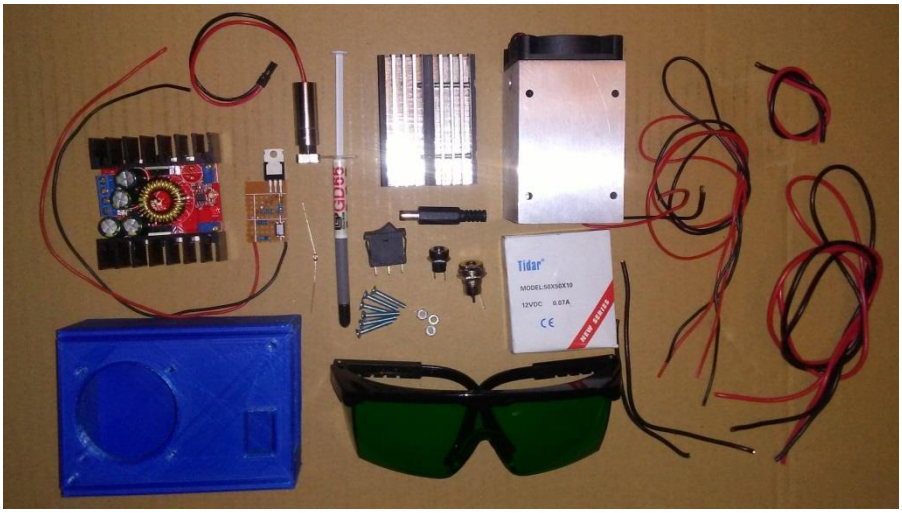
Discovery, Packaging, Settings, Software Tests and Overview of the Endurance Laser.

DISCOVERY:

So after seeing an Endurance lasers post in the group I am in on Facebook I got talking to George, joined his Facebook group https://www.facebook.com/groups/endurancelasers/ and visited his site https://www.Endurancelasers.com . Impressed, I wanted their laser kit. It looked amazing from what I saw. I'm a 3d modeller and been printing many years and know the basics in the movements of the machines and programming, and thought it would be a good challenge to build myself a laser engraving frame using 2020 aluminium extrusion and stl files I moded for my needs. I had a spare MKS 1.0 board and a 12V 30A PSU I could use steppers belts and bolts I had from other projects with printers then all I needed was my cherry on the cake in the form of a laser so I got a 10w laser kit from George at Endurance. I was very surprised it only took just over a week to arrive after been given my tracking number, which if anyone has bought anything online before you know sometimes it can take an age to arrive but this was very quick.

PACKAGING:

When it arrived it came very well packaged and the contents well wrapped. Inside the kit I got a pair of green safety glasses some lengths of silicone wire and also some power wire and some smaller pieces of black wires a 2 way on/off switch, a heat break, a diode and a lens, also 2 50mm fans and a metal housing, a few power-in-jack ports and a power-out-jack, some thermal paste, an M01 board and also a DC/DC converter. All in all it looked like a very nice kit.



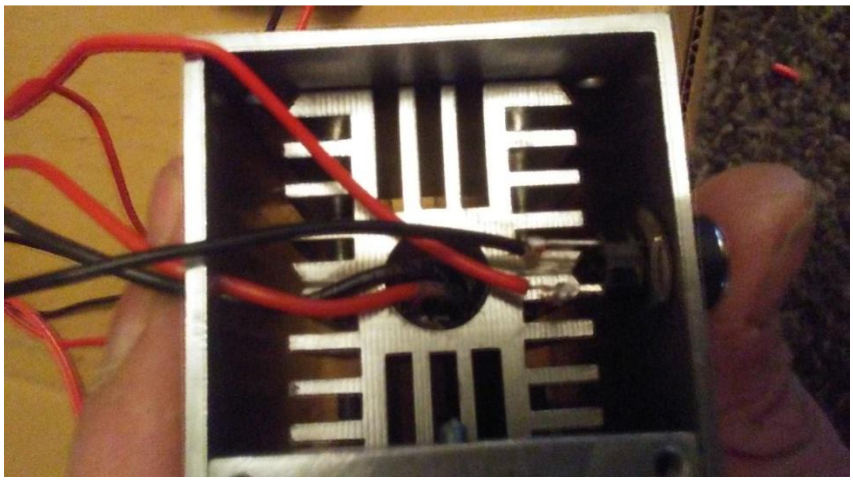
At first I was quite overwhelmed when I got the kit as my soldering abilities are not the greatest but I managed to do what needed to be done with minimal stress, first of all I went to the Endurance site

