CNC Plasma Cutter Training

Basics for using the Dynatorch Table and Hypertherm Powermax 85 CNC Plasma Cutter

Agenda

► <u>Safety First</u>

► <u>The Equipment -- Dynatorch Table</u>

► <u>The Sheetcam Software</u>

► <u>The Dynatorch Software</u>

► <u>The Equipment -- Hypertherm Powermax 85</u>

► <u>Bringing it all together</u>

► <u>Shutdown</u>

Safety First!!!

▶ You are responsible for your safety and the safety of the people around you

▶ This equipment may interfere with pacemakers/hearing aids

▶ Use the machine at your own risk

Safety First!!!

- DO NOT:
  - Put hands on the gantry rails. You will lose fingers!
  - Cut these materials due to TOXIC fumes :
    - Anything cleaned with chlorinated cleaner (e.g. brake cleaner) –PHOSGENE gas is generated
    - Galvanized steel – causes "galvanize poisoning"
    - Heavily painted material – causes arc degradation and unpleasant if not dangerous offgassing
  - Watch the arc without proper safety gear – AWS recommends shade 8 or greater eyewear
  - Handle material without proper PPE/Tools – hot material after cutting will BURN
  - Abuse the equipment (e.g. misusing the torch by placing the cutting head over your hand & pulling the trigger)

Safety First!!!

- DO:
  - Read/review the Operators manual for the Hypertherm 85 on the Committee Drive
  - Proper attire
    - Closed toe shoes
    - Natural fiber garments instead of synthetics
    - Wear proper PPE
      - AWS recommends shade 8 or greater eyewear
      - Cover exposed skin to protect from flash burn
    - Use gloves and/or tools to manipulate the material, especially after cutting when it will be HOT
  - Report any damages or issues immediately by creating an "Issue or Request" thread on Talk (https://talk.dallasmakerspace.org)

The Equipment – Overview
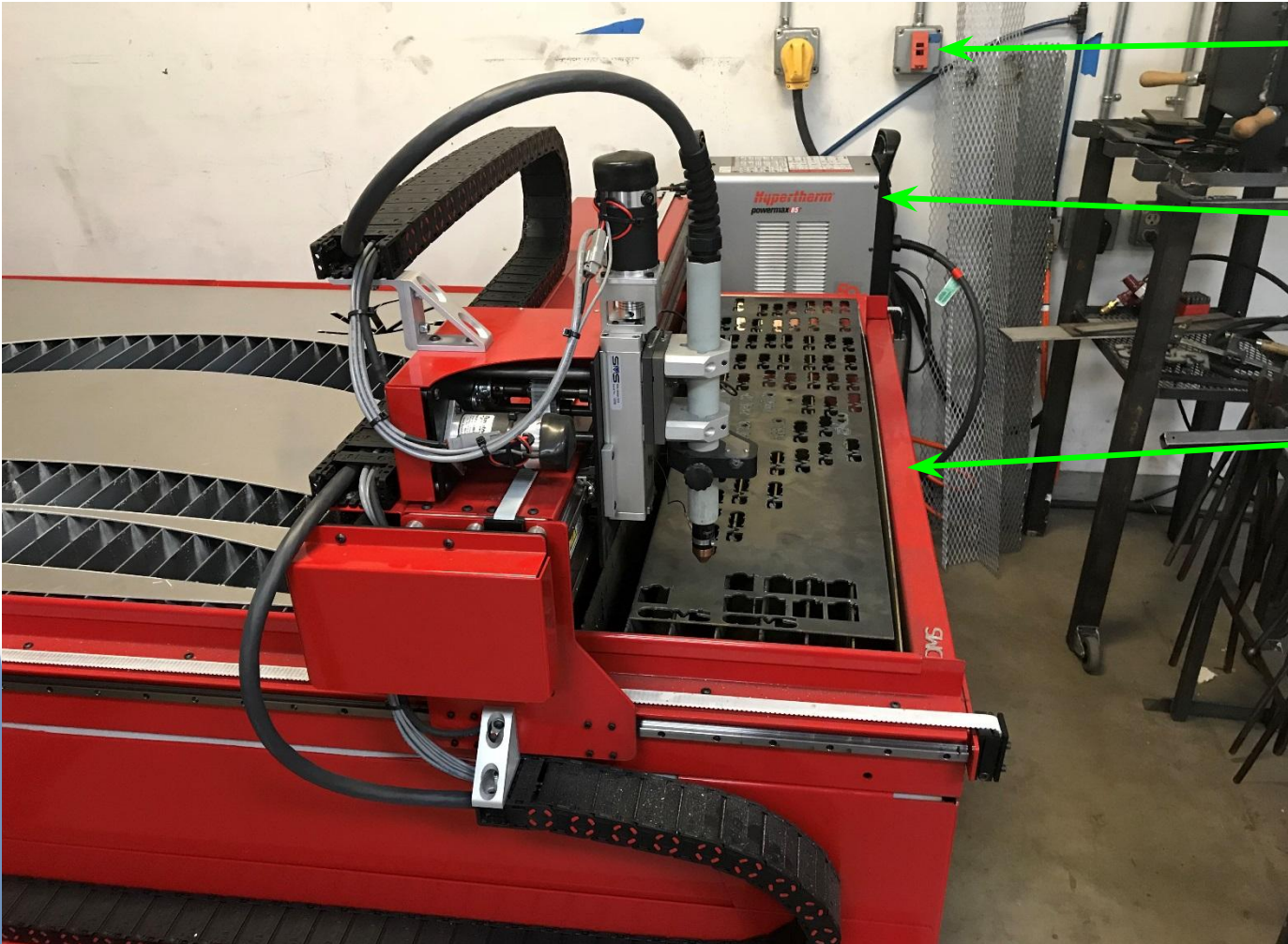
Exhaust Fan Switch

