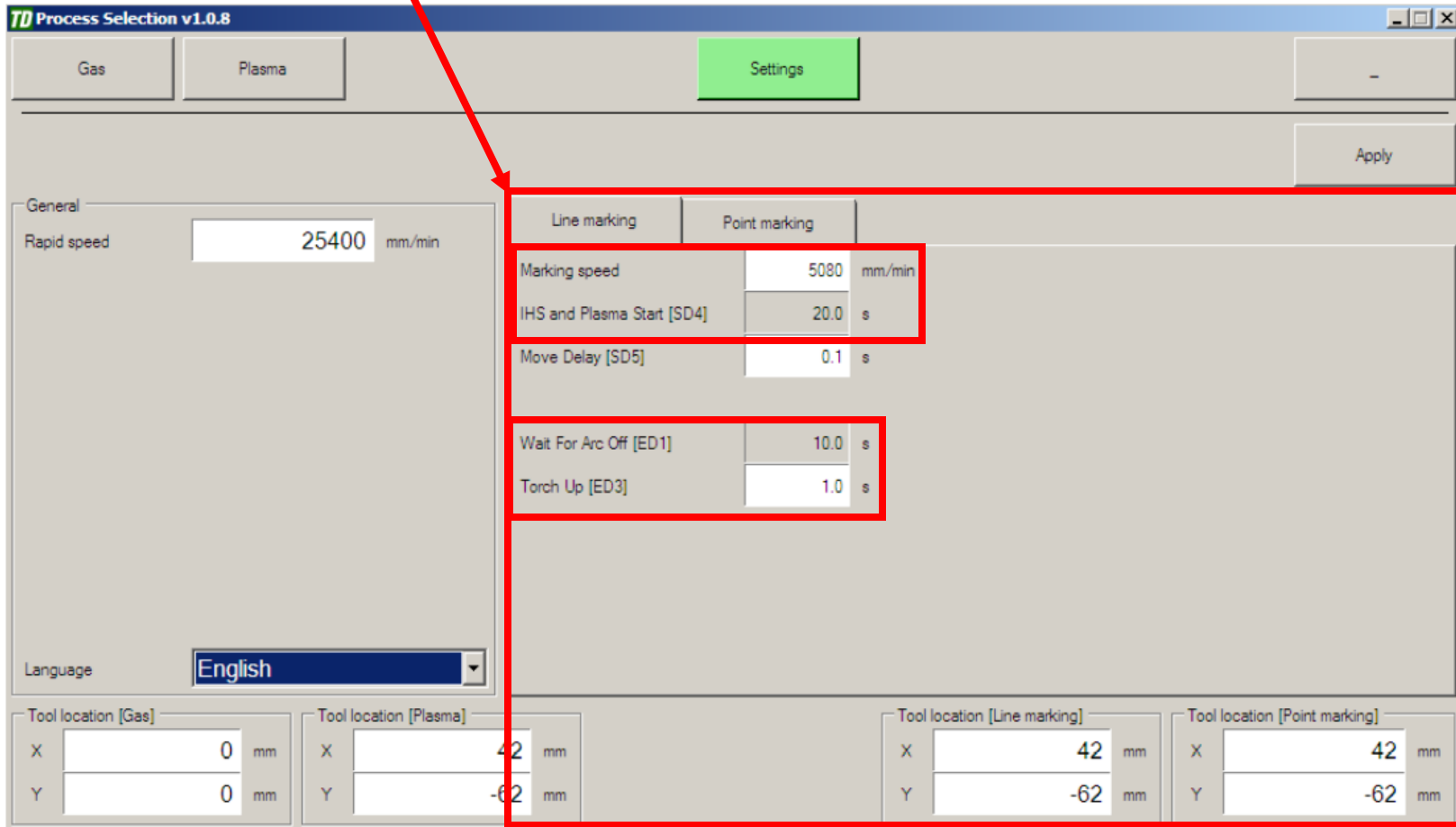
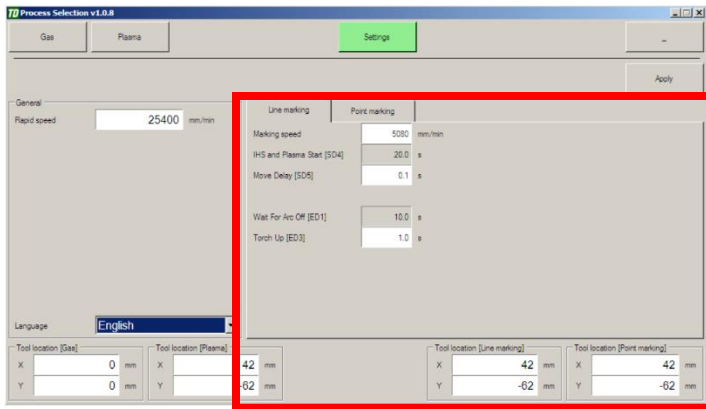
The screenshot shows a settings window with a 'Language' dropdown menu set to 'English'. Below it are two columns of tool location settings: 'Tool location [Gas]' and 'Tool location [Plasma]'. The 'Gas' column has X=0 mm and Y=0 mm. The 'Plasma' column has X=42 mm and Y=-62 mm. A red box highlights the language dropdown and the tool location input fields.

Tool location [Gas]		Tool location [Plasma]	
X	0 mm	X	42 mm
Y	0 mm	Y	-62 mm

Tool Locations-

If a laser pointer is installed on the machine, it is best to define tool locations relative to the laser pointer. This way you can position and set the zero-point using the laser pointer and the system knows the location of all additional tools and can automatically handle them while cutting a program. Adding tool offset in your cutting program is not required.

9.7.) Line Marking-



9.7.) Line Marking (Cont'd.)-

Marking Speed-

This is the speed selection for the marking tool.

SD1, SD2 and SD3-

These delays are typically not used when using plasma as the marking device but are fully available and programmable.

SD4-Typically used for starting the Initial Height Sensing and igniting the marker.

Move Delay-

Delay before motion will begin.

ED1-Typically delay waiting the arc to extinguish.

ED2-This delay is typically not used.

ED3-This is the time that the controller waits after the marking is completed (torch up), before commanding the machine to move to the next position.

9.8.) Line Marking (Cont'd.)-

Line marking	Point marking
Marking speed	5080 mm/min
IHS and Plasma Start [SD4]	20.0 s
Move Delay [SD5]	0.1 s
Wait For Arc Off [ED1]	10.0 s
Torch Up [ED3]	1.0 s

Tool location [Line marking]		Tool location [Point marking]	
X	42 mm	X	42 mm
Y	-62 mm	Y	-62 mm

Point Marking-

SD1- This delay is typically not used but is fully available and programmable.

SD2- Typically used for a marker down delay. This is the time that it takes for the marker to descend to marking height.

SD3- This is the marking time, or the time the marking takes place. If using plasma as the marker device this would be the depth of the mark.

SD4- This is a marker-up raise time, or the time it takes for the marker to climb up to travel height.

Move Delay- This delay is typically not used.

Rapid- This delay is typically not used.

9.9.) Edit and create a Process-

Process Database-

The iCNC Performance has a unique feature that allows building a database for specific cutting parameters based on material, thickness, gas, and tool. Based on material, thickness and tool selected, the cutting parameters can change automatically for kerf, cutting speeds and other parameters. Once a database is built up with all the correct information, the guess work of where to set the cutting parameters will be minimized. This would be helpful when a new operator is trained to operate the cutting machine assuring consistent cut quality.

Process Selection v1.0.8

Buttons: Gas, Plasma, Settings, Cancel, New, Ok

Process ID: 10002

Material: Mild Steel

Thickness: 50 mm

	CUT	DELAYS
Speed	280	mm/min
Kerf	2.10	mm
Creep speed	200	mm/min
Creep time	2.0	s

Notes: Tip-70

9.9.) Edit and create a Process (Cont'd.)-

NOTE! It is not necessary to use all three fields to set the database e.g., use material and thickness only and leave tool at Default.

Setting up the Database-

- 1.) “Click Edit” on the process selection screen and then “Click New”.
- 2.) Select the wanted Thickness or create a new thickness by “Clicking New”.

The screenshot shows a dialog box titled "Thickness". It has a close button (X) in the top right corner. The dialog is divided into two main sections. The first section, "Type new thickness", contains three input fields: "Name" with the value "50 mm", "Value" with the value "50.00 mm", and "Metric list" with the value "50 mm". The second section, "Or select from these lists", contains an "Inch list" dropdown menu. At the bottom right of the dialog, there are two buttons: "Ok" and "Cancel". A red arrow points to the "Ok" button.

Name: Thickness that is shown in the process selection.

Value: Thickness that is used internally (Example the process list is arranged by the value not by the name).

Metric/Inch List: Pick a common thickness from the list.

“Click Ok” after thickness settings have been set.

9.9.) Edit and create a Process (Cont'd.)-

3.) Set your Parameters-

TD Process Selection v1.0.8

Gas Plasma Settings

Cancel New Ok

Process ID: 10002

Material: Mild Steel Thickness: 50 mm New...

CUT DELAYS

Speed	280	mm/min
Kerf	2.10	mm
Creep speed	200	mm/min
Creep time	2.0	s

Notes: Tip-70

3.) Set your Parameters (Cont'd.)-

CUT	DELAYS
Speed	280 mm/min
Kerf	2.10 mm
Creep speed	200 mm/min
Creep time	2.0 s

Notes: Tip-70

Speed- This is the machine cutting speed. This setting duplicates the cutting speed setting in folder 1 Parameters. Changing one, changes the other.

Kerf-The process kerf.

Creep Speed- The initial speed of the cutting torch will immediately be activated after the start command is given. The duration of this speed is determined by the setting of the Creep Time parameter. This ‘ramp-up” speed is used only shortly, to assist with piercing. After the creep time is over the torch accelerates/decelerates to the normal cutting speed.

Creep Time- Length of the time for using the creep speed.

Note: Allows the operator to put notes corresponding the changes that were made to the process.

10.) Cutting Parameter Delays-

NOTE! Parameter windows may alternate based on the machine setup. If a delay is not shown it is set as hidden. Delays can also be locked so that editing the time value is not possible. See installation/service manual about setting delays. Pictures for reference only.

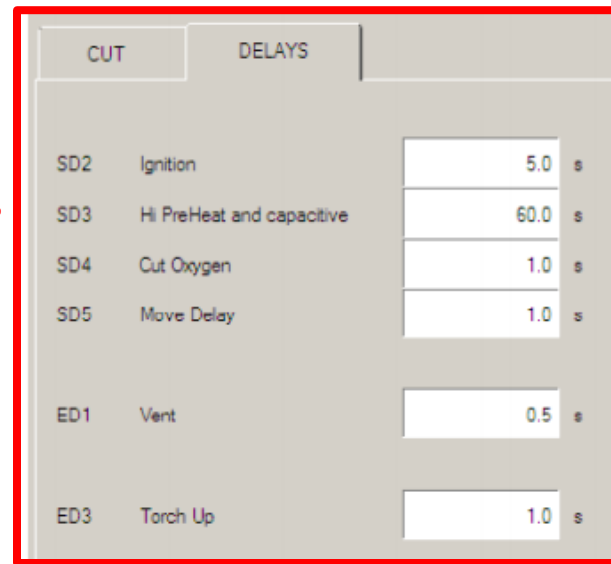
The screenshot shows the 'TD Process Selection v1.0.8' software interface. At the top, there are tabs for 'Gas', 'Plasma', and 'Settings', with 'Gas' selected. Below the tabs are 'Cancel', 'New', and 'Ok' buttons. The main area displays 'Process ID: 10002', 'Material: Mild Steel', and 'Thickness: 50 mm'. There are two sub-tabs: 'CUT' and 'DELAYS', with 'DELAYS' selected. The 'DELAYS' section contains two tables of parameters. The left table lists delays SD2 through ED3, and the right table lists Start, Piercing Up, Stay Up, and Piercing Down. Two red boxes highlight the SD2-SD5 and Start-Piercing Down sections.

Parameter	Description	Value	Unit
SD2	Ignition	5.0	s
SD3	Hi PreHeat and capacitive	60.0	s
SD4	Cut Oxygen	1.0	s
SD5	Move Delay	1.0	s
ED1	Vent	0.5	s
ED3	Torch Up	1.0	s

Parameter	Value	Unit
Start	SD4	
Piercing Up	1.0	s
Stay Up	0.5	s
Piercing Down	1.0	s

10.) Cutting Parameter Delays (Cont'd.)-

SD1- Is generally not used but is fully programmable.



CUT		DELAYS	
SD2	Ignition	5.0	s
SD3	Hi PreHeat and capacitive	60.0	s
SD4	Cut Oxygen	1.0	s
SD5	Move Delay	1.0	s
ED1	Vent	0.5	s
ED3	Torch Up	1.0	s

SD2-Provides a time for igniting the torch. The ignition output is activated for this user selectable time. After time has elapsed the igniter will turn off. To override the feature if the machine is not equipped with auto ignition, set timer value for SD2 to zero.

SD3-Is generally used for a high preheat timer and turning capacitive height sensing ON. This determines the time allocated for preheating the material before piercing. The time is user defined based on the type of material and thickness. The thicker the material, the higher the timer value. To override the feature if the machine is not equipped with auto high preheat, set timer value for SD3 to zero.

SD4-Is generally used for Cut Oxygen. This determines the time allocated for heating the material with cutting oxygen, normally with thicker materials. This is best used with the pierce Up/Down function (See below).To override the feature if the machine does not need extra pierce with cutting oxygen, set timer value for SD4 to zero.

10.) Cutting Parameter Delays (Cont'd.)-

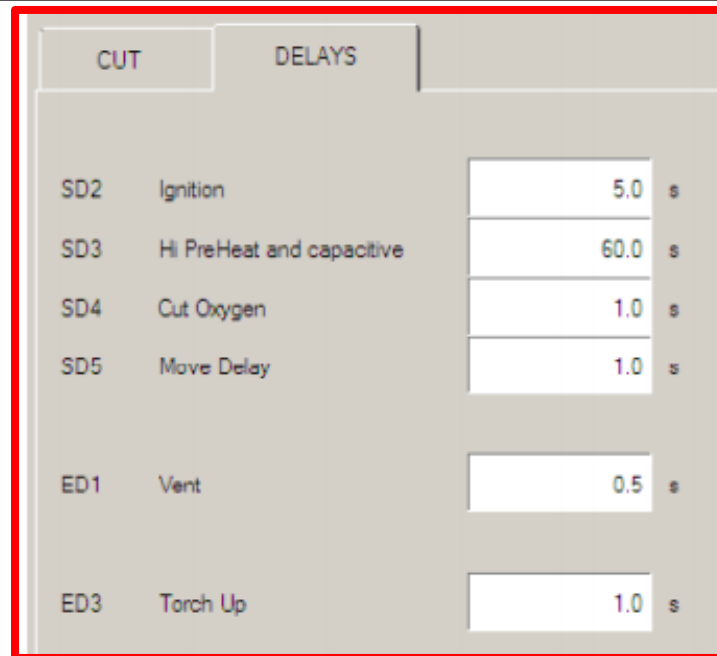
Start	SD4	
Piercing Up	1.0	s
Stay Up	0.5	s
Piercing Down	1.0	s

Pierce up/down event timing: Activating the feature-

- 1.) START:** Select the start delay at which the timing is to begin execution, e.g., SD4.
- 2.) PIERCING UP:** Enter the desired time to raise the torch for piercing.
- 3.) STAY UP:** Enter the desired time to stay up before the pierce lowering time begins.
- 4.) PIERCING DOWN:** Enter the desired time to lower the torch to the cutting height.

10.) Cutting Parameter Delays (Cont'd.)-

NOTE! The piercing up and piercing down timer values are usually set to equal amounts as not to create a ramping or stepping effect. This is also true with the primary raise and lowering of the torch when no automatic capacitive height sensor is installed.



Parameter	Description	Delay (s)
SD2	Ignition	5.0
SD3	Hi PreHeat and capacitive	60.0
SD4	Cut Oxygen	1.0
SD5	Move Delay	1.0
ED1	Vent	0.5
ED3	Torch Up	1.0

Examples: SD4 starts the event timing sequence for piercing up/down routine. The initial values for piercing up time - stay up time and piercing down time are set to 1 second for this example.

- 1.) Cutting oxygen turned on as torch raises to piercing height. Set SD4 value from .1-.9 seconds.
- 2.) Cutting oxygen turned on during stay up time. Set SD4 value from 1.1-1.9 seconds.
- 3.) Cutting oxygen turned on while torch lowering to cutting height. Set SD4 value from 2.1-2.9 seconds.

10.) Cutting Parameter Delays (Cont'd.)-

CUT		DELAYS	
SD2	Ignition	5.0	s
SD3	Hi PreHeat and capacitive	60.0	s
SD4	Cut Oxygen	1.0	s
SD5	Move Delay	1.0	s
ED1	Vent	0.5	s
ED3	Torch Up	1.0	s

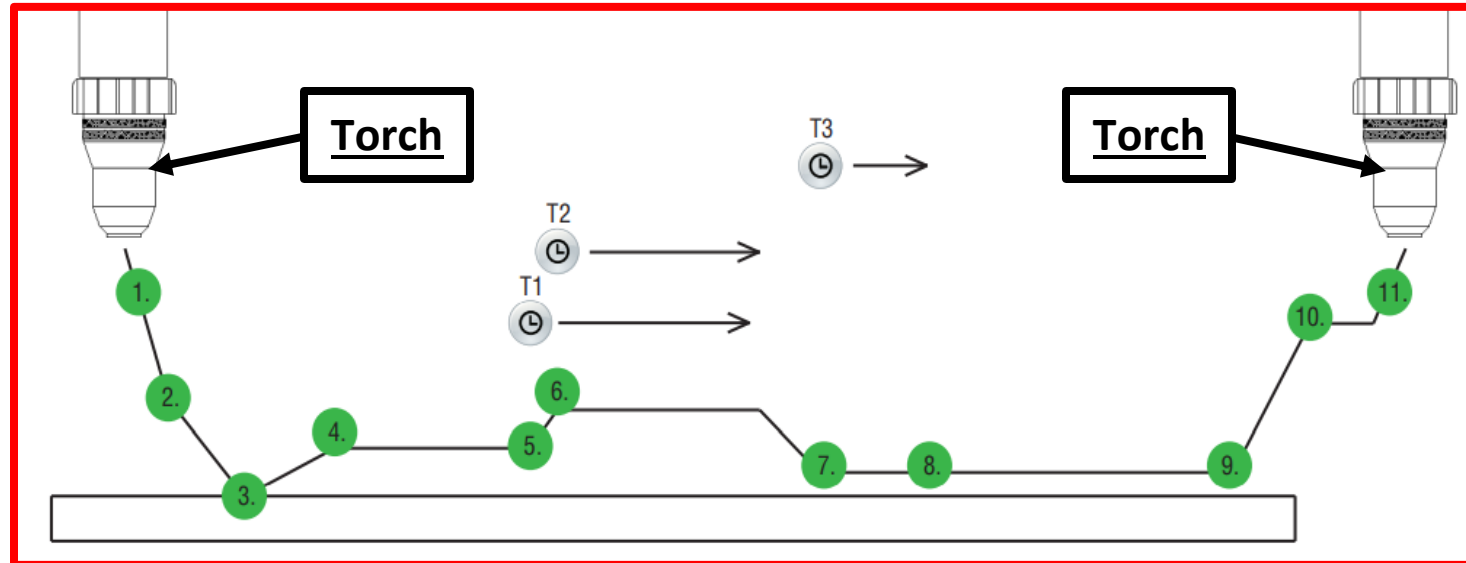
Start Move Delay is the time allocated for the initial piercing through the material. After this time has expired, motion automatically begins.

ED1- is the first delay executed after the program is finished or the cut manually interrupted by the operator. This delay is usually used for the primary raising of the torch after completion of the current cut. This allows the torch to clear any parts, which may have tipped up preventing damage or misalignment of the torch. Set the value to zero to prevent the torch from raising after completion of a cut.

ED2- is typically not used.

End Move Delay is typically used to allow excess cutting oxygen to bleed off through the cutting tip before rapid traverse to the next piercing location occurs. This prevents the cutting stream from nicking prior cut parts when the traverse path is directed over a part. Typically set to 1-2 seconds when the cutting oxygen valve is located on the inlet of torch. If the cutting oxygen valve is located on the gas manifold, allow additional time.

10.1.) Pierce/Cut Sequence-



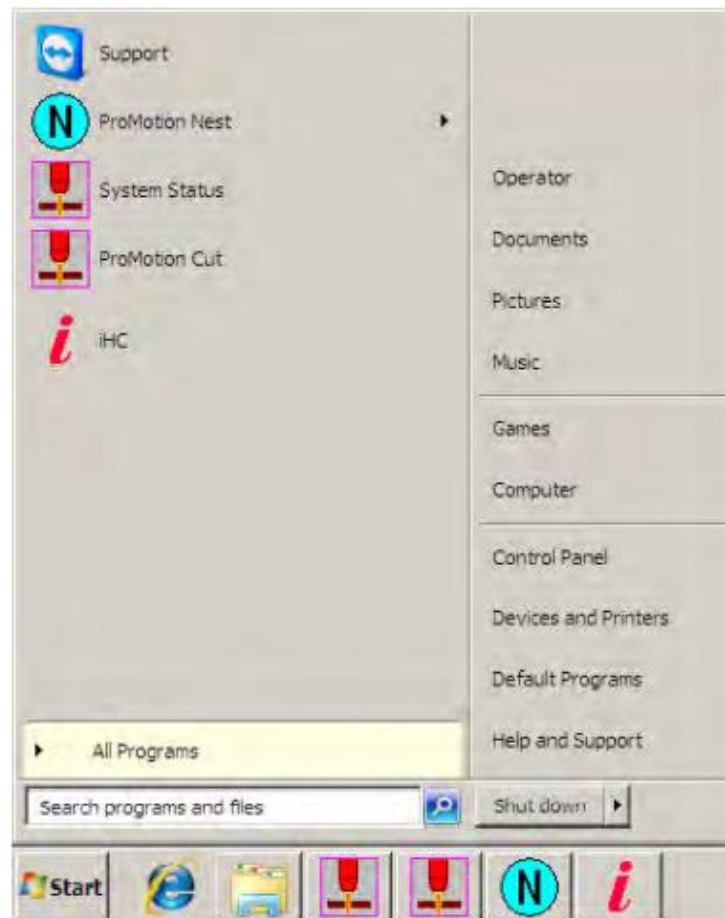
Pierce/Cut Flow Sequence:

- 1.) IHS Start activated torch starts to find the plate.
- 2.) Torch reaches slowdown height and starts to move slowly.
- 3.) Torch touches the plate.
- 4.) Torch moves to ignition height and gives command to start the plasma.
- 5.) Plasma arc ignites and gives ok to move signal to the height controller. Pierce time T1 starts.
- 6.) Torch moves to pierce height. Pierce height delay T2 starts.
- 7.) After Pierce time T1 ends iHC XT Ok to move signal output activates and cutting motion starts. Torch moves to cut height after pierce height timer ends.
- 8.) AVC control starts after AVC delay T3 ends.
- 9.) Cuth path ends.
- 10.) Torch moves to retract height.
- 11.) If idle for long enough, torch retracts to home position.

10.2.) iHC User Interface-

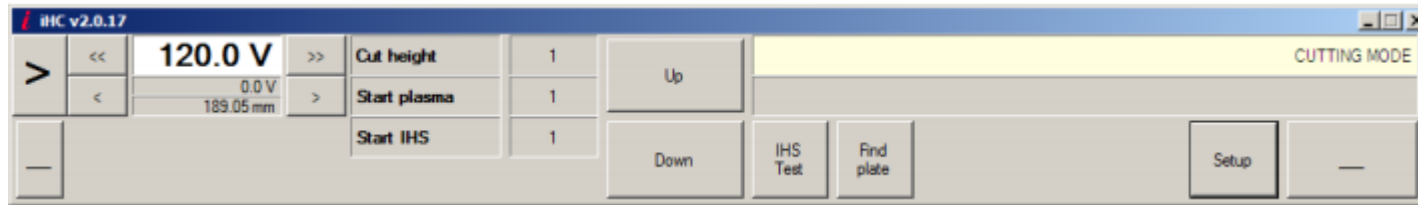
The iHC can be almost invisible to the operator because the Height Control Parameters can come from the cutting program or fully automatically from the Material/Thickness/Tool parameter sets. This window does not hide any controls normally used to run the iCNC Performance it can be always viewed. This chapter describes the User Interface at the controller when the automatic parameter setting features are not in use. This allows for changes at the time of cutting and/or settings before starting to cut.

To start the software, select **“iHC.exe-Shortcut”** from the Windows Start menu.

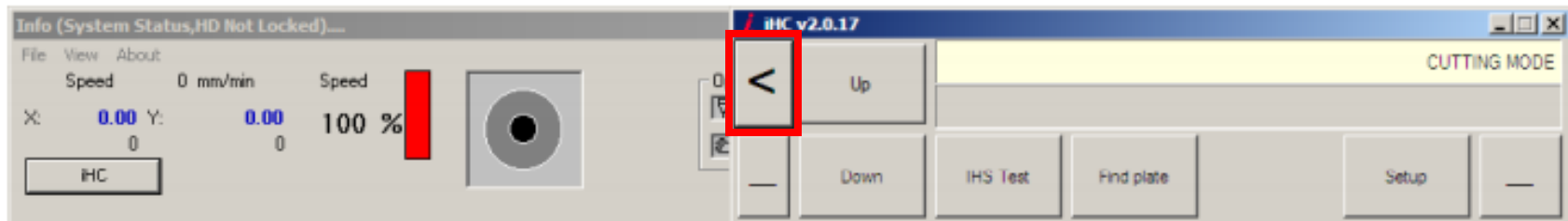


10.2.) iHC User Interface (Cont'd.)-

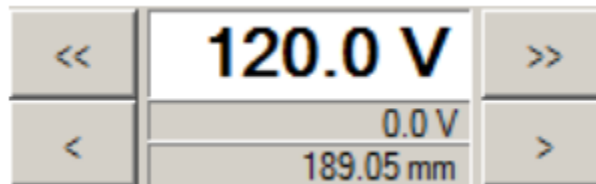
Main Bar-



The large right pointing arrow can be used to make the iHC main bar smaller. This allows operator to see position and other information about the machine.



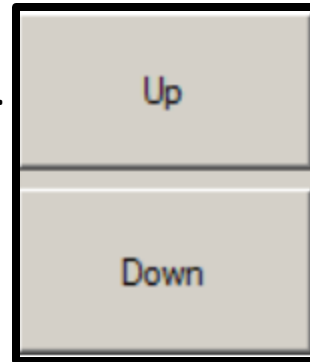
- On the left side of the main window there is a display showing the set value for Arc Voltage. The Arc Voltage can be modified using the left and right arrows on the sides of the slider. One click changes the voltage 1V or 0.1V.



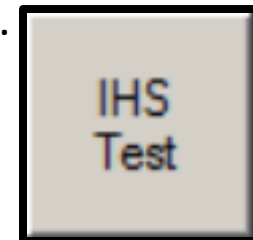
- If AVC Sampling is used the left side of the main window will show the cutting distance. One click changes the cut height 0.5mm or 0.1mm.

10.2.) iHC User Interface (Cont'd.)-

- The “UP” and “DOWN” Buttons- can be used to move the torch in manual mode.



- IHS Test Button- causes the torch to drive down to find a plate. This feature can be used to test that the iHC plate sensing works properly. The text on IHS Test button changes to “Cancel” after being pressed. **“Clicking “Cancel” returns the torch immediately to the home position.** Torch will stay at ignition height after plate has been sensed.



- Find Plate-This feature is used when thicker material is placed on the table, this feature is used before the cutting process to make sure the torch will not collide to the plate on first piercing point. “Find Plate” uses the Find Plate Speed to conduct the Plate Contact Test. After finding the plate, the torch returns to Home Position. When **“Find Plate”** is **“Clicked”**, the text on the button changes to “Cancel”. **“Clicking “Cancel”** returns the torch immediately to the home position.



10.2.) iHC User Interface (Cont'd.)-

- “Clicking on “SETUP” opens the Setup Window.



- The iHC window can be minimized with this button on the far right that looks like a dash.



- There are two text fields at the top right corner of the iHC window. In a normal situation it should read “CUTTING MODE” in the upper field. If the height control is not running or there is a connection problem it reads “WAITING FOR REPLY...” on the lower text field. Lower text field will also show status messages like lower software limit.



- You can monitor the status of the station by viewing colors changing on the screen. The number field on the right from the “Cut height” text shows when the AVC is active, when IHS start is “ON” and when the torch is in cutting height.

Cut height	1
Start plasma	1
Start IHS	1

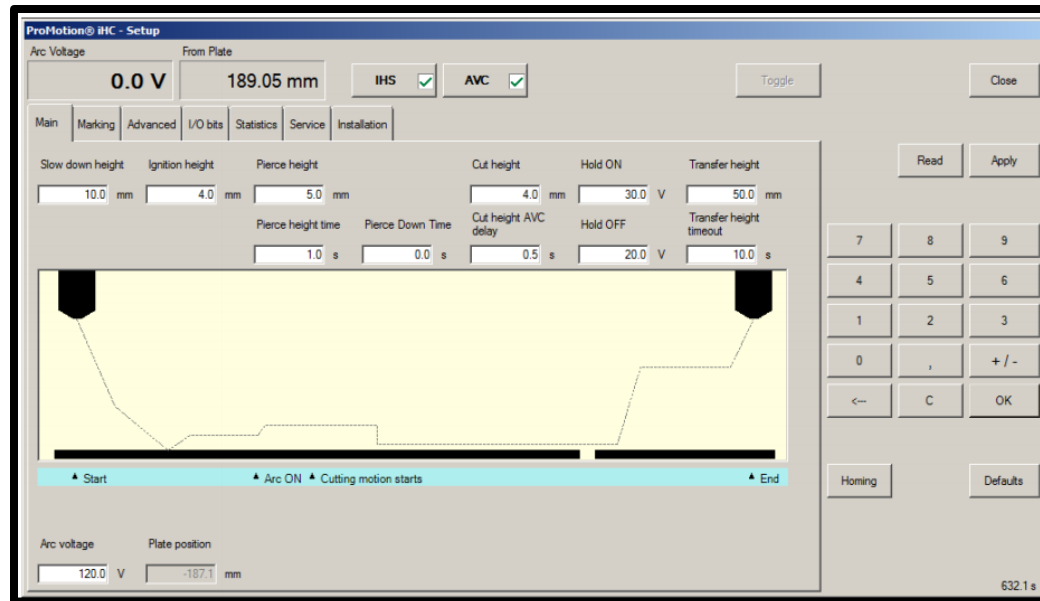
10.3.) Main Settings-



“Clicking the **“Setup”** Button will open the Setup Main screen under the iHC Info Bar.

The Screen

10.3.) Main Settings (Cont'd.)-

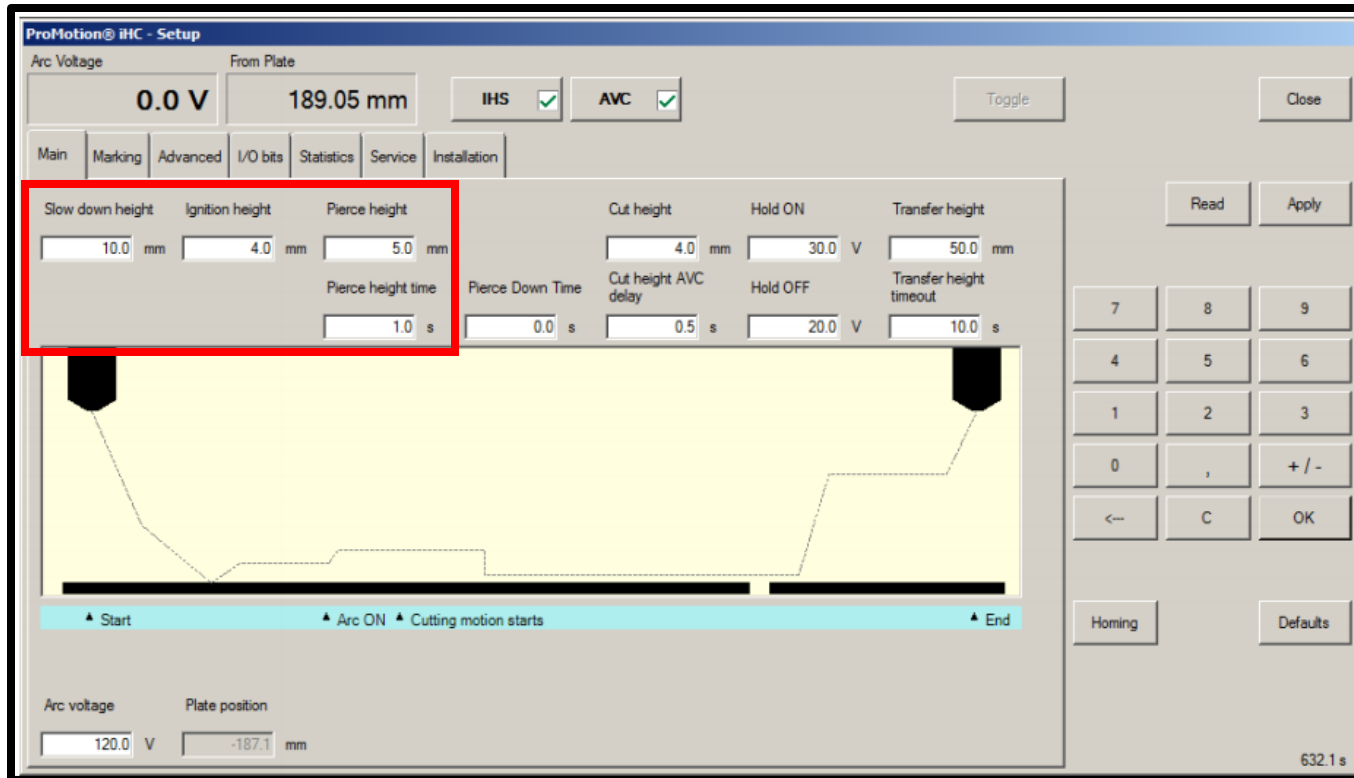


This Screen Above:

- Continuously displays the actual Arc Voltage and the height of the torch from the plate (the height where the plate was sensed at the time of pierce).
- Has various tabs for more options.

