

ELECTRIC SHOCK CAN KILL

Electric Shock can injure or kill. CNC operation and many of the processes used produce high voltage electrical energy. This electric energy can cause serve or fatal shock to the operator or others in the work place.

- Never touch any parts that are electrically “live” or “hot”
- Wear dry gloves and clothing. Insulate yourself from the work piece or other parts of the plasma cutting circuit.
- Repair or replace all worn or damaged parts.
- Extra care must be taken when work place is moist or damp.
- Install and maintain equipment according to NEC (National Electric Code), refer to publications section in this manual.
- Disconnect power source before performing any service or repairs.
- Read and follow all the instructions in the operating manuals.



GASES, DUST, AND FUMES

Gases and fumes produced during the cutting process can be dangerous to your health.

- Keep all fumes and gases from the breathing area. Keep your head out of the cutting fume plume.
- Use an air-supplied respirator if ventilation is not adequate to remove all fumes and gases.
- The kinds of fumes and gases from cutting depend on the kind of metal being cut, coatings on the metal, and the different processes. You must be very careful when cutting or welding any metals which may contain the following:

Antimony	Chromium	Mercury
Arsenic	Cobalt	Nickle
Barium	Copper	Selenium
Beryllium	Lead	Silver
Cadmium	Manganese	Vanadium



- Always read the Material Safety Data Sheet (MSDS) that should be supplied with the material you are using. These MSDSs will give you the information regarding the kind and amount of fumes and gases that may be dangerous to your health
- For information on how to test for fumes and gases in your work place refer to publications section of this manual.
- Use special equipment, such as down draft and water cutting tables, to capture fumes and gases.
- Do not use in an area where combustible or explosive gases or materials are located.
- Phosgene, a toxic gas, is generated from the vapors of chlorinated solvents and cleansers. Remove all sources of these vapors.
- This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Sec. 25249.5 et seq.)

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

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

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.

- Avoid prolonged contact with dust from routing, sawing, grinding, drilling, and other construction activities. Wear protective clothing and wash exposed areas with soap and water. Allowing dust to get into your mouth, eyes, or lay on the skin may promote absorption of harmful chemicals.

WARNING: Use of router tool can generate and/or disburse dust, which may cause serious and permanent respiratory or other injury. Always use NIOSH/OSHA approved respiratory protection appropriate for the dust exposure. Direct particles away from face and body.



FIRE AND EXPLOSION

Fire and explosion can be caused by hot slag, sparks, oxygen fueled cutting flame, or the plasma arc.

- Be sure there is no combustible or flammable material in the workplace. Any material that cannot be removed must be protected.
- Ventilate all flammable or explosive vapors from the workplace.
- Do not cut or weld on containers that may have held combustibles.
- Provide a fire watch when working in an area where fire hazards may exist.
- Hydrogen gas may be formed and trapped under aluminum work pieces when they are cut underwater or while using a water table. DO NOT cut aluminum alloys underwater or on a water table unless the hydrogen gas can be eliminated or dissipated. Trapped hydrogen gas that is ignited will cause an explosion.



NOISE

Noise can cause permanent hearing loss. CNC operation, plasma arc cutting, plate marking, routing, and drilling can cause noise levels that exceed safe limits. You must protect your ears from loud noise to prevent permanent loss of hearing.

- To protect your hearing from loud noise, wear protective ear plugs and/or ear muffs. Protect others in the workplace.
- Noise levels should be measured to be sure the decibels (sound) do not exceed safe levels.
- For information on how to test for noise refer to the publications section of this manual.



PLASMA ARC RAYS

Plasma Arc Rays can injure your eyes and burn your skin. The plasma arc process produces very bright ultra violet and infrared light. These arc rays will damage your eyes and burn your skin if you are not properly protected.

- To protect your eyes, always wear a welding helmet or shield. Also always wear safety glasses with side shields, goggles or other protective eye wear.
- Wear welding gloves and suitable clothing to protect your skin from the arc rays and sparks.
- Keep helmet and safety glasses in good condition. Replace lenses when cracked, chipped or dirty.
- Protect others in the work area from the arc rays. Use protective booths, screens or shields.
- Use the shade of lens as suggested in the following per ANSI/ASC Z49.1:

Arc Current	Minimum Protective Shade No.	Suggested Shade No.
Less than 20A	4	4
20A-40A	5	5
40A-60A	6	6
60A-300A	8	9
300A-400A	9	12
400A-800A	10	14



ELECTRIC AND MAGNETIC FIELDS

Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding and plasma cutting current creates EMF fields around cables and machines. EMF fields may interfere with some pacemakers, and operators having a pacemaker should consult their physician before operation. Exposure to EMF fields may have other health effects which are now not know.



PINCH AND CRUSH POINTS

CNC machines in motion can create pinch points in normal operation. Be aware of all areas that may potentially be a hazard when the CNC machine is in motion. Avoid working on the machine while the control electronics are energized. CNC machines may use hard stops as part of normal setup, while in motion these stops may be contacted creating a crush point. Do not stack or store any additional items in contact with the machine.



MECHANICAL DRIVES

Mechanical drives are in use while the CNC machine is in operation. These drives use gears, belts, and/or drive screws. These components move at high speed. Do not attempt to service, adjust, or otherwise touch these components while the machine is on. Secure loose articles of clothing and cables to prevent entanglement.



HEAVY COMPONENTS

Certain components of CNC machines are heavy. Use caution when lifting or moving these components. Use team lifting when necessary to avoid personal injury. Some components must be lifter by mechanical devices. When using a mechanical device to move component follow all manufacturer's safety guidelines. Material being operated on by the machine may be heavy, use all lifting guidelines outlined in Occupational Safety & Health Administration technical manual Sect. 7, Ch 1.5. See publications section for additional information.



AUTOMATIC OPERATION

Any CNC machine may operate automatically without warning. Only a trained individual familiar with the software, machine, and computer system should operate this equipment. Keep the immediate area around the CNC machine clear of materials that may cause interference. Keep area clear of bystanders. All untrained persons should not work on or near a CNC machine. Do not leave the CNC machine unattended while power is on to any electronics.



MOVING TOOLS

Certain tool attachments such as Arc Voltage Height Control (AVHC), plate marker, automatic z-axis move autonomously and may cause bodily injury. Keep area under and around all tool attachments clear. When maintaining or adjusting a tool ensure that power is off to all components.



FLYING DEBRIS

Metal cutting and marking operations can create debris. Use proper eye protection pursuant to ANSI Z87.1 requirements. All persons operating in the vicinity of CNC operations should be aware of debris take necessary precautions. Consult the publications section of this manual for further information.



AIR LINES UNDER PRESSURE

Certain tools use compressed air lines to activate. These air lines are under pressure. Hot sparks or flying debris may cause damage to these lines. Ensure that the air lines are kept free of punctures, burns, or other damage or defects that could cause failure. Inspect air lines periodically and repair or replace damaged lines.



SHARP ROTARY TOOLS

Routing or drilling applications use high speed rotating bits that contain sharp edges. Keep clear of bits when in use. When changing bits ensure that the router, spindle, or drill is off and power is not applied. Use proper protection and care when changing sharp bits.



HOT MATERIALS

The process of plasma cutting creates an arc of electricity that can be up to 45000°F (25000°C), oxygen fueled cutting flame can be up to 6330°F (3500°C). As a result a cut materials will be very hot after cutting. Use extreme care when handling recently cut materials. Proper protective apparel such as protective gloves should be worn when handling recently cut material. Material handling apparatuses should also be considered. It is recommended to allow material to cool completely before handling.