Hypertherm PowerMax 85 power supply

Dynatorch Super B Table (4x8 feet)

The Equipment – Dynatorch Table
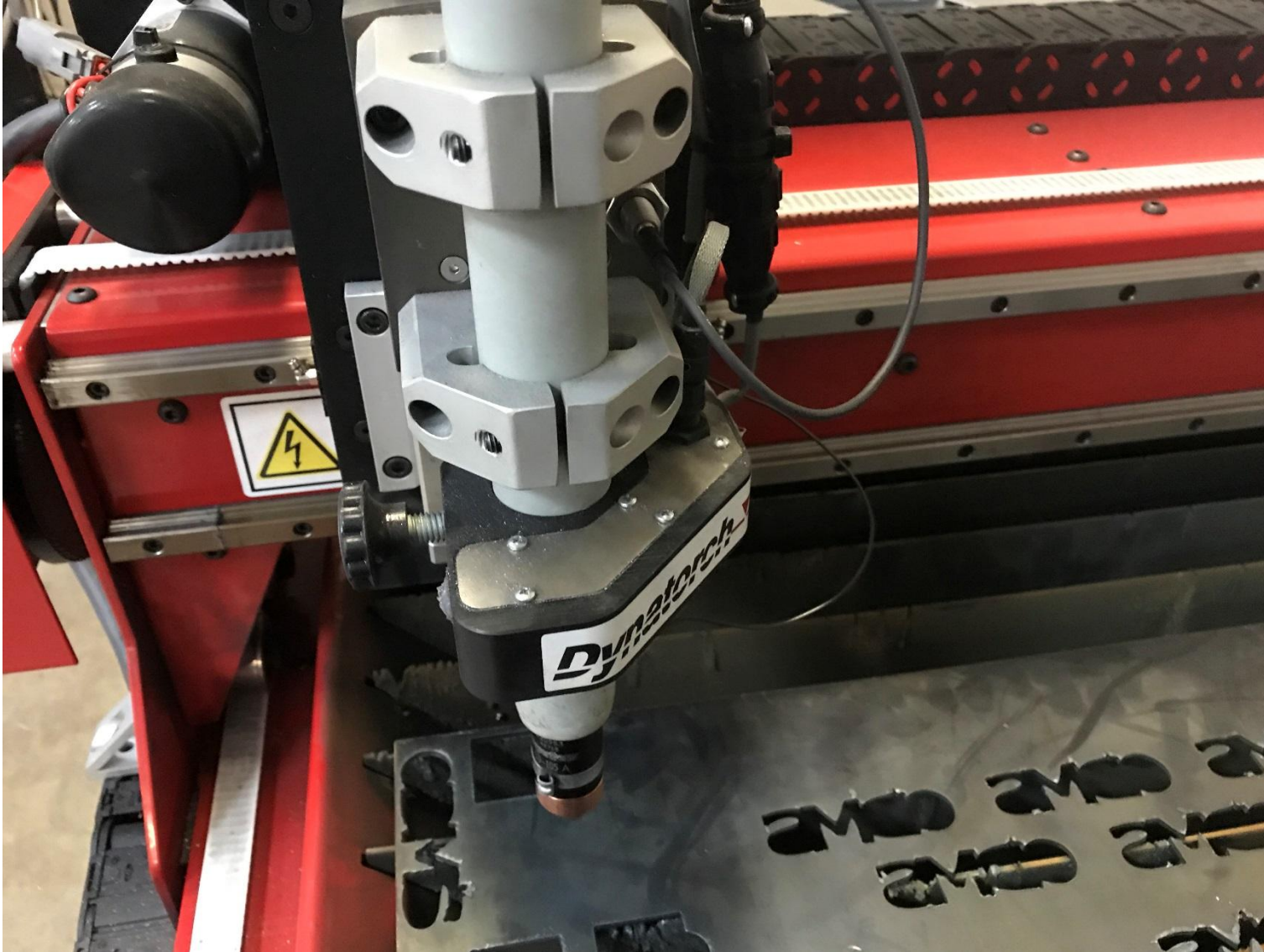
Control Panel Power Switch & E-Stop
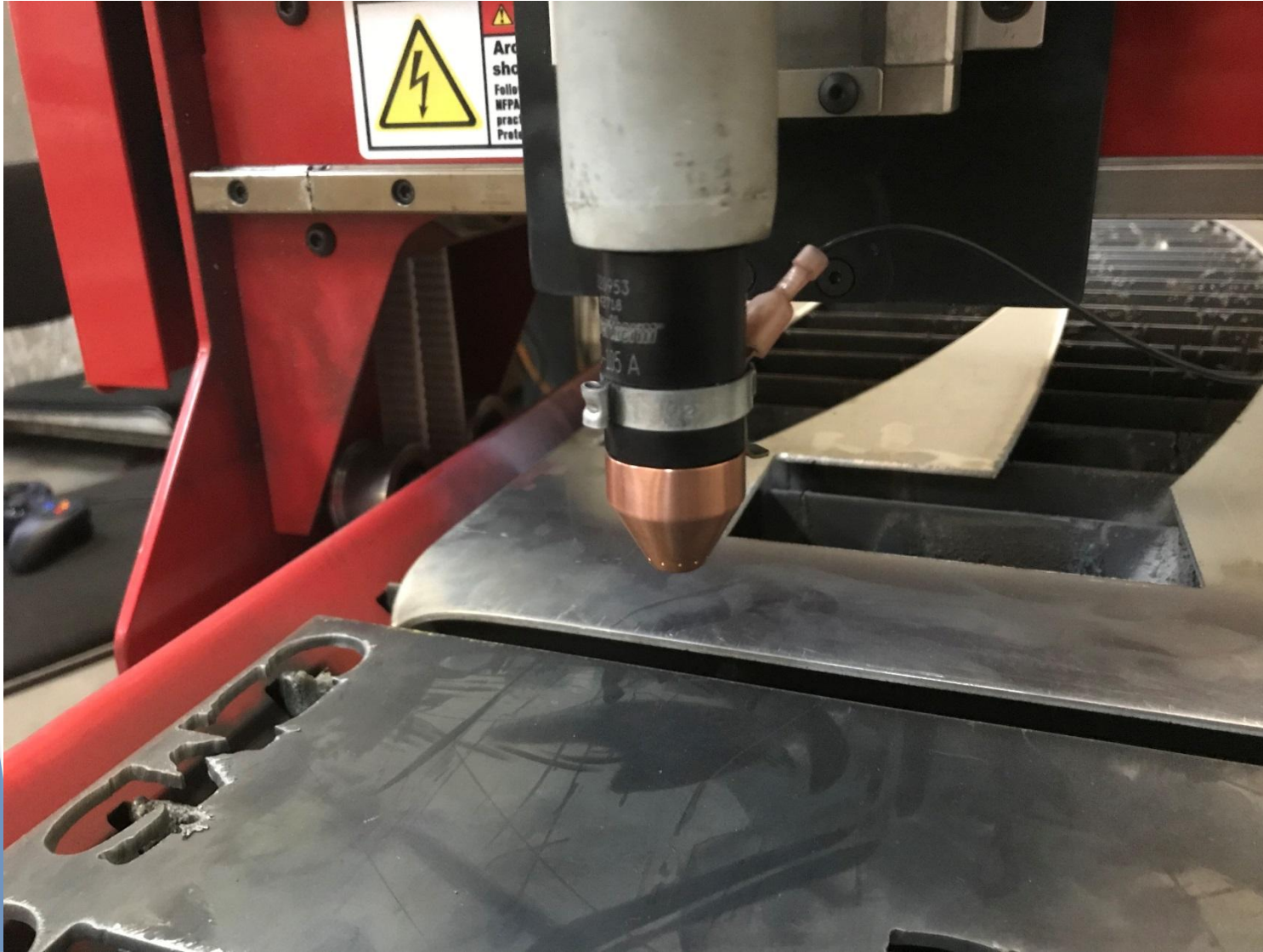
Gantry