Most of the parameters of the iHC can be directed in the Setup window. The upper middle part of the Setup-window consists of buttons and fields which are always displayed.

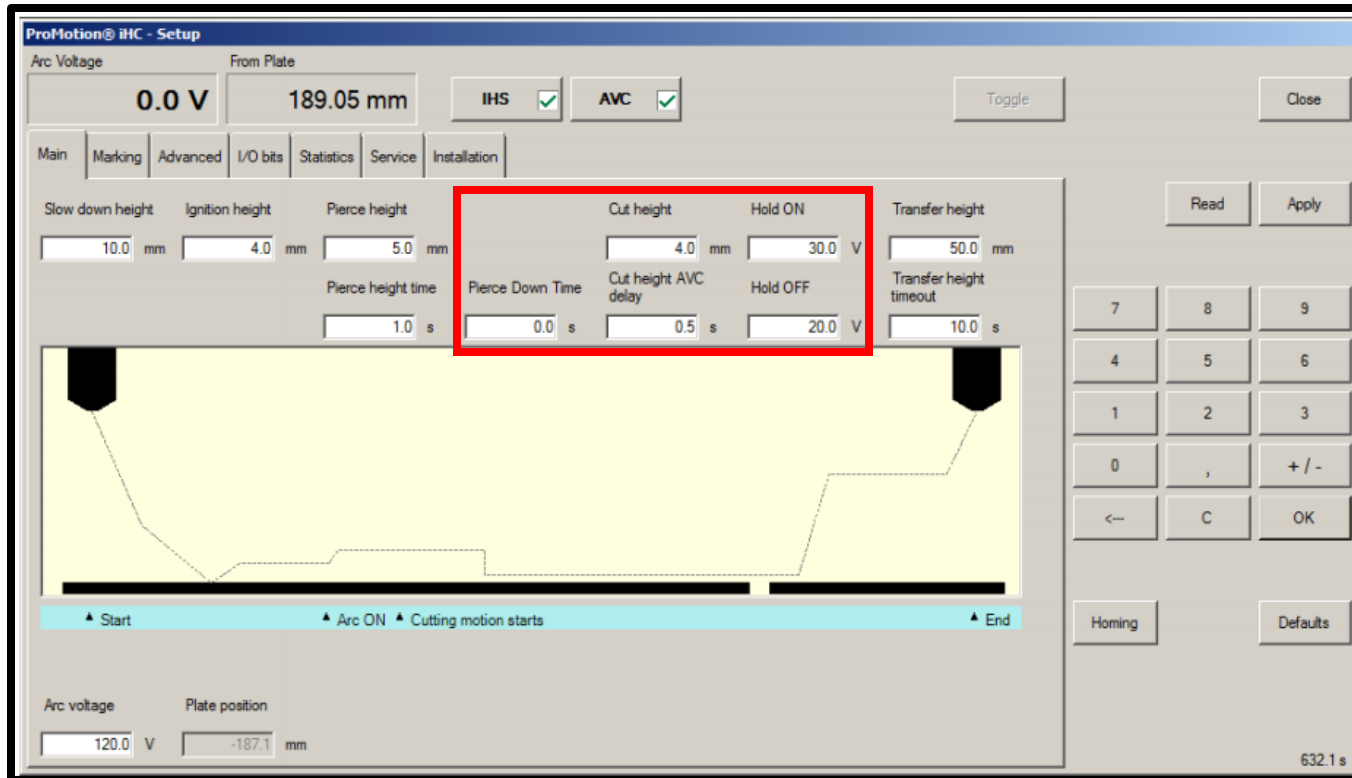
10.3.) Main Settings (Cont'd.)-



This screen is used for intuitive setting of iHC operation parameters. When setting any of these parameters the process diagram visually indicates what each parameter means.

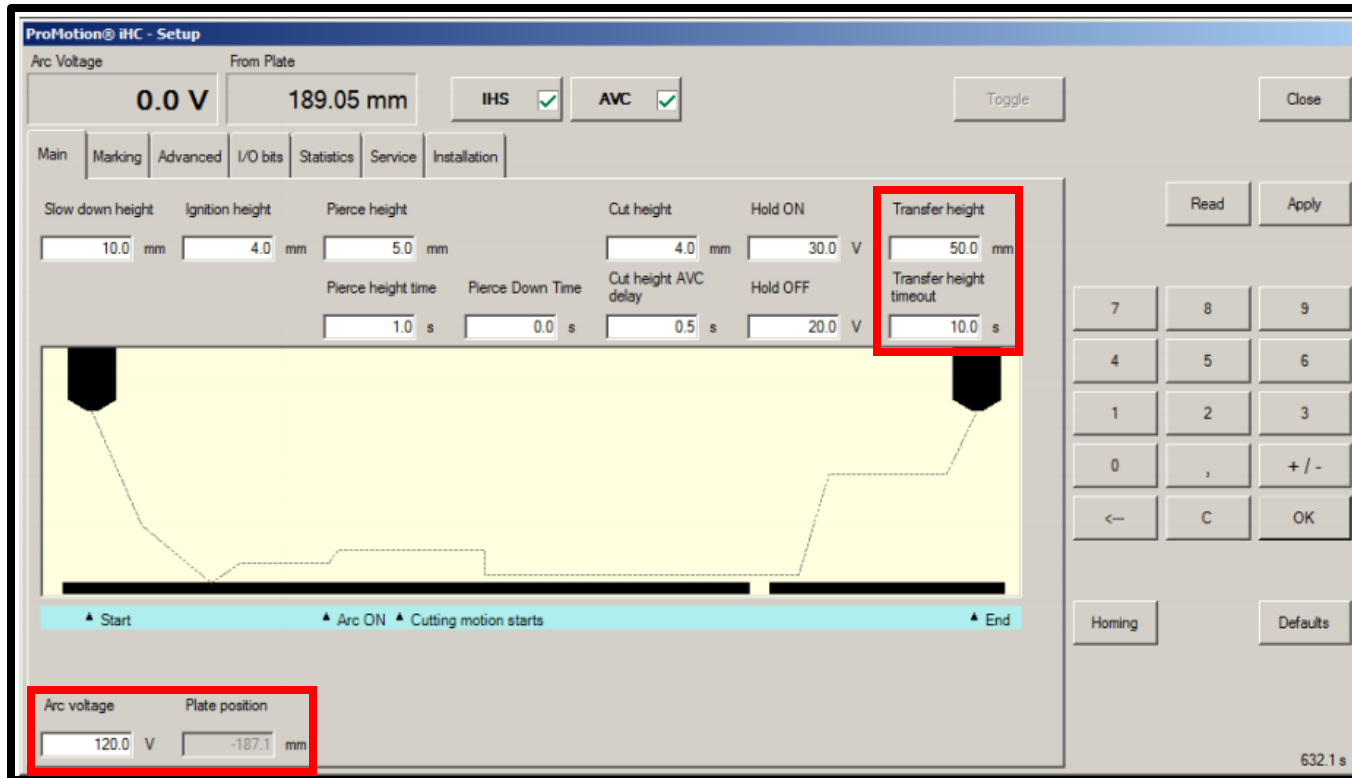
- **Slow Down Height**- This is the distance from the last known plate height where the lifter should slow down the motion for plate sensing to avoid a hard hit.
- **Ignition Height**- This determines the distance from the plate where the torch will be ignited.
- **Pierce Height**- This determines the distance from the plate where the actual piercing will be done after igniting the torch.
- **Pierce Height Time**- This determines how long the torch will stay on pierce height.

10.3.) Main Settings (Cont'd.)-



- **Pierce Down Speed**-This determines the transfer speed from pierce height to cut height.
- **Cut Height**- This determines the torch height for cutting after piercing is complete.
- **Cut Height AVC Delay**- This determines the time given for the arc voltage to stabilize after reaching the cut height to allow for control of the torch height based on measured Arc Voltage (also proper cutting speed is required).
- **Hold ON**- Cutting voltage increase required to freeze torch motion while crossing kerf.
- **Hold OFF**- Cutting voltage increase below while torch motion recovers to AVC control.

10.3.) Main Settings (Cont'd.)-



- **Transfer Height**-This determines the height where the torch will be lifted after the cut for rapid transfer to the next pierce point. Use high enough value to avoid collisions.
- **Transfer Height Timeout**-This determines how long the system waits at this height for the new pierce command before lifting the torch all the way up to home position.
- **Arc Voltage**-This display shows actual arc voltage in real time when cutting is active.
- **Plate Position**-This shows where the plate was last sensed in comparison to the Torch Lifter Home position.

10.4.) System Setup & Diagnostic Menus-

Marking Tab-

Main	Marking	Advanced	I/O bits	Statistics	Service	Installation
Arc Voltage	<input type="text" value="110.0"/>	V				
Cut height	<input type="text" value="1.0"/>	mm				
Ignition height	<input type="text" value="2.0"/>	mm				
Pierce height	<input type="text" value="2.0"/>	mm				
Pierce height time	<input type="text" value="1.0"/>	s				
Pierce Down Time	<input type="text" value="1.0"/>	s				
Cut height AVC delay	<input type="text" value="0.5"/>	s				

- **Arc Voltage**- used when marking.
- **Cut Height**- used when marking.
- **Ignition Height**- used when marking.
- **Pierce Height**- used when marking.
- **Pierce Height Time**- used when marking.
- **Pierce Down Time**- used when marking.
- **Cut Height AVC Delay**- used when marking.

10.5.) Advanced Tab-

Provides the option for more detailed control of the system behavior.

The screenshot shows the 'Advanced' tab of a control interface. The 'Advanced' tab is highlighted with a red box. The settings are as follows:

- High jog speed: 1500.0 mm/min
- Low jog speed: 300.0 mm/min
- Adjust speed: 3000.0 mm/min
- Homing speed: 600.0 mm/min
- Find plate speed: 600.0 mm/min
- Plate contact release speed: 60.0 mm/min
- Main arc lost timeout: 0.2 s
- Collision rebound offset: 0.1 mm
- AVC sampling enable:
- Collision retract enable:
- Collision retract height: 1.0 mm
- Collision recovery delay: 1.0 s
- Ohmic plate contact enable:
- Plate sensing force enabled:
- MAX:
- Plate sensing force: 15
- Max allowed force: 400
- Drive force: 12
- 0, 74, Reest:

<u>Default Values</u>	<u>Imperial</u>	<u>Metric</u>
High Jog Speed	59.06 IPM	1500 mm/min
Low Jog Speed	111.81 IPM	300 mm/min
Adjust Speed	118.11 IPM	3000 mm/min
Homing Speed	23.62 IPM	600 mm/min
Find Plate Speed	23.62 IPM	600 mm/min
Plate Contact Release Speed	2.36 IPM	60 mm/min
Main Arc Lost Time Out	1 Second	N/A
Collision Rebound Offset	N/A	N/A
Hold Off AVC Delay	0.0 Second	N/A
Collision Retract Height	0.4" (Inches)	1 mm
Collision Recovery Delay	1 Second	N/A
Plate Sensing Force	25 Lbs./Sq. In.	N/A
Maximum Allowed Force	250 Lbs./Sq. In.	N/A

IPM=Inches per Minute, Lbs./Sq. In.= Pounds per Square Inch.
mm/min=Millimeters per Minute.

10.5.) Advanced Tab (Cont'd.)-

The screenshot shows the 'Advanced' tab of a software interface. The 'Collision retract enable' checkbox is highlighted with a red box. A red arrow points from this checkbox to a larger red box at the bottom of the page containing the text 'Collision retracts Enable'. Other settings visible include 'Collision retract height' (1.0 mm), 'Collision recovery delay' (1.0 s), 'Ohmic plate contact enable' (checked), 'Plate sensing force enabled' (unchecked), 'Plate sensing force' (15), 'Max allowed force' (400), and 'Drive force' (12). A 'MAX' label is also present next to the force settings.

- **Collision Retracts Enable**-Enables the collision retract feature that lifts the torch when plate contact has occurred while cutting. This feature is mainly used to protect torch consumables from hot slag emerging on top of the plate after piercing. Higher pierce height must be used to protect consumables while piercing. If Collision Retract activates all the time while cutting, check system for proper cutting speed, arc voltage and gas pressure. Note that on small radius holes while using lower speeds the slag might shoot up to the torch and retract the torch if this occurs and hole quality is more important than consumable life you can disable this feature.

10.5.) Advanced Tab (Cont'd.)-

Main	Marking	Advanced	I/O bits	Statistics	Service	Installation
High jog speed	<input type="text" value="1500.0"/>	mm/min	<div style="border: 1px solid red; padding: 5px;"><p>Collision retract enable <input type="checkbox"/></p><p>Collision retract height <input type="text" value="1.0"/> mm</p><p>Collision recovery delay <input type="text" value="1.0"/> s</p><p>Ohmic plate contact enable <input checked="" type="checkbox"/></p></div> <div style="border: 1px solid gray; padding: 5px;"><p>Plate sensing force enabled <input type="checkbox"/></p></div> <p style="text-align: right;">MAX</p> <p>Plate sensing force <input type="text" value="15"/> <input type="text" value="0"/></p> <p>Max allowed force <input type="text" value="400"/> <input type="text" value="74"/></p> <p>Drive force <input type="text" value="12"/> <input type="button" value="Reset"/></p>			
Low jog speed	<input type="text" value="300.0"/>	mm/min				
Adjust speed	<input type="text" value="3000.0"/>	mm/min				
Homing speed	<input type="text" value="600.0"/>	mm/min				
Find plate speed	<input type="text" value="600.0"/>	mm/min				
Plate contact release speed	<input type="text" value="60.0"/>	mm/min				
Main arc lost timeout	<input type="text" value="0.2"/>	s				
Collision rebound offset	<input type="text" value="0.1"/>	mm				
AVC sampling enable <input type="checkbox"/>						

- **Collision Retract Height**- This sets the height for the torch where it retracts to, after plate contact has occurred while cutting is active
- **Collision Recovery Delay**-This determines how long the torch will remain in the collision retract height until automatic height control is activated again
- **Ohmic Plate Contact Enable**-By using this function requires a connection between the torch shield cap and the voltage divider. This method is more accurate and sensitive than the Plate sensing by force. Ohmic plate contact enable should always be used as the main plate sensing feature if possible. This function is not usable when cutting under water.

Ohmic plate contact enable

10.6.) Input/Output Bits Tab or I/O Bits Tab-

This tab displays the status of various system signals for diagnostic purposes. I/O bits are separated to inputs (signals that come from other devices to iHC) and outputs (signals that go from the iHC to other devices).

The screenshot shows a software interface for monitoring I/O bits. At the top center is a tab labeled "I/O bits". Below it are two columns: "Input" on the left and "Output" on the right. Each column has a list of 13 items, each with a checkbox and a numerical label. The "Input" column items are: 1 Torch Collision, 2 Upper Limit Switch, 3 Plate Contact, 4 IHS Start, 5 Main Arc, 6 Marking, 7 Hold, 8 Up, 9 Down, 10 Laser pointer, 11 Motor power, 12 Maintain ARCV, and 13 Optional. The "Output" column items are: 14 System Error (Inverted), 15 Optional, 16 Sense 24V, 17 IHS Active, 18 Main Arc, 19 Marking, 20 Plasma start, 21 Stepper enable, 22 Stepper direction, 23 Stepper pulse, and 24 Laser pointer. The checkboxes for items 21, 22, and 23 in the "Output" column are filled with green. At the bottom right of the interface is a button labeled "Start plasma".

I/O bits	
Input	Output
<input type="checkbox"/> 1 Torch Collision	<input type="checkbox"/> 14 System Error (Inverted)
<input type="checkbox"/> 2 Upper Limit Switch	<input type="checkbox"/> 15 Optional
<input type="checkbox"/> 3 Plate Contact	<input type="checkbox"/> 16 Sense 24V
<input type="checkbox"/> 4 IHS Start	<input type="checkbox"/> 17 IHS Active
<input type="checkbox"/> 5 Main Arc	<input type="checkbox"/> 18 Main Arc
<input type="checkbox"/> 6 Marking	<input type="checkbox"/> 19 Marking
<input type="checkbox"/> 7 Hold	<input type="checkbox"/> 20 Plasma start
<input type="checkbox"/> 8 Up	<input checked="" type="checkbox"/> 21 Stepper enable
<input type="checkbox"/> 9 Down	<input type="checkbox"/> 22 Stepper direction
<input type="checkbox"/> 10 Laser pointer	<input checked="" type="checkbox"/> 23 Stepper pulse
<input type="checkbox"/> 11 Motor power	<input type="checkbox"/> 24 Laser pointer
<input type="checkbox"/> 12 Maintain ARCV	
<input type="checkbox"/> 13 Optional	

Start plasma

10.6.) Input/Output Bits Tab or I/O Bits Tab (Cont'd.)-

I/O bits

Input		Output	
<input type="checkbox"/>	1 Torch Collision	<input type="checkbox"/>	14 System Error (Inverted)
<input type="checkbox"/>	2 Upper Limit Switch	<input type="checkbox"/>	15 Optional
<input type="checkbox"/>	3 Plate Contact	<input type="checkbox"/>	16 Sense 24V
<input type="checkbox"/>	4 IHS Start	<input type="checkbox"/>	17 IHS Active
<input type="checkbox"/>	5 Main Arc	<input type="checkbox"/>	18 Main Arc
<input type="checkbox"/>	6 Marking	<input type="checkbox"/>	19 Marking
<input type="checkbox"/>	7 Hold	<input type="checkbox"/>	20 Plasma start
<input type="checkbox"/>	8 Up	<input checked="" type="checkbox"/>	21 Stepper enable
<input type="checkbox"/>	9 Down	<input type="checkbox"/>	22 Stepper direction
<input type="checkbox"/>	10 Laser pointer	<input checked="" type="checkbox"/>	23 Stepper pulse
<input type="checkbox"/>	11 Motor power	<input type="checkbox"/>	24 Laser pointer
<input type="checkbox"/>	12 Maintain ARCV		
<input type="checkbox"/>	13 Optional		

Start plasma

10.6.) Input/Output Bits Tab or I/O Bits Tab (Cont'd.)-

Inputs-

- 1.) **Torch Collision-** This issued in case the lifter has a breakaway/collision sensor, signals from the sensor can be wired into Torch Collision input. Torch Collision will activate System Error output to CNC.
- 2.) **Upper Limit Switch-** Is used to find home position when iHC is turned on.
- 3.) **Plate Contact-** This inbit becomes active on plate contact during IHS or cutting sequence.
- 4.) **IHS Start-** This inbit from CNC becomes active when the IHS sequence starts.
- 5.) **Main Arc-** This inbit from plasma which indicates plasma arc has ignited.
- 6.) **Marking-** This inbit to put height controller to marking mode.
- 7.) **Hold-** This turns off when hold inbit turns active. Hold is used during cutting to prevent the torch from diving into the plate when movement slows down i.e.: during tight corners.
- 8.) **Up-** This inbit from CNC that moves the torch up.
- 9.) **Down-** This inbit from CNC that moves the torch down.
- 10.) **Laser pointer-** This inbit from CNC to turn on the laser pointer output.
- 11.) **Motor power-** This inbit telling is the motor power turned ON.
- 12.) **Maintain ARCV-** This reserved for future use.
- 13.) **Optional-** This is reserved for future use.

10.6.) Input/Output Bits Tab or I/O Bits Tab (Cont'd.)-

Outputs-

I/O bits	
Input	Output
<input type="checkbox"/> 1 Torch Collision	<input type="checkbox"/> 14 System Error (Inverted)
<input type="checkbox"/> 2 Upper Limit Switch	<input type="checkbox"/> 15 Optional
<input type="checkbox"/> 3 Plate Contact	<input type="checkbox"/> 16 Sense 24V
<input type="checkbox"/> 4 IHS Start	<input type="checkbox"/> 17 IHS Active
<input type="checkbox"/> 5 Main Arc	<input type="checkbox"/> 18 Main Arc
<input type="checkbox"/> 6 Marking	<input type="checkbox"/> 19 Marking
<input type="checkbox"/> 7 Hold	<input type="checkbox"/> 20 Plasma start
<input type="checkbox"/> 8 Up	<input checked="" type="checkbox"/> 21 Stepper enable
<input type="checkbox"/> 9 Down	<input type="checkbox"/> 22 Stepper direction
<input type="checkbox"/> 10 Laser pointer	<input checked="" type="checkbox"/> 23 Stepper pulse
<input type="checkbox"/> 11 Motor power	<input type="checkbox"/> 24 Laser pointer
<input type="checkbox"/> 12 Maintain ARCV	
<input type="checkbox"/> 13 Optional	

Start plasma

10.6.) Input/Output Bits Tab or I/O Bits Tab (Cont'd.)-

Outputs-

- 14.) **System Error (Inverted)**- This can be connected to CNC controller's external stop.
- 15.) **Optional**- Reserved for future use.
- 16.) **Sense Relay 24VDC**- Output for voltage divider board.
- 17.) **IHS Active**- This output which is active from the time IHS Start turns active until Ignition Height has been reached.
- 18.) **Main Arc**- This output to CNC which becomes active when the main arc inhibit is activated and the transfer delay has passed.
- 19.) **Marking**- This output to turn ON the marking output.
- 20.) **Plasma Start**- This output to turn on the plasma start output.
- 21.) **Stepper Enable**- This step motion enabled/disabled.
- 22.) **Stepper Direction**- DIR signal active.
- 23.) **Stepper Pulse**- Step pulse signal active.
- 24.) **Laser pointer**- The output to turn ON the laser pointer output.

10.7.) Installation Tab-

Note! These parameters are password protected. Some parameters are the same as on the Advanced Tab.

Installation

Encoder pulse edges per meter	<input type="text" value="1280000"/>	Plate contact release speed	<input type="text" value="60.0"/> mm/min
Full speed	<input type="text" value="7000.0"/> mm/min	Adjust speed	<input type="text" value="3000.0"/> mm/min
Home distance	<input type="text" value="-2.0"/> mm	Up limit timeout	<input type="text" value="20.0"/> s
Manual acceleration	<input type="text" value="0.10"/> g	Main arc lost timeout	<input type="text" value="0.2"/> s
Manual deceleration	<input type="text" value="0.30"/> g	Upper soft limit distance	<input type="text" value="5.0"/> mm
Machine acceleration	<input type="text" value="0.10"/> g	Lower soft limit distance	<input type="text" value="-212.0"/> mm
Machine deceleration	<input type="text" value="0.50"/> g	Reference position error limit	<input type="text" value="2.0"/> mm
Homing speed	<input type="text" value="600.0"/> mm/min	Voltage gain	<input type="text" value="20"/>
Out of limit speed	<input type="text" value="180.0"/> mm/min	P-Gain	<input type="text" value="60"/>
Torch collision polarity inverted	<input checked="" type="checkbox"/>	iHC starts plasma	<input checked="" type="checkbox"/>
Use collision for plate sensing	<input checked="" type="checkbox"/>	Pre Plasma Start	<input type="checkbox"/>
Multiple ignitions enabled	<input checked="" type="checkbox"/>		

10.7.) Installation Tab (Cont'd.)-

- **Encoder pulse edges per meter-** Determines by the type of encoder and the threaded shaft of the lifter.
- **Full Speed-** The maximum speed of the lifter. Full Speed is used above Slow Down Height.
- **Home Distance-** The distance of the home position from the limit switch.
- **Manual Acceleration & Manual Deceleration-** Used on jog, when AVC is on.
- **Machine Acceleration & Machine Deceleration-** Used when the software drives the lifter.
- **Homing Speed-** The speed used in the homing process.
- **Out Of Limit Speed-** The speed used when the torch is moving out of limit switch.
- **Plate Contact Release Speed-** The speed used when driving out of plate until contact is released.
- **Adjust Speed-** Used in arc-voltage control process to determine the maximum control speed of the lifter
- **Up Limit Timeout-** When moving up, the torch halts after this timeout if the limit switch is not found.
- **Main Arc Lost Timeout-** Typically 0.1s to avoid losing the cut without real cause.
- **Hold OFF AVC Delay-** Additional delay after Hold OFF which can be useful after piercing and in corners.

10.7.) Installation Tab (Cont'd.)-

- **Upper Soft Limit Distance-** Upper soft limit which is located above the limit switch. The position of the upper soft limit is determined by adding the Upper Soft Limit Distance to the position of the limit switch.
- **Lower Soft Limit Distance-** Lower soft limit which is located below the plate. The position of the lower soft limit is determined by subtracting the Lower Soft Limit Distance from the position of the limit switch. Lower soft limit is supposed to be determined so that short motion below table surface is allowed but limiting the lifter from hitting the hard stop of the lifter.
- **Reference Position Error Limit-** If there is a cumulative error in the position of the limit switch, the Reference Position Error Limit determines how large of an error can be tolerated. If the Reference Position Error Limit is exceeded, the torch performs homing
- **Voltage Gain-** Determines how much force the system uses to correct the difference between the actual voltage and the target voltage.
- **P-Gain-** Used to tune the movement. Too large of a value can cause the lifter to oscillate and too small of a value makes the movement soft and inaccurate.
- **I-Gain-** Used to fine-tune the movement of the lifter.
- **Torch collision polarity inverted-** Select NC or NO use of a collision sensor.

10.8.) Parameter Limits-

Parameter Name	Default	MIN.	MAX.
Adjust Speed	3000mm/min	60	18000
Collision recovery delay	1 Second	0	10 Seconds
Collision retract height	1mm	0	100mm
Cut height	1mm	1mm	50mm
Cut height AVC delay	0,2 Seconds	0	10 Seconds
Manual acceleration	0.3g	0.3g	5g
Manual deceleration	0.3g	0.3g	5g
Encoder pulses per meter	500000p/m	0	2 [^] 31
Find plate speed	600mm/min	60	5000
Full speed	6000mm/min	60	50000
High jog speed	3000mm/min	60	20000
Hold off AVC delay	0	0	10
Hold off limit	8	0	100
Hold on limit	10	0	100
Home distance	-2	-100	100
Homing speed	2000	60	20000
I-Gain	0	0	2 [^] 31
Ignition height	2	1	50
Low jog speed	300mm/min	120	10000
Lower soft limit distance	-1000	-1000	0
Machine acceleration	0.1g	0.3	5
Machine deceleration	0.3g	0.3	5
Out of limit speed	180mm/min.	60	2000
P-Gain	80	0	2 [^] 31
Pierce down time	0s	0	10
Pierce height	2mm	1	50
Pierce height time	1s	0	10
Plate contact release speed	60mm/min	60	10000
Reference position error limit	5	0.05	20.4
Slow Down Height	50mm	0	500
Touch Current Limit	10s	0	20
Transfer Height	50mm	0	500
Transfer Height Timeout	10s	0	20
Up Limit Timeout	20s	1	120
Upper Soft Limit Distance	5mm	0	1000
Voltage Gain	10	1	256

11.) NEST-

ProMotion® Nest-

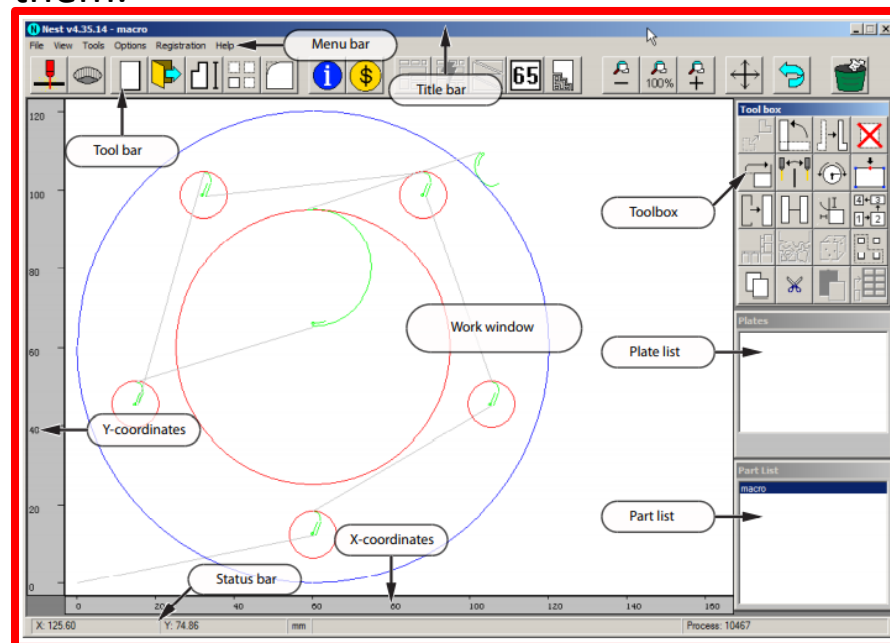
ProMotion® Nest is a software which converts CAD pictures (DXF format) to cutting programs. It is also possible to modify existing cutting programs (EIA, ESSI or CNC-2 format).

Basics-

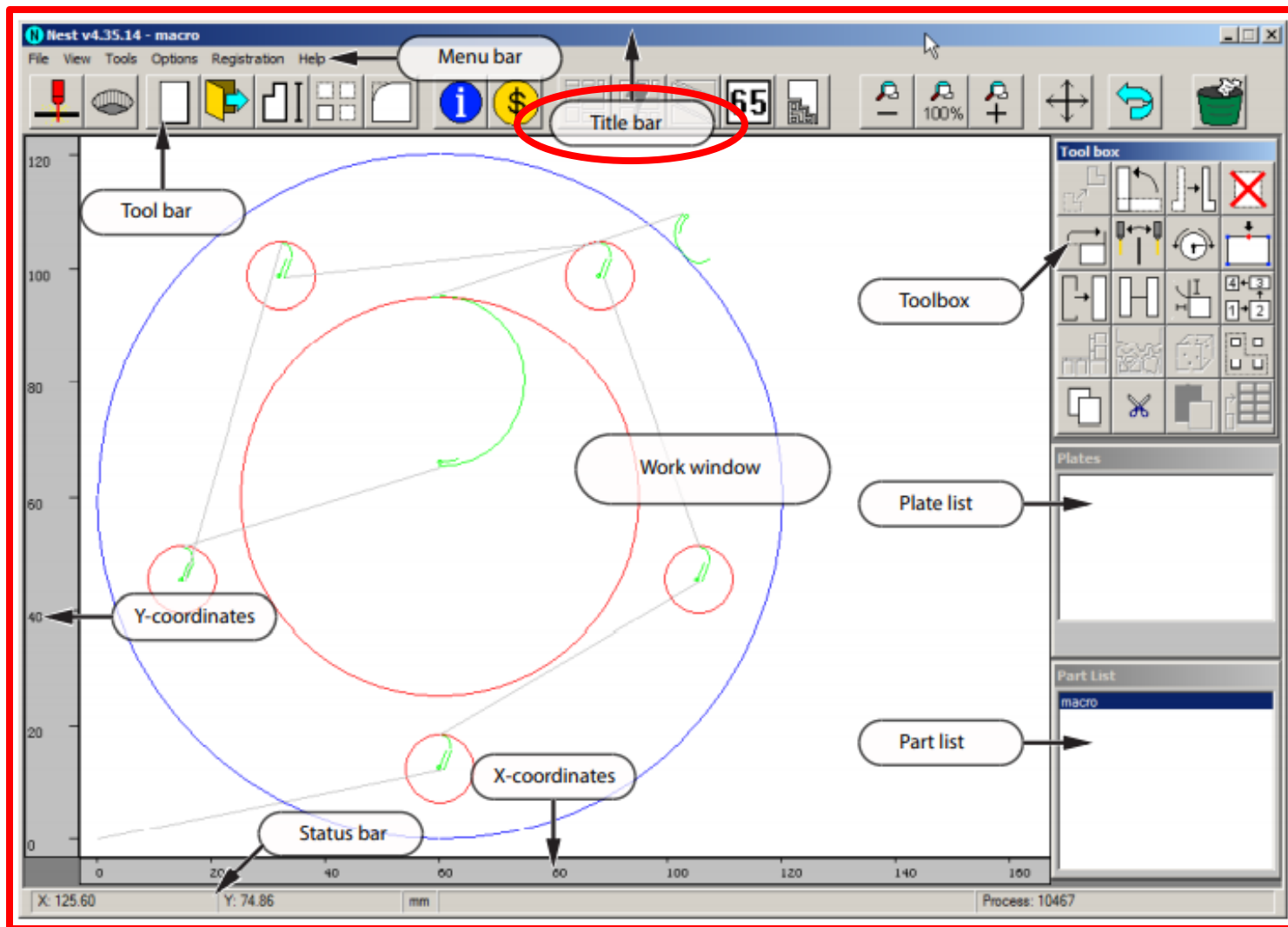
When ProMotion® Nest loads a CAD picture it adds cutting technology (kerf side, piercing points, cutting order, etc.) to shapes automatically. If you want, you can easily change any of those settings. Copy the shapes to a plate, nest, set cutting order, etc. and either send the cutting program to ProMotion® Cut or save it for later use.

