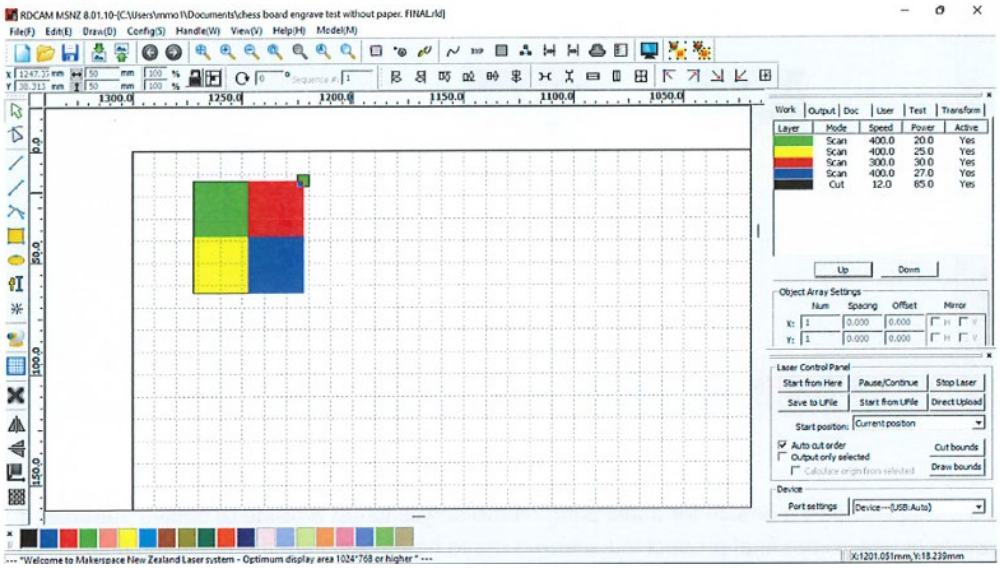
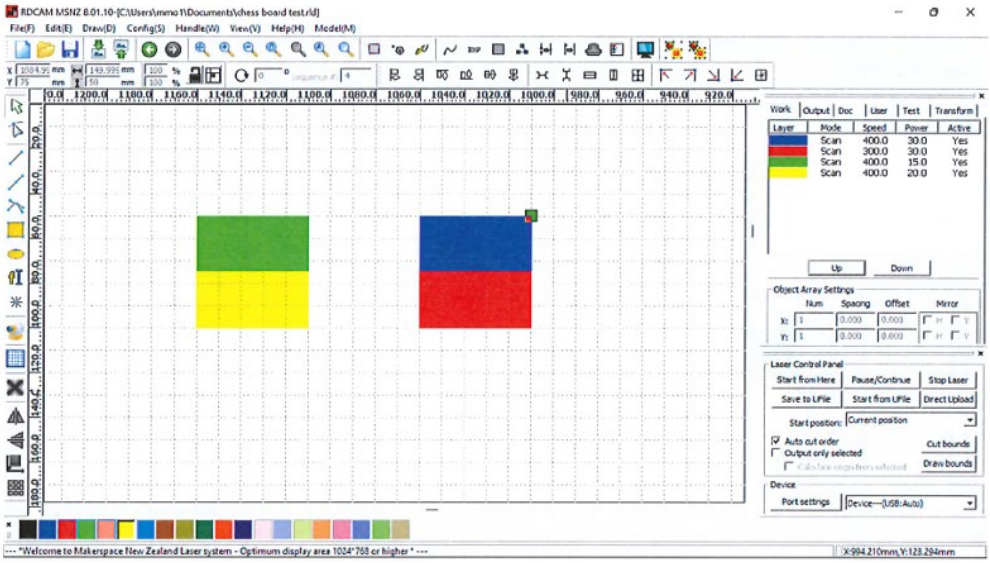
The laser cutter measures from the top right corner so I had to make sure that if there was room, I minimised material waste I moved the nozzle as far to the right and up that I could. I then had to pick my engraving speed and power as well as make sure the cutting speed and power were right. For cutting the 6mm wood I used a power of 75 and a speed of 15, for the 3.2mm wood I used 30 speed and 60 power, for cutting acrylic I used 12 speed and 85 power but after a few cuts, it was found that lowering the power to about 70 would warp pieces less and leave a better cut. 1



