



# CNC Plasma Table Quick Start Guide

*SheetCam, CommandCNC, BladeRunner Controls*

*Linux-Based Professional Control Systems*

Revision 1.0

9/22/2025

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# 1. Safety & Prerequisites

## 1.1 Safety Requirements

**⚠ DANGER: Plasma cutting involves high voltage, intense heat, UV radiation, and toxic fumes.**

Personal Protective Equipment (PPE) - Required for all operations:

1. ANSI Z87.1 safety glasses or welding helmet with appropriate shade
2. Leather welding gloves - full coverage to wrists
3. Fire-resistant clothing - no synthetic materials
4. Hearing protection when required

Environmental Safety Requirements:

- Adequate ventilation or fume extraction system (OSHA required)
- Fire extinguisher within reach (Class C for electrical fires)
- Clear 15-foot radius of flammable materials
- Grounded electrical system with proper bonding
- First aid kit and emergency contact numbers posted

## 1.2 Control System Prerequisites

Before operating CNC plasma systems, operators must understand:

- Basic CNC principles and coordinate systems
- G-code fundamentals and program structure
- CAD to CAM to CNC workflow (Design → Toolpath → Control)
- Emergency stop procedures and safety systems

Star Lab CNC Desktop overview

The diagram illustrates the Star Lab CNC desktop environment. At the top right is the **STAR LAB** logo with the tagline "Serious CNC Machines - USA Made" and the phone number "1-855-433-3689". A "Computer" box on the right contains "File System" and "Trash" icons. A "DXF-Gcode" box contains folders for "DXF Files for cutting", "DXFs", and "Job Files from sheetcam". A "DRAW" box contains "Inkscape" and "G2CAD" icons. A "CAM" box contains the "SheetCam TRIG" icon. A "CUT" box contains the "Star Lab" icon. A "Training and Troubleshooting" box contains "Start Down.mpg", "Cutting.ppt GSEC.mpg", and "2022 Power up Complete..." files. An "Install and Setup" box contains "Training Files", "Factory Files", "CommonCNC Configurator", "Home", "Text Editor", and "CardCNC Hub Utility" icons. A "MAINTENANCE SCHEDULE" section on the right lists tasks: "Wipe rails clean (Top and Bottom) (Use WD40 as cleaner)" daily, "1 pump of grease in bearings of long axis (Mobile XHP 222)" weekly, and "Grease Z axis ballscrew and twin bearings (Mobile XHP 222)" every 5 months. A note at the bottom of the schedule says: "Also check for loose pinion gears, debris in gear rack, soot on rails, any abnormal bearing sounds." The Windows taskbar at the bottom shows the time as 09:31 on 2025-09-25.

## 2. Star Lab CNC Plasma System Overview

### 2.1 Workflow Process

CNC plasma cutting involves three distinct stages:

#### 2.1.1 Stage 1: CAD (Computer-Aided Design)

Create precise technical drawings using professional CAD software:

- Q Cad, Inkscape
- AutoCAD (.DWG format - industry standard)
- SolidWorks, Inventor, or other parametric CAD
- CorelDRAW or Adobe Illustrator for artistic designs

*Export files as DXF format for best compatibility with SheetCam*

#### 2.1.2 Stage 2: CAM (Computer-Aided Manufacturing) - SheetCam TNG

Generate optimized toolpaths and machine code:

- Import and validate CAD geometry
- Define material properties and thickness
- Create cutting tools with appropriate parameters
- Assign operations (inside cuts, outside cuts, etching)
- Optimize part nesting for material efficiency
- Generate G-code using appropriate post processor

#### 2.1.3 Stage 3: CNC Control - CommandCNC

Execute precise cutting operations using advanced control systems:

- Load and verify G-code programs
- Home machine and establish work coordinates
- Monitor cutting operations with real-time feedback

### 2.2 Control System

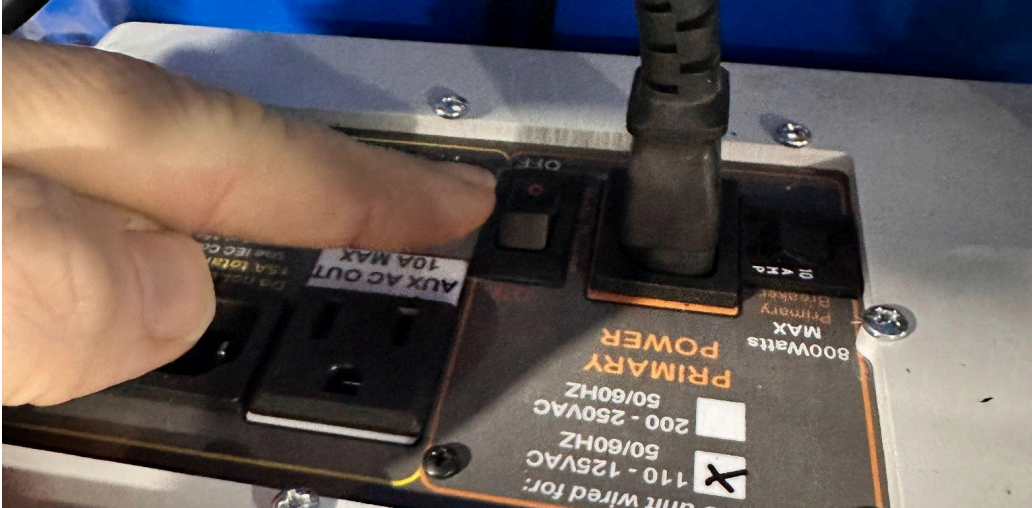
Feature	CommandCNC EtherCut
<b>Operating System</b>	Linux (CommandCNC)
<b>Communication</b>	Ethernet (EtherCut protocol)
<b>THC System</b>	DTHC 5 Digital System
<b>Advantages</b>	Modular design, advanced DTHC, extensive support