ProMotion® Nest user interface-

ProMotion® Nest user interface is a collection of several small windows, buttons, and bars. Below is a brief description of all of them.



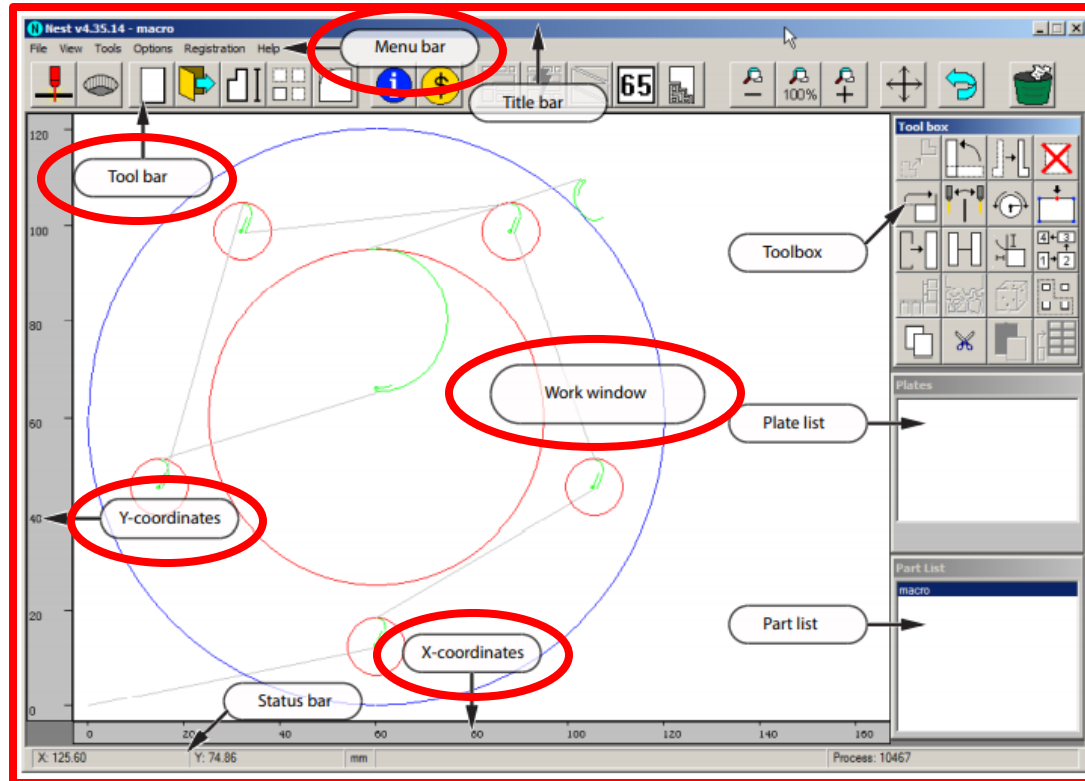
11.) NEST (Cont'd.)-



Title Bar-

The Title Bar is at the top of the ProMotion® Nest window. It contains the version number, the name of the registered user and the name of the active job.

11.) NEST (Cont'd.)-



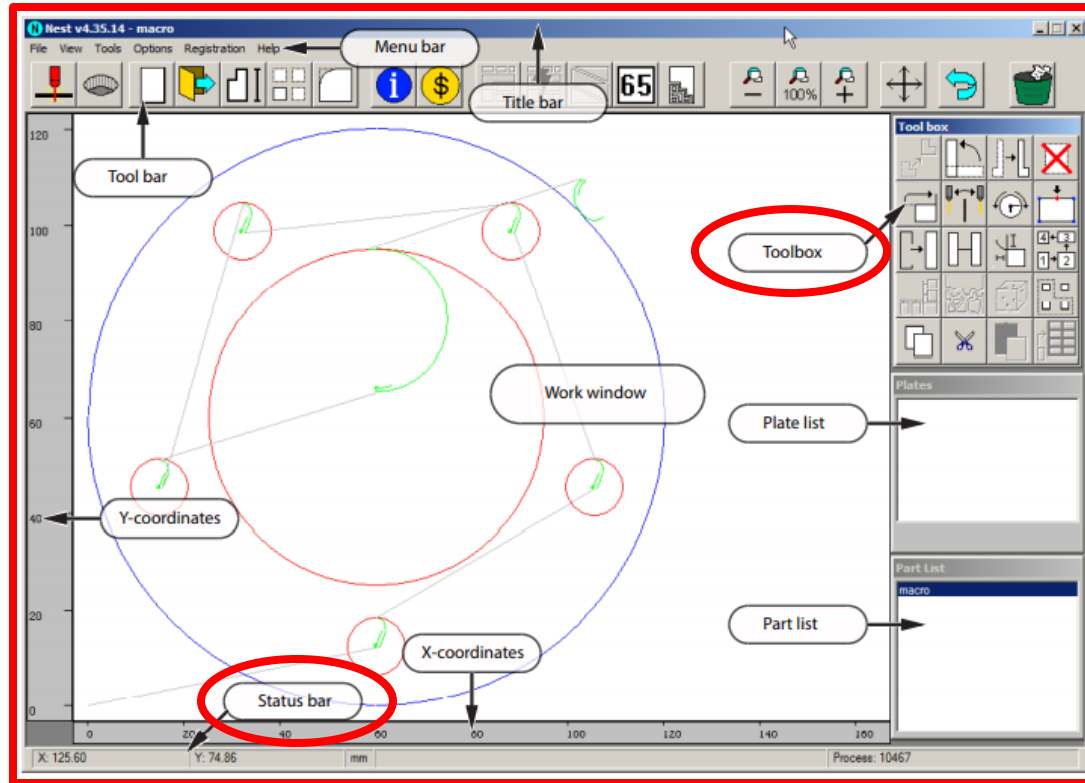
Menu Bar- The Menu Bar lies just below the Title Bar and allows you to choose one of the following: File Menu View Menu Tools Menu Options Menu Registration Menu Help Menu

Toolbar- The Toolbar lies just below the menu bar. The Toolbar contains buttons for quick access to most of the important tools of ProMotion® Nest (i.e.: load, save, macros). See more at chapter Toolbar.

Work Window-The Work Window is the large white area in the middle of the screen. The Active Job is displayed here, and editing is also done here.

Coordinates: Y-Coordinates are displayed on the left side of the work window and **X-Coordinates** are just below the work window.

11.) NEST (Cont'd.)-



Status Bar-The Status Bar lies at bottom of the ProMotion® Nest window. The Status Bar displays messages and hints from ProMotion® Nest . It also displays the current coordinates of the mouse cursor, when it is on in the work window.

Toolbox-The Toolbox is located at the top right corner of the ProMotion® Nest window. It contains buttons for most editing tools. - 3 - © 1997 - 2012 Victor Technologies ProMotion® Nest ProMotion® Nest v4.32.

11.) NEST (Cont'd.)-

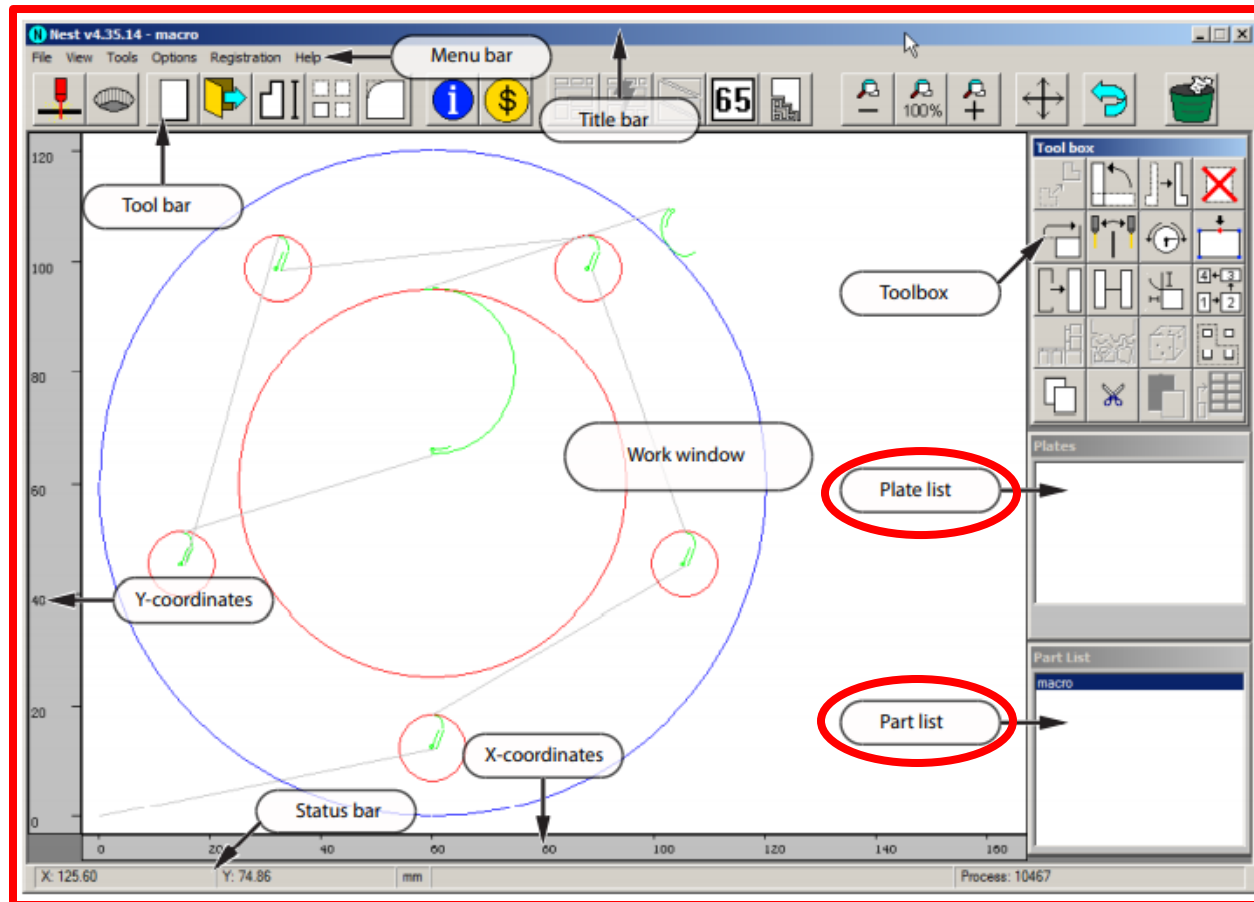
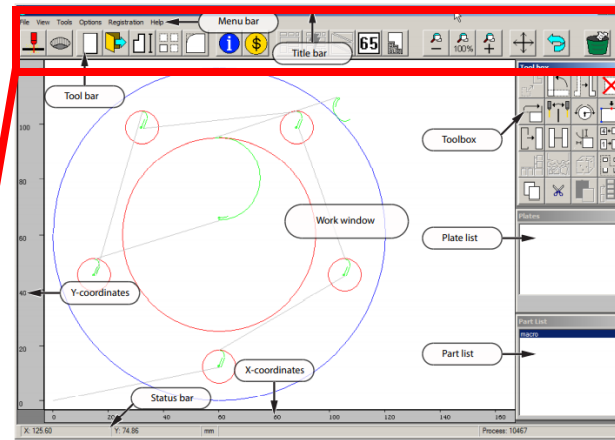


Plate List-The Plate List is located just below of the toolbox. The Plate List contains a list of all plates loaded to ProMotion® Nest. See “Plate list” for more information.

Part List-The Part List is located at the bottom right corner of the ProMotion® Nest window. The Part List shows all the shapes loaded to ProMotion® Nest. See “Part List” for more information.

11.1.) Toolbar -

ProMotion® Nest toolbar looks like this:

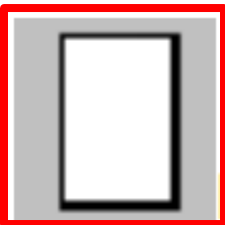


Here is a brief description of each tool:

Send to Cutting- Sends the current nesting to ProMotion® Cut and activates it.

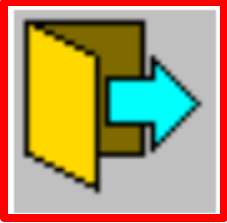


New Plate-Creates a new plate. See more info at topic New Plate under File Menu.



11.1.) Toolbar & Functions (Cont'd.)-

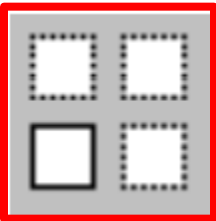
File Open- Opens a CNC or a DXF file.



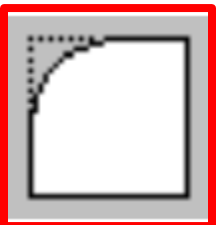
Macro Starts the Macro Tool. See more info at topic Macro under File Menu.



Rows and Columns Multiplies part or parts. See more info at topic Rows and Columns.



MicroCAD-Starts the MicroCAD tool. See more info at topic MicroCAD.



11.1.) Toolbar & Functions (Cont'd.)-

Nest Info Activates the Nest Info window. See more info at topic Nest Info.



Cost Calculator-Activates the Cost Calculator tool. See more info at topic Cost Calculator.



Nest-Automatic nesting. See more info at topic Nest.



Feed Rates- Add feed rates to your cutting program. See more info at topic Feed Rates.



11.1.) Toolbar & Functions (Cont'd.)-

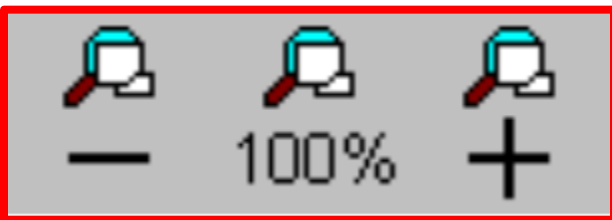
Optimized Holes-Add optimized cutting parameters for holes to get best possible cutting quality. Requires ProMotion® Optimizer software.



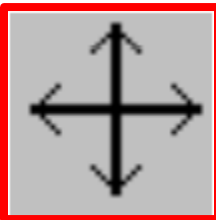
Plate Editor-Edit the plate with this tool. See more at chapter Plate Editor.



Zooming- See more at Zooming.



Pan-You can pan the view by moving the mouse cursor over the work window and pressing the left mouse button or keep your mouse wheel button pressed in to pan.



11.1.) Toolbar & Functions (Cont'd.)-

Undo-Undoes the last editing you made for the current nesting.



Trash-Trashes the current nesting.



11.2.) Toolbar Functions-

NOTE! This tool works only on ProMotion® iCNC controllers.

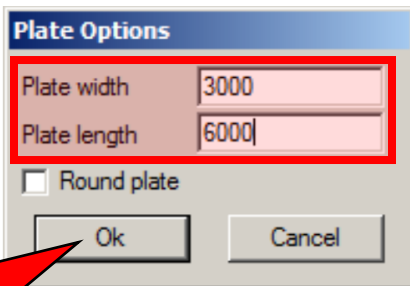
1.) Send to Cutting-



When the nesting is ready for cutting click this button to send it to ProMotion® Cut.

2.) New Plate-

When you activate this tool, a window appears asking the length and width of the new plate.

A dialog box titled "Plate Options" with a blue header. It contains two input fields: "Plate width" with the value "3000" and "Plate length" with the value "6000". Below these fields is a checkbox labeled "Round plate" which is currently unchecked. At the bottom are "Ok" and "Cancel" buttons. A red arrow points to the "Ok" button.

Insert the values, **“Click Ok”** and a new empty plate appears. The name of the plate appears in the Plate List. To create round plates simply check the round plate option and enter the diameter of the circle.

11.2.) Toolbar Functions (Cont'd.)-

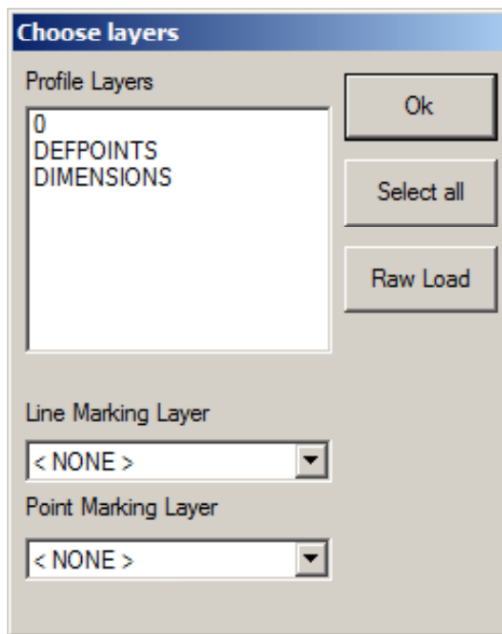
Open-



Opens a File. ProMotion® Nest can open DXF, EIA, ESSI, CNC-2 and DSTV files.

If you load a file that is in DXF-format and that file includes more than one layer, ProMotion® Nest will ask you to select which layers are loaded to the nesting.

DXF-Files:



If there are line and/or point markings in the DXF-file, they must be in their own separate layers. Line and point marking layers are chosen in the same dialog as the profile layers. In the example above the layer “PROFILES” is selected for containing the profiles. The layer “POWDER” is selected as line marking layer and there is no selected point marking layer.

Select all loads all layers to the nesting.

To speed up the loading process and to cut off all auxiliary elements (like measure lines) ProMotion® Nest starts to load elements from the DXF file after it has found a certain keyword from the file. Sometimes there is a need to load elements before that keyword. Raw Load is made for cases like this. It loads every possible element from the DXF file to your nesting.

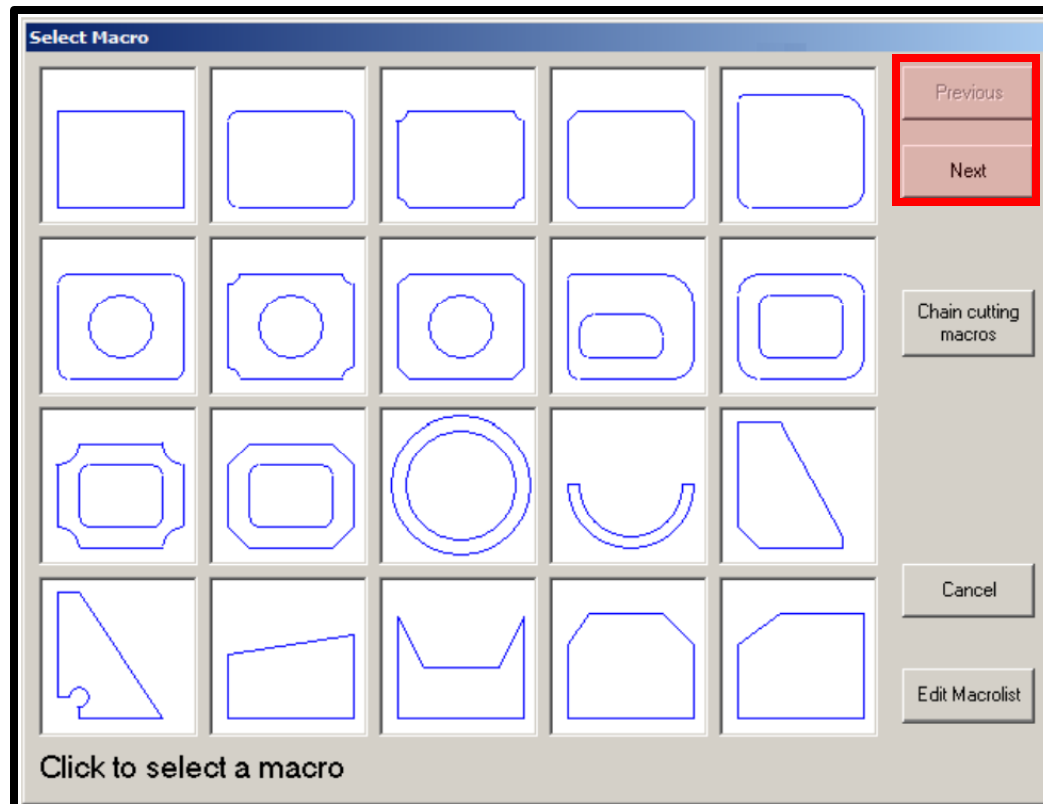
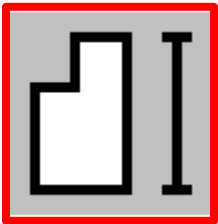
11.2.) Toolbar Functions (Cont'd.)-

Other files:

- ESSI and EIA files do not have any layers to choose. Just make sure that your options are set correctly.
- See also Line and point marking.
- Opening DSTV-files is an optional module.

Macro Shapes-

When you select this tool, the macro list window opens. This window displays small images of the available macros. There are only 20 macros displayed at a time, but you can see more macros by choosing **“NEXT” and “PREVIOUS”**.



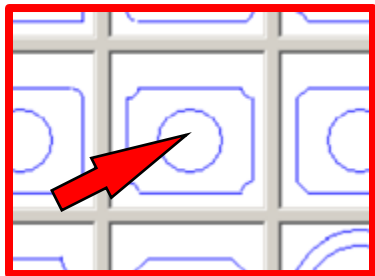
11.2.) Toolbar Functions (Cont'd.)-

Creating a New Shape with Macros-

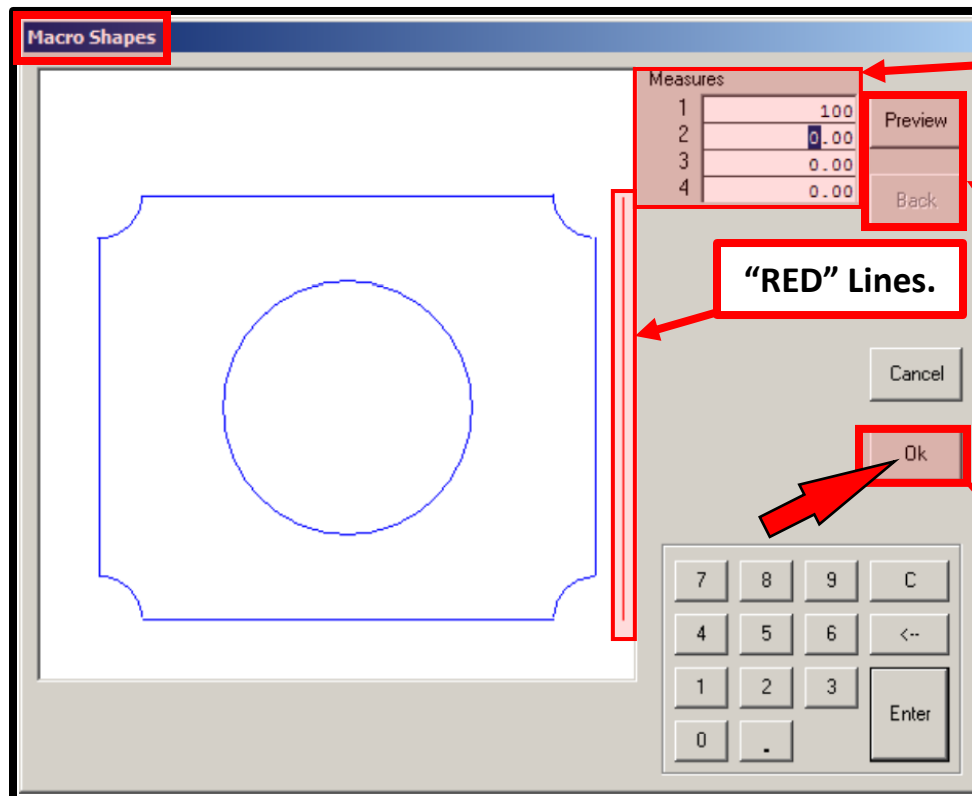
NOTE! You can input numbers by using the number pad or the wheel of your mouse.

- 1.) Select the Macro you want by double-clicking it. The window below opens.
- 2.) Enter your measurements in the boxes provided.

In the picture on the left side of the window you can see the shape and red lines. Those red lines are measure lines, and they show you which measurement you are entering. When you have entered all the measurements, you can preview the shape by choosing **“PREVIEW”**. If you want to change the measurements after you have previewed them, simply choose **“BACK”**, and adjust your measurements. When you are satisfied, choose **“OK”** and the shape appears in ProMotion® Nest’s work window.



1.) Select the Macro you want by double-clicking image.



2.) Enter your measurements in the boxes provided.

“RED” Lines.

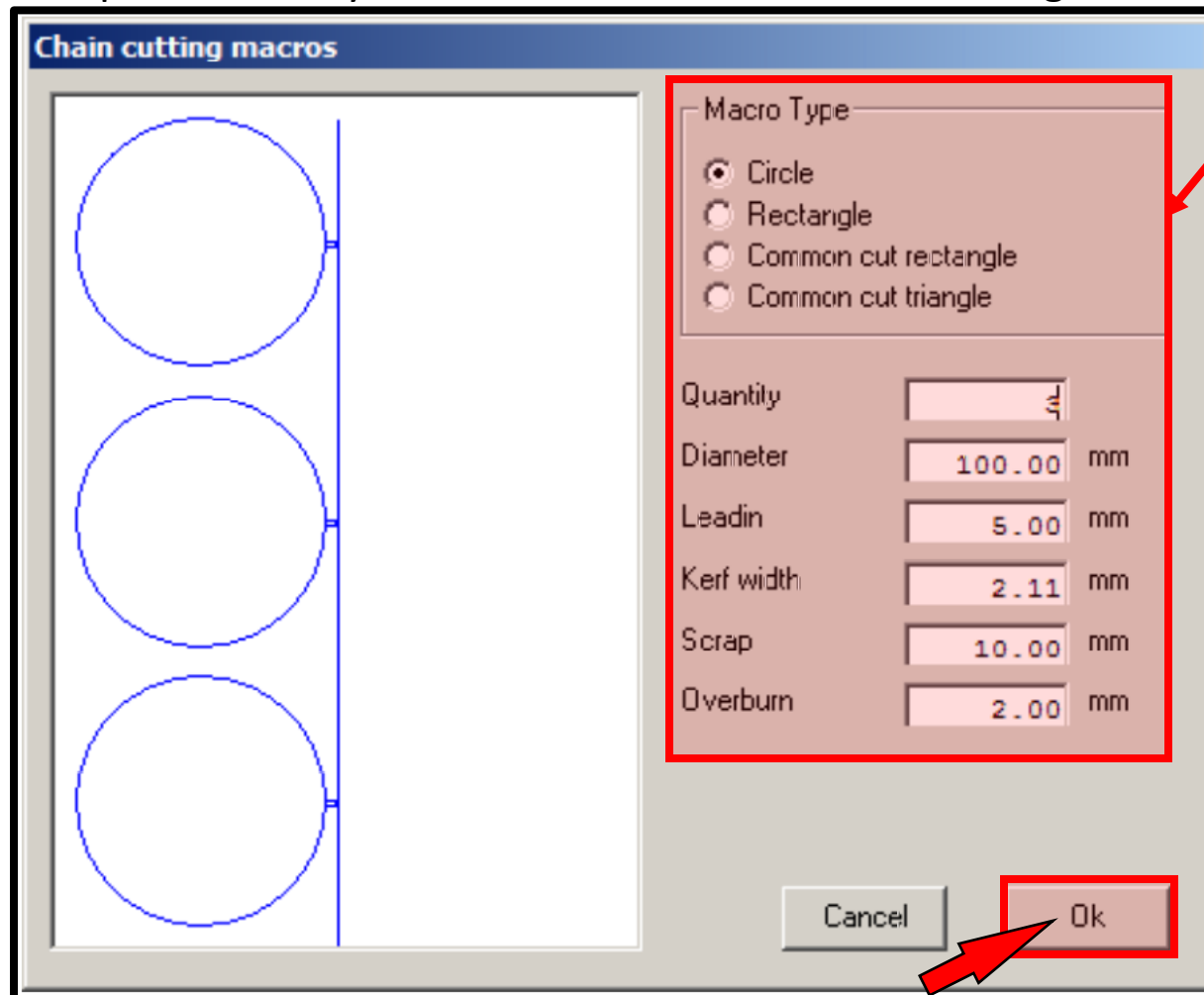
Select “Preview”, if macro is not acceptable, select “Back”.

Select Preview, if macro acceptable, select **“OK”**.

11.3.) Chain Cutting Macros-

Chain cutting macros are simple shapes - circles, triangles, and rectangles - which are cut in a single line with just one piercing. It is also possible to make common cut shapes, where two rectangles or triangles have one mutual side.

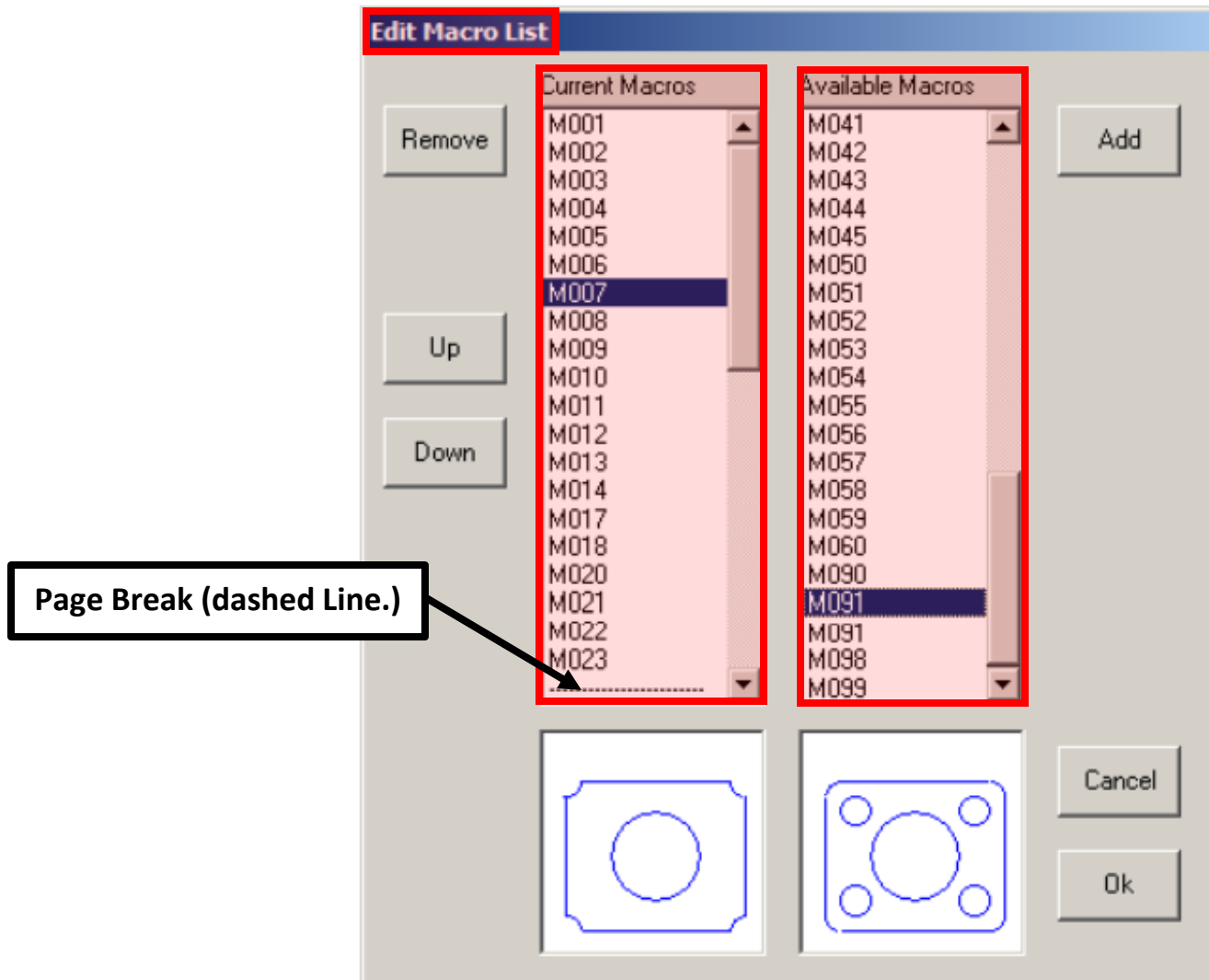
Using chain cutting macros is simple. Just **insert the correct parameter values and click "OK"**. When you change the parameters, you can see the effect of those changes immediately in the preview area.



Insert the correct parameter values and click "OK".

11.4.) Editing the Macro List-

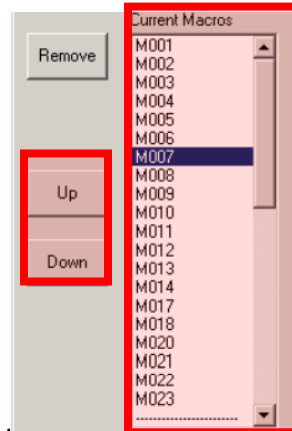
Choose **“EDIT MACRO LIST”** in the first window to open the macro list edit window. The list **“CURRENT MACROS”** shows the macros currently in the list. The list **“AVAILABLE MACROS”** shows all the macros, which you can add to the macro list. The **dashed line** in the **“CURRENT MACROS”** list shows where the page break is. There can be only 20 macros visible in any time in the macro list.