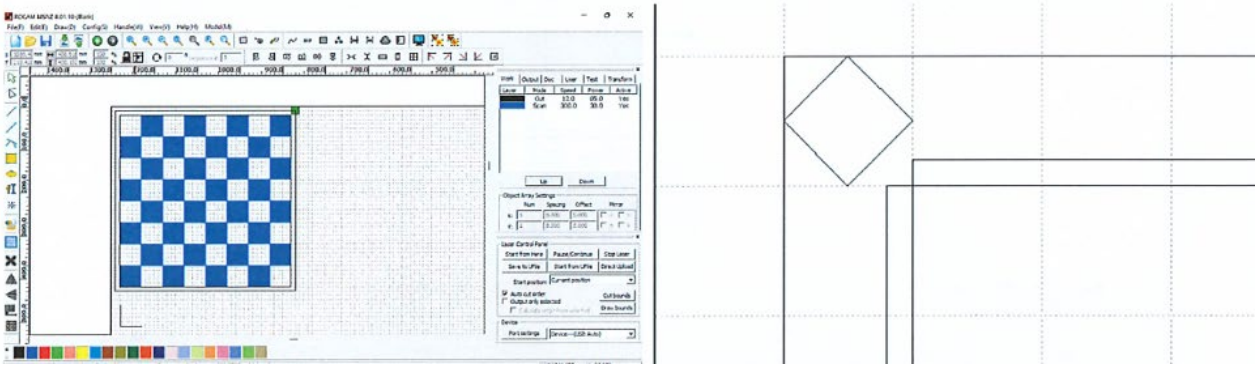
The image above shows the first test I did for engraving speed which had a large range of powers to get a rough power that I could then fine-tune which I did in the image below



This image shows a design for a test plate on the acrylic to get a range of cutting speed and power to use on the final product this allowed me to be efficient when making the final board because I knew I wouldn't need to re-cut anything since I had already tested all the engraving speeds and my grid sizing. This test cut uses lower powers than the one above it because when I used higher powers to engrave the engraved area was quite rough and cut down deeper than I wanted, the rough texture wasn't welcome because I was wanting the cutting to only shade in the alternate squares.

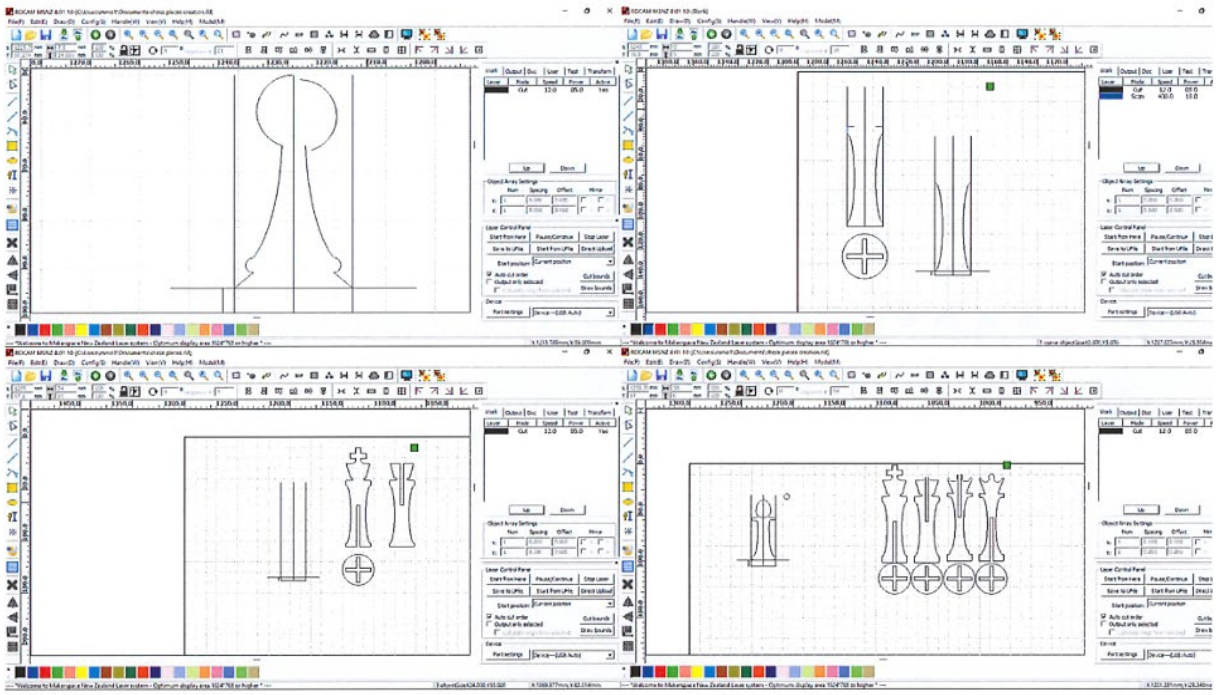
I decided to start with designing my chess board because it will set the size of my chess pieces and was the easiest part of the design which would allow me to get used to the CAD software so when I start designing my chess pieces I would have more experience and a better ability to shape them as intended. Making the chess board first also allowed me to decrease the amount of re-cutting I would need to do if, for example, I made the chess pieces first and later found out they weren't the right size, compared to the chessboard.