No Hands Along these pathways!

The Equipment – Torch & Carrier

- Magnetic Break away
- Laser Sight
- Ohmic Height Sensor

The Equipment – Ohmic Connection

Touches the material, using grounding to sense initial height (ohmic sensing)
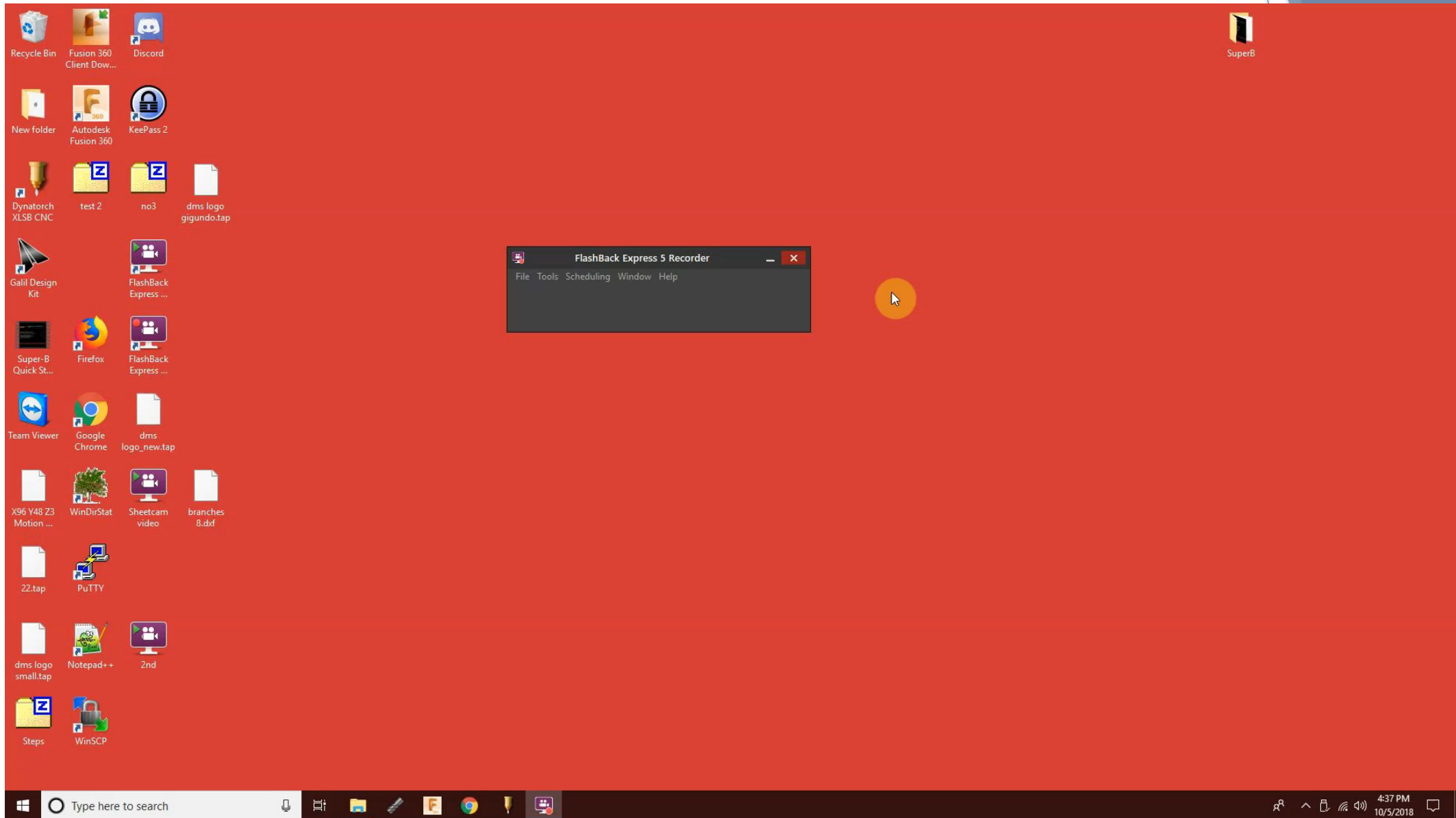
⚠️ DO NOT PULL THE WIRE

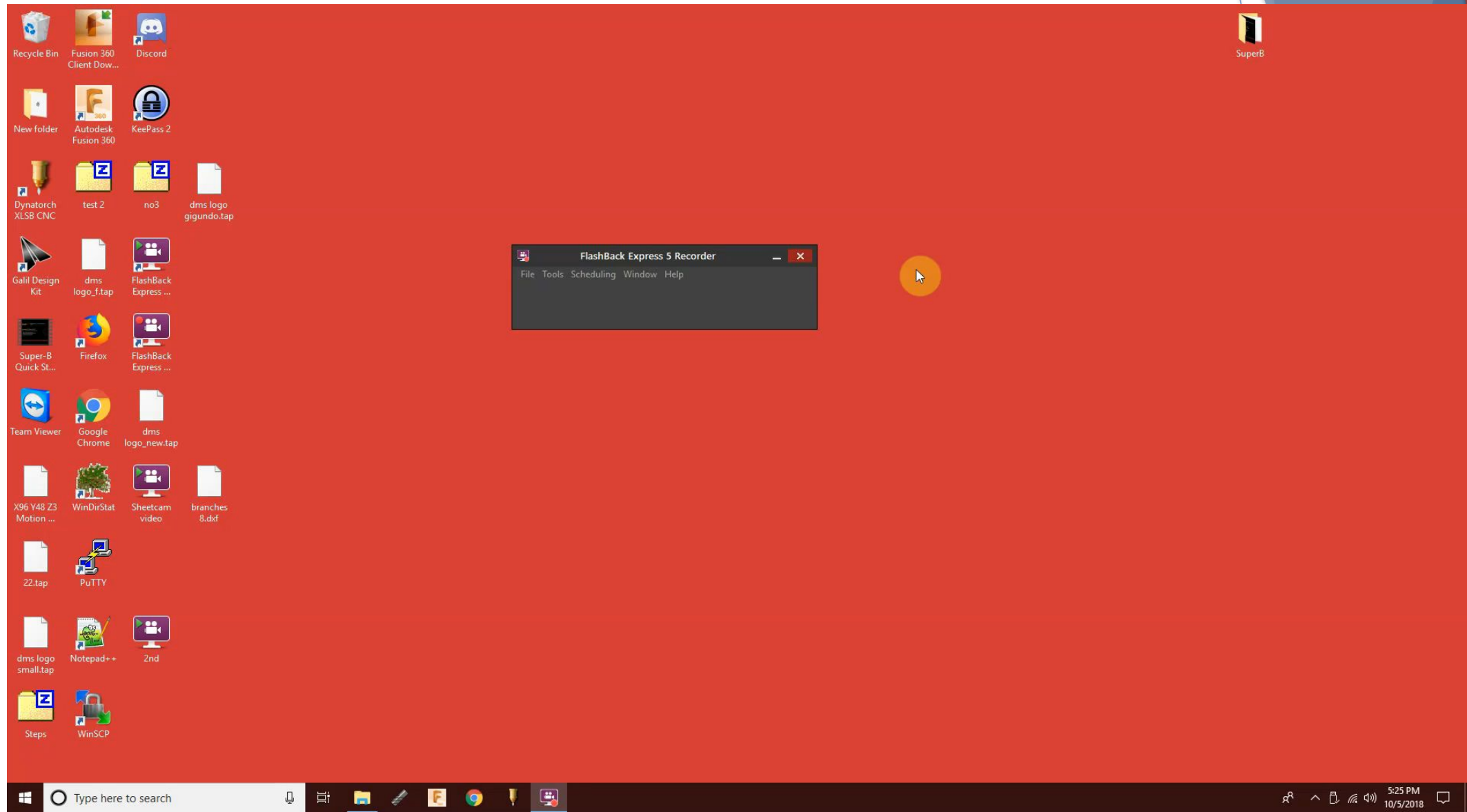Pull the pink connector to remove, allowing access to the consumables