where they have the instructions written and in video format so the information was very easy to obtain and there is the Facebook group where the information has been posted also.

ASSEMBLY:

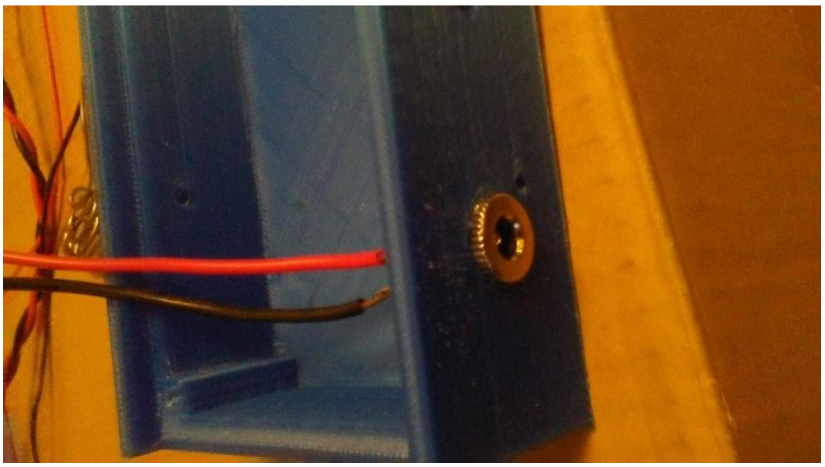
First of all I had to house the diode inside the heat break so had to unscrew the 2 halves and put thermal paste in the semi-circle halfes in the middle of the heat break, I then seated the diode so it was protruding past the heat break slightly, I then applied thermal paste up both side before closing the 2 halves together and tightening which made the thermal paste ooze out. I got rid of the excess thermal paste with a bit of kitchen roll (paper towel).

Then before sliding the heat break and diode into the housing I wired the red and black wires from the fan to the smaller female jack port. The wire got threaded through one of the spare holes on the fan and the red and black wires through the hole in the housing, making sure I left the locking nut inside the housing. Then I soldered the red wire to the shorter pin on the port and the black wire to the longer pin on the port then pushed the wires back through and attached the port to the housing case using the locking nut.