## 3. Control System Operation

### 3.1 StarLab CNC Operation

#### 3.1.1 System Startup

1. Power up table hardware and verify all systems



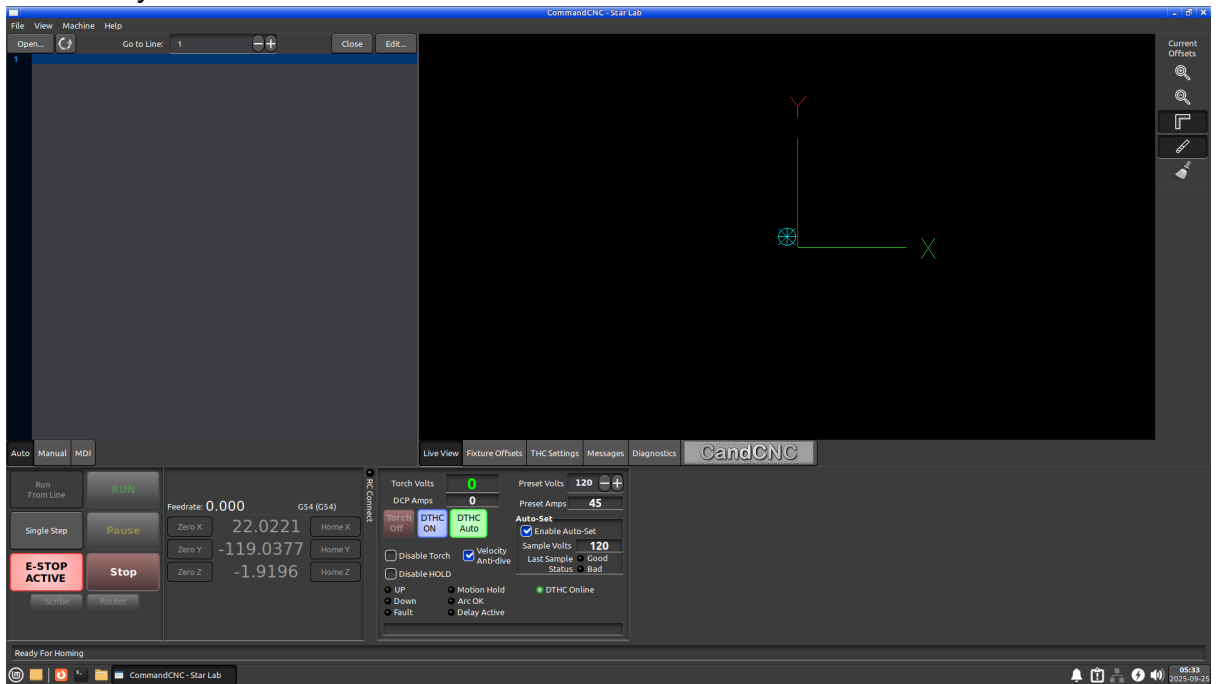
2. Press green ON button on Bladerunner control box after computer desktop finishes loading



3. Launch CommandCNC using appropriate profile (StarLab CNC penguin icon)



4. Wait for system initialization and connection verification



5. Clear Emergency Stop functionality (press flashing e-stop on screen)



### 3.1.2 Machine Homing and Setup

**⚠ Always home the machine before any cutting operations.**

6. Clear table of obstacles and verify limit switch operation
7. Initiate homing sequence for X and Y axes



8. Verify machine coordinates display correctly

Test axis movement and verify smooth operation

## 4. SheetCam TNG Operation

### 4.1 CAD File Import and Processing

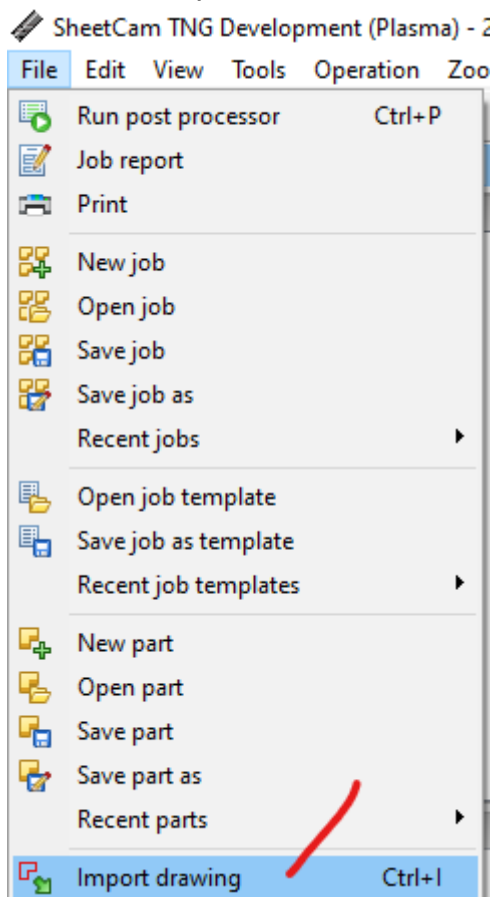
#### 4.1.1 Supported File Formats

SheetCam TNG supports multiple professional formats:

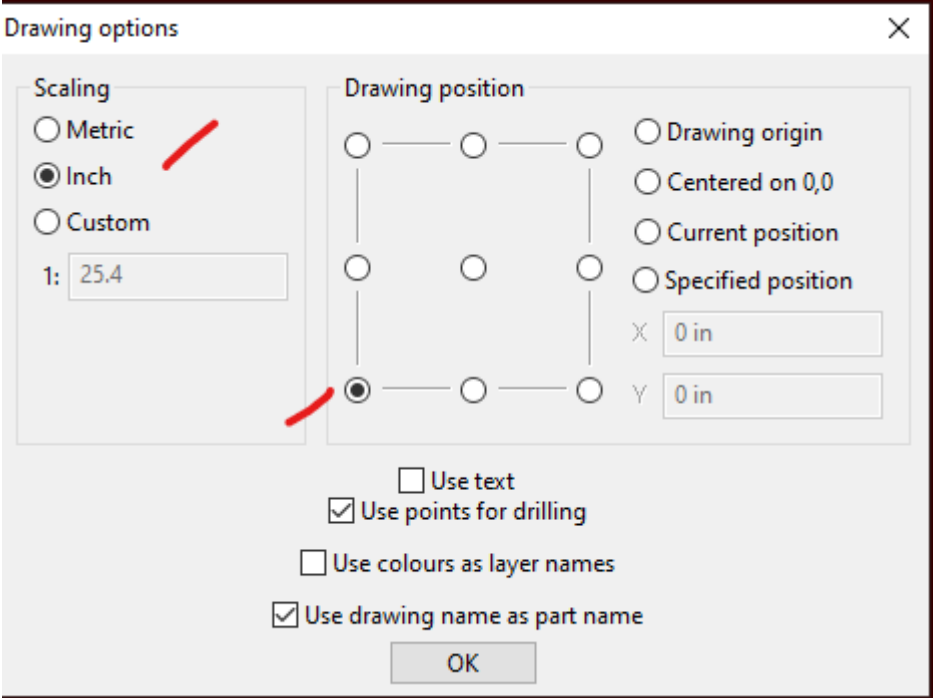
- DXF (recommended - best compatibility)
- DWG (AutoCAD native format)
- SVG (Scalable Vector Graphics)
- AI (Adobe Illustrator)

#### 4.1.2 Import Process

9. Click File > Import



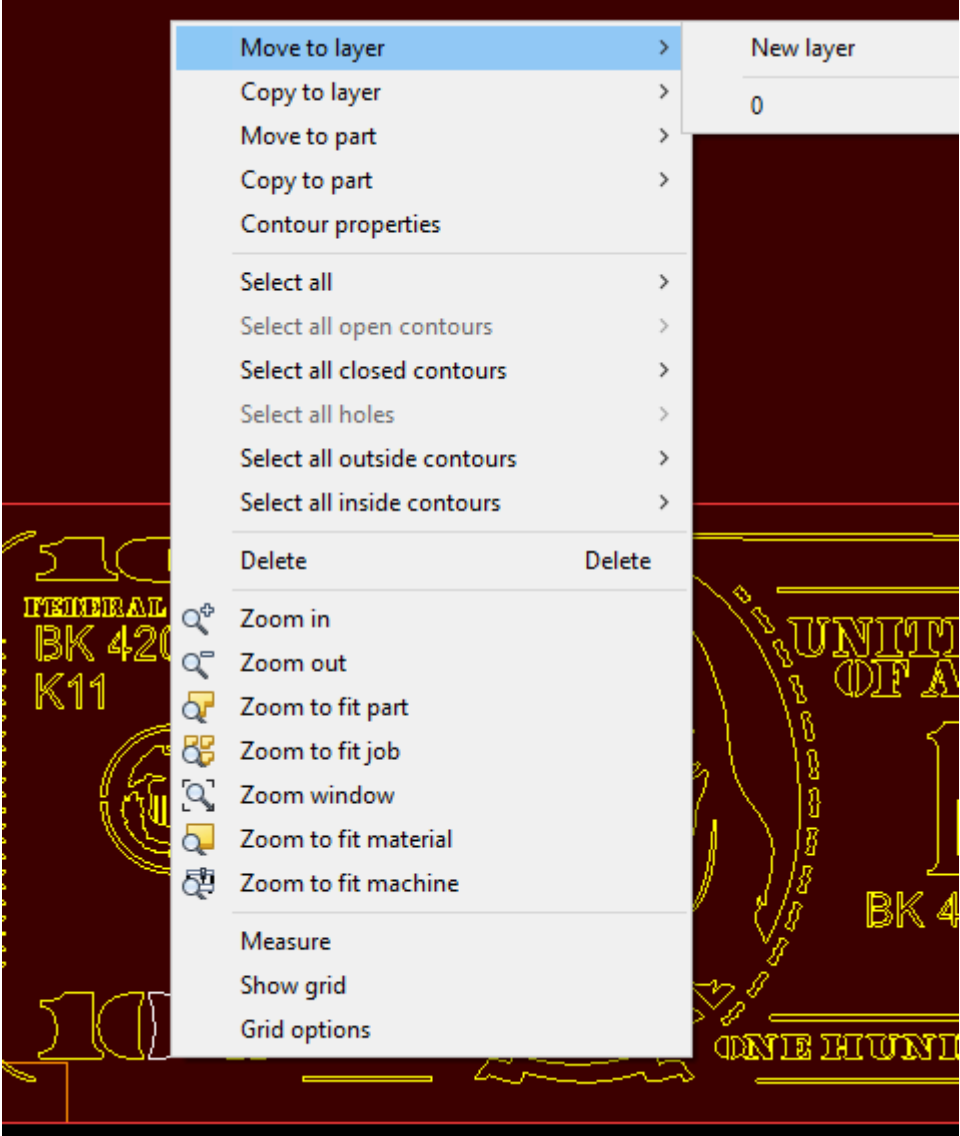
10. Select CAD file and verify import scale