11.4.) Editing the Macro List (Cont'd.)-

How to change the order of macros in the Macro List:

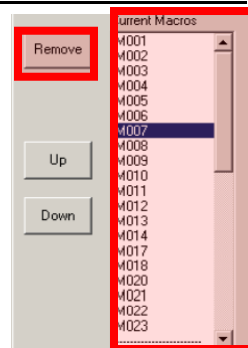
- Select one of the macros in the list **“CURRENT MACROS”**. The macro you selected is displayed in the small picture box just below the list.



- Choose “UP” to move the selected macro one step towards the beginning of the list.
- Choose “DOWN” to move the selected macro one step towards the end of the list.

How to remove a macro from the Macro List:

- Select one of the macros in the list **“CURRENT MACROS”**. The macro you selected is displayed in the small picture box just below the list.

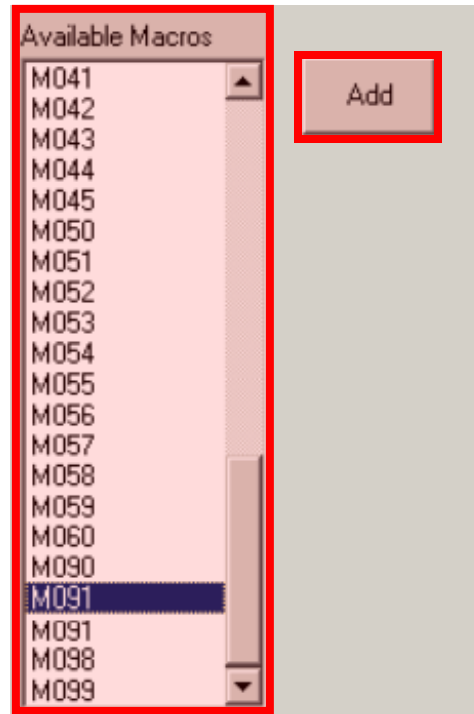


- Choose “REMOVE” and the macro you selected is removed from the list.

11.4.) Editing the Macro List (Cont'd.)-

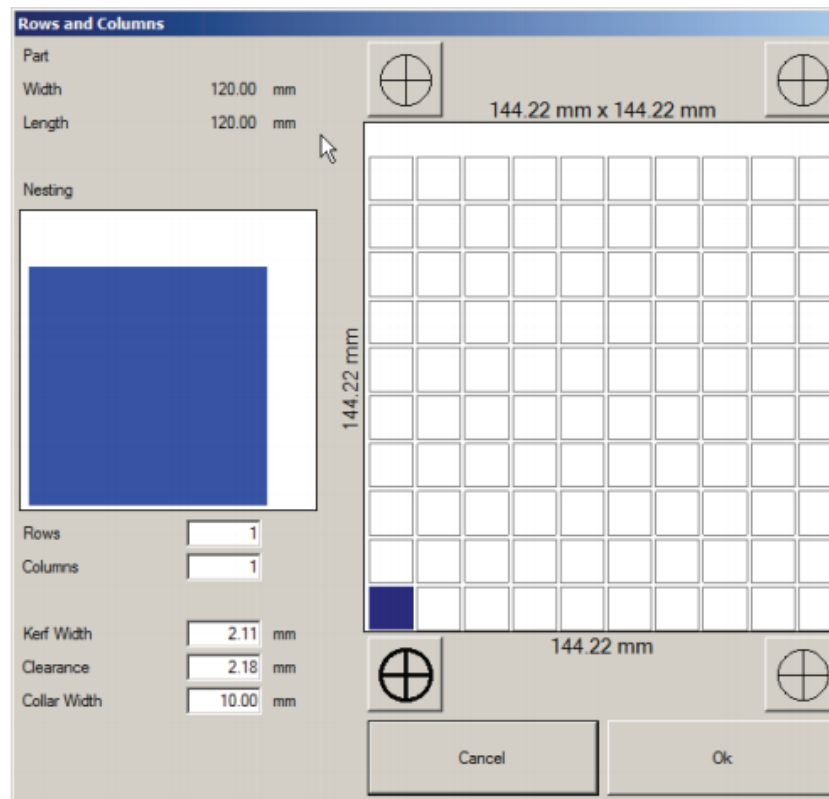
How to add a macro to the Macro List:

- Select one of the macros in the list **“AVAILABLE MACROS”**. The macro you selected is displayed in the small picture box just below the list.



- Choose **“ADD”** and the macro you selected is added to the end of the list.

11.5.) Rows and Columns (Cont'd.)-



Rows-defines how many rows of copies there will be.

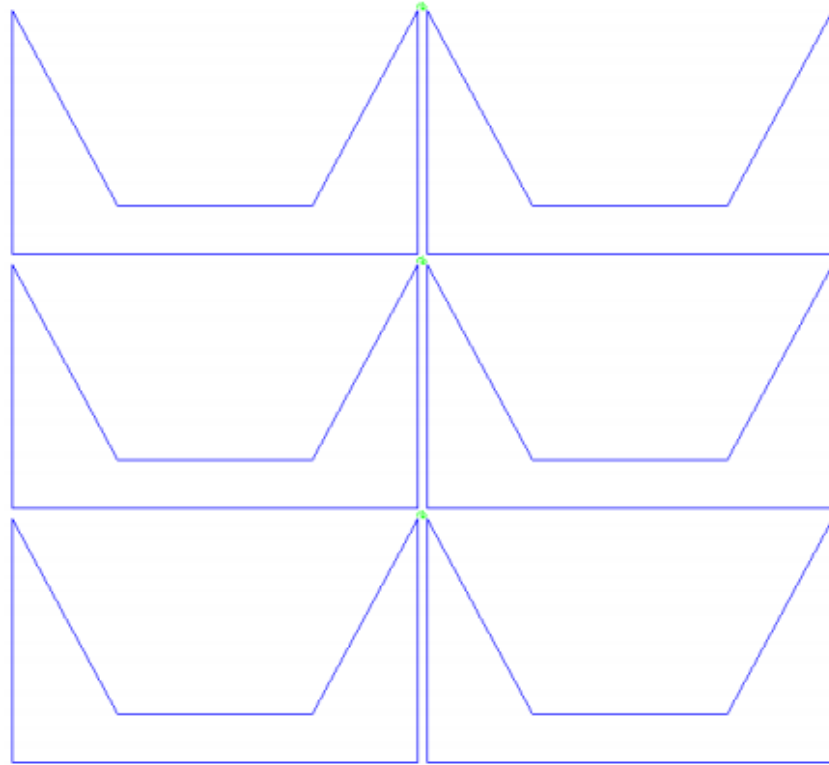
Columns- defines how many columns of copies there will be.

Kerf Width-The minimum kerf width is zero.

Clearance and kerf width define the distance between copies. The distance is clearance + 2 x kerf width. The clearance may also be negative, if you want to copy the parts closer to each other.

Hint: If you need different clearance values in "X" and "Y" directions, then do the Columns first (Rows = 1, Columns = n) and then the rows (Rows = m, Columns = 1). This way you will get (m x n) copies. Please see the below picture as an example of negative "Y" clearance.

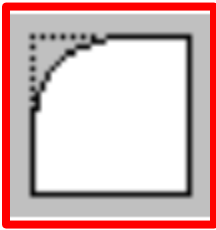
11.5.) Rows and Columns (Cont'd.)-



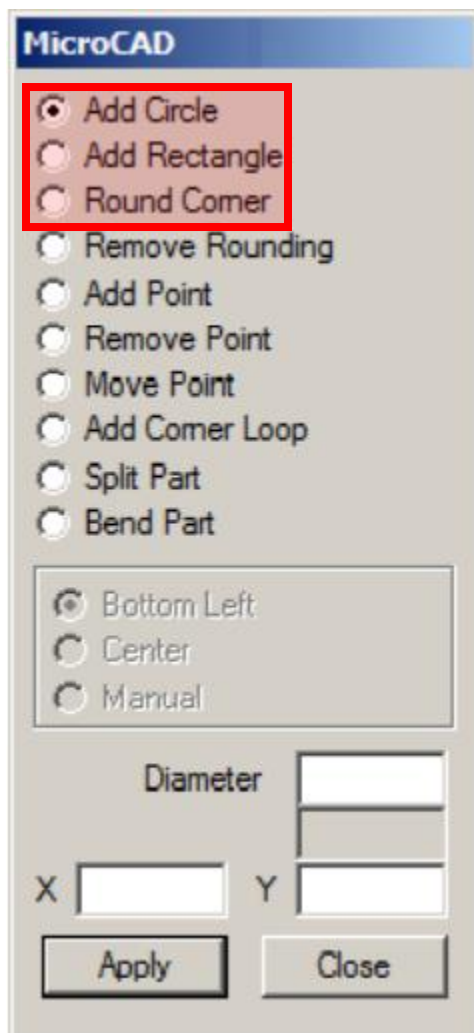
Collar width is an extra distance that is left on the edges of the nesting. This is used to avoid the edges of plate which may not be of good quality. For example, if you have roughly a 50" x 50" plate, but the edges are not perfectly straight, then you can set the collar as 1" and the usable area is then 48" x 48". The minimum collar is zero, but if the clearance is greater than the collar, then the clearance is used as the collar. Required area shows the minimum width and length of the plate that the current parts need when multiplied and used the given parameters kerf, clearance, and collar. You can either type in a number to rows/columns or click the on the grid to create desired number of copies. The crosshairs define the 0-reference point for the parts.

NOTE! Kerf, clearance, and collar are the same that are in the Nesting Options. If you change them here, their values are applied to the nesting options as well. The only exception is the clearance. If the clearance is negative here, automatic nesting still uses zero as the minimum clearance.

11.6.) MicroCAD-



Use this tool to edit profiles. The tools are described below.



Add Circle-

Type the diameter and the coordinates of the center point to the corresponding text fields. Click Apply and the circle is added to the shape. The new circle will be the first one in the cutting order.

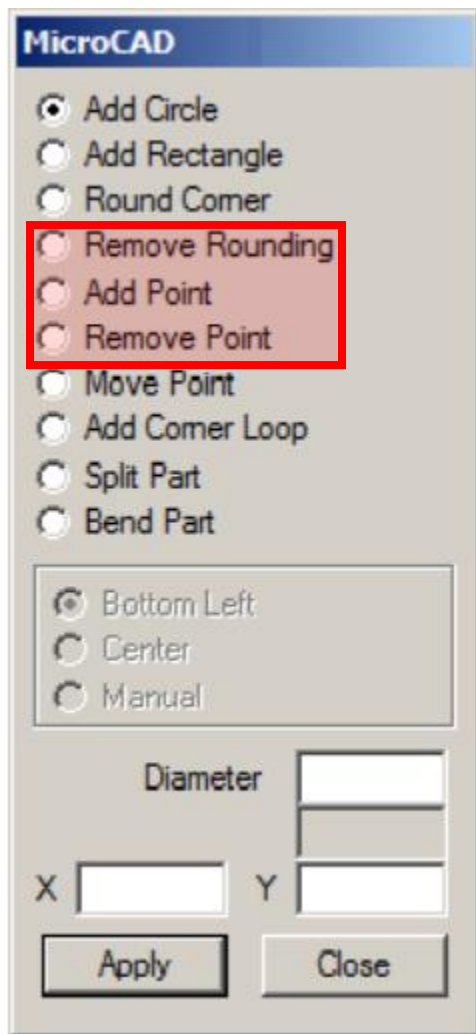
Add Rectangle-

First choose the center point or the bottom left corner of the rectangle. Enter the length, width, and the coordinates in the corresponding text fields. Click Apply and the rectangle is added to the shape. The new rectangle will be the first one in the cutting order.

Round Corner-

Insert the radius of the rounding to the Radius text field and click Apply to verify the radius. Moving the cursor over a corner changes the cursor to a cross. Click the corner and it will be rounded with the radius you just set.

11.6.) MicroCAD (Cont'd.)-



Remove Rounding-

Changes arcs to two (2) lines. Move the mouse cursor over an arc and it changes to a cross. Click to remove rounding.

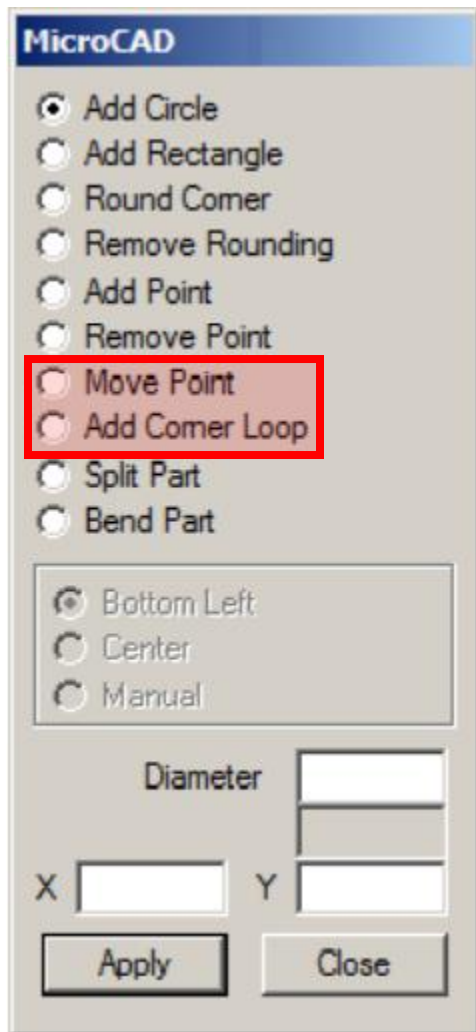
Add Point-

Adds points (lines) to a shape. If the shape contains open profiles, the line is drawn from the last point of the first open profile to the point you added. If there are no open profiles, then new line (and profile) is created from the 0,0 point to the point you added. Adding new points is simple. Just type in the coordinates and click Apply.

Remove Point-

Removes single points from a profile. Move the mouse cursor over a point and it changes to a cross. Click and the point is removed. If the point was the last or the first point of the profile, then the entire element is removed, otherwise the previous and the next point relate to a line.

11.6.) MicroCAD (Cont'd.)-

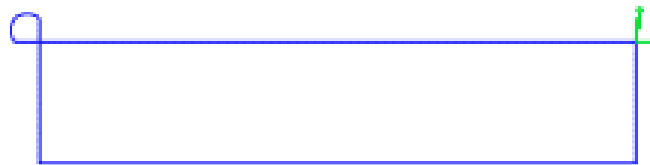


Move Point-

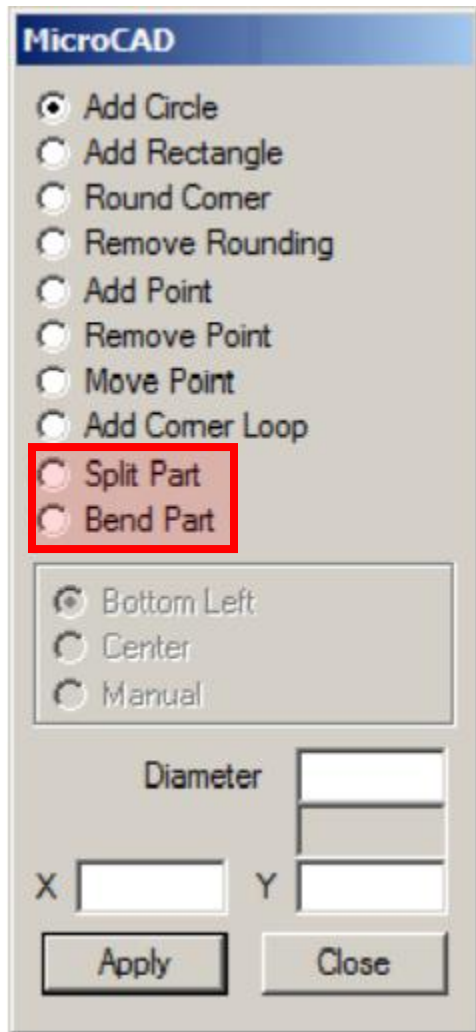
This tool moves a point to another location. Click a point to select it (a small box appears over the point). Enter the new coordinates to the coordinate fields and click Apply. The point moves to the new location.

Add Corner Loop-

This tool adds a loop to a corner. First select the radius of the loop and then left click the corner where you want the loop. Loops like this make it possible to cut very sharp corners.



11.6.) MicroCAD (Cont'd.)- Split Part-



This tool splits parts. Select the option and insert parameters if required, then apply and click the part you want to split. There are three options to split parts.

1.) Equal Length: Use this option to split part equally to a given number of parts.

2.) Max Length: This option splits the part maximizing the length of new parts. The max length of new parts is given as parameter.

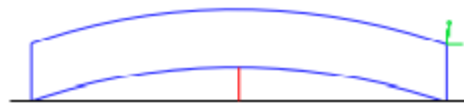
3.) Manual: Use this option to manually split parts. Hold the left mouse button down and draw a line across the part and then release the button. The part is split along that line you drew.

Bend Part-

This tool bends a rectangular part. Set the bending value, apply, and then click on the part to bend it.



The bending value is the height of the arc at its highest (center) point as shown in the picture above. Bending value is displayed as the red line. If there are any holes inside the part they are shifted accordingly, but they are not bent.



NOTE! This tool can bend rectangles only. Any other shapes are bent incorrectly or not at all.

11.7.) Nestinfo-



NestInfo displays information about the current nesting. NestInfo contains following information:

Plate-

- **Plate Name** - The name of the current plate.
- **Area** - The area of the plate. (Square foot or square meters)
- **Plate Width**-(inches or millimeters)
- **Plate Height**-(inches or millimeters)
- **Collar Width**- This is defined in Nesting Options.(inches or millimeters)
- **Net Usage (%)**- The relation between the parts area and the plate area in percentage.

Nesting Info

Plate	
Plate Name	Default
Area	1.50
Plate width	1000.00
Plate length	1500.00
Collar Width	10.00
Net usage (%)	???

Parts	
Parts nested	32
Nest width	974.00
Nest height	426.00
Parts area	???
Piercings	54

Buttons: Calculate Area, Edit Info, Save Info, Close

Nominal Areas

Parts	0.30
Used Plate	0.44
Nominal Usage (%)	68.69
Real Usage (%)	???

Info

Empty text area for additional information.

- **Parts Nested**- The number of parts in the nesting.
- **Nest Width**- The width of the nesting.
- **Nest Height**- The height of the nesting.
- **Parts Area**- The total area of all parts. (Square Foot or Square Meters)
- **Piercings**- The number of the piercing points in the nesting.

Nesting Info

Plate		Parts	
Plate Name	Default	Parts nested	32
Area	1.50	Nest width	974.00
Plate width	1000.00	Nest height	426.00
Plate length	1500.00	Parts area	???
Collar Width	10.00	Piercings	54
Net usage (%)	???		

Buttons: Calculate Area, Edit Info, Save Info, Close

Nominal Areas

Parts	0.30
Used Plate	0.44
Nominal Usage (%)	68.69
Real Usage (%)	???

Info

11.7.) Nestinfo (Cont'd.)-

Nominal Areas-

- **Parts-** The total of all parts' nominal sizes.
- **Used Plate-** Nominal size of used plate.
This is exactly (nest width + 2 x collar width) x (nest height + 2 x collar width).
- **Nominal Usage (%)**- The relation between nominal size of all parts and used plate.
- **Real Usage (%)**- The relation between real area of all parts and used plate.

Plate		Parts	
Plate Name	Default	Parts nested	32
Area	1.50	Nest width	974.00
Plate width	1000.00	Nest height	426.00
Plate length	1500.00	Parts area	??
Collar Width	10.00	Piercings	54
Net usage (%)	??		

Nominal Areas	
Parts	0.30
Used Plate	0.44
Nominal Usage (%)	68.69
Real Usage (%)	??

If you have checked the No area calculations option in Handling options there is no data in the fields Area, Parts area, Real usage, or Net usage. If you want to know areas, click Calculate area or go to Handling options and uncheck the no area calculations option.

Info-

You can type additional info related to the current nesting or part to the Info field. This info is saved to CNC2 files and when you open such files, you can see the written notes. To enable the Info field, you must click Edit info. The notes you make will not be stored until you click Save info.

11.8.) Cost Calculator-



Use this tool to approximate the cost to cut a part or a nesting. The calculator gets the nesting data automatically, but you need to provide the cost profile data, such as the cutting speed of the machine. If you want to use your cost profile later, you can save it on your hard drive. You can also compare prices of different nesting's. It is amazing how much you can save simply by using the bridge tool only!

Cost Calculator #10467

Cost Profile

Name:

Rapid speed: mm/min

Cutting speed: mm/min

Cut start time: s

Cut end time: s

Machine hour: \$/h

Job preparation: min

Effective usage: %

Consumable set: \$

- Pierces per set: #

- Change time: min

Gas per cut hour: \$

Electricity per cut hour: \$

Other per machine hour: \$

Material cost: \$/m2

Torches: #

Acceleration: mg

Nesting Info

Name	Default
Plate area	1.50 m2
Plate width	1000 mm
Plate length	1500 mm
Collar	10 mm
Real usage	17 %
Nominal usage	69 %
Parts	32 #
Piercings	54 #
Nesting width	974 mm
Nesting length	426 mm
Parts area	0.26 m2
Cut length	13876 mm
Arc seconds	312 s
Arc seconds per piercing	5.8 s/prc
Avg. rapid speed	4638 mm/min

Machine Time

	Time	\$
Rapid	1:25	2.36
Cutting	5:12	8.67
Delays	7:12	12.00
Total active	13:49	23.03
Changing consumables	2:42	4.50
Idle time	5:00	8.33
Total inactive	7:42	12.83
Total	21:31	35.86

Material Costs

	\$
Plate	
<input type="radio"/> Whole plate	-
<input checked="" type="radio"/> Rectangle	133.00
<input type="radio"/> Efficiency: <input type="text" value="100"/> %	-
Consumables	9.00
Gases	1.73
Electricity	3.47
Others	3.59
Total	150.79

Total **186.65 \$**

Buttons: Material cost calculator, Save Offer, Save for comparison, Compare, Load, Save, Close

11.8.) Cost Calculator-

DATA:

Cost Profile-

Cost profile is a collection of variables that describe how the machine, user or material affects the costs.

- Name Profile name (e.g., “plasma1 iron 0.25 inches”).
- Rapid speed Usually a constant value.
- Cutting speed Dependent on the tool, material (type and thickness) and process.
- Cut start time between the torch coming to the piercing point and the start of the cutting movement.
- Cut end time between the torch coming to the end of a cut profile and the start of the rapid movement.
- Machine hour the correct value of machine hour cost is essential to get reliable results.
- The cost of machine hour is often priced so that it includes the profit expectations that were set when the machine was purchased. This cost is usually \$60-\$100 if the machine is in active use. 60 - 100 \$ is also a correct value if you need to order some of the work from subcontractors.
- If the machine is used only occasionally, you can choose to use just the cost of labor.

11.8.) Cost Calculator (Cont'd.) -

Cost Profile-

- Job preparation the time that the machine stands idle during job preparation. Job preparation time includes not only bringing the plate to the cutting table, setting plate alignment, loading the cutting program, setting the cutting parameters but also those actions taken after the program is cut collecting the cut parts from the table, cutting scraps off the remnant plate, taking the remnant plate away, etc. This time should be set so that it covers all the time between the moment the cutting table is empty and the moment when the table is empty again - excluding the time when the machine is running a cutting program.
- Effective usage an alternative to the Job preparation. If you know that the job preparation time in your machine is usually half of the machine time, set this to 50%.
- Consumable set the cost of a consumable set. • Pierces per set How many piercings can be done with a single consumable set.
- Change time The time it takes to change a consumable set.
- Gas per cut hour
- Electricity per cut hour.
- Other per machine hour
- Material cost How much does a square foot (or meter) of plate cost.

11.8.) Cost Calculator (Cont'd.) -

Cost Profile-

- Torches Quantity of torches.
- Acceleration Machine acceleration that affects the average rapid speed.

11.9.) Nesting Info.-

This Data is provided automatically by the software.

- Name-Name of the Nesting
- Plate area
- Plate width
- Plate length
- Collar A safety zone left by automatic nesting to the edges of a plate.
- Real usage Percentage of the parts area to the plate area.
- Nominal usage Percentage of the nominal area of the parts compared to the plate area or compared to the area of a rectangle, which is drawn around the parts.
- Parts
- Piercings
- Nesting width
- Nesting length
- Parts area
- Cut length
- Arc seconds
- Arc seconds per piercing

11.9.) Nesting Info. (Cont'd.)-

This Data is provided automatically by the software.

- Average Rapid Speed this is affected by the machine acceleration. If the machine has slow acceleration and/or the average rapid movement is short, then the machine **probably never reaches the maximum rapid speed.**

Machine Time-

Shows the active and inactive times along with their costs, calculated from the given data. Active time is the time that it takes to run the cutting program. Inactive time is the time that it takes to prepare a job (like changing the plate) and change the consumables.

Material Costs-

This frame shows the consumption of material, consumables, gases, etc. and their costs. The material consumption can be handled in several ways:

- You can select the entire plate to be consumed or just the rectangle surrounding the nesting.
- If there is no plate or ready nesting, then you can approximate the material consumption with a probable effective usage.

TOOLS:

Save Offer- Saves your current price calculation as a simple text file.

Material Cost Calculator- Allows you to calculate how much a square foot (or meter) of plate cost.

See more in chapter Material Cost Calculator.

Save for Comparison- This saves the current cost calculation to the computer memory. You can compare this to later calculations by using the compare tool.

11.9.) Nesting Info. (Cont'd.)-

TOOLS (Cont'd.):

Compare- Opens the compare window. See more in chapter Compare.

Load- Loads a saved cost profile.

Save- Saves the current cost profile.

Close- Closes the cost calculator.

12.) Compare-

Previous			Current			Difference		
Machine Time			Machine Time			Machine Time		
	Time	\$		Time	\$		Time	\$
Rapid	1:25	2.36	Rapid	1:25	2.36	Rapid	0	0.00
Cutting	5:12	8.67	Cutting	5:12	8.67	Cutting	0	0.00
Delays	7:12	12.00	Delays	7:12	12.00	Delays	0	0.00
Total active	13:49	23.03	Total active	13:49	23.03	Total active	0	0.00
Changing consumables	2:42	4.50	Changing consumables	2:42	4.50	Changing consumables	0	0.00
Idle time	5:00	8.33	Idle time	5:00	8.33	Idle time	0	0.00
Total inactive	7:42	12.83	Total inactive	7:42	12.83	Total inactive	0	0.00
Total	21:31	35.86	Total	21:31	35.86	Total	0	0.00

Material Costs			Material Costs			Material Costs		
		\$			\$			\$
Plate			Plate			Plate		
Whole plate		-	Whole plate	0.00		Whole plate		0.00
Rectangle	133.00		Rectangle	133.00		Rectangle		0.00
Efficiency	100 %	-	Efficiency	100 %	0.00	Efficiency	100 %	0.00
Consumables		9.00	Consumables		9.00	Consumables		0.00
Gases		1.73	Gases		1.73	Gases		0.00
Electricity		3.47	Electricity		3.47	Electricity		0.00
Others		3.59	Others		3.59	Others		0.00
Total		150.79	Total		150.79	Total		0.00

Total	186.65 \$	Total	186.65 \$	Total	0.00 \$
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Relative to parts area

Savings / day 0.00 \$ Productivity increase 0 %
Savings / week 0.00 \$ Close

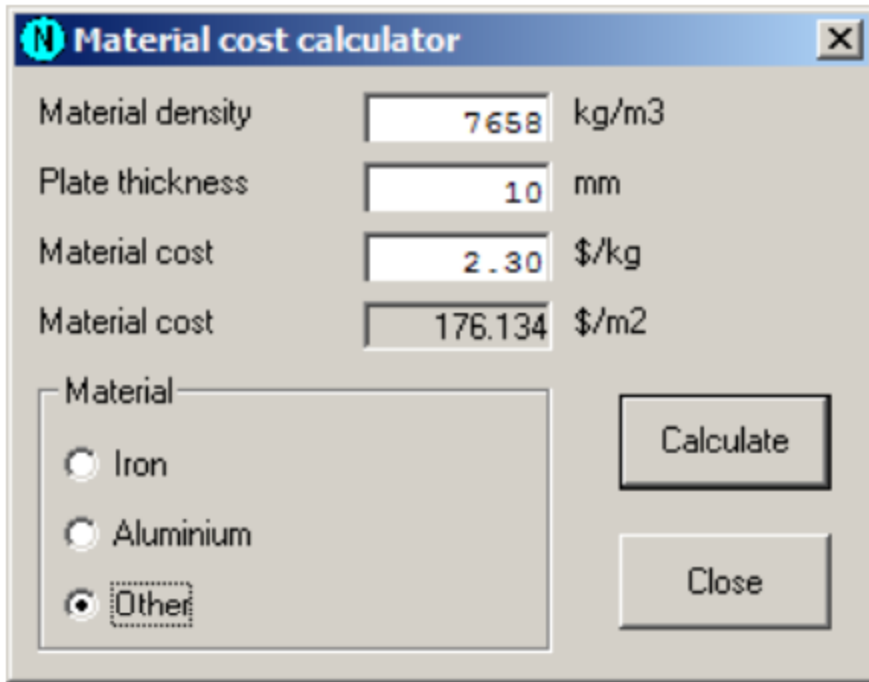
This window compares the costs. The Previous frame shows the results of that cost calculation, which you saved for comparison in Cost Calculator the Current frame shows the latest cost calculation - the one you were looking, when you chose Compare in the Cost Calculator. You can see the difference of these two in the Difference frame. If you look at the Current frame, you can see that there is a checkbox Relative to parts area. That is because sometimes you can fit more parts to the same plate by nesting the parts better.

12.) Compare (Cont'd.)-

Previous			Current			Difference		
Machine Time			Machine Time			Machine Time		
	Time	\$		Time	\$		Time	\$
Rapid	1:25	2.36	Rapid	1:25	2.36	Rapid	0	0.00
Cutting	5:12	8.67	Cutting	5:12	8.67	Cutting	0	0.00
Delays	7:12	12.00	Delays	7:12	12.00	Delays	0	0.00
Total active	13:49	23.03	Total active	13:49	23.03	Total active	0	0.00
Changing consumables	2:42	4.50	Changing consumables	2:42	4.50	Changing consumables	0	0.00
Idle time	5:00	8.33	Idle time	5:00	8.33	Idle time	0	0.00
Total inactive	7:42	12.83	Total inactive	7:42	12.83	Total inactive	0	0.00
Total	21:31	35.86	Total	21:31	35.86	Total	0	0.00
Material Costs			Material Costs			Material Costs		
		\$			\$			\$
Plate		-	Plate		0.00	Plate		0.00
Whole plate		-	Whole plate		0.00	Whole plate		0.00
Rectangle		133.00	Rectangle		133.00	Rectangle		0.00
Efficiency	100 %	-	Efficiency	100 %	0.00	Efficiency	100 %	0.00
Consumables		9.00	Consumables		9.00	Consumables		0.00
Gases		1.73	Gases		1.73	Gases		0.00
Electricity		3.47	Electricity		3.47	Electricity		0.00
Others		3.59	Others		3.59	Others		0.00
Total		150.79	Total		150.79	Total		0.00
Total		186.65 \$	Total		186.65 \$	Total		0.00 \$
<input type="checkbox"/> Relative to parts area								
Savings / day		0.00 \$	Productivity increase		0 %			
Savings / week		0.00 \$				Close		

This kind of situation gives false results, because if you cut more parts out of plate, you will use more time (and money). But when you compare the parts area, you can see that you have less wasted material and thus you have saved more. That is why this option is here. If both nesting's have same parts, then this option has no effect to the result. Savings per day is the sum, how much you save, if you cut this kind of jobs for 8 hours. Savings per week is the same, but for 40 hours. Productivity increase shows how much less time you need to cut this job.

12.1.) Material Cost Calculator-



The image shows a software window titled "Material cost calculator" with a close button (X) in the top right corner. The window contains the following fields and controls:

- Material density:** A text input field containing "7658" followed by the unit "kg/m3".
- Plate thickness:** A text input field containing "10" followed by the unit "mm".
- Material cost:** A text input field containing "2.30" followed by the unit "\$/kg".
- Material cost:** A text input field containing "176.134" followed by the unit "\$/m2".
- Material:** A group box containing three radio button options: "Iron", "Aluminium", and "Other". The "Other" option is selected.
- Buttons:** Two buttons are located on the right side of the window: "Calculate" and "Close".

Use to calculate the price of one square foot (or meter) of your plate. Select first the material from the material frame. If you selected any other material than the Other, then the calculator automatically sets the material density. Set the plate thickness and the material price per pound (or kilogram). Choose Calculate and you are ready.

12.2.) Nest-



This tool activates the automatic nesting process. It nests all the parts in the current nesting to the current plate. If you have not defined a special nesting area (see Show nesting area), automatic nesting uses the whole plate. You can modify the process by changing the nesting options. In the following case's part is not nested but moved to the right side of the plate:

- The part does not fit on the plate or on the nesting area.
- There is at least one open profile in the part.
- If you are using multitorch and the number of copies of the part are not evenly divided between the torches, the remaining (modulo) parts are not nested.