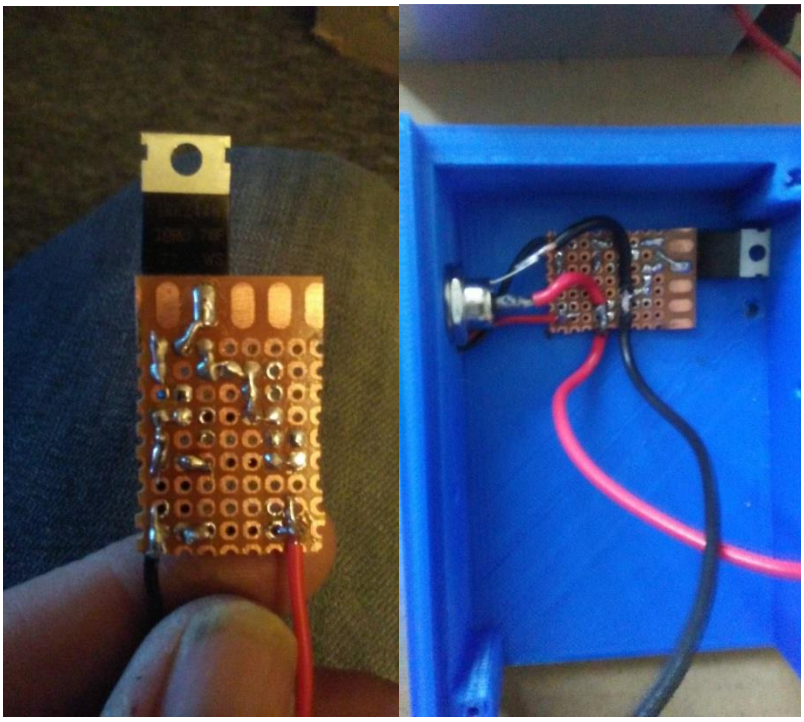


Afterwards, I had to slide the heat break and diode into the housing allowing the wires from the diode to go through the smaller hole on the left of the housing case. I attached the heat break and diode to the housing using 4 screws to hold it firmly in place and that's pretty much the main part of the laser done, which was very straight forward.

Next was the wiring and soldering, which I wasn't looking forward to, but turned out a lot less intensive than I first thought. First of all I fed the wires into the control box and soldered the red wire and black wire to the larger in-jack; the red wire to the short connector and the black wire to the long connecter making sure I left the locking nut on the inside of the control box like I did with the fan jack. I fed the jack port and the wires back into the hole of the control box locking in place using the locking nut.



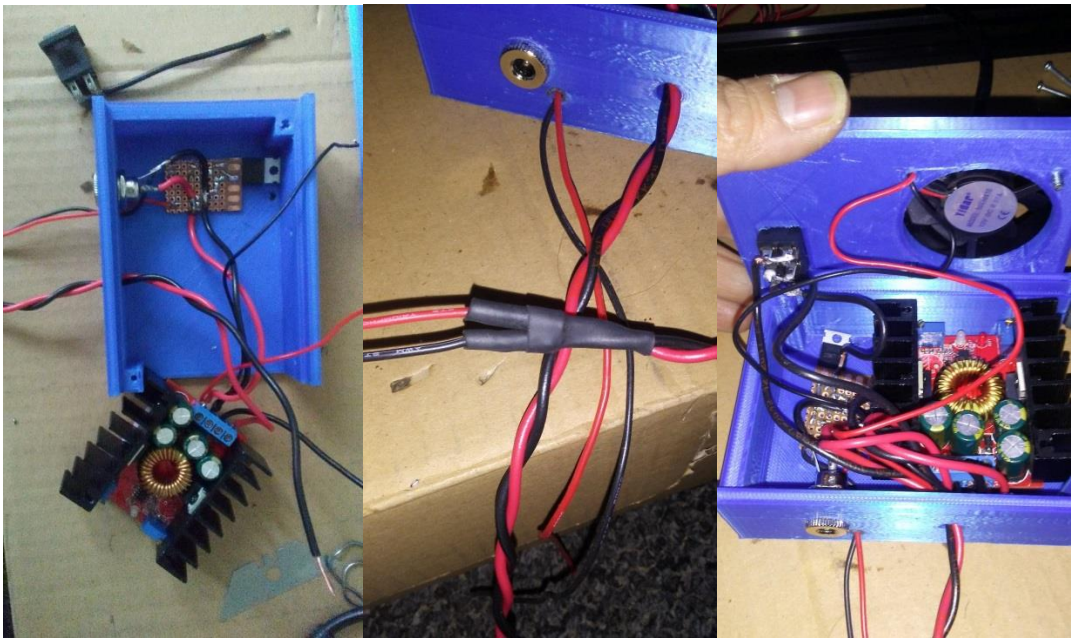
Next was to make some cuts in the casing of the black and red wires and solder them directly to the M01 board; it was a bit confusing at first but the more I looked at it, the diagrams, and the clips the more it made sense. I eventually got the courage to solder onto the M01 board and it was surprisingly easy. I was worried about putting too much solder on the board and bridging the connections somewhere, but apparently it was easier than I thought.