11. Check geometry completeness and accuracy



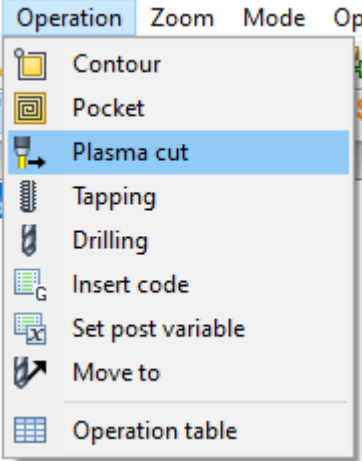
12. Organize geometry by layers if needed



13. Small parts before large parts

4.3.2 Operations & Lead-in/Lead-out Configuration

Go to the Operation menu, click Plasma Cut.



Contour Method:

- *Inside Offset:* Cuts inside the part outline (holes, cutouts).
- *Outside Offset:* Cuts outside the part outline (profiles).
- *No Offset:* Cuts directly on the line (for special cases).

Direction: Clockwise or counterclockwise. Typically SheetCAM auto-selects based on inside/outside.

Overcut: Extends cut past the end slightly, useful on closed shapes to ensure full cut through.

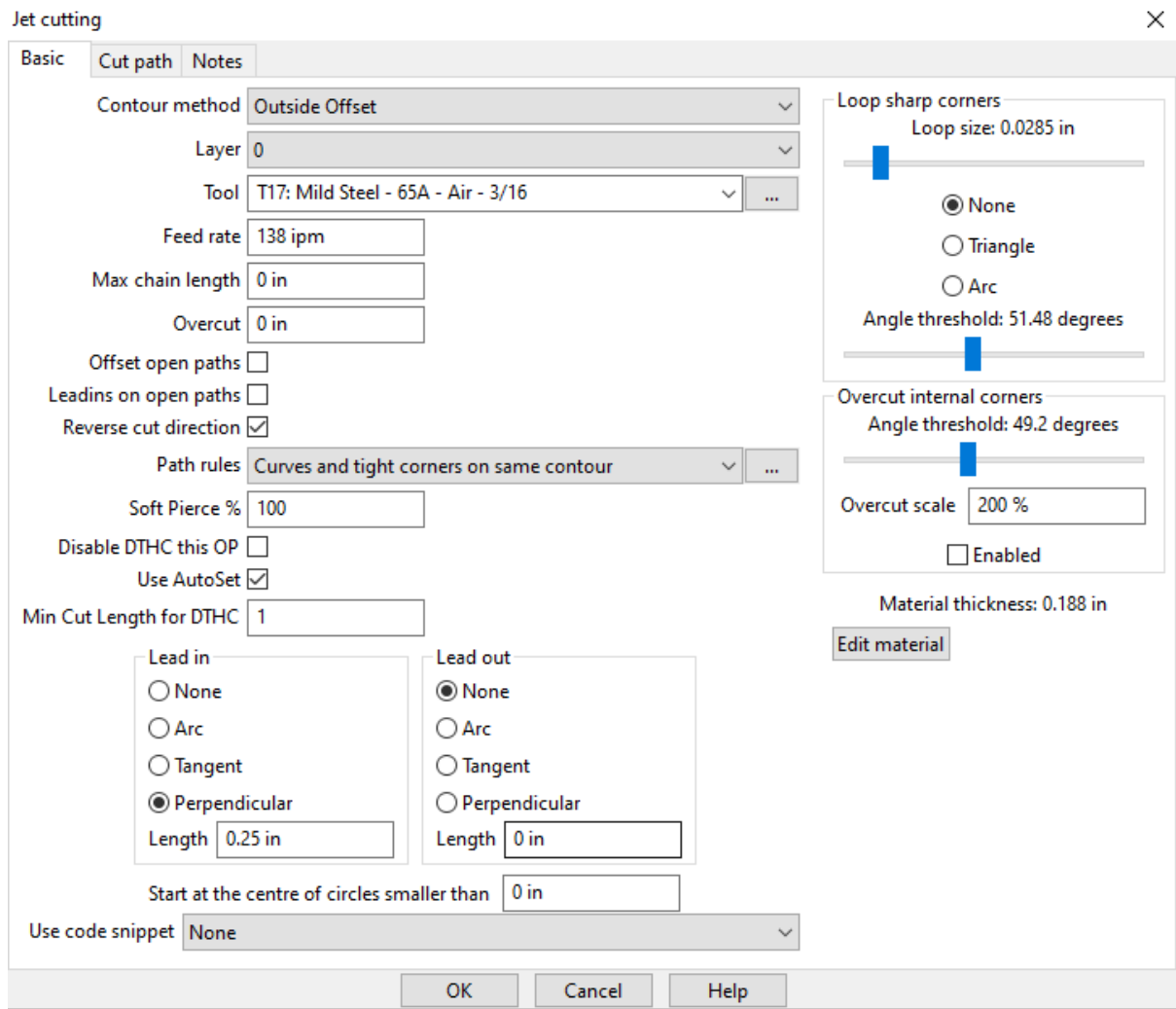
Pierce Height: Distance above the plate where torch fires to pierce.