See also MultiNest, Triangle Nest and NestInfo.

12.3.) Feed Rates-



Use this tool to add feed rates (i.e., cutting speeds) to your cutting program. You can set feed rates for individual profiles or elements.

While you are using this tool, you can see several flags with different colors on screen. Each of those flag's display what is the feed rate after the flag. The color of the flag indicates the type of feed rate (i.e.: program, profile, and element feed rates). Red flags mean error and you should not see them. If you do see a red flag, just reset the feed rate for that element.

Definition of different feed rates:

Program Feed Rate - The default feed rate for the whole cutting program if there are no profile or element feed rates set.

Profile Feed Rate - The feed rate for a single profile. The whole profile is cut with this feed rate, if there are no element feed rates set. The profile feed rate can be set to program feed rate or custom feed rate.

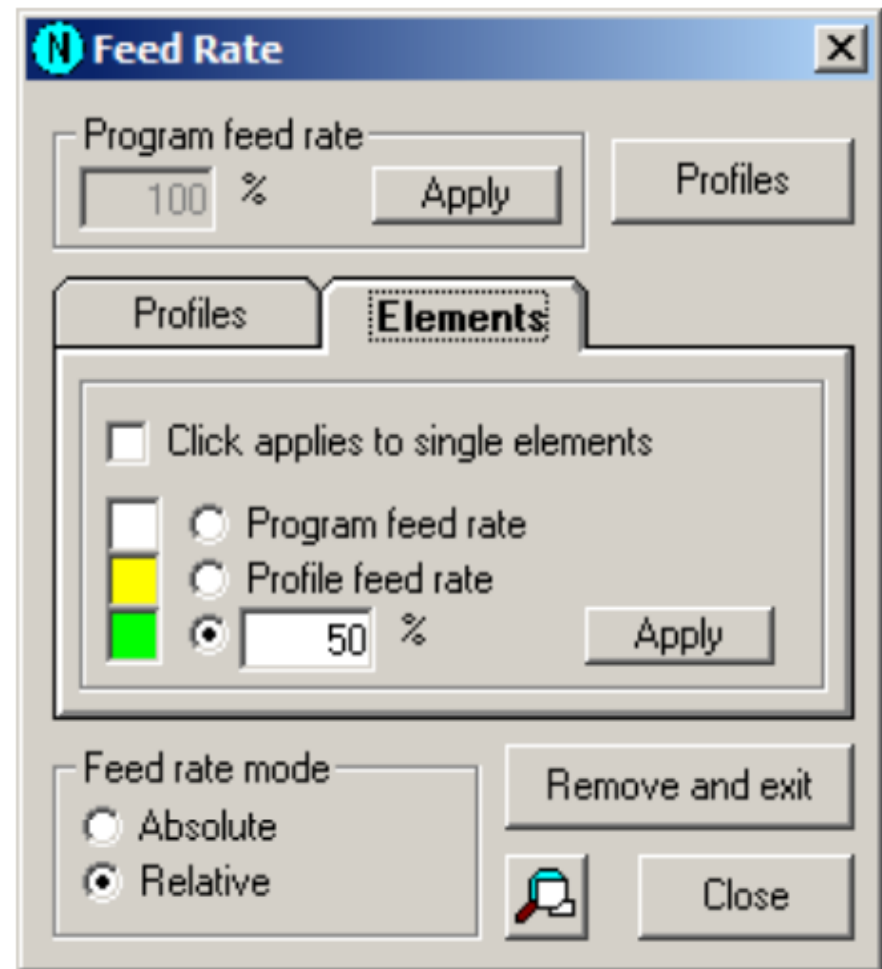
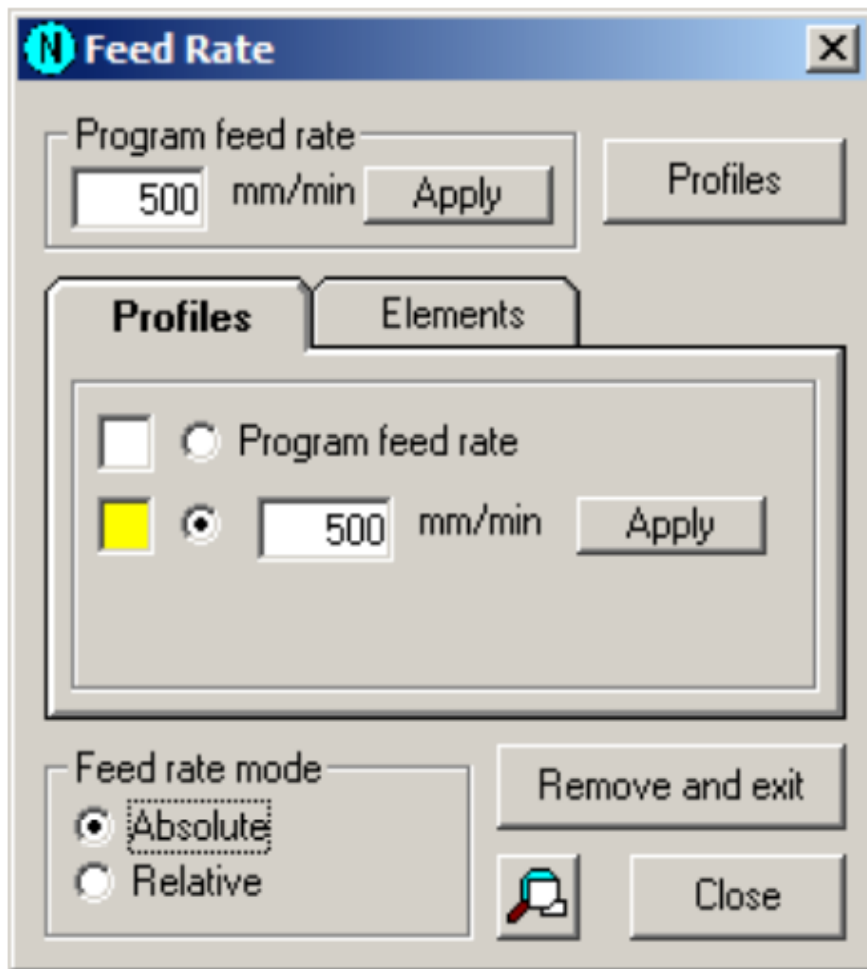
Element Feed Rate - The feed rate of a single element which can be set to program, profile, or custom feed rate.

12.3.) Feed Rates (Cont'd.)-

Feed Rate Modes:

Absolute - Feed rates are given in millimeters (or inches) per minute.

Relative - Feed rates are given relative (1-100%) to the current cutting feed rate. This type is supported only in ProMotion® iCNC controllers. This would be like turning the feed rate override potentiometer of the controller.



12.3.) Feed Rates (Cont'd.)-

How to use this Tool:

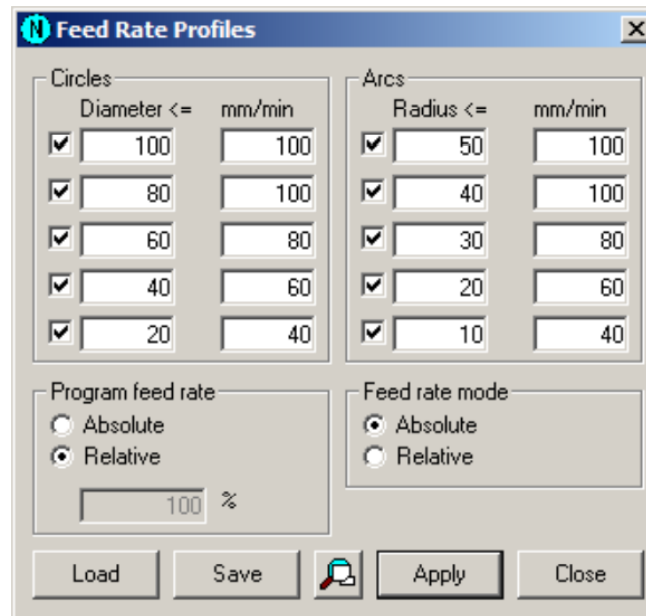
- When you start this tool, it requests the program feed rate. This feed rate is set to all profiles and elements, which do not have a feed rate. If every element already has a feed rate, then the tool starts immediately.
- To change a program feed rate, insert the new value in the corresponding text field and click Apply. • When you choose the profiles or elements, their feed rates change. If the Profiles tab is on top then your click changes the feed rate of profiles. If the Elements tab is on top then your click changes the feed rate of elements. Profiles and elements get that feed rate, which is set in the tab.
- You can set the profile feed rate type in the Profiles tab. If you want to use the custom feed rate, type its value in the text field and choose Apply. The feed rate that you select here is set to all profiles which you choose after this. This change has no effect on feed rates which are already set. It is applied only to those profiles that you choose.
- To set the element feed rate type in the Elements tab. If you want to use the custom feed rate, type its value to the text field and choose Apply. The feed rate that you select here is set to all elements which you choose after this. This change has no effect on feed rates which are already set. It is applied only to those elements that you choose.

12.3.) Feed Rates (Cont'd.)-

How to use this Tool (Cont'd.):

- If you have checked Click applies to single elements in the Elements tab, then your clicks change the feed rates of single elements. If it is not checked, then you must click the start and the end element. All the elements between start and end also get the same feed rate.
- If you click an element with the left mouse button, then the whole element is selected. Right click splits the element and the feed rate is set only to the other half. Right click works only, if click applies to single elements is not checked.
- You can remove all the feed rates by choosing Remove and exit. This also closes this tool.
- You can easily set all feed rates to the whole nesting with the use of Feed rate profiles tool.

12.4.) Feed Rate Profiles-

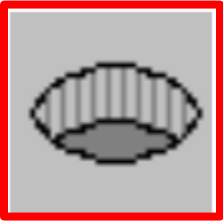


Feed Rate Profiles- These let you set feed rates to all arcs and circles at the same time. You do not need to choose each of them separately.

This is how you use feed rate profiles:

- Start this tool by choosing Profiles in the Feed Rates dialog.
- Select absolute or relative feed rates.
- Set the diameter and the corresponding feed rate values for circles. If you do not need all the diameter + feed rate pairs, you can disable them by un-checking the box at the beginning of the line.
- Set the radius and the corresponding feed rate values for arcs. Disable extra lines.
- Set program feed rate if you use absolute feed rates.
- Click Apply to set the feed rates according to your given profile. All existing feed rates are removed, and the feed rates defined in the profile are applied to the nesting.
- Save the profiles for future use. This is handy when you need different profiles for different tools. Click Save and enter the file name. Click Load to reuse the file.

12.5.) DiameterPro-



NOTE! DiameterPro requires ProMotion® DiameterPro to work.

12.6.) Plate Editor-

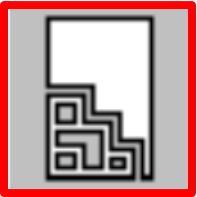
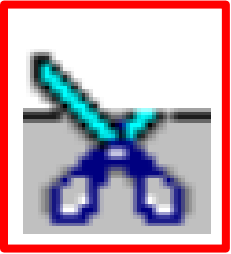


Plate editor is a set of tools which are used to change the shape and position of a plate. Click Plate Editor button to activate the editor. The button stays down until you click it again. A small tool window appears. The tool window contains the plate editor's tools. Click the button again to close the plate editor.

12.7.) Edit Plate-



Use this tool to remove parts out of a plate. **Follow these steps:**

- Move the mouse cursor over the edge of a plate and click it.
- Move the mouse cursor to the next position and click again. A new line appears from the previous point to this point.
- Continue as above until you reach the edge of the plate. Click the edge and the plate is split into two parts, but only one of them is displayed.
- If the wrong part is displayed, use the Change Split tool to change it.

12.8.) Edit Plate with The Machine Motion-



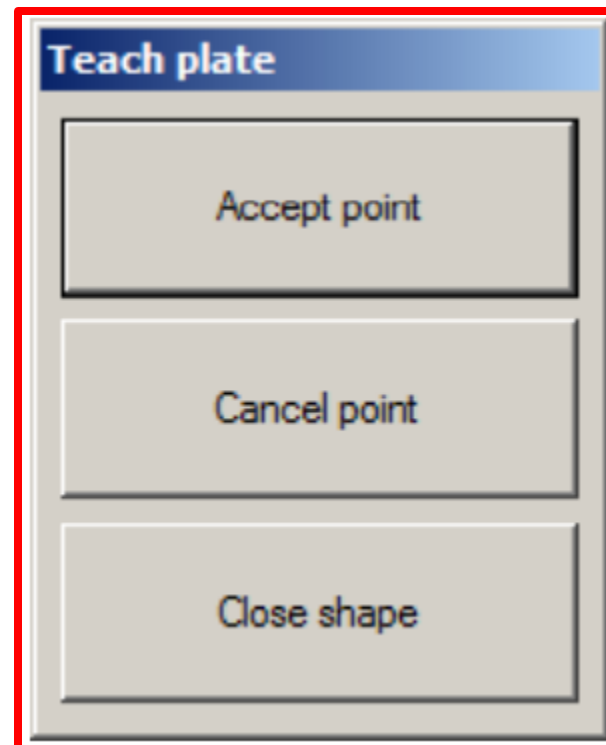
This tool is the same as the Edit Plate tool with the following exceptions.

- Mouse cursor does not respond to the mouse movement. Mouse cursor shows the position of the torch and moves if the torch moves.
- The plate in the ProMotion® Nest's work window is rotated to the same angle as the real plate. When you stop using this tool, the plate is rotated back to its original angle.
- The Space button works as the left mouse button (the left mouse button works too).
- The Esc button cancels editing. The original plate is displayed, and the mouse works normally.
- This tool is usable only with ProMotion iCNC controller.

12.9.) Teach Plate-



Use this tool to teach the shape of the plate. Just drop the plate on the cutting table and then use the laser pointer or the torch to show the edges of the plate.



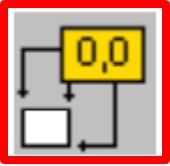
12.9.) Teach Plate (Cont'd.)-

Follow these Steps:

- Place the plate on the cutting table.
- Start this tool. A new window opens (see above).
- Move the laser pointer (or the torch) over the edge of the plate. Then click Accept point.
- Move the laser pointer over the next corner of the plate. Click Accept point again. Repeat this step while you have shown all the corners of the plate.
- Finally click Close shape and your plate is ready.
- If you ever do a mistake while teaching the shape, just click Cancel point to remove the last point. Hint: You can use this tool to teach new parts for cutting if you convert the plate to a part by using the tool Plate-Part-Plate.

NOTE! This tool can be used only with a ProMotion iCNC controller.

12.10.) Set Origin-



This tool sets one of the plate corners* to the origin.

- Click one of the corners to set it as a new origin.

* In this case **"CORNER"** means one end of an element, which is one of those elements that form the plate profile.

Thus, it is possible that it is not a corner at all.

12.11.) Show Nesting Area-



Use this tool to define nesting areas on the plate. Nesting areas are useful with combination of automatic nesting and multitorch tools.

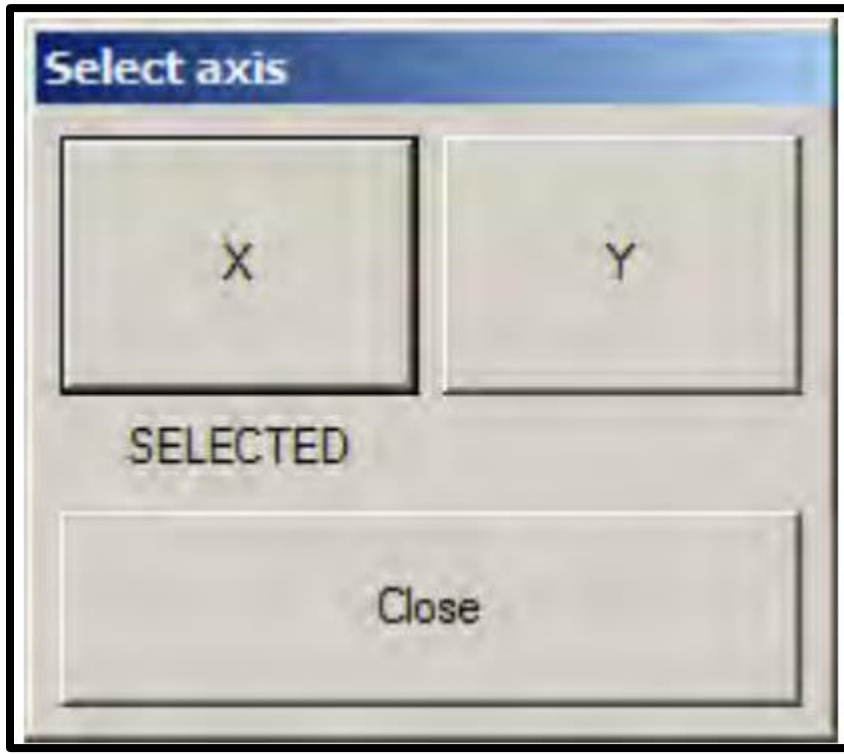
Follow these steps to show nesting area:

- Start Plate editor.
- Select this tool. A red rectangle appears inside the plate. The rectangle is the new nesting area.
- Move the mouse cursor over the edge of the rectangle and press the left mouse button down. The border of the rectangle now follows the movements of the mouse.
- Modify the rectangle as you like and finally close Plate editor to confirm your changes.

12.12.) Align Parts-



Use this tool to align the plate with the X or the Y-Axis. Why? Automatic nesting performs better if the bottom edge of the plate is aligned with the X or the Y-Axis.

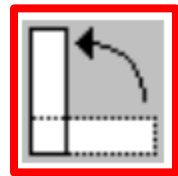


12.13.) Change Split-



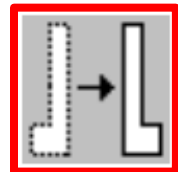
Use this tool to change between parts displayed. See Edit Plate.

12.14.) Rotate Plate-



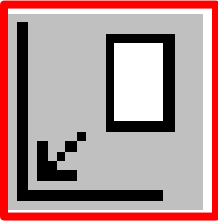
This tool rotates the current plate 90 degrees counterclockwise.

12.15.) Mirror Plate-



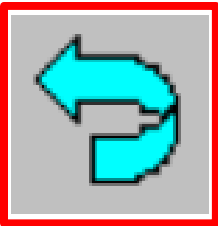
Use this tool to mirror the current plate in Y-Axis.

12.16.) Move to Origin-



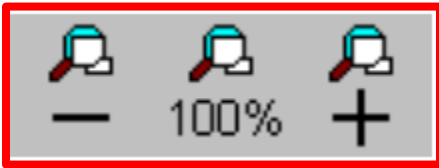
This tool repositions the current plate. After the plate is repositioned, its minimum X-and Y-coordinates are equal to zero.

12.17.) Undo Plate Edit-



Edit Plate-tool splits a plate into two parts. If you made some errors during editing, use this tool to bring the original plate back.

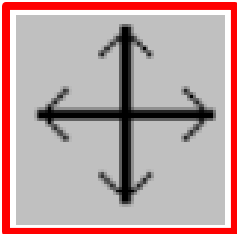
12.18.) Zooming-



The easiest way to zoom in and out is using your mouse wheel. You can use it anytime. If you do not have mouse with a wheel, then you can use Zoom Minus and Zoom Plus buttons. Then the zooming continues until you release the button.

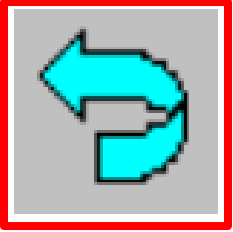
To get back to the normal view i.e., where the whole nesting is visible and as large as possible, just click the Zoom 100% button.

12.19.) Pan View-



You can pan the view by moving the mouse cursor over the work window while pressing the left mouse button. The picture will follow the mouse movement until you release the left mouse button.

12.20.) Undo-



Use this tool to cancel the last action.

12.21.) Trash-



Closes the current nesting which is seen in the work window. If there are more than one nesting open, the next one will be displayed in the work window.

13.) File Menu-

The File menu is used to open existing files, save new files, and exit the application. Here is a list of all items in the File menu. Item/Action.

<u>ITEM</u>	<u>ACTION</u>
New	Create a new blank plate.
Open	Open an existing file.
Trash	Close current nesting.
Save As	Save current nesting.
Macro	Create a new shape with macros.
Print	Print the current nesting.
ESSI/EIA Raw Import	Imports ESSI and EIA files as they are.
DNC	Download from DNC.
Import	Import nesting from ProMotion® Cut.
Export	Export nesting to ProMotion® Cut.
Exit	Exit ProMotion® Nest Application.

NOTE! Some of these tools were already explained in the Toolbar chapter. Those tools are not repeated in this chapter.

13.1.) Save As-

Saves the current nesting (the one in the work window) in the chosen format. Possible formats are ESSI, EIA, DXF, ROBOTIC CNC and CNC-2. For more information about ESSI and EIA see ESSI Options and EIA Options.

In the demo version of ProMotion® Nest no saving is possible.

It is also possible to save point marking programs. This is an optional module. See more at topic Point Marking.

NOTE! ProMotion® Nest cannot read ROBOTIC CNC. If you want to edit your cutting programs later, then the best format is CNC-2.

13.2.) Print-

This tool prints the current nesting to the default printer.

13.3.) ESSI/EIA Raw Import-

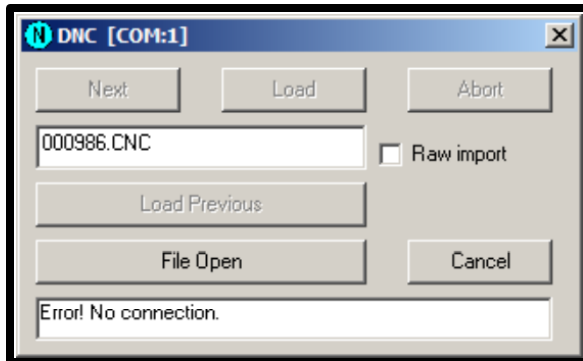
Use this tool to load ESSI and EIA files to ProMotion® Nest when you have a cutting program that is ready to be sent to cutting without editing.

Basically, this is just like the normal file open. This tool uses the same ESSI and EIA options than the file open does. Where it differs from the normal file open is that keeps things simple. It does not try to reason which shapes are holes or where the lead-ins or anything else is. Raw import just reads the file in

as it is. This way you can utilize any kind of cutting program which is not otherwise supported by the logic of ProMotion® Nest (i.e.: common cutting and programmed stops).

13.4.) DNC-

Use this tool to load files from DNC connection. ProMotion® iLink must be running on the PC you are downloading the files from.



Next Allows the user to browse the files available in ProMotion® iLink working directory (folder). Available filenames are displayed in the text field just below this button.

Load Allows the user to start DNC download. The file currently displayed in the text field starts loading. You can just type the file name into the text field and choose Load.

Abort Allows the user to abort DNC download.

Load Previous Allows the user to utilize the last file again without downloading.

File Open Allows user to change to normal File Open dialog. Use this to locate a file in the controllers' hard drive or on the network that is accessible.

13.5.) Import-

This tool imports a nesting created by ProMotion® Cut.

13.6.) Export-

This tool exports the current nesting to ProMotion® Cut. Please note that the exported nesting will not open automatically in ProMotion® Cut. To open it, you must use the import tool of ProMotion® Cut.

13.7.) Exit-

This tool closes the ProMotion® Nest software.

Important! All nesting's will be closed and all data they contain will be lost upon exiting. If you want to save one or more of those nesting's, you should save them before exiting.

14.) View Menu-

In View menu you can change the appearance of ProMotion® Nest and the way how it draws your nesting's.

Black and White View-

This option turns drawing color to black.

14.) View Menu (Cont'd.)-

Outbits-

If this option is checked, then ProMotion® Nest displays special outbits, if there are any in the nesting. For more info see the ProMotion® Cut manual.

Transfer lines-

- Hide All Transfer lines can be toggled on or off by selecting this option.
- Show Cut When selected, you can see transfer lines between cutting profiles. This is the default setting.
- Show Line Marking When selected, you can see transfer lines between line marking profiles.
- Show Point Marking When selected, you can see transfer lines between point marking points.

Show Large Buttons-

This option turns all buttons in ProMotion® Nest toolbar and toolboxes to large ones. This setting is recommended for touch screen use.

NOTE! You need to restart ProMotion® Nest to have this change take effect.

15.) Tools Menu-

Tool's menu contains tools to manipulate nesting's. You can fix parts, add marking, nest manually or automatically, set cutting order, add bridges, and do many other things. The tools are organized in an order where they are usually used. For example, you should do automatic nesting before you add bridges.

NOTE! Some tools are not part of the standard ProMotion® Nest, but they are options that may be bought separately. Depending on the options in your license some tools may not be available.

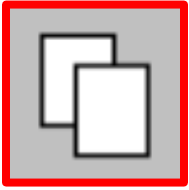
NOTE! Some tools of this menu were already explained in the Toolbar chapter. Those tools are not repeated here.

15.1.) Remove-



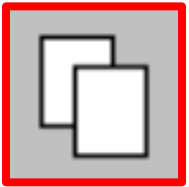
The left mouse button activates area deletion. Keep the left mouse button pressed down and move the mouse. A rectangle will follow the movement of the mouse. When you release the left mouse button, all the profiles that are completely inside the rectangle will be deleted. If you click the right mouse button, only a single element or a transfer line point will be deleted.

15.2.) Copy-



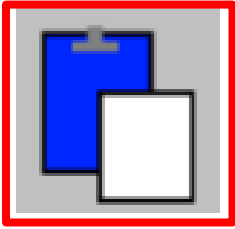
This tool allows user to copy different objects to the clipboard from where she/he can paste them to any nesting. The object that is to be copied can be chosen from the “Options” menu. There are two kinds of objects that can be copied: shapes and nesting’s. An object can be copied by moving the mouse cursor over the part and clicking the left mouse button.


15.3.) Copy-

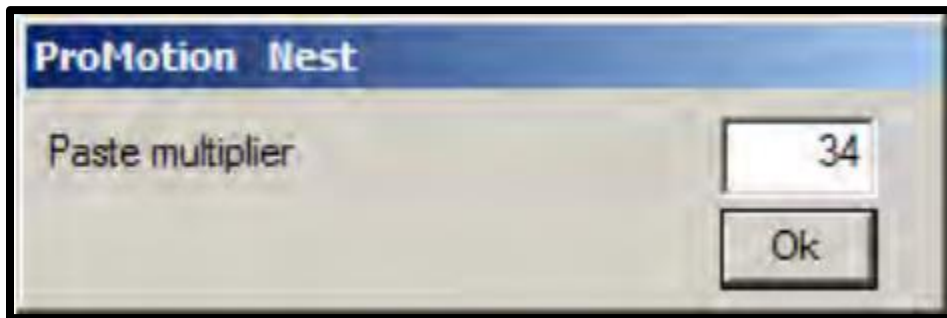


This tool allows user to copy different objects to the clipboard from where she/he can paste them to any nesting. The object that is to be copied can be chosen from the “Options” menu. There are two kinds of objects that can be copied: shapes and nesting’s. An object can be copied by moving the mouse cursor over the part and clicking the left mouse button.

15.4.) Cut-

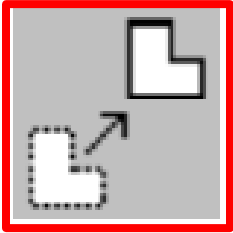


Use this tool to paste the copied/cut objects to a nesting. When you choose  a dialog window appears (see below). If you want more than one copy, change the paste multiplier in the dialog window. The paste multiplier tells how many times the copied objects are to be pasted. Click on the editing area and the objects are pasted.



15.5.) Edit-

Move Shape-



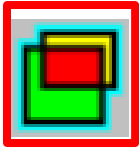
Use this tool to manually change the position of a shape. Move the cursor over a shape and press the left mouse button down. Now the shape will follow the movement of the mouse until you release the button.

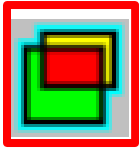
This tool also activates Collision Tools-



Colliding means that you move a shape as close to another as possible. ProMotion® Nest provides collision tools for this purpose. To collide a shape, you should first move the shape close to its final position and then use the appropriate collision tool. There are four tools for colliding shapes: up, down, right, or left.

15.5.) Edit (Cont'd.)-

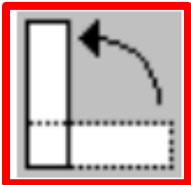


There is a  button in the middle of collision tools (buttons). Pressing this button will cause the shapes to appear in a different color if they do not have enough space between them. Releasing the button allows the parts to revert to their normal color.

So, how great should the distance be between two shapes? In the Nesting Options check the kerf width and clearance parameters. The distance between two shapes should be twice the kerf width and once the clearance. This formula is used by the colliding tools and overlap checking.

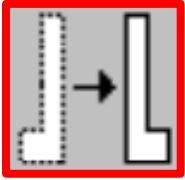
NOTE! Collision tools are visible only when the Move Shape tool is active.

15.6.) Rotate Shape-



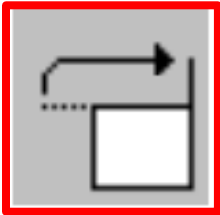
Allows the user to rotate a shape simply by grabbing it with a mouse. The part will follow the mouse movement (rotate). The rotation steps can be set in Handling Options. Recommended steps are 5 or less degrees.

15.7.) Mirror-



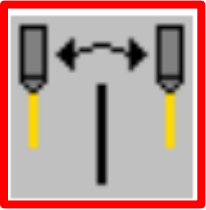
This tool allows you to mirror shapes in X or Y axis. If you move the mouse cursor over a shape and click the left mouse button, the shape will be mirrored in Y axis. If you click the right mouse button, the shape will be mirrored in X axis.

15.8.) Change Piercing Point-



There are two ways to change the current piercing point. To change the pierce point to the first point of the element, move the mouse cursor over the element and click the left mouse button. If you want to choose any point on the element, move the mouse cursor to the desired start point and click the right mouse button. This tool can only be used on complete profiles.

15.9.) Change Compensation Side-



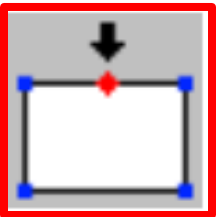
Change the compensation side by moving the mouse cursor over the element and clicking the left button.

16.) Change Cutting Direction-



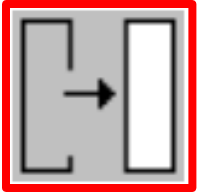
Change the cutting direction by moving the mouse cursor over the element and clicking the left button.

16.1.) Split Element-



An element can be split in two by moving the mouse cursor to the desired split point and clicking the left mouse button.

16.2.) Join Profiles-

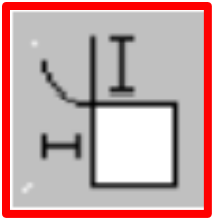


Use this tool to close an open profile or join two or more open profiles.

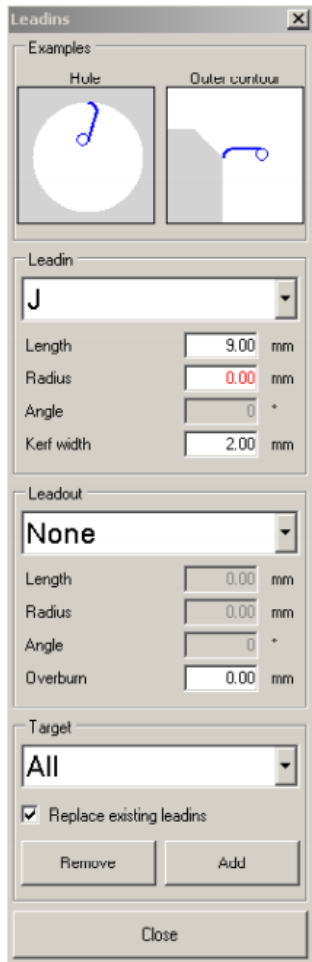
Follow these steps:

- Hold down the left mouse button.
- Drag a rectangle around start/end points of open profile(s).
- Release the mouse button.

16.3.) Leadins-



By using this tool, you can add, remove, and modify leadins and lead outs. When the Leadins tool is active, the dialog window below is visible. Use that window to change the parameters of the leadins and lead outs. If a value is shown red the lead in cannot be created (picture showing too small radius).



<u>Leadin and Leadout Types:</u>	
Nothing	No lead-in or lead-out. This type has a special purpose, if you generate
Straight	A straight line which has the same direction as the first (or the last) element of a profile.
90 Degrees	A straight line which is on 90 degrees angle (on the kerf side) compared to the first (or the last) element of a profile.
Arc	An arc which has a 90 degrees central angle. Connects the first (or the last) element of a profile tangentially.
0-179 Degrees	A straight line which is on 1 to 179 degrees angle (on the kerf side) compared to the first (or the last) element of a profile.
J	A lead-in that contains a straight and an arc. Straight section always points to the center of the hole. Restrictions are arc radius cannot be smaller than ½ of kerf, length needs to be bigger than arc radius.
Semi-Circle	A half circle. Connects the first (or the last) element of a profile tangentially.
Custom	This is a user defined type read from a file. ESSI- and EIA-programs often has this kind of lead-ins (or lead-out's). You cannot add this kind of lead-ins.

Lead-in / Lead-out Selection: To add, remove or modify leadins, click on the pierce point or select “Target”, check box “Replace existing leadins” and click “Add”.

Length: Length of the lead-in (straights).