2



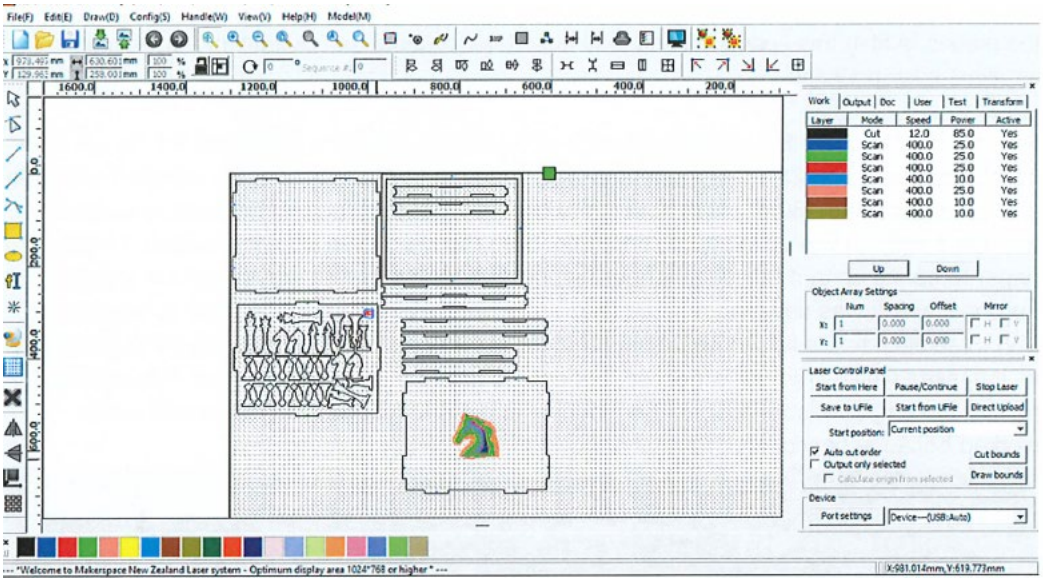
While making the first few chess pieces on the CAD program I thought it would be better if I made a template that I could scale to the size of my pieces while designing them so I used a series of lines to show the sides, centre and base thickness to allow better accuracy when designing the pieces and other utility lines that I used for aligning parts of the piece.

3

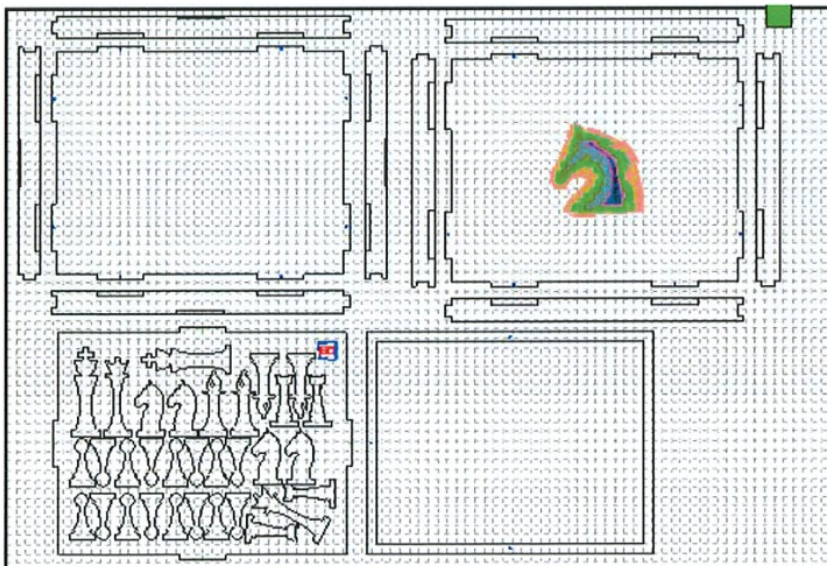


The images above show the designing process using the template that also stopped parts of the chess piece exceeding the width of the base. This template also allowed me to make the pieces quicker because I was able to align parts to the lines on the template. After I had designed and cut out the chess pieces I put them in a lathe and sanded down each of the bases to get rid of any extra glue using the template also helped me have confidence in the fact that each piece was aligned with the same as the rest, it also allowed me to quickly and efficiently make new pieces. The king's height is 95mm, the queens 85mm, the bishops 70mm, the knights 60mm, the rooks 55mm and pawns 50mm. The bases of the pieces were all 30mm except for the pawn which is 26mm wide.

4



5



The first image above shows how all the pieces looked when it came to cutting the case out. All the pieces were cut on 6mm thick wood apart from the piece that holds the chess pieces that were cut at 3.2mm. The horse was engraved in 4 different layers increasing the depth of the burns each time, before cutting the horse into the box I did i smaller test on an individual piece of wood to ensure that everything was working as intended. The second image shows everything grouped with the parts they're to be assembled with, I moved the parts to be like this so that I could ensure everything was aligned correctly and that there were no sizing issues. The hole for the chess pieces to sit in is in some cases rotated, this is to allow all of the pieces to fit in this space making it so I use less material and overall end up with the smallest case possible.