The SheetCAM Software – Creating G-code

- Open SheetCam
  - Start menu shortcut
  - Toolbar shortcut
- Import the design
  - .SVG
  - .DXF
  - G-code

SheetCam Software Demo

Dynatorch Software Demo

Running Dynatorch - Cuts Demo

The Equipment – Hypertherm Powermax 85

Rear controls
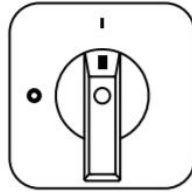
ON (I)/OFF (O) power switch
Activates the power supply and its control circuits.

Front controls and LEDs

Adjustment knob

Operating mode switch

Status screen

Fault LED (yellow)

Automatic/manual pressure setting mode selector

Current/gas selector
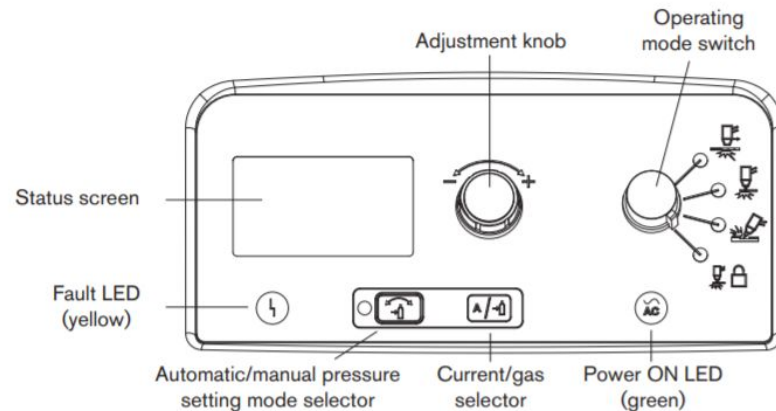
Power ON LED (green)

Fault LED (yellow)
When illuminated, this LED indicates that there is a fault with the power supply. For information about these fault conditions and how to correct them, refer to section 5.

Power ON LED (green)
When illuminated, this LED indicates that the power switch has been set to I (ON) and that the safety interlocks are satisfied. When blinking, the power supply has a fault.