Radius: Radius of the lead-in (arcs).

Angle: Angle of the lead-in (Free angle). Kerf: Selected process kerf.

Overburn Length: Overburn means that when the machine has cut around a profile, it starts to cut the profile again (it goes for a next round) and cuts it some length. That length is defined here. Just enter the value to the text box and click at the pierce point or select target and click “Add”.

Target: Select the type of profiles where you want to modify leadins/outs.

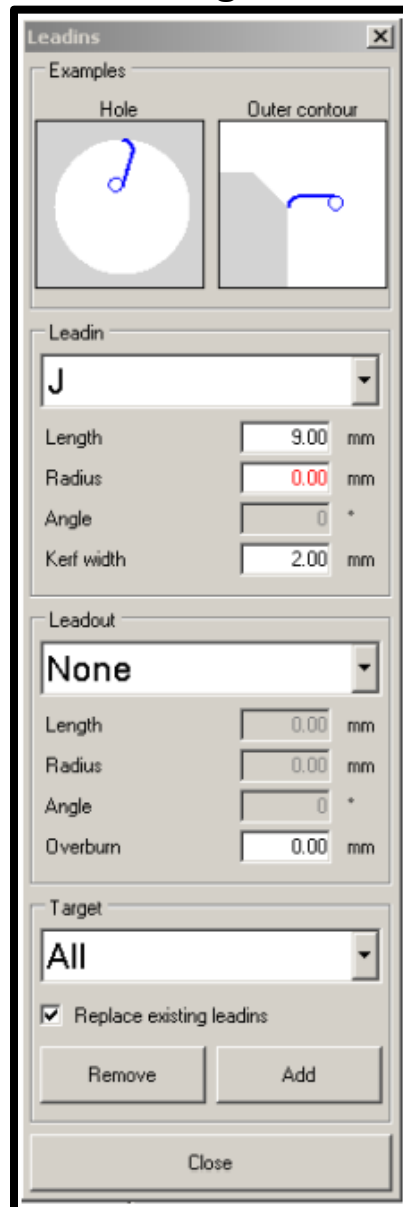
Replace existing leadins:

Check this option if you want to change existing leadins or lead-outs. Otherwise, you can only add new lead-ins (or lead-outs) to profiles, which has no leadins (or lead-outs).

Examples:

How to add a lead-in/out:

- 1.) Choose the type of lead-in you want. Set Length, Radius etc.
- 2.) Choose the type of lead-out you want. Set Length, Radius, Overburn etc.



Examples:

How to add a lead-in/out (Cont'd.):

3.) Click the profile where you want to add a lead-in.

How to change a lead-in into another:

Repeat steps 1-2 above.

3.) Check the “REPLACE EXISTING LEADINS” box.

4.) Click the profile that has the lead-in you want to change.

How to add a lead-in and lead-out to a profile:

1.) Check the “LEAD-IN” box.

2.) Choose the type of lead-in you want.

3.) Check the “LEAD-OUT” box.

4.) Choose the type of lead-out you want.

5.) Click the profile to add the lead-in and lead-out.

How to change all lead-ins and lead-outs of Hole profiles:

Repeat steps 1-4 above.

5.) Check the **“REPLACE EXISTING LEADINS”** box.

6.) Select **“HOLE PROFILES”**.

7.) Choose **“ADD”**.

How to remove all lead-outs:

1.) Set lead-in to **“None”**.

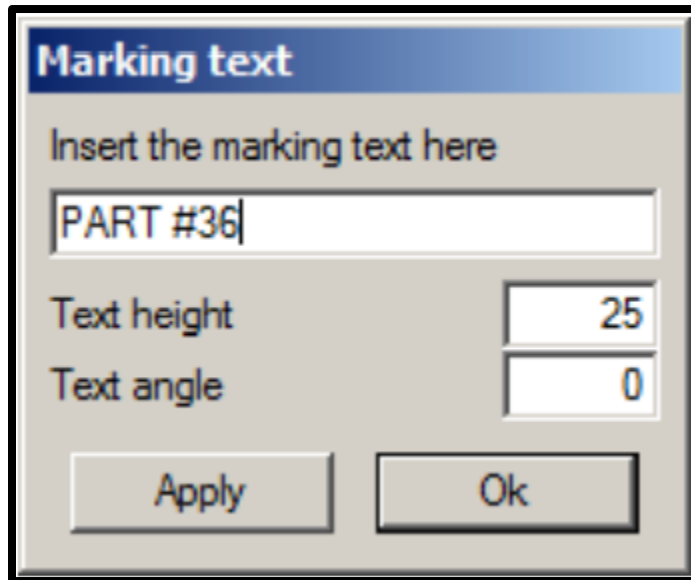
2.) Set lead-out to **“None”**.

3.) Select target **“ALL PROFILES”**.

4.) “Click **“ADD”**.”

17.) Marking-

With this tool you can insert text on plates for marking. Selecting this tool activates the window below:



To Insert text for marking:

- 1.) Write the text you wish to mark into the field Insert the marking text here.
- 2.) Set the text height. The minimum allowed height is 5 mm (0.2 inches).
- 3.) Set the text angle (0-360 degrees).
- 4.) Click Apply to confirm the changes.
- 5.) Click the part you want to mark. The text is inserted to the spot you clicked.

NOTE! This is an additional module, and it is not included in the basic version of ProMotion® Nest.

17.1.) Hole to Point-

This tool converts round holes to point marking points. You only need to click those holes you want to convert.

NOTE! You cannot reverse the conversion. If you make a mistake, please use Undo tool.

17.2.) Cut to Line Marking-

This tool converts holes to line marking profiles. You only need to click those holes you want to convert.

NOTE! You cannot reverse the conversion. If you make a mistake, please use Undo tool.

18.) Autonest-

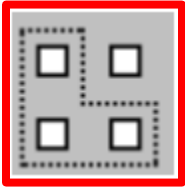
18.1.) Triangle Nest-

This tool nests the parts into the smallest possible rectangle. For example, two triangles are nested so that their sides are facing each other. This tool works well with triangles and that is where the name comes.

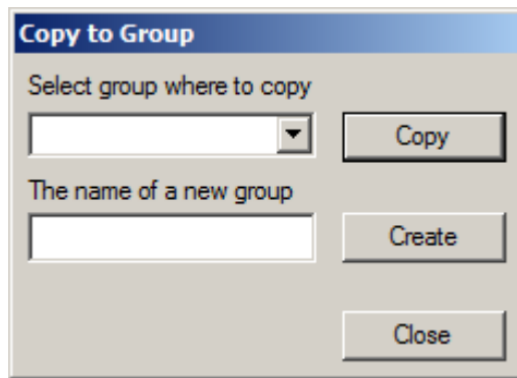
18.2.) MultiNest-

MultiNest nests all shapes automatically. If shapes do not fit on the current plate, MultiNest creates new copies of the current plate and continues nesting on them until all the shapes are nested.

18.3.) Groups-



This tool allows you to copy shapes to nesting groups. Nesting group is a group of parts, which all move and Autonest together like a single shape. When this tool is active the dialog below is visible.



When this tool is active, you can select (and unselect) shapes by clicking on them or drawing a rectangle around them.

The list Select group where to copy shows all possible groups where you can copy shapes. This list contains all geometries from the geometry window, and you can later turn them to groups (see example below).

Copy button copies all the selected shapes to the group selected from the list.

18.3.) Groups (Cont'd.)-

If you want to create a new group, write its name to the field, and choose Create. Now you can see the new group in the list and in the geometry list window.

When you have copied all the shapes you want from this nesting, choose Close.

Please note that all other tools are disabled while this tool is active.

How to create a nesting group:

- Activate Groups tool.
- Create a new group (type its name to the text field labeled. “The name of a new group” and choose Create).
- Select the group you just created from the list Select group where to copy.
- Select the shapes you want add to your group (click all of them).
- Choose Copy.
- Close groups tool and activate your group from the geometry list (left click the name of your group in the list).
- Right click the geometry list and select Toggle Group On/Off from the pop-up dialog box. Now you can see an asterisk in front of the geometry name. This means that this geometry is a group.
- Now you can manually move and rotate the parts in your group. Move them close to each other.
- When your group is ready, right click the geometry list again and this time select Copy to Nesting. Enter the number of groups you want to nest and finally you have groups in your nesting!

18.4.) Freeze-

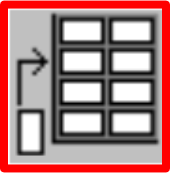


Use this tool to freeze parts for the duration of the automatic nesting process. Frozen parts do not change their position during automatic nesting process.

- Click the part you want to freeze. You will now see the parts highlighted in bright blue.
- To freeze multiple parts, draw a rectangle around the desired parts.
- To unfreeze a part, click it again.

NOTE! Automatic nesting cannot nest inside holes of frozen parts. If you want to nest to those holes, you should do it manually and then freeze the parts inside of them too.

18.5.) AutoFill-



This tool fills the remaining area of the plate with the copied shapes. ProMotion® Nest nests all shape automatically to get optimal fill. The nesting options affect to the performance of this tool.

Follow these steps to fill a sheet:

- 1.) Copy a shape by using the Copy tool.
- 2.) Click the AutoFill button.

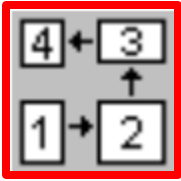
18.6.) Cutting-

18.7.) Optimize Cutting Order-

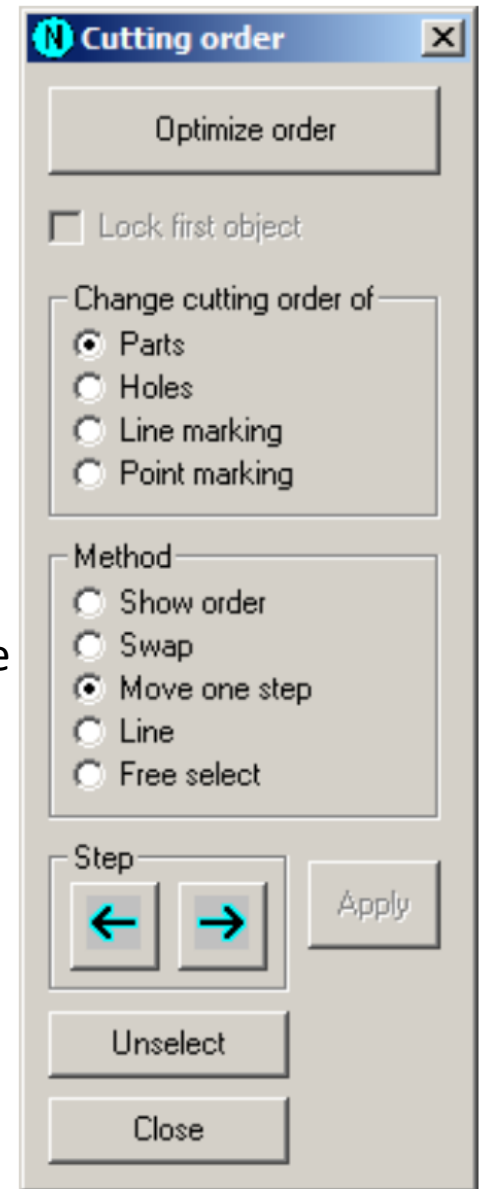
Use this tool to let ProMotion® Nest to make cutting order for you. ProMotion® Nest will calculate the optimum cutting order so that parts are always cut near the edge of the plate. Please note that when a part is cut off the plate it leaves a hole, which is now the edge. The idea is to prevent the heat to bend the plate.

If you are not happy with the result, you can easily change the cutting order using the Change Cutting Order tool.

18.8.) Change Cutting Order-



When this tool is activated, the following dialog will appear: You can let ProMotion® Nest to do the cutting order for you by clicking the Optimize order button. See more details at Optimize Cutting Order. You can also do the cutting order yourself by using this tool. The cutting order can be changed between Parts (shapes), Holes, Line Marking Profiles and Point Marking points. There are five methods which can be used to change the cutting order: Show Order, Swap, Move One Step, Line and Free Select. In the Show Order method, you just click the objects in that order they are about to be cut or marked. When you click an object, it will change its color to indicate that it is selected. If the color of the object will not change, then you cannot change its order (it is probably the wrong type). Selections can be removed by clicking the Unselect button. The option Lock First Object can be used with this method. If it is selected, then you cannot change the cutting order of the objects which are before the first selected object in the cutting order. When you are ready, choose Apply to create the new cutting order. This is the only method that you can use online and point markings. In the Swap method you choose two objects and their positions in the cutting order will be changed between them.



18.8.) Change Cutting Order-

When you click the first object, it will change color to indicate selection. When you click the second object, the first object will become unselected, and the cutting order will change. In the Move One Step method you just choose the object, which cutting order you want to change, and then use the Step arrows to change the cutting order. If you click the left step arrow, the selected object will be cut earlier and if you click the right arrow, it will be cut later. In the Line method you draw a line over the parts or holes whose order you want to change. The cutting order of the first part/hole that the line overlaps will not change. The rest of the overlapped parts/holes will come immediately after the first one. In the Free select method you just click the profiles in the order you want to cut them and then choose to apply. This method is named free select, because you can select any cutting order between parts and holes (e.g., you can first cut all the holes in your nesting and then all the parts). This method may disarrange the internal data structures of ProMotion® Nest, which may cause automatic nesting and some other tools to fail. You should only use this method if you cannot set the cutting order with the other methods. If you decide to use this method, use this when you have done everything else for your nesting. Apply button is used in combination with the Show order and the Free select methods. Unselect button removes all selections. Close button closes the dialog.

18.9.) Bridge-



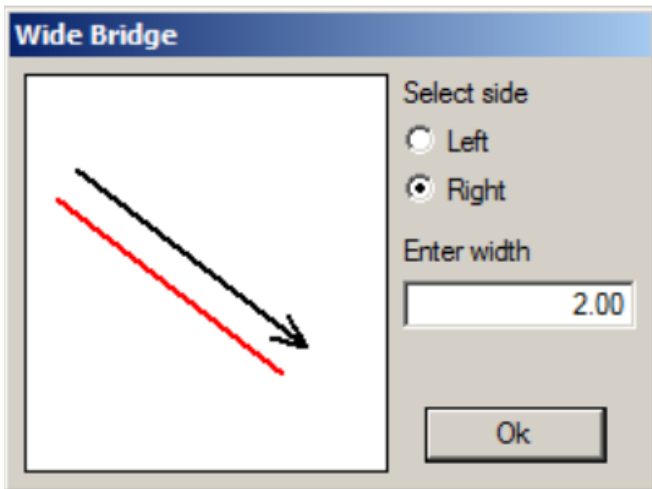
With this tool it is possible to create a bridge between two or more complete shapes. Bridge is a two-way line which unites two shapes. Bridge can be created by pressing the left mouse button down and moving the cursor over all the shapes which will be bridged. A **“RUBBER BAND”** will follow the mouse movement and shows the location of the future bridge. When the left button is released, the bridge will be created. If Vertical-Horizontal Bridging option is chosen from Handling Options, then all the bridges will be either vertical or horizontal. If the **“RUBBER BAND”** is more horizontal than vertical, then the bridge will be horizontal. Otherwise, it will be vertical. The Y-coordinate of the horizontal bridge is the same as the Y-coordinate of the starting point of the **“RUBBER BAND”**. Likewise, the X-coordinate of the vertical bridge matches the X-coordinate of the starting point of the **“RUBBER BAND”**.

NOTE! Lead-in and lead-out of the first shape will be copied to the final shape. Possible lead-ins and lead-outs of the other shapes are removed.

18.9.) Bridge (Cont'd.)-

Wide Bridge-

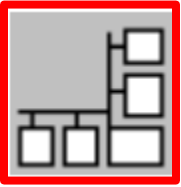
Wide bridge is like a normal bridge above, but it leaves a solid area between two profiles. You can create wide bridges just like normal bridges. The only exception is that when you release the mouse button the window below appears.



The black line represents the line you just drew. It is also the other side of the bridge. The red line is the other side. The wide bridge will be created between these lines.

- Select the side of the red line left or right.
- Enter the width of the bridge. If you enter a width that is less than 0.1 mm (0.004 inches), a normal bridge is created instead of a wide one.
- Click “OK”. Activate Wide Bridge feature in handling options.

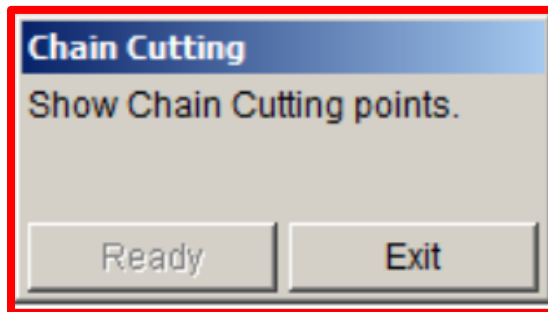
19.) Chain Cutting-



This tool is used to chain profiles together. This way you can cut several profiles with a single piercing.

Follow these steps:

- Click the point where you want the chain to begin. Now a “RUBBER BAND” follows your mouse movement and shows the route of the chain.
- Move the mouse cursor to the next point you want the chain to go and click again.
- When you click a profile, it is added to the chain.
- Continue these steps until your chain is ready. Choose “READY” on the chain cutting dialog (see picture below).



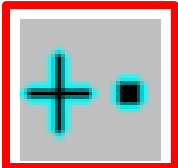
- The chain is ready. If you want to create a new chain, repeat the procedure above.

19.) Chain Cutting (Cont'd.)-

Special Cases:

- If the profile has a lead-in or lead-out, the chain automatically goes to the beginning of the lead-in and continues from the end of the lead-out.
- If the profile is not closed, the chain automatically goes to the beginning of the profile and continues from the end of it.

19.1.) Add Transfer-line Point-



A new transfer-line point can be added by clicking the left mouse button. The new transfer-line point will be the last in the cutting order. The cutting order can be changed by the Change Cutting Order tool.

19.2.) Scrap Cutting-



Use this tool to create scrap cutting lines to your nesting. Scrap cutting lines are used to cut the scrap out of the plate when the cutting program is completed. Use this tool only on ready nesting's.

Do this:

- **“Click the point”** where you want to start your scrap cutting line. This point should be outside of the plate or inside of a part.
- Now a **“RUBBER BAND”** follows your mouse.
- **“Click the next point”** of the scrap cutting line. If that point is outside of a part and inside of the plate, it will become a waypoint. That means that the scrap cutting line goes through this point. If the point is inside of another part or outside of the plate, the scrap cutting line ends at the boundary of the part or the plate.

A margin is left to the beginning and to the end of the scrap cutting line. These margins can be set in the Handling options.

Hint: When crossing the plate's edge do it by drawing the scrap cutting line from part's edge to the plate's edge. This way you do not have to be that exact when setting the plate's edge.

20.) Special Tools-

Special Tools are tools which are not needed by every user of this software but can be utilized in special cases.

20.1.) Point Marking-

Use this tool to select which holes will be point marked. This tool is part of an optional point marking module. Follow these steps to select holes for point marking:

- 1.) Hold the left mouse button down and drag a rectangle around all the holes you want to mark.
- 2.) Release the left mouse button and all holes which are inside the rectangle turn to black. They are selected for marking.
- 3.) When you have selected all the holes you want to mark, save the point marking program by using the **“Save As -> Point” tool.**

If you accidentally selected a wrong hole, you could unselect it by drawing a new rectangle around it. If you want to (un)select just one hole, you can just left click it.

NOTE! This tool works only for single shapes - not for entire nesting.

NOTE! This is an additional module, and it is not included in the basic version of ProMotion® Nest.

20.2.) Coating Lines-

If your machine has a welding torch, you can coat shapes easily with this tool.

Follow these Steps:

- 1.) Set the distance between lines and other settings in Special Tool Options.
- 2.) Activate this tool from the **“Menu Actions->Special Tools->Coating Lines”**.
- 3.) Hold the left mouse button down and drag a rectangle around those shapes you want to coat.
- 4.) Release the mouse button and all the selected shapes are filled with black horizontal lines - coating lines.

ProMotion® Nest saves the coating lines as line marking lines. You should configure your machine so that the welding torch replaces the line marker. Alternatively, if your ProMotion® Nest has ESSI/EIA saving option, you can redefine the line marking code sequences to correspond the welding torch control commands.

20.3.) Machining Allowance-

Machining Allowance is an additional area left on cut pieces to be processed by a machining tool. When activated, the program displays a window with a short description of how to use this tool. More important, the window contains a setting needed to set machining tolerance on profiles.

20.3.) Machining Allowance (Cont'd.)-

A profile is pointed with the mouse cursor and by clicking the right mouse button the machining tolerance will be added to the whole profile. If the tolerance is needed only for a part of the profile, the tolerance is set with two clicks of the left button: first click the point where the tolerance should start and again where the tolerance should end.

The machining tolerance variable is set in the Machining Allowance dialog window. Enter the width of the tolerance into the edit box and click Ok. The dialog window will disappear, and the given width is in effect.

You can activate this tool also by **“Pressing “Control” and “A”** simultaneously.

20.4.) Offset-

This tool calculates the real cutting path when kerf compensation is added. This is an advantage, if your controller cannot do it properly or it takes too much time.

Kerf compensation's value is half of the kerf width set in **“Nesting Options”**.

NOTE! This is an additional module, and it is not included in the basic version of ProMotion® Nest.

20.5.) Anchor-

Use this tool to anchor the part on plate during cutting. This is done by creating small gaps on the cutting profile, so the cutting is ceased on these gaps. The length of the gaps can be set in the tools.ini (see ini files).

20.6.) Common Cut-

Common Cut tool lets you join two parts in a way that their common section (line) is cut with a single cut. This can save a lot of time if the cutting speed is low.

Follow these steps:

- Move two parts close to each other.
- Select this tool.
- Move mouse pointer inside one of the parts and press left mouse button.
- Move mouse pointer inside the other part while pressing the left mouse button.
- Release the mouse button and the parts will be merged.

NOTE! The correct kerf must be set in the Nesting Options before the use of this tool.

20.7.) Drill Select-

Adds a special tool selection code for a point marking (drill) point. Select the tool from the menu that pops up when you right-click the screen. When this tool is active you can see small flags on each point marking point. The flags show the currently selected tool.

20.8.) Plate-Part-Plate-

This tool simply converts a plate to a part and vice versa.

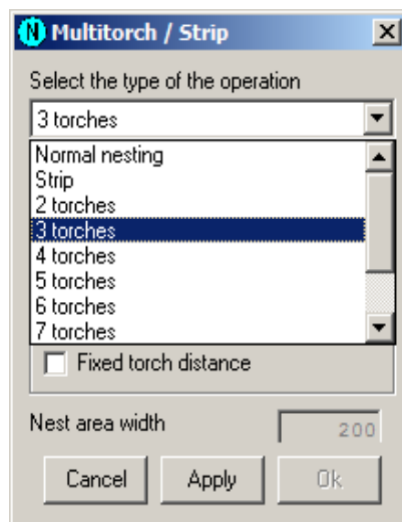
Exceptions: Conversion does not work if...

- There are any parts on the plate.
- There are multiple parts on screen.

20.8.) Single/Multitorch Settings-

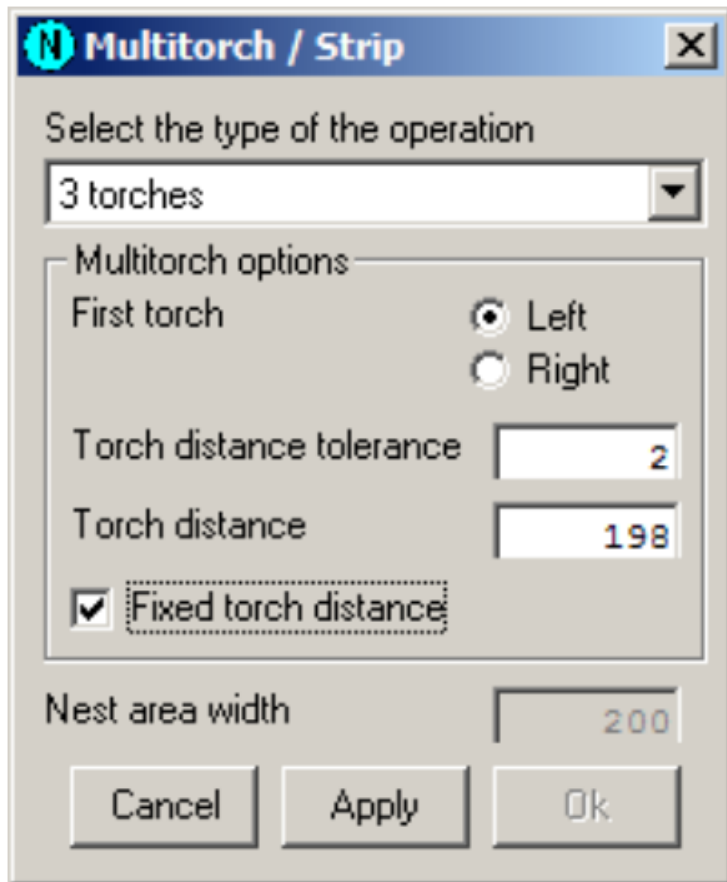
Select the type of the operation from the following list:

- Normal Nesting-Removes all Multitorch data from the plate and it becomes a normal plate again.
- Strip-There is only one torch, but the automatic nesting process uses only a narrow strip instead of the whole plate. The strip's width is given to the textbox Nest area width. It is also possible to show nesting area with Show nesting area tool.
- "n" Torches-You can set the maximum number of torches in Handling options. This operation divides the plate into n parts of equal size and divides the shapes of the current nesting between them. Only those shapes which the first torch will cut are displayed normally and the rest are displayed as shadows.



20.9.) Multitorch Options:

- First torch Sets the first torch on left or right.
- Torch distance tolerance the maximum error allowed in distance between two torches and in distance measured from the first torch.
- Torch distance the distance between two torches. The system calculates this for you if you have not chosen the fixed torch distance.
- Fixed torch distance If you want to set the torch distance by yourself, check this option. This way you can define narrow nesting areas.



Nest Area Width:

Nest area is the area (per torch) which is left when the plate collar, the torch distance tolerance and the nesting clearance has been taken out of it. The nest area should be wide enough for the parts to be nested. Minimum width for the nest area is the part's width plus two times the kerf width.

Finally:

When you have selected the type of the operation and set all the necessary options, choose Apply and then Ok.

Important:

Nesting options Clearance and Collar are used during the torch distance calculations. Thus, you should set them before you set any of the Multitorch settings.

21.) Pick Part-

Use this tool to pick any part from a nesting. The picked part will be copied to its own nesting and then moved to the origin.

When you have activated this tool, just click the part that you want to pick.

21.1.) Show Parts-

Lists the names of all parts in the current nesting. Even if there are several copies of a part, its name is listed only once. Click a name in the list and all parts of that name will be colored in the work window.

22.) Ruler-

Use this tool to measure distances in your nesting. Press the left mouse button where you want to start the measuring. Then move the mouse and keep the mouse button pressed. On top right corner is a yellow label where you can see the distance from the start point to the current mouse location.

23.) Options Menu-

The Options menu provides tools to configure the ProMotion® Nest software.

Handling Options-

Handling Options

Measurement

- Metric
- Inches

DXF Options

Point distance

- Small 0.05
- Medium 0.30
- Large 1.00
- Custom 0.30

- Scale always 1:1
- Move Shapes to Origin
- Convert text to marking
- Extended text search

Miscellaneous

- Show crosshair
- Vertical-Horizontal Bridging
- Use Wide Bridges
- Torch on Right
- Software Keyboard
- DNC Enabled

Anchor width 0.00

Rotation angle

- 90°
- Custom 90.00

Scrap Cutting

Start/End point adjustment

	From	To
Part	2.00	2.00
Plate edge	2.00	2.00

Marking Options

- Mark all
- Skip all marking
- Skip line marking
- Skip point marking
- Extended part marking
- Do all markings first
 - Go to origin after marking
 - Stop after marking

CNC Options

- Enable advanced CNC
- Add plate to CNC program
- Use old style leadins

Default leadin

Arc

Length 0.00 mm

Radius 5.00 mm

Angle 0°

Kerf width 0.00 mm

Default leadout

None

Length 0.00 mm

Radius 0.00 mm

Angle 0°

Overburn 0.00 mm

Cancel Ok

Measurement-

Measurement is either in millimeters or inches. This option defines which.

DXF Options-

- Point Distance If two points are this close to each other, then they are assumed to be the same point. Important! Note: Change the point distance before loading a file.
- Scale always 1:1 When reading DXF files ProMotion® Nest tries to detect which measurement is used in the file. This detection is ignored if Scale always 1:1 is checked. Then the DXF file is read in millimeters or inches depending on the measurement setting.
- Move Shapes to Origin If this option is selected, then the shape in DXF file is moved so that its minimum coordinates are at 0,0 point. If the DXF file contains a nesting (more than one shape), then the nesting is moved so that its minimum coordinates are at 0,0 point. All the shapes in the nesting are moved the same distance, so their relative position to each other does not change.
- Convert text to marking If this option is checked, ProMotion® Nest converts DXF text entities (TEXT and MTEXT) to marking lines. Those marking lines form the same text that was in the DXF file. Note: This option is part of the marking text module. Marking text module is an optional module and it is not part of the basic module.
- Extended text search Usually ProMotion® Nest searches the text entities at the same region (of DXF file), where the other entities are located. If you check this option ProMotion® Nest searches text entities from the beginning of the file to the end of the file.

CNC Options-

- Enable advanced CNC Some new features have been added to the Robotic CNC language. Old versions of WinRobo and Pro3Nest software does not support these new features. If you are making code to WinRobo older than version 7.5.2 or to Pro3Nest older than version 7.0.9, then do not check this option.

Note: Export always uses the most advanced version. This setting applies only to Save As CNC.

- Add plate to CNC program When saving in Robotic CNC, this option saves the plate with all the geometries.
- Use old style lead-ins This option supports older versions of Robotic and ProMotion Controllers. When saving in Robotic CNC and if there are no lead-ins or lead-outs given for a shape, this option adds a special lead-in code that the controller recognizes. The controller has its own lead-in settings which apply in cases like this. Note: Export always uses the lead-ins that you can see on screen. This setting applies only to Save As CNC.

Rotation Angle-

Defines the rotation angle, that the Rotate tool uses. The angle is in degrees. Recommended setting is Custom: 5 degrees.

Scrap Cutting-

These values define the distance between the scrap cutting line piercing/end point and the edge of part/plate. In the “FROM” field a negative number means that the scrap cutting starts before the edge (e.g., outside of the plate or inside of a part). In the ‘TO’ field a negative number means that the scrap cutting stops before the edge (e.g., inside of the plate or outside of a part).

Suggested values are: From Part \geq kerf width, To Part \leq negative kerf width, From Plate edge = 0 (if the plate edge is set correctly else < 0) and To Plate edge > 0 .

Default Lead-ins:

In this section you can define what kind of lead-ins and lead-outs are automatically added to all profiles when loading DXF or creating macros. If you load EIA or ESSI files, no lead-ins or lead-outs are added, because they usually have programmed lead-ins and lead-outs.

Marking Options-

These settings affect how, and which markings are saved to a CNC file and then eventually marked.

- If Mark all is selected then both line markings and point markings are saved.
- If Skip all marking is selected, then none of the markings are saved. This is a useful option if you just want to print the part names (on paper), but not really mark them.
- If Skip line marking is selected, then only point markings are saved.

Marking Options (Cont'd.)-

- If Skip point marking is selected, then only line markings are saved.
- If Extended part marking is checked, then the Line marking start block (please see Code Sequences) is saved just before every line marking and the end block is saved right after every line marking. This applies to point markings as well. This option is disabled if you have Do all markings first option checked.
- If do all markings first is checked, then all the markings are saved first and after them the parts to be cut. Go to origin after marking moves the machine to the zero point of the plate, when all the markings are done. If stop after marking is checked, then the machine stops after markings.

Miscellaneous Options-

- Show Crosshair If this box is checked, a crosshair will be drawn at the current cursor position.
- Vertical-Horizontal Bridging If this box is checked, bridging is done vertically or horizontally. See Bridge tool for further information.
- Use Wide Bridges This is an option for bridging tool. If this option is selected, a solid area is left between bridged profiles so they will stay together when cut from the plate. See Bridge tool for more information.
- Torch on right Changes the origin point from the bottom left corner to the bottom right corner.

Miscellaneous Options (Cont'd.)-

- Software keyboard If you do not have a keyboard, you can always use the software keyboard for text input. If you set this option, then the software keyboard is automatically displayed when text input is needed. Please note that you can use the mouse wheel for numerical input in ProMotion® Nest
- DNC enabled This option sets the default download behavior of ProMotion® Nest , when requested from ProMotion® Cut. If this option is set, then DNC download automatically activates when you **“Click “DOWNLOAD”** in ProMotion® Cut. See more info about DNC in chapter File Menu.

23.1.) Special Tool Options-

These are options for special tools.