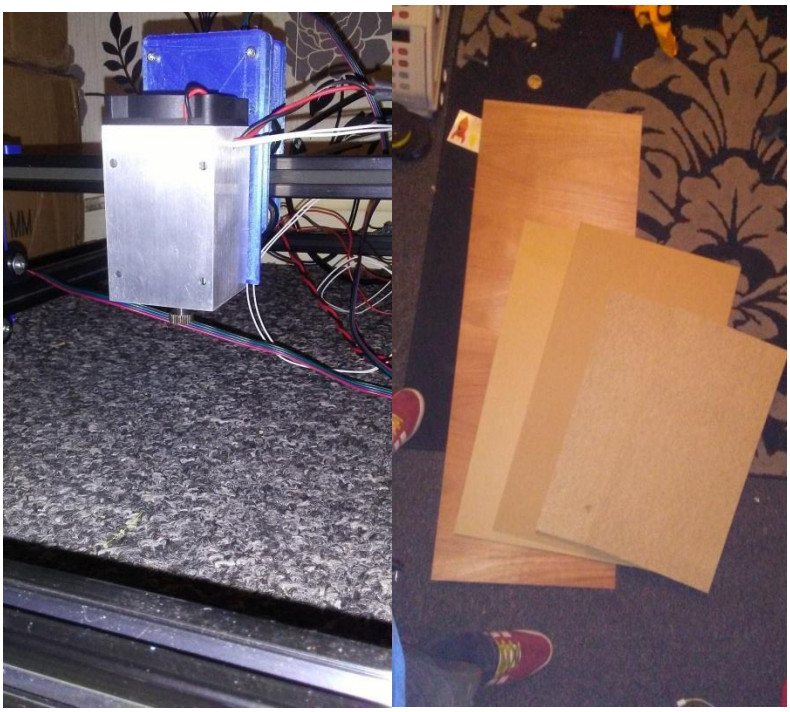
The red and black silicone wires coming out of the M01 board are the TTL/PWM wires going into the motherboard's TTL/PWM port. I then soldered the short black wire to the first two pins on the 2 way on/off switch and put it into the lid of the control box . The lid that has the hole already, the perfect size, and it just clicked into. I then attached the fan onto the lid threading the wire through a spare hole to allow it to go into the control box. Then I soldered the red and the black fan wires to the end of the red wire, and the black wire I soldered earlier onto the M01 board, the red and the black wires then went into the DC/DC converter.

The black wire I soldered onto the 2 way on the off switch that went into the lid, I soldered that to the M01 board at the top onto the MOSFET. Next I twisted the thicker wires together and wired them to the 2 wires hanging out of the laser module I assembled earlier and used the heat sink tubing to seal the wires to avoid bare wires touching.

The red wire went into the DC/DC converter and the black wire went onto the 2 way on the off switch to position 2, and the spare black wire I had left went from the spare DC/DC converter port then I soldered it to the middle pins on the 2 way on/off switch.



Once all this was in place and put together I put the red and the black wires into my 12V 30A PSU into a spare rail that I'm powering my engraver frame with, and then soldered the red wire and the black wire into the male jack plug, as I did with the rest of the ports; the red wire on the shorter connector, the black wire on the longer connector and that then plugged into the control box. I mounted it all on my engraving frame and used a spare 12v 3A power pack to power the cooling fan which I already had, and that was all I had to do. Then I was ready to fire it up and do a test run.

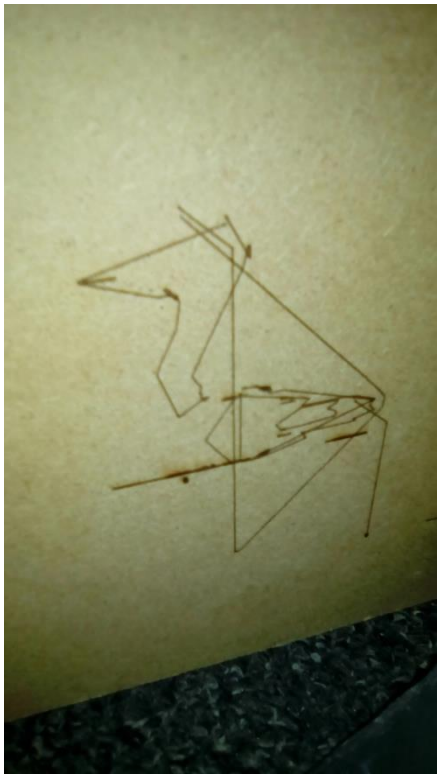


I put smaller thicker pieces of chip board under my laser engraver frame to protect the surfaces getting any burn marks, I switched the control box, switched to position 2 to activate the (TTL/PWM mode), then turned my motherboard's fan speed to 1 on the LCD controller and focused the laser to a fine point and when I saw the little blue dot change colour and scorched ever so slighty I figured it was focused.