Cut Height: Distance above plate while cutting.

Pierce Delay: Time the torch stays on before starting motion (lets arc stabilize). (Usually these are defined in the tool, but you can override them here.)

You can add cut rules (example: slow down on small holes, increase pierce delay on thick material).

Rules are linked to the tool or can be applied per operation.



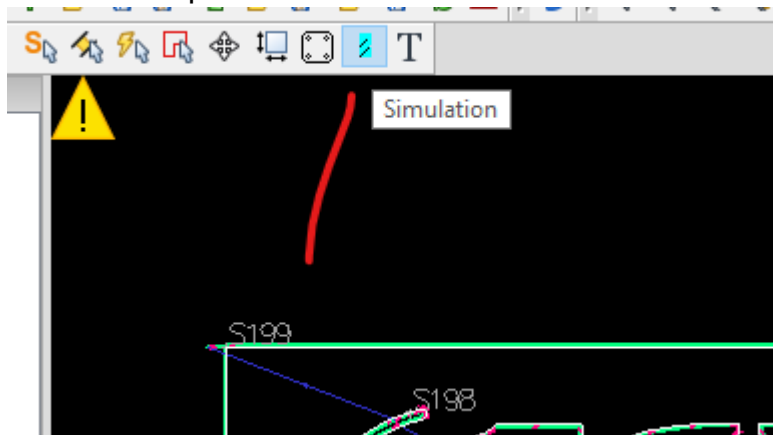
Lead-in strategies:

- Arc lead-ins for smooth entry on curves
- Perpendicular lead-ins for straight edges
- Ramp lead-ins for thick materials
- Pierce away from finished edges

## 4.4 G-Code Generation

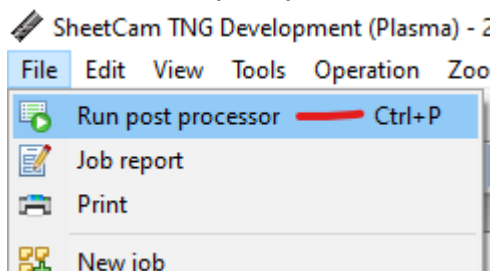
### 4.4.1 Final Verification Process

14. Review all operations and cutting sequence
15. Verify material boundaries and nesting
16. Check tool assignments and parameters
17. Simulate toolpath if available