The Equipment – Hypertherm Powermax 85

On the BACK
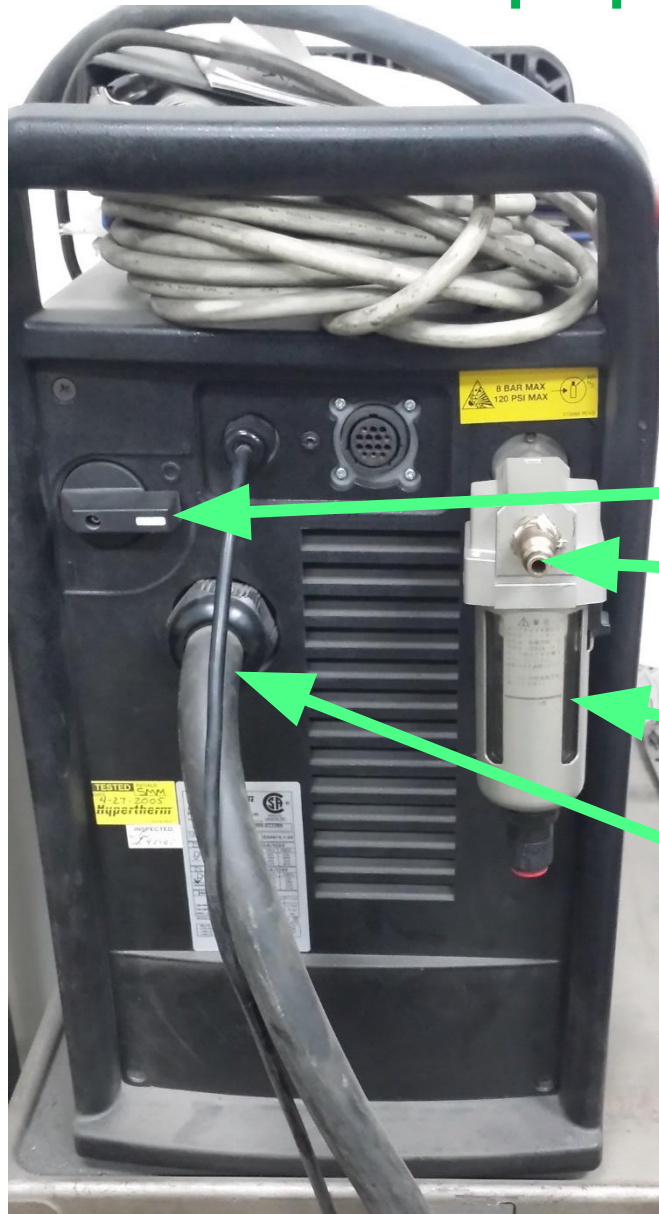
Power switch

Gas (Air) hose inlet

Gas (Air) dryer/filter

Power cord

The Equipment – Hypertherm Powermax 85

⚠️ **POWER OFF before touching the BUSINESS END OF THE TORCH!**

Plug in the air hose (expected to already be so)

Adjust amperage to correct range (digital readout!)

The Equipment – Hypertherm Powermax 85

Checking the Consumables:

- Bring the torch front and center so it can be removed and checked over
- Remove the ohmic sensor wire from the spade connector
    - TOUCH ONLY THE PINK CONNECTOR
- Remove the shield from the torch
- Remove the OHMIC retaining cap from the torch
- Remove the nozzle from the torch
- Remove the electrode from the torch
- Remove the swirl ring from the torch
- Check each for any damage per the specifications
- Reinstall in the opposite manner
- Ensure proper torque (no tools to tighten on the torch)

Shielded consumables

DO NOT USE THIS STYLE.

OHMIC

Torch head

1 Shield   2 Retaining cap   3 Nozzle   4 Swirl ring   5 Electrode
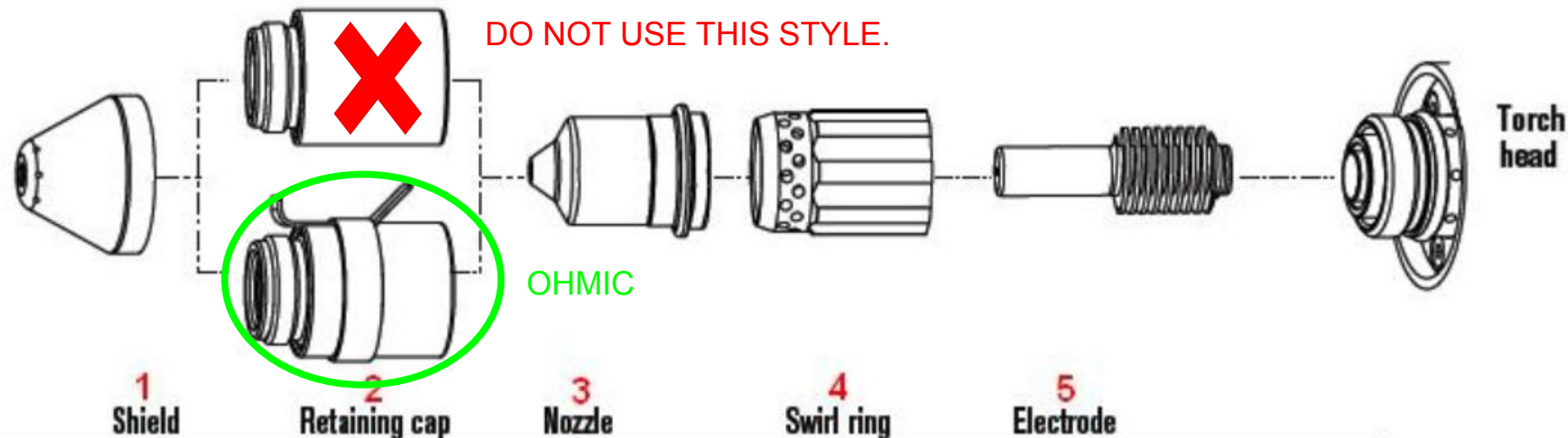
The Equipment – Hypertherm Powermax 85

Checking Torch Condition -- General Guidelines

- Check the torch head
  - Are they the right parts?
    - Use the right consumables (next section) for the stock thickness
    - Are they in good working order?
    - The head should be relatively clean
    - The electrode should have a maximum pitting of 1/16"
    - The nozzle output orifice should be round
      - Not oval
      - Not oblong
      - Not the size of a pencil eraser

The Equipment – Hypertherm Powermax 85

Here are pictures of consumables: notice the markings in very small print/etching