SOFTWARE AND TESTS:

INKSCAPE- FREE VERSION:

At first we downloaded Inkscape as its a free program and creates G-codes compatible for Marlin based laser setups. The program itself as a whole is good as you can create images/designs from scratch and you can manipulate or edit existing svg's/photos. Using the Jtechphotonics plugin you can create vector G-codes and there's a plugin for Raster image G-codes. The vector G-codes we initially created to test the laser didn't turn out so well as the travel lines were being burnt as well as the image. After looking through the setting options and many google searches later we were still at a loss as to why this was happening and still no closer to getting any results with the laser. Whilst we get to know how the laser functions and the technical side of how it works, we decided to stop using Inkscape and look at other compatible software to use. This isn't the last time we will use Inkscape, once we become more familiar with all the different settings that can be applied we will try again.

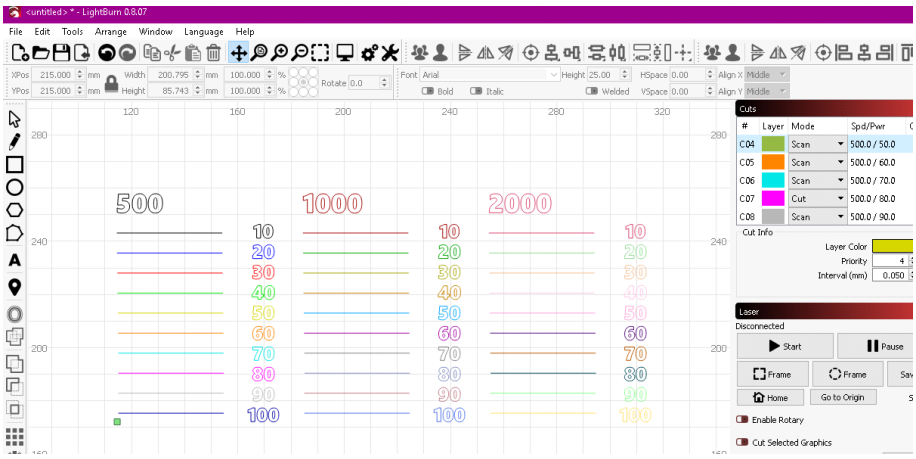


(Still burning on traversal moves)

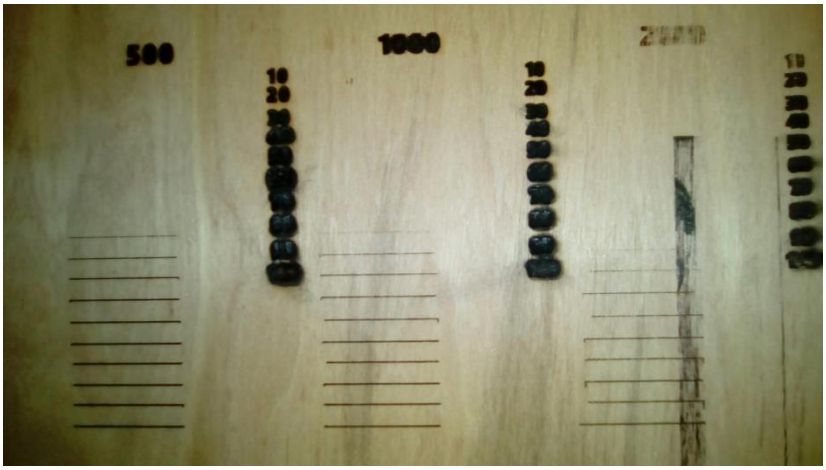
LIGHT BURN - FREE 30 DAY TRIAL - $40 FOR FULL VERSION:

Light burn was easy to install and set up for Endurance Laser on the computer but to connect to the laser we had to update the Marlin firmware to 2.o (1.0 was too old of a version to work, which was already on the Mks 1.0 board we are using) because of the limited space where our Endurance Laser is set up once we started burning we found it easier to save the G-codes onto an SD card and control it on the screen like we would do with a 3D Printer which works just as well as having it connected via usb. This way we could set up the next project ready for the next burn (not sure if you can do them at the same time within the program).

Once you learn what each function of the program does and how they work it's a really easy program to use alongside an Endurance Laser. There are many video tutorials and manuals easily available online that help you to learn everything you need to know to make the most out of each function. The easy part of the whole process has been creating each project and preparing them for burn (vector cut/engrave, raster scan, image scan) but it's all been trial and error with the result as we learn which settings are best to use for different materials and final results. One mistake that we were making at first was changing too many variables at a time (speed/max laser %/interval lines for images and raster) eventually after many fails we started to change one variable at a time, which resulted in more successful burns from the Endurance Laser but still left room for improvement. On one of the images we did noticed it was smaller than it should have been so I measured it and compared it to the size of what it should have been. Not only did it look smaller it was smaller by quite a lot, luckily we knew straight away to check the calibration of the motor e-steps, which was easily done on the screen. They should be set to 100 for our set up but they were at 80, which explains why the image size was wrong. With the calibration now set correctly we decided to do a test, which was created in Light burn to save wasted time on failed burns. We tested 3 different speeds each doing vector cut lines at intervals of 10% increasing it by 10 each line. We also had the percentage written next to each line, which was done as a raster scan so we could see what settings would produce the best overall burn/depth without too much charring. When creating the test, each line was assigned a different colour which allowed them to have the different settings needed. It was fairly straight forward to create within Light burn, just a little time consuming to change each setting (30 in total)



Now that this file has been created it can be used for each different material. Depending on what your laser set-up is like this test can be amended for different speeds, at the moment we get too much wobble over 2000 so that's the highest we can go for now.



(for some reason the laser moved too high as they were separate G-codes, didn't see the need to re-do it)

Now as we have successful test results we can start fine tuning different projects with quicker successful burns (fancy fonts and intricate details seem to need slower speed over basic fonts/detail/shapes)

(Speed too fast)

(Greyscale test-bamboo) (Newsprint test-bamboo)

(Slate tests, Left-good results, focused correctly, Right-slightly out of focus/blurred edges, looks burnt)

Overall using Light burn for an Endurance Laser has been very successful and it's now been purchased to continue further testing. The results so far have shown the potential in what can be achieved with a 10w Endurance Laser and we have only just begun experimenting with all that can

be done through the Light burn software.

OVERVIEW:

I can't fault the laser module it works exactly how it's supposed to, the journeys been super smooth transitioning my knowledge of 3d printing into laser engraving and got to say I'm definitely hooked. My mind is blown by the possibilities what this machine can actually do I haven't even started to scratch the surface yet or should that be scorch the surface.

When I wasn't sure of something I was super happy how quick George and his team were to answer all my questions regardless of how stupid they were or simple, they were always understanding to my problems!

I would never buy another brand of diode laser after owning the Endurance laser kit. It does exactly what it says it will online. I can see why other members of the Facebook community love their Endurance lasers because they are not even comparable to cheap Chinese lower voltage lasers that only run for an hour at a time before they stop working or they blow the diode before ever using them. But still all that aside, with Endurance lasers it's not just about the kits quality it's also about the excellent customer services you receive when talking or asking questions from George himself and also from his team. Overall an amazing guy and an awesome company and product and I would recommend Endurance lasers to everyone there great. I've had so much fun doing tests and building the engraver and the setup as a whole. This definitely won't be the last laser I get from George and Endurance Lasers it's been so much fun and educational.