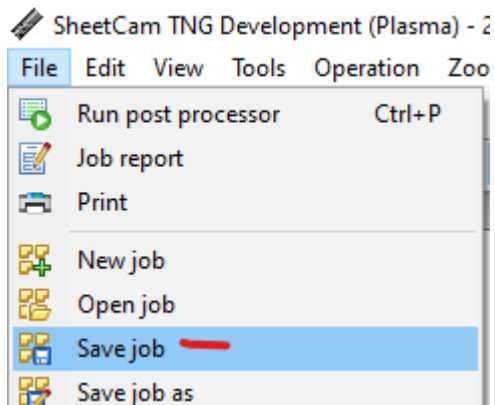
### 4.4.2 Post Processing

18. Click File 'Run post processor'



19. Choose descriptive filename and location
20. Select G-Code (.tap) for file type and save

## 21. Save SheetCam job file for future modifications

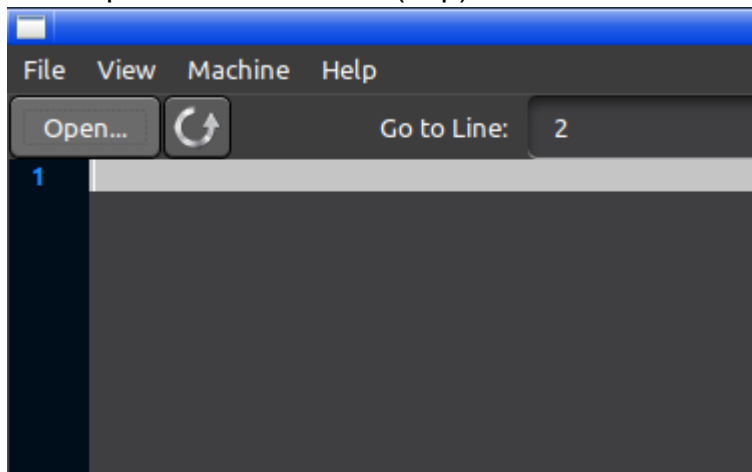


## 5.3 Program Loading and Execution within CommandCNC

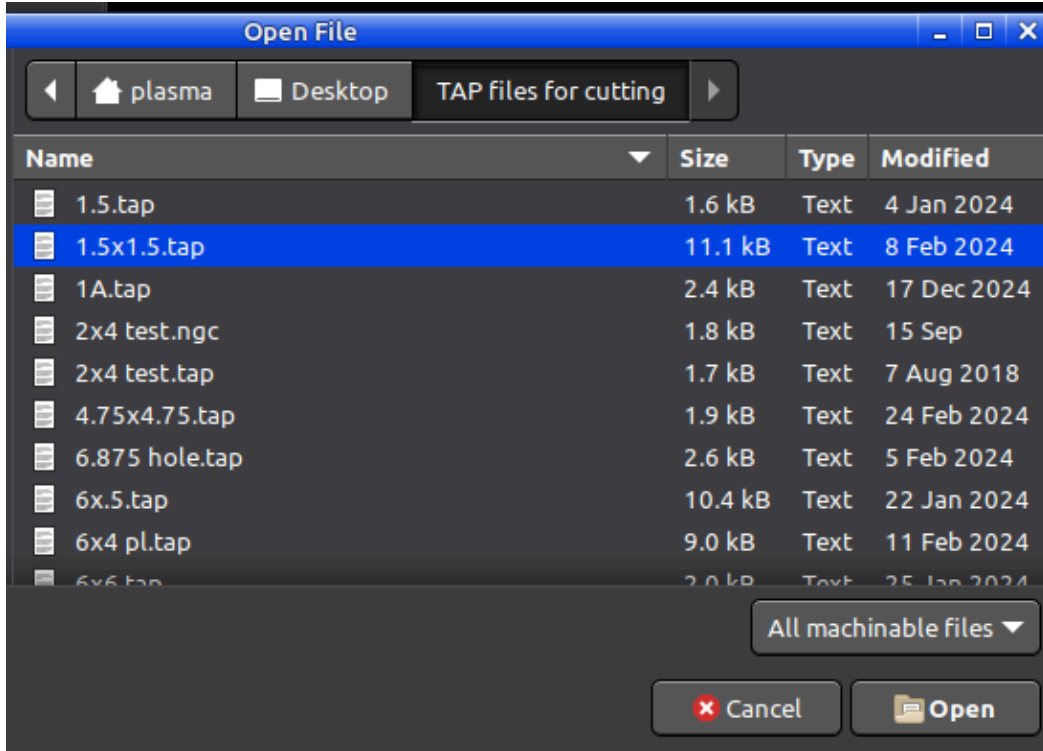
### 5.3.1 G-Code Verification

✓ **Always verify programs before cutting materials.**

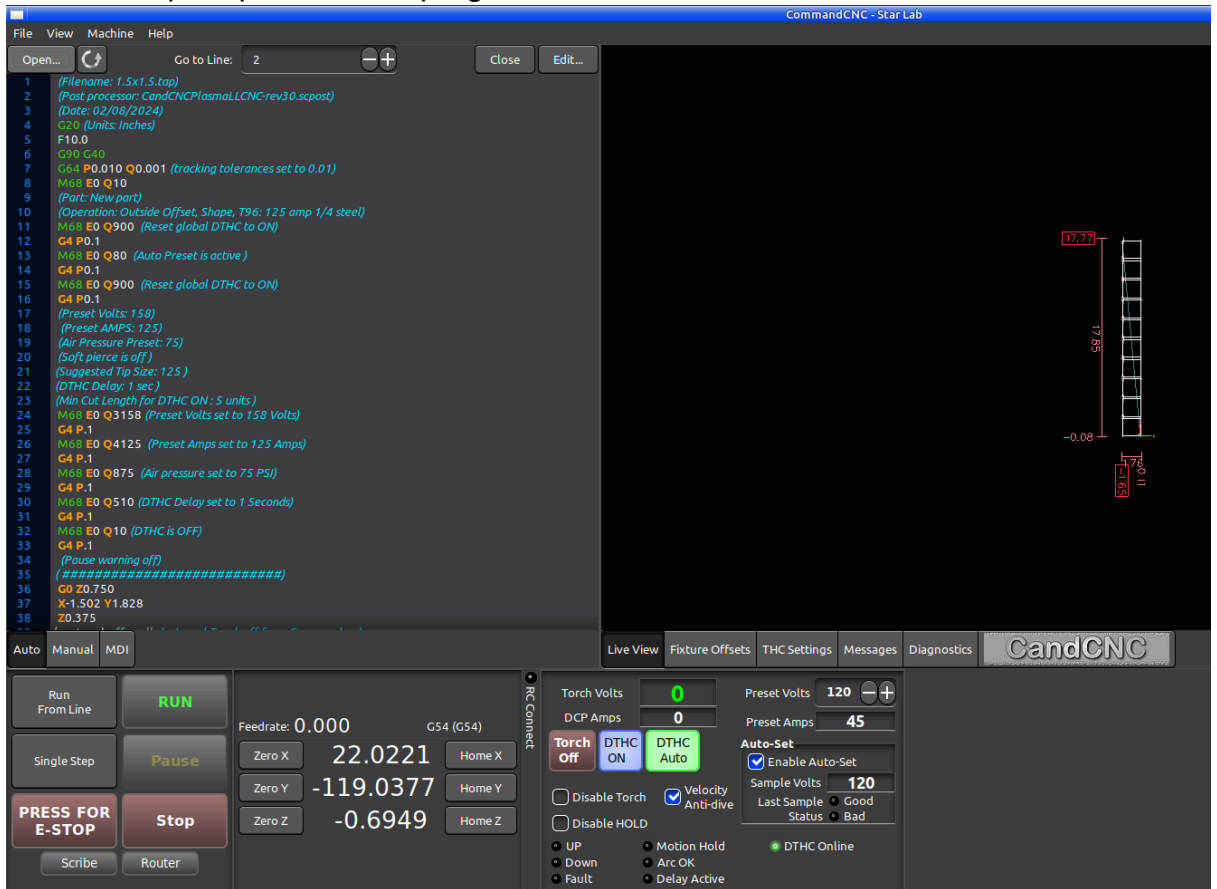
## 22. Click Open to load G-Code (.tap) file