Shield / Deflector • Retaining cap • Nozzle • Electrode • Swirl Ring
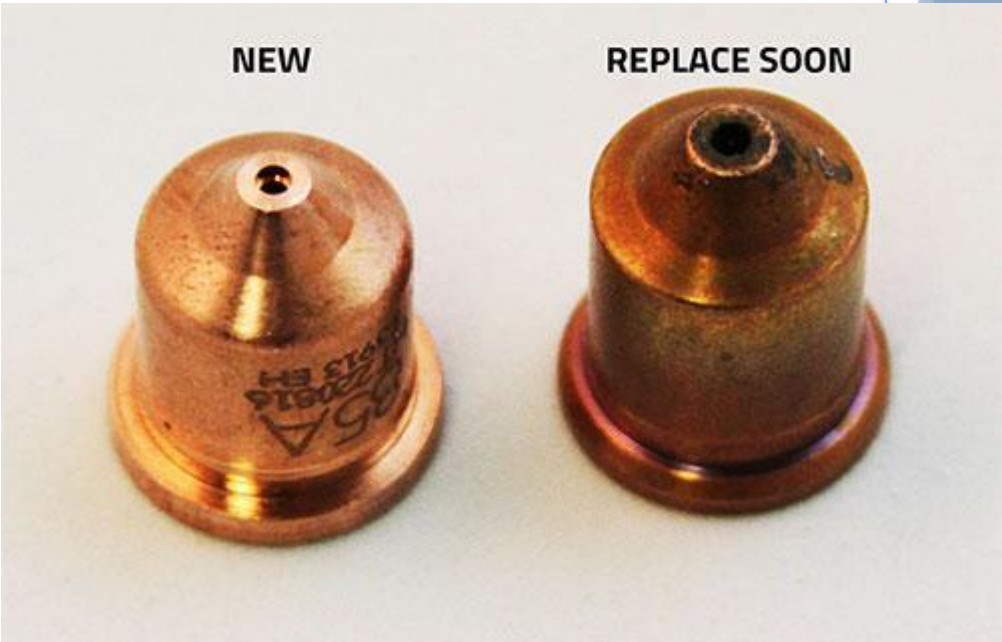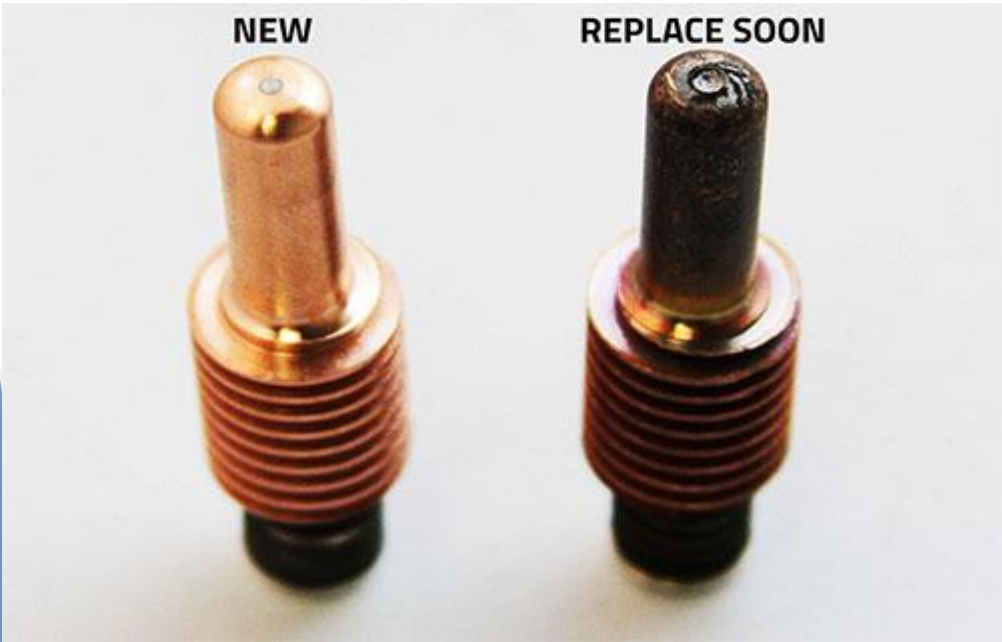
The Equipment – Hypertherm Powermax 85

Buying Consumables

► DMS makes an effort to have good equipment on hand, but for best results, plan to supply your own
  ► Local source is Metroplex Welding supply
      Closest branch to 'Space:
      Address: 1970 W Northwest Hwy, Dallas, TX 75220
      Phone:(972) 556-0213
► Order online using part numbers for best price, but be prepared to wait

	Standard PN	Fine cut PN
Shield	220817	220948
Retaining Cap	220953	220953
Nozzle	220941	220930
Electrode	220842	220842
Long Life Electrode	220777	220777
Swirl Ring	220857	220947

The Equipment – Hypertherm Powermax 85 General Guidelines

► Rated duty cycle is
  ► 100% at 66 amps.
  ► 80% at 74 amps
  ► 60% at 85 amps
► PLEASE do not abuse this
  ► Translates to 6 minutes of actual cutting for every 10 of "use" at 85 amps

 or

  ► 8 minutes of cutting at 74 amps

  ► Time a "dry run" to see how long your design will take to cut

► Maximum recommend material thickness: being mechanized for CNC *reduces* recommended capacity to 3/4" cut ("clean"), (3-27 in User Manual)
► Attach the ground clamp directly to the stock for best cut quality

The Equipment – Hypertherm Powermax 85

It is ***imperative*** that the work piece is grounded.

