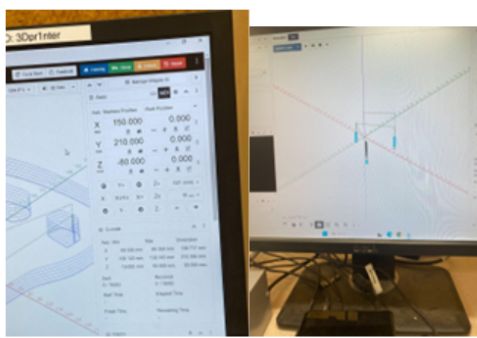


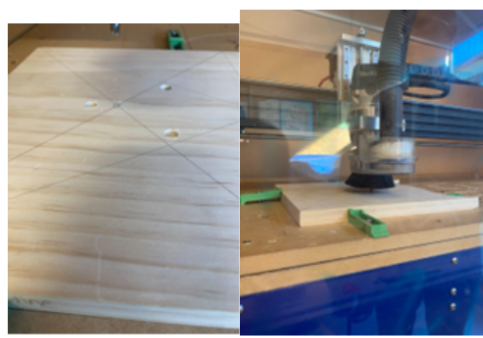
High Merit
NZQA Intended for teacher use only

1

MARK OVERALL GRADE	N <input type="checkbox"/>	A <input type="checkbox"/>	M <input checked="" type="checkbox"/>	E <input type="checkbox"/>	Comments: high merit. XXXX showed capabilities with the CNC router. He was independent with it and could set up and use it safely. He needed to strengthen his evaluation, improve a little with accuracy of the route, and also the description of the efficiency/tooling/material wastage.
--------------------	----------------------------	----------------------------	---	----------------------------	--



2



CNC.js

- Zeroing offsets before routing (left photo)
- Showing copied g code into cnc.js program (had to upload it as a NC program using vertigo postprocessor)

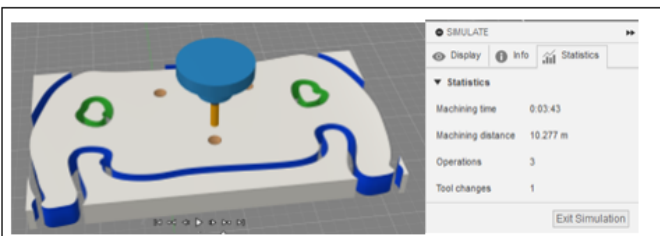
Routing

- Bore holes after routing with the cnc machine (left photo)
- Bore holes during routing with the cnc machine (right photo)

Measurements of tool bits used

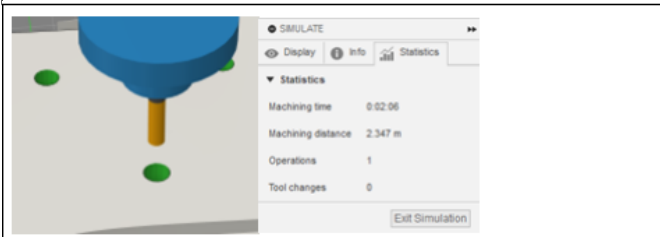
3

T6: width 6mm flute length 20mm overall length 60.1mm
 T10: width 6.35mm flute length 25.4mm overall length 63.5mm



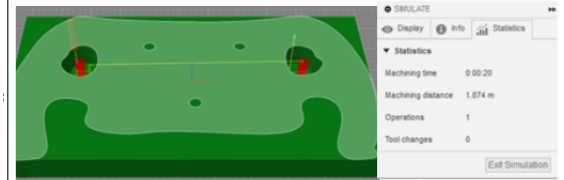
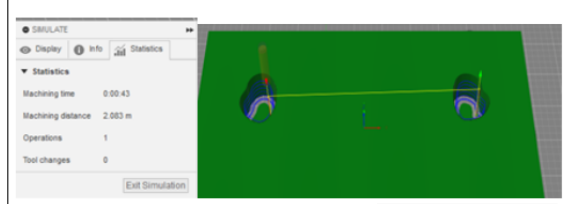
Paths (simulation)

- Stats for all tool paths (bore holes, thumb holes, outline. Not including time per tool change)
- CAM simulation of board after simulation



Bore holes

- Stats for the holes (no tool changes were needed as it was the only tool path)
- Bore holes after CAM simulation

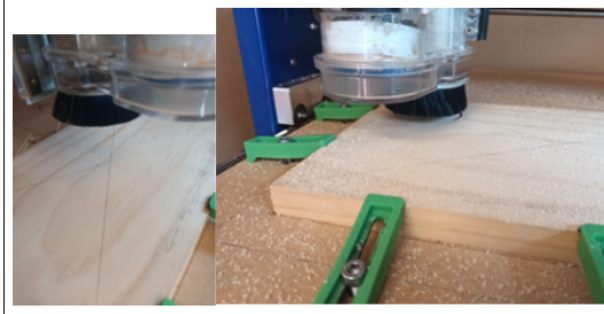



4



Thumb hole testing



- Thumb holes didn't drill through. To fix this I changed the type of tool path from 2D pocket to 2D contour
- Stats for the 2D pocket and 2D contour (2D contour made the finale design)

Test route:

	
<p>Final test route</p> <ul style="list-style-type: none"> - Hole cut out (2D contour practice) - Measurements (Width, length, height) - Engrave (needed two different tool bits and tool paths) <p style="text-align: right;">5</p>	<p>Fusion CAM final test route</p> <ul style="list-style-type: none"> - Stats (time, distance, tool, etc.) - Board during simulation - Board after simulation

FINAL CAD DESIGN

	
<p>Final renders of steering wheel</p> <ul style="list-style-type: none"> - Has thumb holes - Has space for fingers to wrap around the wheel - No sharp edges <p style="text-align: right;">6</p>	<p>Tool paths</p> <ul style="list-style-type: none"> - Shows bore holes - Thumb holes - Outline of the wheel - Green arrows (where the tool bit raises) - Red arrows (where the tool bit goes descends)

 <p style="text-align: center;">7</p>	
<p>Route one</p> <ul style="list-style-type: none"> - I didn't add a retract height for the bore holes - Cut through the board - Thumb holes are off due to the board moving slightly while routing - Good outline 	<p>Route 2 (result)</p> <ul style="list-style-type: none"> - Bore holes had a safe retract height and didn't go through the board sideways - Added more clamps to stop the board from moving - Backside is not as splintered as the first route

My final outcome meets the parameters and specifications; it does not have jagged or sharp edges; it has three 10mm bore holes each 40mm from each other or 120 degrees from each other. It may not be a generic steering wheel, but it is a f1 wheel giving me more room and space for possible error. Since we used wood, the wheel has a small amount of flexibility but is still rigged and strong. Both hands also fit comfortably while holding the steering wheel. I used two different tool paths and two different tool bits to make my route; this also meets the cnc specifications.

Overall, the look at design of my wheel is aesthetically pleasing; I have had little to no bad feedback and overall follow specifications well. I was first on the router because I wanted to get comfortable with it so I could use the cnc as effectively and efficiently as possible. My total route time (minus tool changes) was 3 minutes and 43 seconds. This was a good time because it meant I could take a little longer on tool change. The final route took minimal effort to complete as all I had to do was send my code to the computer and clamp it down. I chose my tools with appropriate flute length, so it didn't burn the wood, I used a tool bit with a smaller diameter to make the bore holes the right size. I chose to make my f1 wheel rectangular because I could put it sideways and close to the edge of my stock so I could get the most out of the piece of wood I was given, so I could minimize the amount of waste product left over.