23. Browse for the G-code (.tap) file and press Open to load into control system



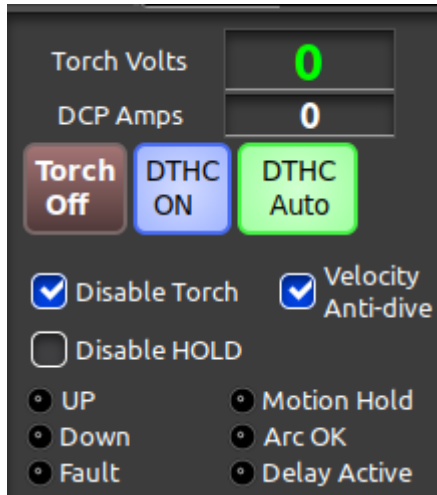
24. Review toolpath preview and program information



### 5.3.2 Dry Run Testing

► Tip: Use dry run mode to verify motion without firing the torch.

## 25. Enable 'Disable Torch'



26. Run program to verify all motion paths

27. Check for potential collisions or other issues

## 5.4 Cutting Operations

### 5.4.1 Pre-Cut Checklist

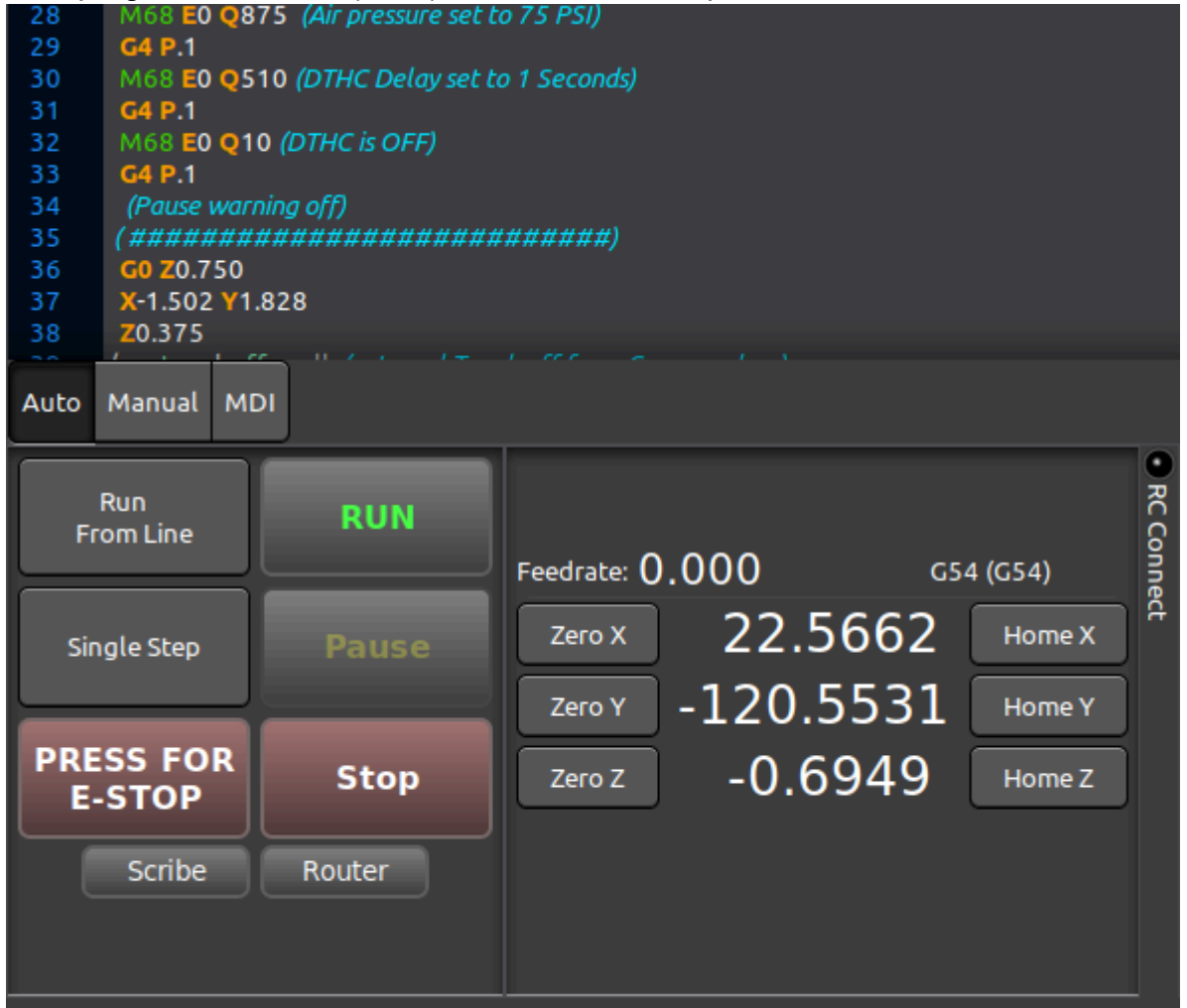
Complete this checklist before starting any cutting operation:

5. Verify all safety equipment is in place and functional
6. Check plasma consumables and replace if worn
7. Verify plasma amps matches preset selected
8. Confirm air pressure and quality (dry, clean air, 100-130 psi at plasma cutter)
9. Test Emergency Stop and verify functionality
10. Ensure material is properly secured and grounded
11. Check fume extraction system operation, water bed full

### 5.4.2 Cutting Execution and Monitoring

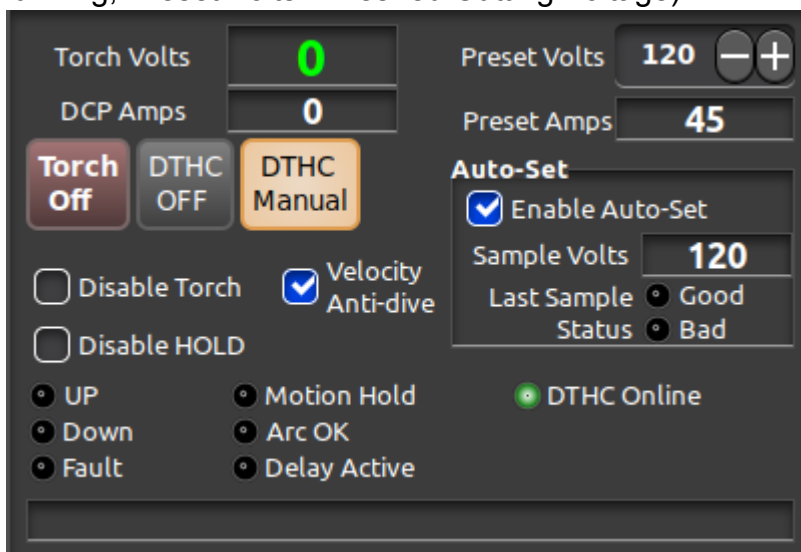
**⚠ Monitor the first several cuts closely - be ready to stop if issues occur.**

28. Start program execution (RUN) and monitor initial pierce



29. Observe cut quality and edge characteristics

30. Monitor THC operation and height control (Torch Volts = Actual volts when running, Preset Volts = Desired Cutting Voltage)



31. Watch for unusual sounds, sparks, or cutting issues

32. Use feed rate override if necessary for quality, while being mindful of torch volts

## 6. Maintenance Program

### 6.1 Daily Maintenance Tasks

Start each day with these essential checks:

- Inspect plasma consumables
- Check air pressure and moisture separator
- Clean cutting table of debris and dross
- Verify Emergency Stop functionality
- Test all axes movement and home position

### 6.2 Weekly Maintenance Tasks

Weekly maintenance ensures continued reliability:

- Clean air filters and drain moisture from tanks
- Inspect all electrical connections for tightness
- Check linear guide cleanliness and lubrication
- Verify torch cable condition and connections
- Test cutting quality with standard test patterns

### 6.3 Monthly Maintenance Tasks

Comprehensive monthly maintenance:

- Calibrate machine accuracy with precision measurements
- Check gantry squareness and alignment
- Verify THC system calibration and performance
- Inspect drive components for wear
- Update documentation and maintenance logs

## 7. Emergency Procedures

 **EMERGENCY: Press Emergency Stop immediately in any dangerous situation.**

### 7.1 CommandCNC Emergency Response

CommandCNC emergency sequence:

33. Press Emergency Stop (hardware or software button)
34. System immediately halts all motion and plasma output
35. Turn off plasma power supply main disconnect
36. Power down control system if safe to do so
37. Secure work area and assess situation

### 7.2 System Recovery After Emergency Stop

Safe recovery process:

38. Identify and resolve the cause of emergency stop
39. Inspect all systems for damage or hazards
40. Reset Emergency Stop button (twist to release)

41. Power up systems in proper sequence
42. Re-home machine and verify functionality
43. Test all safety systems before resuming operations

## 8. Support Resources & Documentation

### 8.1 Star Lab CNC Support

✓ **Star Lab: Comprehensive support through official channels and community forums.**

StarLab support resources:

- Official Support Site: [starlabcnc.com](http://starlabcnc.com) click on Resources
- Video tutorials and setup guides
- Phone & email support
- Engineering-monitored forums
- CommandCNC documentation and guides

## 9. Appendix & Quick Reference

### 9.1 Contact Information

- Star Lab CNC Technical Support: 651-433-3689

### 9.2 Universal Best Practices

- Always verify programs with dry runs before cutting
- Maintain clean, dry compressed air supply
- Use genuine Hypertherm consumables
- Keep detailed maintenance and calibration logs
- Backup all configurations and programs regularly

### 9.3 System-Specific Best Practices

StarLab CommandCNC:

- ✓ Leverage LinuxCNC's real-time capabilities
- ✓ Use integrated THC for consistent results
- ✓ Keep configurations backed up

### 9.4 Revision History

Version	Date	Author	Changes
1.0	9/25/2025	Max W	Initial Release

--- Star Lab CNC Plasma Systems Manual ---

Star Lab • CandCNC CommandCNC • SheetCam TNG