If it is not grounded it can ruin the torch, and possibly the entire CNC system
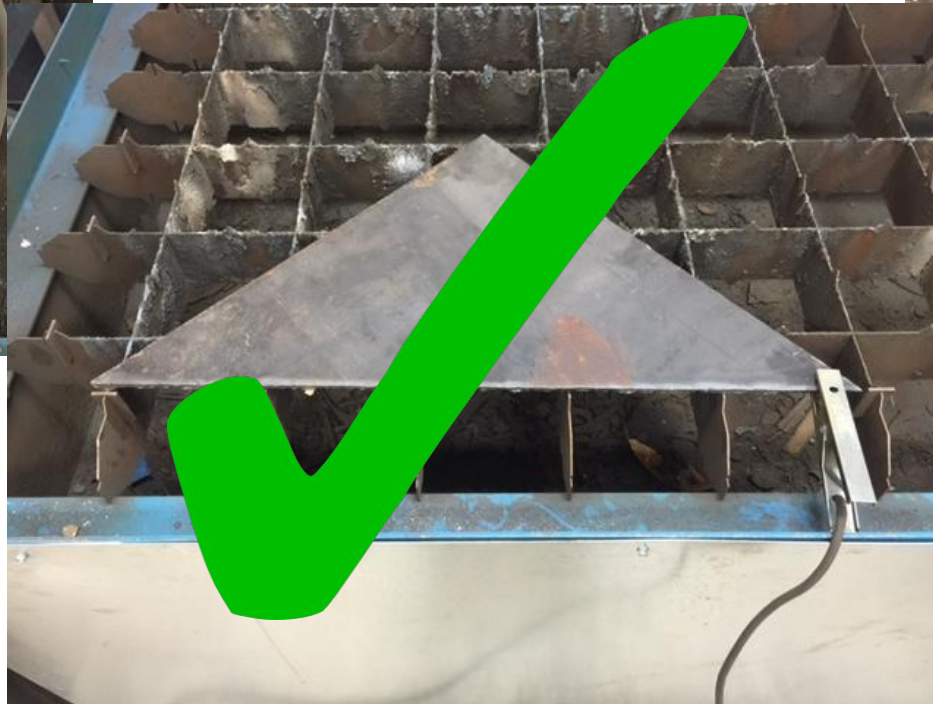
The Equipment – Hypertherm Powermax 85

This is what can happen if this is not properly done.

The arc found a ground other than the intended path (tip of the electrode, through the work piece) and melted the side off the torch arcing to the carrier.

Arc Damage

The Equipment – Hypertherm Powermax 85

Basic Usage:

- Selecting Amps, cut speeds, etc.
  - The black book kept with the Hypertherm power supply will be an appropriate starting point. However, you should consult the wiki (https://dallasmakerspace.org/wiki/CNC_Plasma_Cutter_Training#Equipment) for the most up-to-date information
- Always TEST
  - Things can change, so pick a scrap section of your stock, and do a test cut or 2 (or however many you need to make sure it's working as you desire)

Basic Troubleshooting:

- Front panel of the Hypertherm power supply for fault indications
  - There may be either a fault light or fault codes.
- Check for proper grounding of the table AND the stock

Bringing it all Together

- Turn on the PC
- Use Sheetcam to create G-code
- Turn on the Dynatorch control panel
- Open Dynatorch software
  - The machine will home automatically, so stay clear
- Do torch/consumable checks
- Load the stock into the cutting bed
- Ensure the ground clamp is well-attached to the stock and out of the way of the gantry as it follows the cut paths
- Move the torch with [Does it fit ?] over the stock
- To ensure the stock can contain the cuts, and is aligned properly, move the torch to each edge of the design
  - Use the laser for visual check for fit, location, and stock edge alignments
  - Use the "Does it Fit" button to move/adjust (Farthest Y, Closest Y, Nearest X & Farthest X)
  - Make sure the torch position falls within the stock dimensions
- Turn the Hypertherm Powermax 85 on
- Adjust the amperage
- Turn the Exhaust fan on
- Adjust cut settings in Dynatorch software
- Initiate the cut using Start cycle [Start Cycle]
  - "Dry run" the cuts as a final check (lightning bolt off)
  - Repeat with the torch turned on (lightning bolt on)
-

Shutdown

- Move torch to "Load" or "Home" position so it's ready for the next person
- Log off the computer
- Power off the exhaust fan
- Power off the Hypertherm
- Power off the Dynatorch table at the control box
- Clear the table of any materials -- be careful, parts will be HOT!
- **Clean up, please**
  - Clean residue from slats
  - Pull the tray and remove & discard any dropped metal and/or slag
  - Stock with holes all over it is NOT USEFUL. <u>DO NOT place it in the scrap bin</u>. Scraps should be >6" per side and made square so they are useful. Otherwise, throw it in the dumpster. Thank you.
  - TAKE YOUR STUFF WITH YOU

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Now, let's burn some metal!