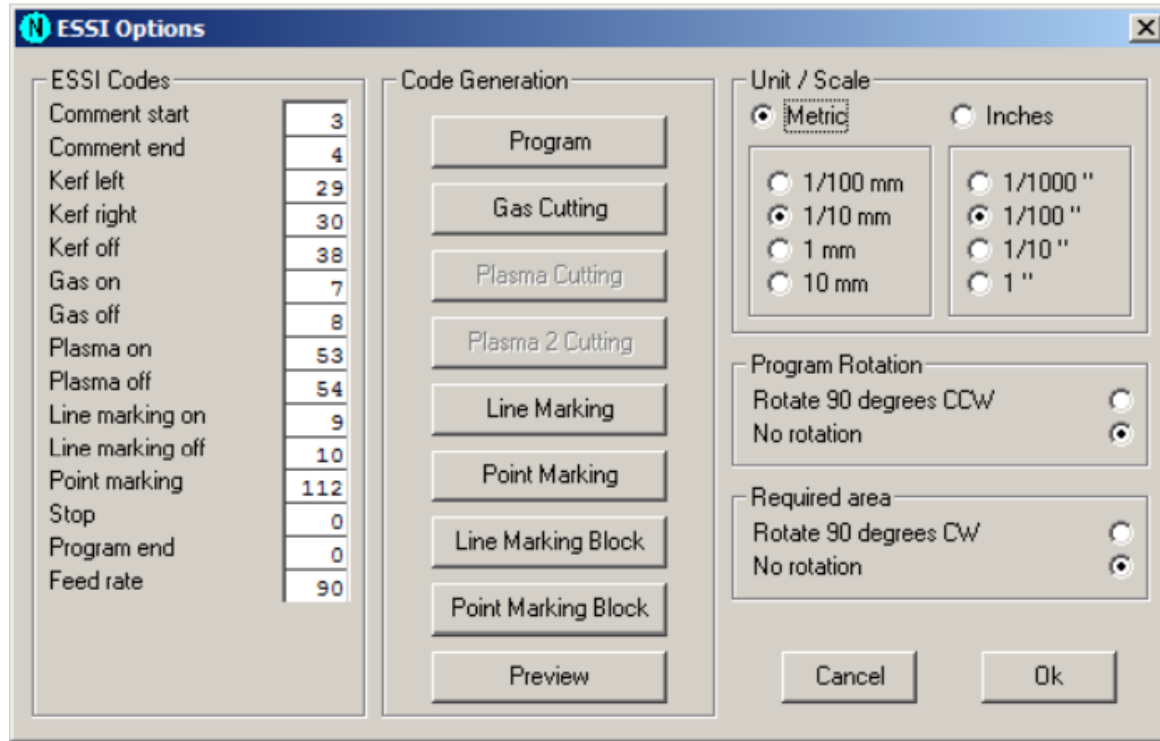
Coating Lines-

Distance between lines is the distance between two coating lines.

Lead-in / Lead-out is the measure how much the coating lines will be drawn over the edges of a shape.

Minimum Gap is the smallest width of a hole that is not jumped over when the coating lines are drawn.

23.2.) ESSI Options-



These options are used when reading and writing **“ESSI files”**.

Essi Codes-

ESSI files these are interpreted according to these codes. These codes should match the codes used in the ESSI file.

Program Rotation-

If the rotation is selected, all the new nesting's which are read from ESSI files will be rotated 90 degrees counterclockwise.

ESSI Options (Cont'd.)-

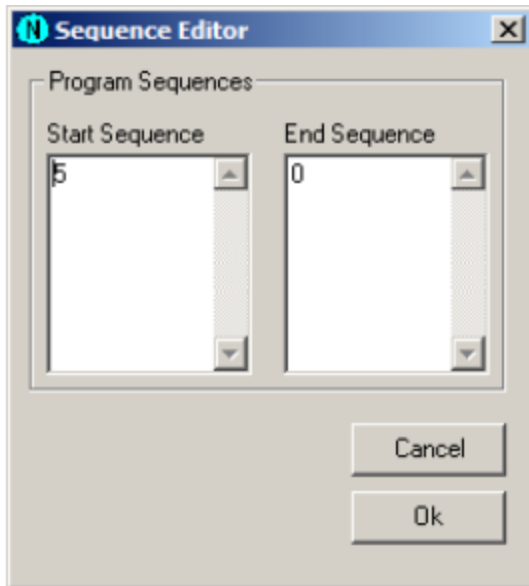
Unit / Scale-

These options set the default units and scale used in ESSI files.

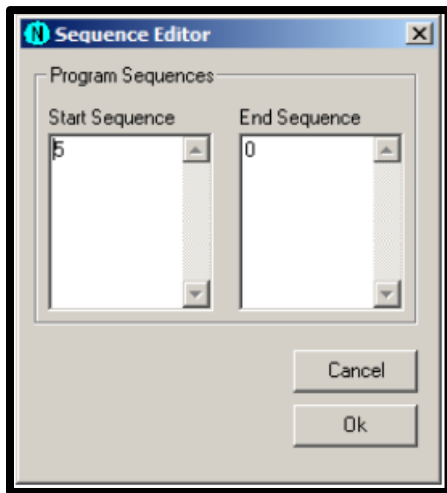
Code Generation-

Use these commands to define start and end sequences of different actions. These sequences are used in writing ESSI files. See Code Sequences for more information.

23.3.) Code Sequences-



23.3.) Code Sequences (Cont'd.)-



In ESSI and EIA options it is possible to modify the code sequences, which are added to the beginning and the end of certain actions, when saving files.

The caption of the upper frame shows which actions sequences are currently being modified (e.g., in the picture above they are the sequences of gas cutting). Start and end sequences can be seen in the edit fields. Some actions need the specification of the kerf side (e.g., all cutting sequences).

Sequence	Explanation - The beginning and the end of...
Program	...a cutting program.
Gas Cutting	...a profile to be cut with gas torch.
Plasma	...a profile to be cut with plasma torch. Not supported at the moment.
Plasma 2	...a profile to be cut with plasma 2 torch. Not supported at the moment.
Line Marking	...a single line marking profile.
Point Marking	...a single point marking.
Line Marking	...all line markings.
Point Marking	...all point markings.

Example-

The picture above shows the gas cutting sequences of ESSI files. Kerf side is set to the left. The start sequence is 6 (rapid move off), 29 (kerf left), 7 (gas cutting on). The end sequence is 8 (gas cutting off), 38 (kerf off), 5 (rapid move on).

With these settings the following code is generated:

6	(<u>start</u> sequence)
29	(<u>start</u> sequence)
7	(<u>start</u> sequence)
++1000	(a profile)
+1000+	(a profile)
+ -1000	(a profile)
-1000+	(a profile)
8	(<u>end</u> sequence)
38	(<u>end</u> sequence)
5	(<u>end</u> sequence)

23.4.) EIA input Options-

EIA Input Options

Codes

Absolute coding	G90
Incremental coding	G91
Inches	G20
Metric	G21
Rapid move	G00
Linear cut	G01
Arc CW	G02
Arc CCW	G03
Circle CW	G32
Circle CCW	G33
Kerf left	G41
Kerf right	G42
Kerf Off	G40
Gas On	M07
Gas Off	M08
Plasma On	M15
Plasma Off	M16
Plasma 2 On	M17
Plasma 2 Off	M18
Line mark On	M09
Line mark Off	M10
Point mark	M05
Message start	(
Message end)
Stop	M00
End of program	M02

Null G is linear

Unit / Scale

Metric Inches

<input type="radio"/> 1/100 mm	<input type="radio"/> 1/1000 "
<input type="radio"/> 1/10 mm	<input type="radio"/> 1/100 "
<input checked="" type="radio"/> 1 mm	<input type="radio"/> 1/10 "
<input type="radio"/> 10 mm	<input checked="" type="radio"/> 1 "

Coding

Absolute Incremental

I and J codes

Absolute Incremental

Program Rotation

Rotate 90 degrees CCW No rotation

Feed Rate and Kerf

Ignore F codes Ignore K codes

K Codes

Value is kerf width Value is kerf compensation

F Codes

Relative Absolute

Advanced

Load Save As... Cancel Ok

These options are used when ProMotion® Nest reads EIA files.

23.4.) EIA input Options (Cont'd.)-

Codes-EIA files are interpreted according to these codes. These codes should match the codes used in the EIA file.

Null G is Linear- This is when this option is set, ProMotion® Nest interprets lines without G-codes as linear movement. If the cutting is on, then it is linear cutting, otherwise it is just rapid movement. When this option is not set, lines without G-codes are interpreted as the same type that was the last read G-code.

Unit / Scale-These options set the default units and scale used in EIA files. If an EIA file has unit definition, then that overrides this setting. The scale is always defined here.

Coding-If coding is set to absolute, then all X and Y coordinates are absolute. Otherwise, they are incremental.

I and J codes.

I and J codes are the coordinates of the center point of an arc. If set to absolute all I and J codes, as well as X and Y codes, are absolute, if not they are incremental. If X and Y codes are set to incremental then I and J are also incremental.

NOTE! “Coding” and “I and J codes” have effect only when they are not defined in the EIA file.

23.4.) EIA input Options (Cont'd.)-

Program Rotation-If rotation is selected, then all new nesting's read from EIA files are rotated 90 degrees counterclockwise.

Feed Rate and Kerf-

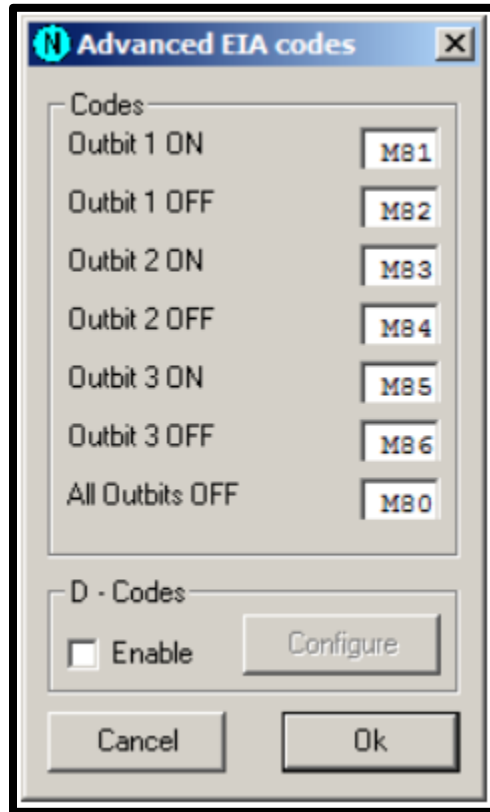
- **Ignore F codes** If this option is set, then all F codes (feed rates) are ignored when reading files.
- **Ignore K codes** If this option is set, then all K codes (kerf) are ignored when reading files.
- **K Codes-**
 - a.) Value is kerf width If this option is set, then the value of the K code is interpreted as kerf width.
 - b.) Value is kerf compensation If this option is set, then the value of the K code is interpreted as kerf compensation.
- **F Codes-**
 - a.) Relative If this option is set then F codes are interpreted as percentage of the full feed rate.
 - b.) Absolute If this option is set then F codes are interpreted as millimeters or inches per minute.

Load & Save As...

If you need to read different EIA files from different sources it is useful to save the settings for each EIA type separately. Save the settings by using the Save as button and load them back with the Load button.

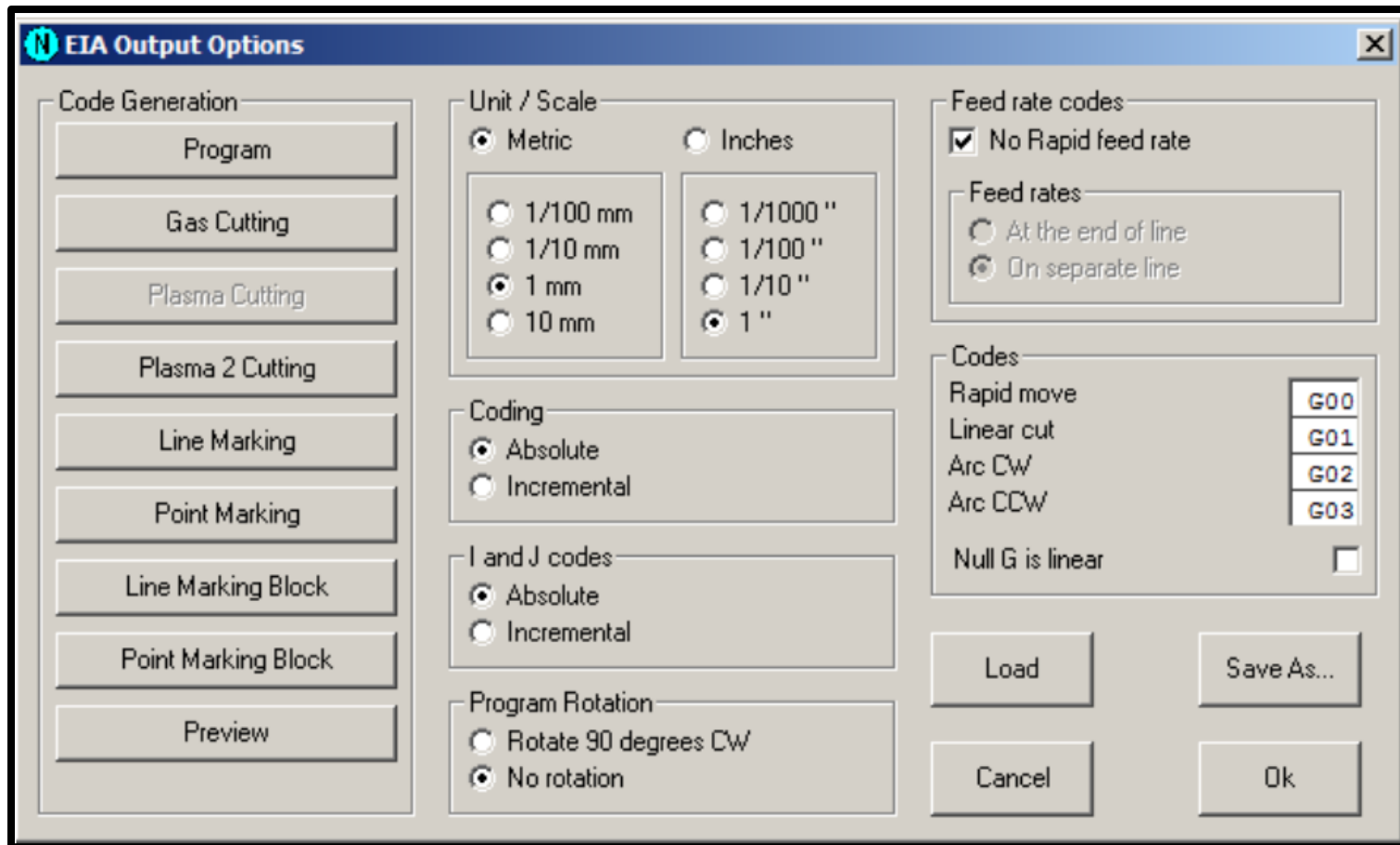
See also EIA Programming.

Advanced EIA-



Here you can configure the outbits for EIA input. The meaning of these outbits is explained in the ProMotion® Cut manual. D codes are predefined kerfs used in some systems. Choose Configure to change the kerf values of D codes.

23.5.) EIA Output Options-



These options apply to the saving of EIA files.

Code Generation-

Use these commands to define start and end sequences of different actions. See Code Sequences for more information.

23.5.) EIA Output Options (Cont'd.)-

Unit / Scale-These options set the unit and scale used in saved EIA files.

Coding-If coding is set to absolute, then all the X and Y coordinates are absolute. Otherwise, they are incremental.

I and J Codes-I and J Codes are the coordinates of the center point of an arc. If set to absolute, all I and J codes are absolute. Otherwise, they are incremental. If X and Y codes are set to incremental, then I and J are also incremental.

Program Rotation-If rotation is selected then all generated EIA files are rotated 90 degrees counterclockwise.

Feed Rate Codes-

- No Rapid feed rate If this option is set, then feed rates are not saved for rapid speed.
- Feed rates at the end of line/on separate line Feed rates can be saved on their own lines or at the end of a code line. This option determines which way is used. See examples below.

Example 1 (at the end of line):

```
G01 X10 Y10 F200
```

Example 2 (on separate line):

```
F200
```

```
G01 X10 Y10
```

23.5.) EIA Output Options (Cont'd.)-

Codes-

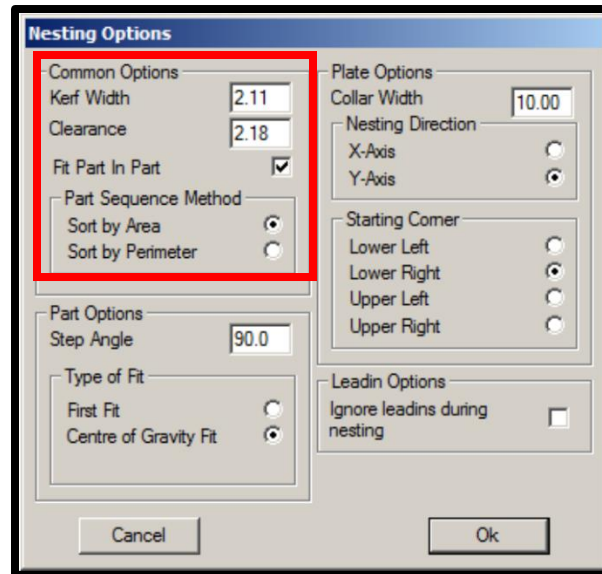
Rapid move, Linear cut, Arc CW, and Arc CCW set the codes, which are used when saving EIA files. If Null G is linear is selected, then there will be no code before rapid movement or linear cut.

Load & Save As...

If you need to save different EIA files from different sources which use various types of EIA, it is useful to save the settings for each EIA type separately. Save the settings by choosing Save as and load them back by choosing Load.

See also EIA Programming.

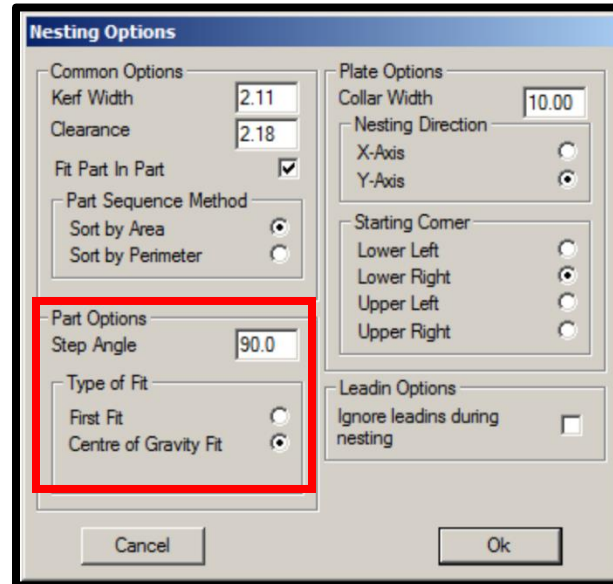
23.6.) Nesting Options-



Common Options-

- **Kerf Width-** The kerf width of the selected cutting process.
- **Clearance-** Specifies the minimum distance always to be left between shapes nested on a plate. If this variable is set to zero (0), the program places them as close to each other as the kerf width allows.
- **Fit Part in Part-** If selected, the program will attempt to place smaller shapes to the holes of the larger ones.
- **Part Sequence Method-** Shapes can be nested either in an order set by their surface area or their perimeter. If sort by area is chosen, then those shapes that have largest surface area will be nested first. When sort by perimeter is chosen, the shapes which have largest perimeter will be nested first. (A shape which is long, but thin, has a great perimeter, but a small surface area.).

23.6.) Nesting Options (Cont'd.)-



Part Options-

- **Step Angle**-When nesting shapes onto a plate, ProMotion® Nest attempts to place them on it in different positions. Between each attempt, ProMotion® Nest rotates the shapes as many degrees as given here. A full circle is 360 degrees. Thus, if this variable is set to 90, the shapes will be attempted to nest in four different positions; if set to 1 degree ProMotion® Nest tries 360 different positions. Obviously, the smaller the step angle, the better the result, but a small step angle naturally extends the nesting time.
- **Type of Fit**-Shapes can be nested according to two principles, the First Fit, and the Center of Gravity Fit. The First Fit setting tells ProMotion® Nest to place the shape in the first position it determines will work. The Center of Gravity Fit setting tells ProMotion® Nest to calculate the position where the center of gravity of the shape is as close to the bottom line of the plate as possible. The bottom line of the plate is selected in the Plate Options (see below).

23.6.) Nesting Options (Cont'd.)-

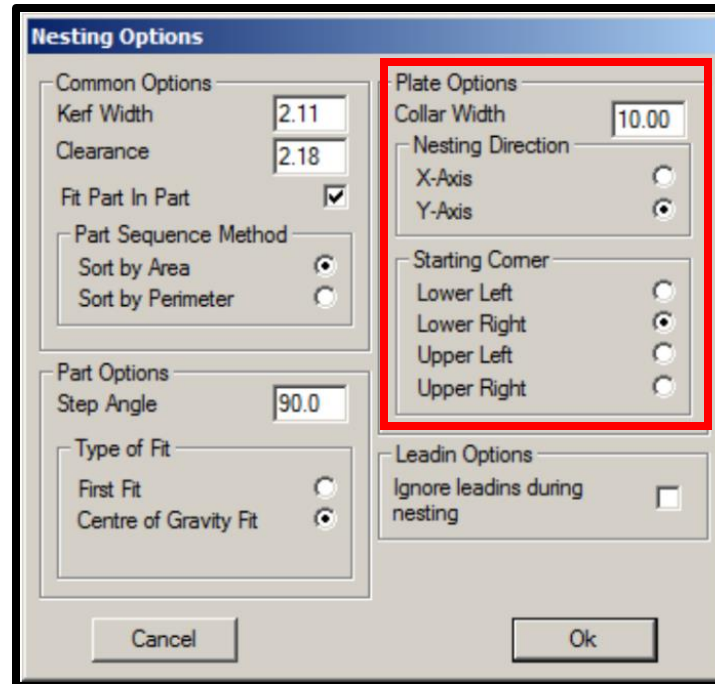
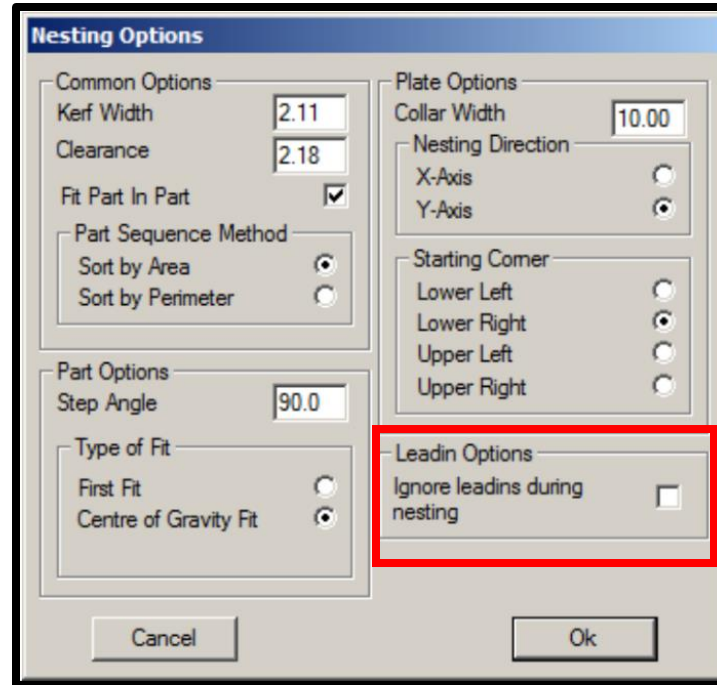


Plate Options-

- **Collar Width**-Sets the distance to be left between the plate's edges and the outermost shapes. In other words, shapes are never to be placed closer to the edge of the plate than stated in this variable.
- **Nesting Direction**-This option sets the axis on what the nesting process proceeds. Whether the nesting process proceeds to the left, or the right depends on the starting corner setting.
- **Starting Corner**-Determines which corner the nesting begins at (Lower Left, Lower right, Upper Left, Upper Right.).

NOTE! If Clearance is greater than Collar width, then Collar width is set to same as

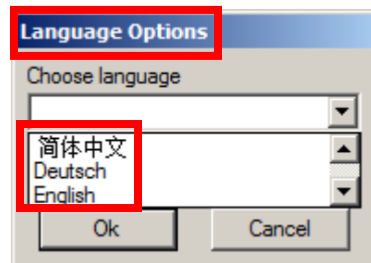
23.6.) Nesting Options (Cont'd.)-



Lead-in Options-

- **Ignore Lead-Ins during Nesting-** When selected all lead-ins and lead-outs are ignored during the nesting process. This is a useful option if shapes are going to be nested and then bridged. Bridging removes extra lead-ins that can be ignored.

24.) Language Options-



Changes the language used by the user interface of ProMotion® Nest.

25.) Registration Menu-

Tools to register your ProMotion® Nest software.

Registration Form- Please fill this out form to order software or new software options. It is also recommended to use this form if you have some technical **problems, especially license related.**

Registration- Use this dialog to enter your new license number. If you received your new license as a license file simply copy that file to the ProMotion® Nest directory. If you received the license by fax, then you should fill in the form carefully and completely.

26.) Help Menu-

Help menu has the following items:

- Contents Opens the help file on your screen.
- About... Provides information about your version of ProMotion® Nest Software.

27.) List Windows-

There are two list windows on the right-hand side of ProMotion® Nest user interface. Those windows are Plate List and Part List. They both offer several tools for your use.

27.) List Windows (Cont'd.)-

27.1.) Plate List-This window contains a list of all plates, which are opened. The list is sorted alphabetically. The active plate has a blue bar on it (it is selected). **These tools are available in the plate window:**

Activate - Click the name of the plate to activate it.

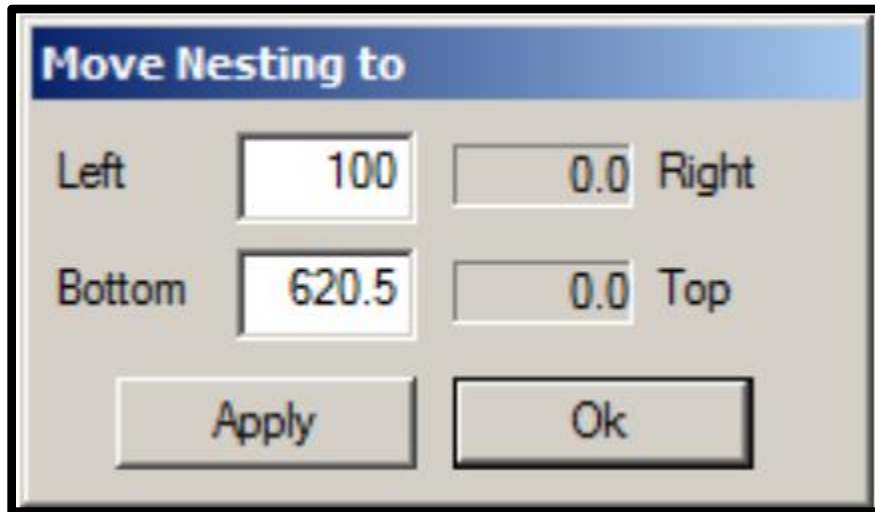
Nest - Double-Click the name of the plate and it will be automatically nested.

Popup Menu - Right-Click the window to open a popup menu. **The menu contains following commands:**

- **New Plate**-Creates a new plate.
- **Change Plate**-Changes the plate's size.
- **Trash**-Trashes the current plate and the nesting in it.
- **Rename**-Renames the current plate.
- Nest Automatic Nesting on the current plate
- Move Nesting to (See Below).
- Marking Text Activates the marking text tool.
- Print Extras (See Below).

Move Nesting To-

This tool changes the position of the whole nesting. When you select this tool, the window below appears.



Left is the nesting's distance to the left side of the plate. If this number is negative, it means that the nesting is over the plate's edge. Right, Bottom and Top work in the same way.

You can change left and bottom values. When you choose **"APPLY"** the nesting moves and the values (right and top) in this window are updated. **"OK"** is like **"APPLY"** but it also closes this window.

27.2.) Part List-

This window contains a list of all geometries, which are opened. The list is sorted alphabetically. The active geometry has a blue bar on it (it is selected). These tools are available in the geometry window: Activate - Choose the name of the geometry to activate it. Copy to the active plate – Double Click the name of the geometry. Popup menu – Right Click the window to open a popup menu. The menu contains following commands:

- Open.
- Trash.
- Rename, which renames the active geometry.
- Copy to nesting, which copies the active geometry to the active plate.
- Move shapes to origin moves the nesting so that it is minimum X and Y values are equal to zero.
- Add plate creates a plate, puts the nesting on that and moves the job to the plate list (plate window).
- Toggle Group On/Off toggles the status of the active geometry (geometries) to group or to normal. If there is an asterisk (*) before the name of the geometry, then it is considered as a group.
- DSTV properties shows a little window, which displays data read from a DSTV file.
- Nominal size is by default the part's width x part's length. This opens a dialog box, which shows the part's nominal size, and you can change it, if you wish. Nominal size is used in Nest Info.
- Marking Text.

28.) Miscellaneous-

Terminology-

Nesting-

Nesting is divided in the following way:

Element is the atom of a nesting. Element is the smallest part that can be edited. There are four different kinds of elements: lines, arcs, circles, and points.

Profile-is a combination of one or more elements, which are connected to each other. At the starting point of a profile the sheet is pierced and cutting starts. At the end point of a profile the torch is raised up and cutting stops.

Shape-contains one or more profiles. Shape is a logical part, which has a boundary and possibly has some holes.

Nesting-Contains all the shapes but can also be empty.

Transfer line-Transfer line is a path that the torch follows when it is not cutting.

29.) Problems?-

We have listed here some problems, which occur time to time, and solutions to them.

1.) When starting ProMotion® Nest displays the following message “Registration Error! Please, contact your dealer. Running in demo mode.” and starts in the Demo Mode.

OFFICE PC:

ProMotion® Nest requires an activation file (license.txt) and a dongle to work. Please check the following things:

- The dongle is plugged into the PC's USB or LPT port.
- You have installed drivers for the dongle.
- There is a license file (license.txt) in the ProMotion® Nest folder. If all the above are ok, then there may be something wrong with your license file. Please contact your dealer.

ICNC CONTROLLER: Try to close ProMotion® Nest and then start it again. If that did not help, please contact your dealer.

29.1.) DXF-

Overview-

DXF format is supported by most present-day CAD software's. DXF files can be either ASCII or binary formats. Because ASCII DXF files are more common than the binary format, the term DXF file is used to refer to ASCII DXF files.

Requirements and Recommendations.

29.1.) DXF (Cont'd.)-

DXF files are an interface between CADs and nesting software, like ProMotion® Nest. There are certain recommendations and requirements when creating and converting DXF to ProMotion® Nest, which should be noticed:

- It is useful to put geometries on their own separate layer and name that layer so that it is easily recognized (e.g., PROFILES). ProMotion® Nest detects different layers and allows the user to choose which layers to load.
- If there are multiple parts, it is a good idea to put each of them on their own separate layer (e.g., PART1, PART2, etc.).
- Line and point markings must be placed on their own layers. Use POINT or CIRCLE entities for point marking.
- Draw the parts in 1:1 ratio. Do not scale them. ProMotion® Nest reads the coordinates as they are in a DXF file.
- Try to avoid open gaps between different elements. Use POLYLINE or other objects that draw a continuous line.
- All marking objects (point marking, line marking or text objects) must be inside parts. Outside objects are ignored.
- Supported objects are LINE, ARC, SPLINE, CIRCLE, POINT, POLYLINE, VERTEX, ELLIPSE, TEXT, MTEXT and SEQEND.

Unsupported CAD features-

- DWG or binary DXF files are not supported at all.
- Other unsupported objects are INSERT, IMAGE and HATCH. There are others too, but these are the most common.

Additional Notes-

- **ELLIPSE Objects**-are converted to lines with maximum allowed error of 0.1 mm. The error level can be adjusted in inifiles.
- Marking text (TEXT and MTEXT objects) requires the optional “Advanced Marking” software module.
 - **Scanned Drawings**- which are converted to DXF, usually make poor CNC code. The scanner generates unnecessary short lines e.g., a one-inch-long straight line may be formed of one-hundred 0.01” lines. Often the lines may be too short to be accepted at all. When that happens ProMotion® Nest leaves empty gaps in those places indicating an open profile, which cannot be nested until all entities are joined. That is time consuming and in-efficient. This will cause much larger CNC files to be generated, which leads to longer operation time at the CNC controller.

When using scanned drawings build them with as long elements as possible.

29.2.) CNC-2-

We have developed an advanced CNC-language - Robotic CNC-2. CNC-2 is more accurate than old Robotic CNC-, ESSI- or EIA languages. So far ProMotion® Nest is the only software that supports CNC-2. CNC-2 is an excellent choice for making backup copies. It saves not only the nesting, but also the plate.

29.3.) Line and Point Marking-

If a nesting contains line or point markings, they are merged to the shapes of the nesting. You cannot add, move, or alter the markings, unless you also move the shapes. The only thing you can do to the markings themselves is to remove them.

When ProMotion® Nest generates cutting program, it will place possible markings before the cutting in the cutting order. That means: if shape contains line or point markings, the markings will be done first, and the cutting is done after the markings.

The line marking profiles are drawn in black color. The point marking points are drawn as black circles with a cross inside the circle.

29.4.) EIA Programming-

About Functions-

There are 2-two types of functions. Those which define movement of the cutter and those which define some other specific action (i.e.: “torch on”). All functions have a certain identifier, which can be changed in EIA options (see ProMotion® Nest’s options). Syntax of functions:

Key to Syntax:

ID is a string that defines the function.

