

Install and connect a Laser module on your Stepcraft machine.

In this How to... I let you see how to make a 3rd party laser work on your CNC machine.





Used hardware.

This tutorial is written with the hardware.

- Stepcraft 1/420 CNC
- NEJE 20Watt blue (5.5Watt optic) laser 450nm.
- NEJE laser tester and control
- DS15 connector (male normal and female breakout type)
- Several 3D printed parts





Figure 2 NEJE 20 Watt laser set

Figure 1 Stepcraft CNC



Make the laser fit.

The laser dimension are $30 \times 30 \times 80$ mm and that doesn't fit in the 43 mm diameter toolholder. So let's make an adapter for this.

I made one designing it in Solidworks and then printed it on the 3D printer.

The STL file can be found on Thingiverse : https://www.thingiverse.com/thing:4650032

The tight fit depends on the printer quality but with a piece of sticky tape on the laser it can be made a tight fit in the adapter.



Figure 5 Adapter for toolholder and laser



Figure 3 Adapter in toolholder



Figure 4 Laser , adapter and toolholder

Hook the laser up to the Stepcraft.

Now we have make the connection between the Laser and the Stepcraft.

This is done by the Sub D 15 connector on the back of the Stepcraft machine. Because this auxiliary port is also used for the spindle control I made a Laser control box with an Sub D 15 out connector so that both laser and spindle can be used without changing connectors.

Hardware used for this:

- SD 15 Male connector soldering style
- SD 15 Female connector breakout style
- Old unused SCART cable









The SCART cable has 20 wires and we only need 15 of them just connect the wires on all the pins to make an extension cable. The male side goes in the Stepcraft machine and the female we mount in the control box. On this female we plug the Spindle connector now the spindle can be used when the laser is dismounted and vice versa.

Now we have to connect the correct pins on the female breakout connector to the laser tester print. Two extra wires are add to the breakout connector. This is done on pin 2 or pin 10 (GND) and pin 13 (PWM on relay 1) and connect them to the PWM/TTL input pins (JST XH 2.5 2 pin connector).

PWM/Temperature tester board Specification

Power input: DC 12V Output: PH2.0 4pin (12v,GND, PWM/TTL, Temperature) mode: 3 modes (off, manual PWM, PWM / TTL in) temperature display: YES PWM display: yes Manual PWM control: YES



Next setup the CNC control program.

This tutorial is made for WinPC-NC USB ver. 3.40/82.

Step 1.

Click on Parameters, then on basic settings:

Now navigate to the *equipment* window and activate the *laser*.

Speed control	Monitoring Display/Operation
Ports X-Axis Y-Axis Z-Axis	Equipment Dimensions Homing Jog Signal Wizard Spind
Technology	Tools
Cylindrical axis	Length measurement and compensation
Tangentional cutting	Automatic Tool Changer (ATC)
W Depensing	Tool changer with 4th asis
Oxy/fuel cutting	Surface block
3D Printing	Sensor plate
R Laser	C 30 Tools
Sinding	
Digitizing	4th axis
	C Hacros
	Hessages from controller inputs 1181.ff
	👹 Hubi - bead
	Piotlaser
	Camera

Step 2.

The output signals must be assigned according to their functions.

The following logic scheme applies: Enable LaserQ244 Dispensing / Laser (e.g. Pin1) Power LaserQ218 Sp. speed PWM (e.g. Pin17)

Switch to the Signal Wizard in parameters-basic settings and search for the corresponding signals in the lower output table. After that, every signal can be assigned with an output pin over the pull-down menu. Confirm each selection by clicking Accept.

eters			Parameters	
deates Took Misc. parameters Te	echnology Import Formats Basic	Settings	Coordinates Took Misc. parameters Technology Imc	ort Formats Basic Settings
Speed control	Monitoring	Display/Operation	Speed control	Monitoring Display/Operation
HTS X-AXE Y-AXE Z-A	ors Equipment Dimensi	ions Homing Jog Signal Waard Spindle	Ports X-Axis Y-Axis Z-Axis Equipr	nent Dimensions Homing Jog Signal Woard
Inputs Pinnie	NO 📩	• US8	Inputs Pinning	• USB
I247 NotReady n/a		🔘 USB ST	I247 NotReady n/a	O USB ST
235 Homing switch X LPT1	Pin12	@ US8 oc100	I235 Homing switch X LPT1 Pin12	@ US8 oct00
236 Homing switch Y LPT1	Pin12		1236 Homing switch Y LPT1 Pin12	
I237 Homing switch Z LPT1	Pn12		1237 Homing switch Z LPT1 Pin12	
1238 Homing switch 4 n/a		@ @V	1238 Homing switch 4 n/a	
		OPU +EA160802		@ CPU+EA160802
Va 🔻	Accept	@ 0101012	n/a T Accept	@ 07041272
Outouts Pinnie		@ CPU+LPT2 BDI	Outputs Pinning	- OPU+LPT2 BDX
0243 Cooling on/off n/a			0115 Output M87 n/a	
0244 Dependence IPT1	Pot	Port systems	0219 Obvoaumo 1871 Po16	Post patrices
0245 Classing n/s		1973-000	0218 Sp spaced DWM IPT1 Ph10	1074 000
Olde Job artisia IDT1	On 14 inv	terri deve nax	Q210 SP.SPEED FWH LFTL FILZ	ter i tou
Old Table and	Pairs III	LPT2 000_ her	Q217 Protoconscispid hya	LPT2 000_ hex
Q247 300 eno 10a	•		Osto Provincial@epumps inta	•

Figure 6 Assignment Pin 1

Figure 7: Assignment Pin 17

Now all basic connections and settings are made and the Laser should work and the power control is made by the toolpath file.

Note: Power setting is done by the G-code S command (0 = 0% - 255 = 100% power). This can also be done in the toolpath generator program by setting the spindle speed accordingly (0 - 255 speed).

To adjust the correct feed rate and laser power run before every different material the 2 special tests:

- Greyscale Speed test
- Laser Cut test

The calculated feed rate is inserted in the Laser tab file:

Note: This value overrides the G-code "S" speed setting!! So if you want to change the feed rate is must be done in the WinPC-NC Laser tab.

(To switch to the G-code setting the value of 0 should be entered in this field, only for now there is a bug in the software (reported to developer) so that doesn't work yet.)

3 Instellingen 💌				
Coördinaten Gereedschap Spo	eciaal Technology	Gegevensformaat	Basic Settings	
Produceren Laser				
Use laser				
Q244 Doseren/Laser = n/a	1221 Sc	hakelaar = LPT1 Pin	10 _Gravscale adjustment	
Q218 Sp.speed PWM = LPT1	Pin17			
Mir	imum laser load	0 %		
Max	kimum laser load 10	10 %		
Automatic power reduction	20		51 I L I I	
Grayscale adjustment				
Automotio for anime with				
Sensor enable by prompt	sensor		- U U	
Focussing distant	nce from sensor 📑	0.00 mm	White Gray Black	
Switch on/off at G0/G1 a	nd PU/PD		-3D color shading	
Speed/Power from tool s	ettings		on none, 2D data only	
	Laserspeed	_20.00 mm/s	Grayshading depends on PWM Signal	
	Pint laser load _2	20 %	Grayshading depends on PWM Signal inv	
	✓ <u>0</u> K	X Afbreken	Doslaan	

Now you can run your first test runs, have fun.



To fit all the components nice and ordered the Laser control box is made



The Laser control box will fit into the Stepcraft enclosure and is printed. The Laser control box STL files can be found on Thingiverse:



Figure 8 Bottom part Contrrol box