X, Y, I and J are coordinates. Character X, Y, I or J must be first and immediately after them should the coordinates follow (like X123.456 Y-12.3 I1234 J0).

Rapid movement: ID X Y

Linear cut (line): ID X Y

Arc: ID X Y I J

Circle: ID I J

All Other Functions: ID

29.4.) EIA Programming (Cont'd.)-

Example 1 -

(Comments are in parenthesis)

G90

(Absolute Mode)

G21

(Use metric units (millimeters))

G00X100Y300

(Move to point 100, 300)

G41

(Kerf compensation left)

M03

(Gas Torch On)

G01X100Y400

(Linear cut to point 100, 400)

G02X200Y400I150J400

(Clockwise arc to point 200, 400 arc's center at position 150, 400)

29.4.) EIA Programming (Cont'd.)-

G32I150J350

(Clockwise circle of radius 50 and center at position 150, 350)

M05

(Gas Torch Off)

M02

(End of Program)

Example 2-

G00X100Y100

M03

G32I50J0

M05

M02

As you can see there is no definition of the kerf compensation, programming mode or units' type. In this case the defaults are used. The defaults can be set in ProMotion® Nest's EIA options. Let us assume that the programming mode is absolute, but I and J codes are incremental, and units are millimeters. In that case the program would create a circle which center would be at position 150 (100+50), 100 (100+0). If I and J codes would also be absolute then the center of the circle would be 50, 0.

29.5.) Send To-

If you add a shortcut to ProMotion® Nest into Windows' Send to folder, you can send files to ProMotion® Nest directly from the Windows Explorer.

29.6.) ini files-

In the folder where ProMotion® Nest is installed, there is a folder named ini. That folder contains some configuration files, which are useful in some cases.

The format of each ini file is the same. The format is:

ID, TYPE, DATA, INFO

ID is the identification number of that setting. Do not change it!

TYPE is the type of the DATA. Do not change it!

DATA is the actual setting. You can modify this.

INFO is a short description of the setting. You can modify this if you want to.

This is an example from tools.ini-

10,1,1,DNC COM Port [Default: 1]

ID = 10

TYPE = 1

DATA = 1

INFO = DNC COM Port [Default: 1]

A brief description of some ini files:

tools.ini is probably the most important of ini files. There you can change the behavior of some tools and set some error margins. The settings here are such that you should not need to touch these in most of the cases. These settings are for special cases where standard is not working well enough.

ui.ini contains some settings related to the user interface.

Command Line Parameters-

There are a couple of command line parameters which can be used when starting ProMotion® Nest.

-min. Starts the software with its window minimized.

-is. This parameter must be used with a cnc file. When using this parameter ProMotion® Nest reads the file in with raw import. After that it sends the file to cut, trashes the nesting and minimizes itself. This parameter is useful only when using an iCNC controller.

Example of Usage: `pmnest.exe -is C:\CuttingPrograms\testFile.eia`.

30.) Maintenance & Troubleshooting-

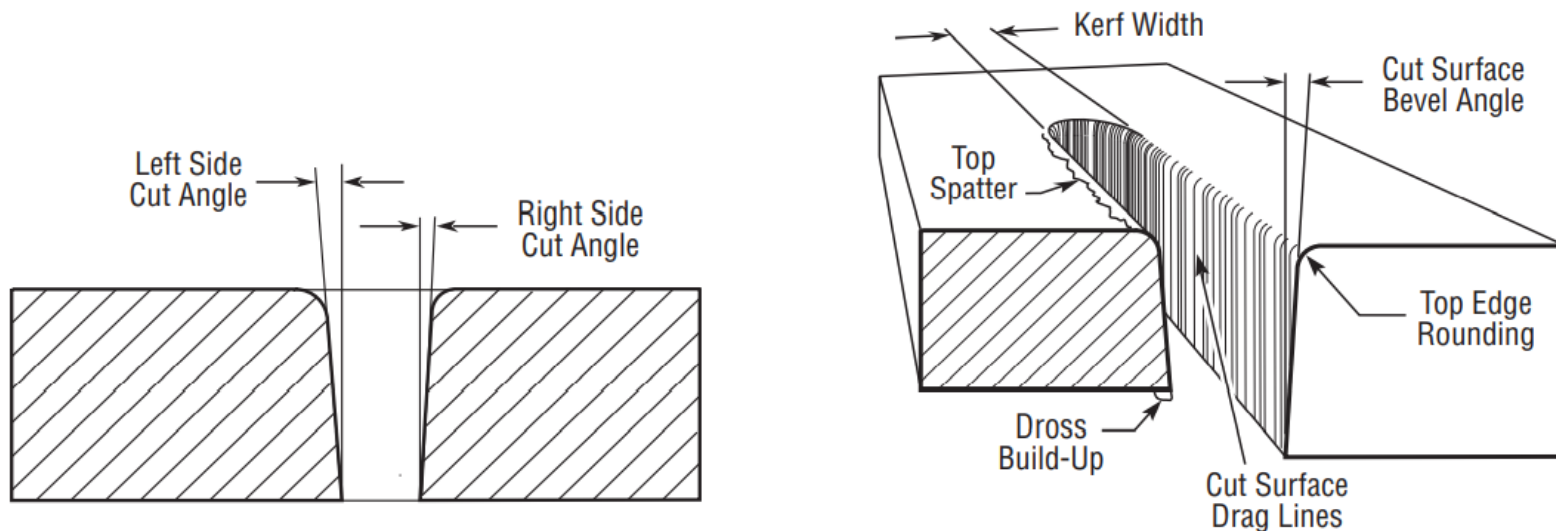
30.1.) Maintenance-

Weekly	Check buttons for wear and tear.
Monthly	Check cables for wear and tear. Check all connectors are properly connected.
	Clean and check rails.
	Clean lifter screw and rails.

30.2.) Cut Quality-

Cut Quality-

Cut quality requirements differ depending on application. For instance, nitride build-up and bevel angle may be major factors when the surface will be welded after cutting. Dross-free cutting is important when finish cut quality is desired to avoid a secondary cleaning operation. Cut quality will vary on different materials and thicknesses.



30.2.) Cut Quality (Cont'd.)-

Cut Surface-

The condition (smooth or rough) of the face of the cut.

Bevel Angle-

The angle between the surface of the cut edge and a plane perpendicular to the surface of the plate. A perfectly perpendicular cut would result in a 0° bevel angle.

Top-Edge Rounding-

Rounding on the top edge of a cut due to wearing from the initial contact of the plasma arc on the workpiece.

Dross Build-up and Top Spatter-

Dross is molten material which is not blown out of the cut area and re-solidifies on the plate. Top spatter is dross which accumulates on the top surface of the workpiece. Excessive dross may require secondary clean-up operations after cutting.

Kerf Width-

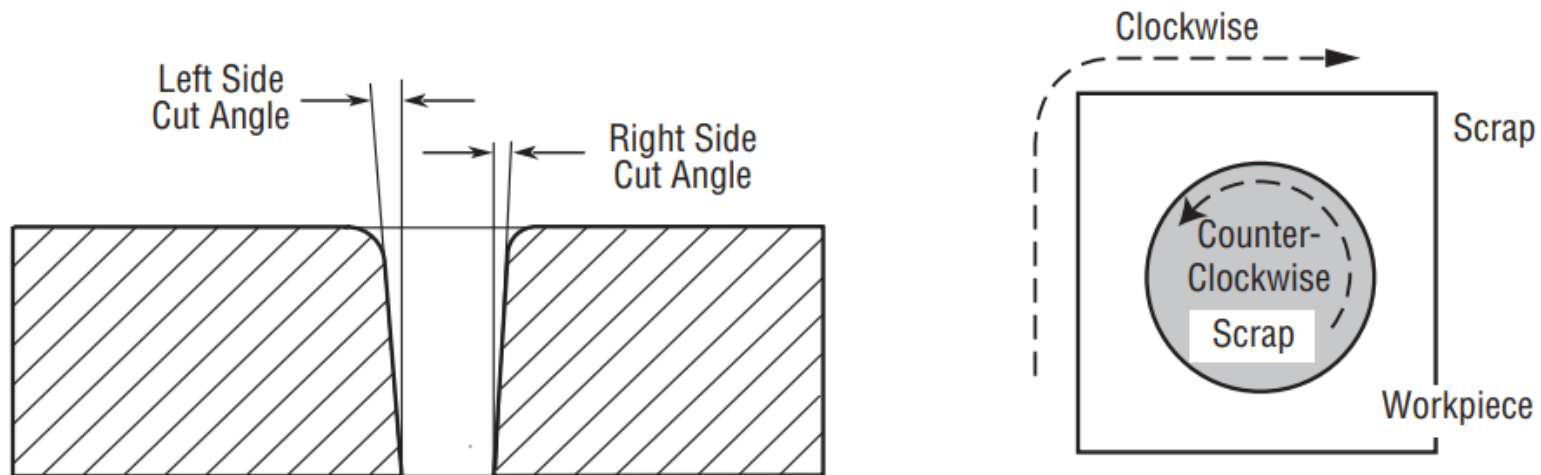
The width of material removed during the cut.

30.2.) Cut Quality (Cont'd.)-

Nitride Build-Up Nitride deposits which may remain on the cut edge of the carbon steel when nitrogen is present in the plasma gas stream. Nitride buildups may create difficulties if the steel is welded after the cutting process.

Direction of Cut-

The plasma gas stream swirls as it leaves the torch to maintain a smooth column of gas. This swirl effect results in one side of a cut being squarer than the other. Viewed along the direction of travel, the right side of the cut is squarer than the left.



Swirl Effect on Side Characteristics of Cut.

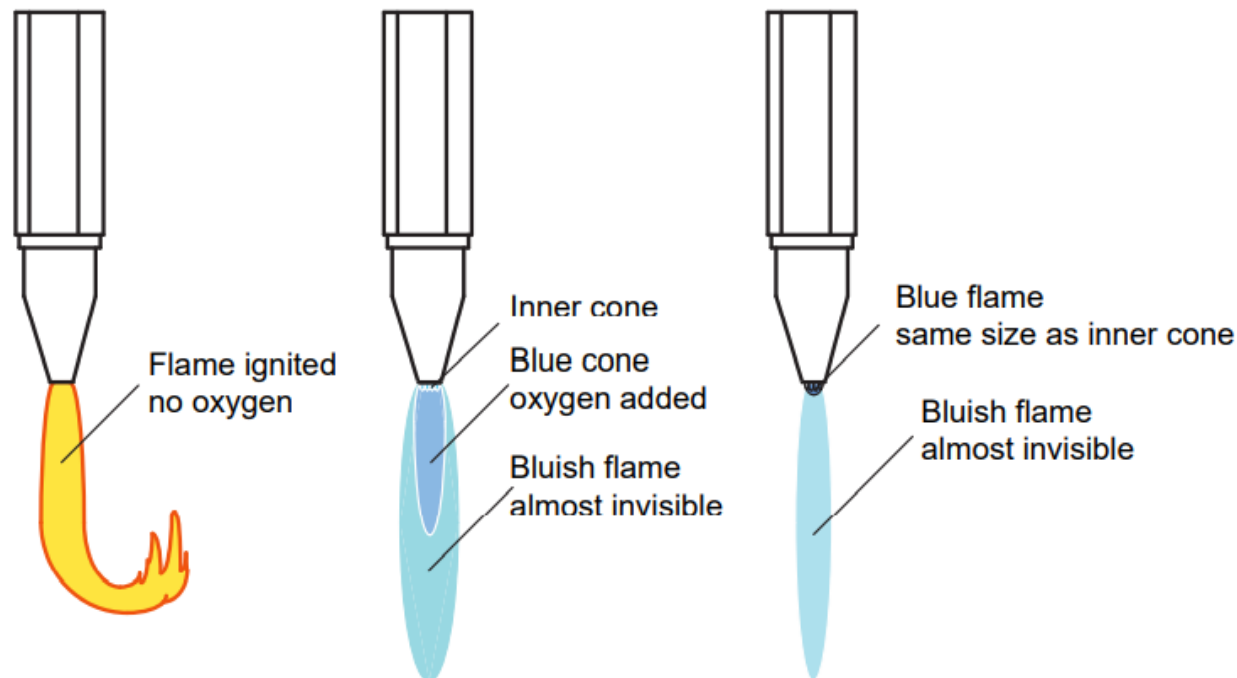
To make a square - edged cut along an inside diameter of a circle, the torch should move counterclockwise around the circle. To keep the square edge along an outside diameter cut, the torch should travel in a clockwise direction.

31.) Oxy Fuel Cutting Quality-

Note! Always follow manufacturers guidelines on adjustments and cutting parameters.

Igniting and adjusting a Neutral Flame-

- 1.) Ignite the flame.
- 2.) Add gas until the flame separates from the tip and then slowly decrease the gas until the flame touches the tip again.
- 3.) Slowly start to add oxygen and watch the inner cone, the blue inner cone will start to shorten as you increase the oxygen flow. Increase the oxygen until the inner cone reduces to the same length as the small preheat flame.
- 4.) At this point the flame temperature and intensity is at its maximum.



31.1.) Effect of Preheat on Cut Quality-

Characteristics of Proper Preheat:

- 1.) Top edge is quite square, and less than 1/16-2" melt over (top rounding).
- 2.) Face of the cut contains an easily removable thin layer of slag which covers a clean surface with well-defined drag lines from top to bottom.
- 3.) Bottom edge contains little to no easily removable slag.

Characteristics of too much Preheat:

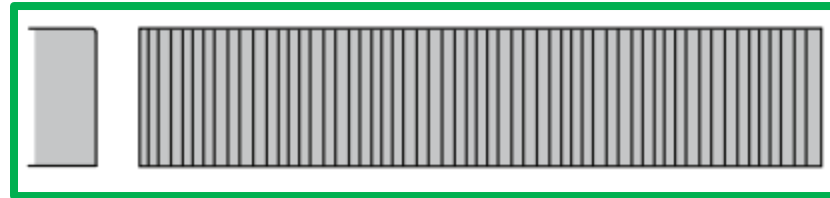
- 1.) Top edge contains heavy roll over and occasional protrusions.
- 2.) Black heavily crusted slag will accumulate on the face of the cut, making it difficult to clean.
- 3.) Upper portion of cut has little to no drag lines and lack of detail because of melting.

Characteristics of too little preheat:

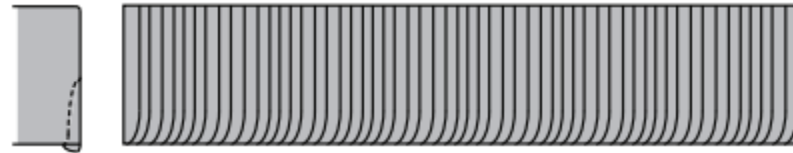
- 1.) Top edge is almost perfectly square.
- 2.) Torch is constantly on the verge of losing cut.
- 3.) Some difficulty is experienced in getting through heavy plate.

31.1.) Effect of Preheat on Cut Quality (Cont'd.)-

Correct Cutting Technique- The cut surface is smooth and square, and the kerf walls are parallel. The lag lines are almost vertical. There is little slag adhering to the bottom edge. The top edge is slightly rounded when the preheat flames are properly adjusted. This surface is ideally suited for many applications without further treatment



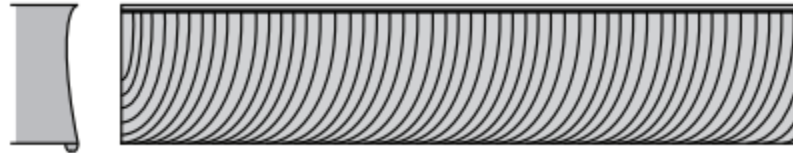
Cutting Speed Too Low- An abnormally low cutting speed results in heavy gouging of the cut surface and slag adhering in large globules. Under this condition, oxygen and fuel gas are being wasted.



31.1.) Effect of Preheat on Cut Quality (Cont'd.)-

Cutting Speed Too High-An

extremely high cutting speed results in heavy lag, as shown by the curved lag lines on the cut surface. The face is reasonably smooth but somewhat concave. Slag will adhere during cutting, but it may be removed with ease. Heavy lag cutting is recommended for straight line cuts only.



Nozzle too far from Surface-When carrying the nozzle too high above the work, excessive rounding of the top edge occurs. Also, the cutting speed may have to be lowered. With the correct nozzle clearance, the preheat flames should not be over 1/4" above the top surface of the work.



Nozzle too near Surface-When the nozzle is carried too low, part of the preheat flame's inner cones become buried in the cut kerf. This produces grooves in the cut face and excessive melting of the top edge. Also, the flame becomes subject to popping and lost cuts may result.

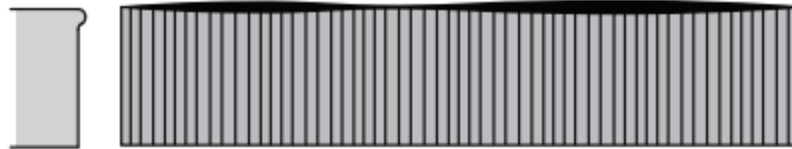


31.1.) Effect of Preheat on Cut Quality (Cont'd.)-

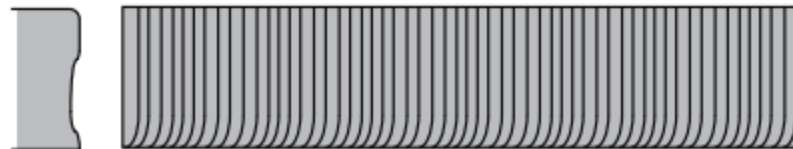
Excess Cutting Oxygen-If the cutting oxygen pressure is too high or the nozzle size too large, a reduction in cut quality will result. Nozzles are made to operate within a limited range of torch pressures. Therefore, excessive oxygen pressure causes distortions in the oxygen stream once it leaves the nozzle.



Excess Preheats Flame-Inexperienced operators often try to increase cutting speeds by using a heavy preheat flame. Excessive preheat causes melting of the top edge and may lower the speed of cutting. In addition, oxygen and fuel gas are



Dirty Nozzle Used-The nozzle has been fouled by some adhering scale causing the oxygen stream to lose its parallel form. The cut surface is no longer smooth or squared with proof of pitting, undercutting, heavy slag, and scale. The nozzle should be cleaned with care, so as not to distort, or bell-mouth, the cutting oxygen bore.



32.) Troubleshooting-

32.1.) Error Messages-

<u>Problem</u>	<u>Cause</u>	<u>What to Check</u>
Limit Switches	Limit Switch Active	Drive machine out from limit switch.
	Broken Cable	Cable for wear and tear.
	Broken Switch	Measure proper operation of switch.
Collision	Torch Collision Active	Seat torch holder properly.
	Broken Cable	Cable for wear and tear.
	Broken Switch	Measure proper operation of switch.
No inbit 04	Plasma did not fire	Check troubleshooting for piercing issues.
Main Arc on Rapid Motion	Torch "ON" while traversing	Check plasma off delays.
No Motion Detected	Enable Button set to "OFF"	Put Enable Button to "ON" .
	No power to servo	Check that servos are
	E-Stop pressed in.	Check external stop buttons.
System Halted all Outputs Disabled	E-Stop pressed in.	Check external stop switches/buttons. Check continuity between E1 and E2 in the power connector.

32.2.) Piercing Issues-

<u>Problem</u>	<u>Cause</u>	<u>What to Check</u>
Plasma will not pierce	Worn out consumables.	Check consumables.
	Error in Plasma.	Check plasma power supply for error messages.
	Plasma start time set too short.	Check plasma start delay time.
	Plasma set to off.	Check plasma button is on Auto.
Plasma starts but crashes to plate	Worn out consumables.	Check consumables.
	Error in Plasma.	Check plasma power supply for error messages.
	AVC set too low.	Check arc voltage setting.
	Collision rebound offset set too low.	Check collision rebound offset setting on iHC.
Plasma arc lost in the middle of a cut	Worn out consumables.	Check consumables.
	Error in Plasma.	Check plasma power supply for error messages.
	Wrong gas pressures.	Check plasma gas pressures.

32.3.) Motion Issues-

<u>Problem</u>	<u>Cause</u>	<u>What to Check</u>
Motors won't move	Enable " <u>OFF</u> "	Turn enable switch to " <u>ON</u> ".
	SW Enable " <u>OFF</u> "	See error messages.
	Speed set to 0	Turn the speed potentiometer to 100%, press the speed up button to increase the speed.
	External stop active	Check continuity between E1 and E2 in the power connector.
Motors move slowly	Limit switch tripped.	Check limit switches.
	Collision tripped.	Check collision sensor.
	Speed set to low	Turn the speed potentiometer to 100%, and/or press the speed up button to increase the speed.

32.3.) Boot and Power Issues-

<u>Problem</u>	<u>Cause</u>	<u>What to Check</u>
Unit will not power up.	No main power.	Measure 24VDC power input, replace power supply.
	Poor power connection.	Check for proper power connector connection.
	Over current fuse tripped.	Remove all cables, leave power off for 1min. Connect only the power cable and try to boot. If CNC powers up connect cables 1 at a time to find out which one is causing the issue.
Unit shuts down during IHS Start.	Poor input power.	Check that power supply is rated minimum of 6.5A. Check that voltage does not drop during rapid torch movement.
Unit will not boot (white screen)	Temperature too low.	Check that temperature is inside specs. Wait until system warms up.
Unit will not boot to windows.	Bios settings lost.	Change correct bios settings, see service manual for correct bios settings.
Data on the screen fills only part of the screen.	Bios settings lost	Change correct bios settings, see service manual for correct bios settings.

33.) Replacement Parts-

<u>Item</u>	<u>Name</u>	<u>Part Number</u>
Power Supply	24VDC PSU	15-6025
Lifter Motor	Stepper Motor	15-2044
Lifter Axis Coupler	Axis Coupler	15-XXXX
Collision Sensor	Inductive Sensor 1pc.	15-2119
Collision Sensor Cable	Inductive Sensor Cable 1pc.	15-2114
Laser Pointer	Laser Pointer	15-2091
Voltage Divider Board	Voltage Divider Board	15-5005
Nema23 Motor		15-6002
Nema23 gearbox		15-6003
Nema34 motor		15-6004
Nema34 gearbox		15-6005
Power Supply 75VDC		15-6019
Servo Adpater Card		15-6021

Contacts for the iCNC PERFORMANCE/iCNC CONTROLLER Operations: Thermo Dynamics

North America- THE AMERICAS

Thermo Dynamics

82 Benning Street

West Lebanon, NH 03784

1-866-279-2628

Denton, TX USA U.S. Customer Care Phone #: 1-800-426-1888 (tollfree) Fax: 1-800-535-0557 (tollfree) International

Customer Care Ph 1-940-381-1212 Fax: 1-940-483-8178

Oakville, Ontario, Canada, Customer Care Ph 1-905-827-4515 Fax: 1-800-588-1714 (tollfree)

EUROPE -Europe E-Mail: automationeurope@thermal-dynamics.com

Milan, Italy

Via Bolsena 7

20098 San Giuliano Milanese

Customer Care Ph +39 0236546801 Fax: +39 0236546840

Germany

Dierdorferstrasse 499

56566 Neuwied

Tel. +49 (0)2631 999960

United Kingdom

Chorley, United Kingdom Customer Care Ph +44 1257-261755 Fax: +44 1257-224800

ASIA/PACIFIC

Cikarang, Indonesia Customer Care Ph 6221-8990-6095 Fax: 6221-8990-6096

Rawang, Malaysia Customer Care Ph +603 6092-2988 Fax: +603 6092-1085

Melbourne, Australia Customer Care Ph 1300-654-674 (tollfree) Ph 61-3-9474-7400 Fax: 61-3-9474-7391

International Ph 61-3-9474-7508 Fax: 61-3-9474-7488

Shanghai, China Sales Office Ph +86 21-64072626 Fax: +86 21-64483032

Singapore Sales Office Ph +65 6832-8066 Fax: +65 6763-5812

Delivery Protocol-

- Most large machinery will be delivering on a tractor trailer 48'-53' long. Please notify Sales Representative with any Delivery Restrictions.
- Customer is required to have a forklift (6000lb. or larger is recommended) with 72" forks or fork extensions and operator.
- Note any visible damage, torn packaging, scuffs or any abnormal marks on the delivery receipt or Bill of Lading (BOL).

Date: 12/02/2020 **BILL OF LADING**

SHIP FROM
 Name:
 Address:
 City/State/Zip: FOB:

SHIP TO
 Name: .ocation#
 Address:
 City/State/Zip: FOB:

FREIGHT CHARGES BILL TO
 Name:
 Address:
 City/State/Zip: FOB:

SPECIAL INSTRUCTIONS: For assistance, please call 833-8WE-SHIP
 Handling Instructions: RMACR11096
 Pickup Instructions:
 Delivery Instructions: RMACR11096
 Pickup Service(s): Liftgate Pickup, Residential Pickup

REFERENCE NUMBER INFORMATION

REFERENCE	# PKGS	REFERENCE	# PKGS	Total # of Pkgs

CARRIER INFORMATION

HANDLING UNITS		PIECES		WEIGHT	H M X	COMMODITY DESCRIPTION <small>Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged to ensure safe transportation with ordinary care. See section 2(x) of NMFC Item 300.</small>	LTL ONLY	
QTY	TYPE	QTY	TYPE				NMFC#	CLASS
1	PLT			385		machine, 48(L) x 48(W) x (H) DO NOT STACK		77.5
1				385		Grand Total		

Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of property as follows: The agreed or declared value of the property is specifically stated by the shipper to be not exceeding _____ per _____

Note: Liability limitation for loss or damage in this shipment may be applicable. See 49 U.S.C. §14706(e)(1)(A) and (B)

RECEIVED, subject to individually determined rates or contracts that have been agreed upon in writing between the carrier and Worldwide Express Operations, LLC, a registered motor carrier broker, pursuant to 49 USC 14101(b) and all applicable state and federal regulations.

SHIPPER'S SIGNATURE / DATE
This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Trailer Loaded:
 By Shipper
 By Driver

Freight Counted:
 By Shipper
 By Driver/pallet
 By Driver/Pieces

COO Amount: \$
 Fee Terms: 3rd Party WWE
 Remit Address:
 Acceptable Forms of Payment:
 Bank Certified Check
 Customer Check
 Personal Check
 Money Order

CARRIER SIGNATURE / PICKUP DATE
Carrier acknowledges receipt of packages and required placards. Carrier certifies emergency response information was made available and/or carrier has DOT emergency response guidebook or equivalent documentation in vehicle. Property described above is received in good order, except as noted.

(Signature) (Date)

Bill of Lading Number : 145787446

SPECIAL INSTRUCTIONS: For assistance, please call 833-8WE-SHIP
 Handling Instructions: RMACR11096
 Pickup Instructions:
 Delivery Instructions: RMACR11096
 Pickup Service(s): Liftgate Pickup, Residential Pickup

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 30 days of purchase to be covered by this warranty. Laguna Tools guarantees all new machine 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 an RMA (return material authorization) number from Customer Service and include the (RMA) number with all returned parts/components requesting warranty coverage.* Any machines returned to Laguna Tools must be returned with packaging in the same way it was received. If a part or blade is being returned it must have adequate packaging to ensure no damage is received 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.

****NOTE: Issuing an RMA number is for referencing materials and issues, it does NOT indicate warranty acceptance/conformity.**

Laguna Tools Warranty-

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 machine 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 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 maybe 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 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. Copyright 2013 Laguna

Tools, Inc. ****Warning – no portion of these materials may be reproduced without written approval from Laguna Tools, Inc.**

WARRANTY & REGISTRATION

THANK YOU!

Welcome to the Laguna Tools® group of discriminating woodworkers. 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 manufacturers' defective workmanship, parts, and materials. For any questions about this product, the intended use or what it was designed for, customer service, or replacement parts, please contact our customer service department:

Laguna Tools® Customer Service
2072 Alton Parkway, Irvine, California 92606, USA
1-800-332-4049
customerservice@lagunatools.com
www.lagunatools.com/why/customer-service/
8AM. to 5PM PST, Monday through Friday

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

Laguna Tools® Warranty Service
2072 Alton Parkway, Irvine, California 92606, USA
1-949-474-1200
customerservice@lagunatools.com
www.lagunatools.com/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 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 of 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 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 1-949-474-1200. 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 Support Website.



Laguna Tools Warranty-

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 maybe 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 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.

Dealer Machinery Warranty

****Any machines returned to Laguna Tools must be returned with packaging in the same way it was received. If a part or blade is being returned it must have adequate packaging to ensure no damage is received 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.**

We require that the defective item/part be returned to Laguna Tools with the complaint. The end-user must request an **RMA (Return Material Authorization) Number** from Customer Service and include the (RMA) number with all returned parts/components requesting warranty coverage.

Laguna Tools Packaging/Laguna Tools RMA Example-

RMA #

RTN. AUTH. #
CR10979

12/1/2020 Return Authorization - NetSuite (Laguna Tools, Inc)

CR10979 PENDING RECEIPT

Actions

CUSTOMER	CREATED FROM	Summary
DATE	SALES EFFECTIVE DATE	SUBTOTAL
CURRENCY	EST. EXTENDED COST	DISCOUNT
SUBSIDIARY	EST. GROSS PROFIT	GST/HST
RTN. AUTH. # CR10979	EST. GROSS PROFIT PERCENT	PST
DEPARTMENT Sales	PROMISE DATE	TOTAL
LOCATION Laguna Texas Demo / Returns	<input type="checkbox"/> DEPOSIT RECEIVED	
SALES REP	<input type="checkbox"/> ACCOUNTING APPROVAL	
PARTNER	COMMENTS	
LEAD SOURCE	RETURN REASON Manufacturers Warranty Defect	
PO # PO-981	SHIP IMMEDIATE SPLIT SHIP	
MEMO	<input type="checkbox"/> REVISED INVOICE	
	ORDER HOLD REASON	

SHIPPING COMMENTS

[Items](#)
[Promotions](#)
[Address](#)
[Messages](#)
[History](#)
[Workflow](#)
[Custom](#)
[Partners](#)
[Sales Team](#)
[Additional Information](#)
[OzLINK](#)
[Pacejet](#)
[SPS](#)

EXCHANGE RATE RATE

DISCOUNT

ITEM	RETURNED	REFUNDED	QUANTITY	UNITS	INVENTORY DETAIL	PRICE DESCRIPTION LEVEL	UNIT PRICE	AMOUNT	TAX CODE	TAX RATE	PST	OPTIONS	GIFT CERTIFICATE	CLOSED	DROP SHIPMENT	CO: ES1 TYF
																Item De Co

Actions

Laguna Tools Packaging/Laguna Tools BILL of LADING Example-

SHIP FROM		SHIP TO		FREIGHT CHARGES BILL TO					
Name: Address: City/State/Zip:		Name: Address: City/State/Zip:		Name: Address: City/State/Zip:					
Bill of Lading Number : 145787446		Carrier Name: <u>Estes Express</u>		SCAC: EXLA Pro number:					
FOB: <input type="checkbox"/>		Freight Charge Terms: (freight charges are prepaid by Worldwide Express unless indicated otherwise)		<input type="checkbox"/> Master Bill of Lading with attached underlying Bill Of Lading					
SPECIAL INSTRUCTIONS: For assistance, please call 833-8WE-SHIP		WWE Number: W709699351							
Handling Instructions: RMACR11096									
Pickup Instructions:									
Delivery Instructions: RMACR11096									
Pickup Service(s): Liftgate Pickup, Residential Pickup									
REFERENCE NUMBER INFORMATION									
REFERENCE	# PKGS	REFERENCE	# PKGS	Total # of Pkgs					
CARRIER INFORMATION									
HANDLING UNITS		PIECES		WEIGHT	H.M. X	COMMODITY DESCRIPTION		LTL ONLY	
QTY	TYPE	QTY	TYPE			NMFC#	CLASS		
1	PLT			385		machine, 48(L) x 48(W) x (H) DO NOT STACK			77.5
1				385		Grand Total			
Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of property as follows: The agreed or declared value of the property is specifically stated by the shipper to be not exceeding _____ per _____						COO Amount: \$ Fee Terms: 3 rd Party WWE Remit Address:		Acceptable Forms of Payment: Bank Certified Check <input type="checkbox"/> Customer Check <input type="checkbox"/> Personal Check <input type="checkbox"/> Money Order <input type="checkbox"/>	
Note: Liability limitation for loss or damage in this shipment may be applicable. See 49 U.S.C. B14706(c)(1)(A) and (B)						CARRIER SIGNATURE / PICKUP DATE Carrier acknowledges receipt of packages and required placards. Carrier certifies emergency response information was made available and /or carrier has DOT emergency response guidebook or equivalent documentation in vehicle. Property described above is received in good order, except as noted.			
SHIPPER'S SIGNATURE / DATE This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.		Trailer Loaded: <input type="checkbox"/> By Shipper <input type="checkbox"/> By Driver		Freight Counted: <input type="checkbox"/> By Shipper <input type="checkbox"/> By Driver/pallet said to contain <input type="checkbox"/> By Driver/Pieces		(Signature)		(Date)	

Bill of Lading Number : 145787446

SPECIAL INSTRUCTIONS: For assistance, please call 833-8WE-SHIP

Handling Instructions: RMACR11096

Pickup Instructions:

Delivery Instructions: RMACR11096

Pickup Service(s): Liftgate Pickup, Residential Pickup

