How to Use the Carvera Air Desktop CNC Machine

Student Manual

1. CNC Process

1.1 Before Your Appointment

- Prepare the 3D file you want to machine.
    - Remember: CNC machining removes material from a larger stock by cutting top-down. If your part requires deep cuts or does not allow enough clearance between the stock edges and toolpaths, machining may not be possible. Be sure to check that Makerspace has the tools needed to CNC your part.
- Bring your own stock piece to cut or check the Makerspace to see what materials we have available.
- Check out the resources linked on the Makerspace Notion page to learn more about the CNC process.

1.2 Scheduling

- Schedule a time with a Makerspace operator using the appointment formed linked on the Makerspace Notion page.
- If none of the listed times work, message Miller (miller.kaplan@cooper.edu) via email or Teams. We may be able to find another time that works for you.

1.3 What to Bring

- You **finalized 3D file**, **exported as an STL or STEP**. You will set up the toolpaths in Fusion 360 with an operator.
- The **stock piece** you will cut your part out of.

2. Materials

You can CNC the following materials:

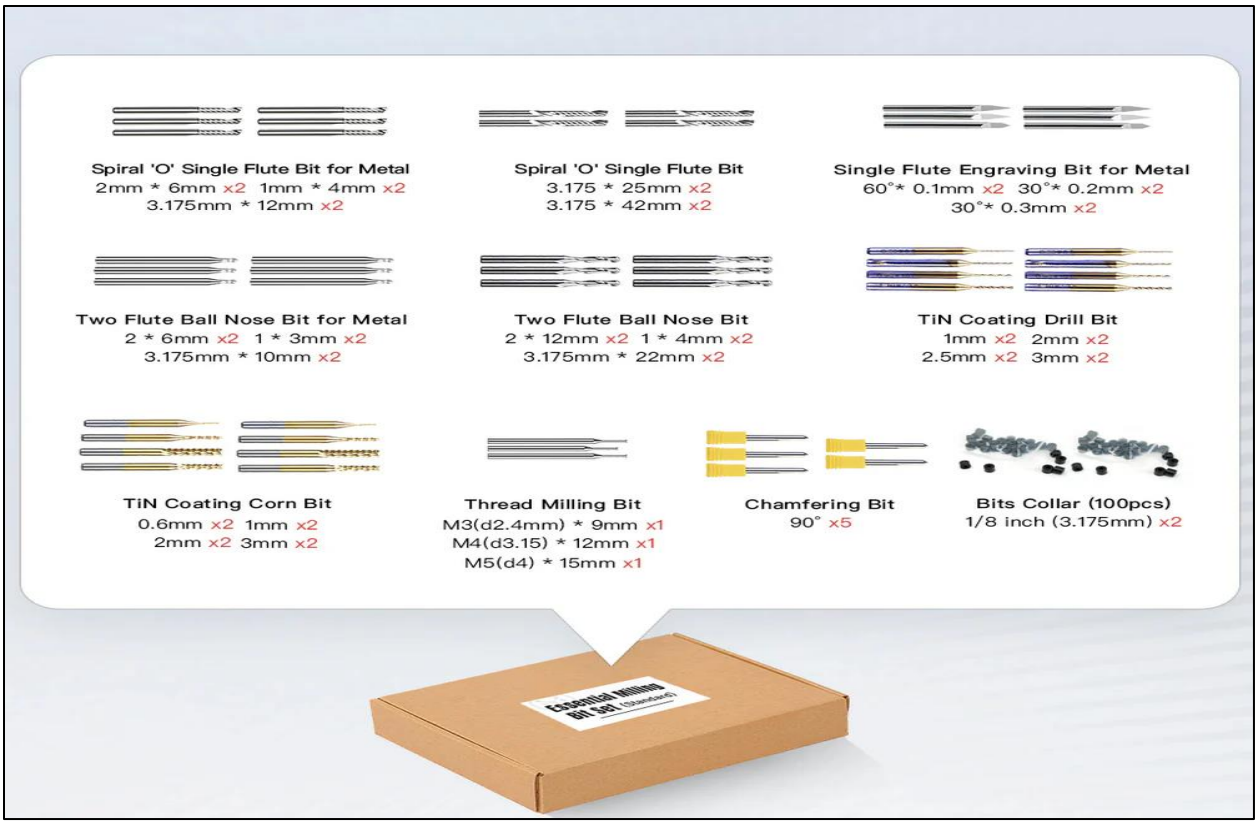
- Aluminum
- Brass
- Copper
- Hardwood
- Softwood
- MDF
- Acrylic
- PCB
- Carbon Fiber

Check that the Makerspace has the material you need before purchasing your own. If you need to use another material, feel free to bring your own (as long as it's safe).

3. Tools Available

Tool	Size (Diameter * Length)	Clearance Length	Materials
Spiral '0' Single Flute Bit – 1/8" Shank	2 mm * 12 mm	28 mm	Hardwood, Softwood, Plastic
	3.175 mm * 25 mm	35 mm	
	3.175 mm * 42 mm	52 mm	
Spiral '0' Single Flute Bit for Metal – 1/8" Shank	1 mm * 3 mm	28 mm	Aluminum, Brass, Copper, Hardwood, Softwood, Plastic
	2 mm * 8 mm		
	3.175 mm * 12 mm		
Two Flute Ball Nose Bit – 1/8" Shank	1 mm * 4 mm	24 mm	Hardwood, Softwood, Plastic
	2 mm * 12 mm		
	3.175 mm * 22 mm	32 mm	
Two Flute Ball Nose Bit for Metal – 1/8" Shank	2 mm * 6 mm	24 mm	Aluminum, Brass, Copper, Hardwood, Softwood, Plastic
	1 mm * 3 mm		
	3.175 mm * 10 mm		
Single Flute Engraving Bit – 1/8" Shank	30° * 0.3 mm	28 mm	Hardwood, Softwood, Plastic
	30° * 0.5 mm		
Single Flute Engraving Bit for Metal – 1/8" Shank	30° * 0.2 mm	28 mm	Aluminum, Brass, Copper, Hardwood, Softwood, Plastic, PCB
	30° * 0.3 mm		
	60° * 0.1 mm		
TiN Coating Drill Bit – 1/8" Shank	1 mm * 10 mm	26 mm	Aluminum, Brass, Copper, Carbon Fiber, PCB, Hardwood, Softwood, Plastic
	2 mm * 12 mm		
	2.5 mm * 12 mm		
	3 mm * 12 mm		
TiN Coating Corn Bit – 1/8" Shank	0.6 mm * 3 mm	28 mm	Carbon Fiber, PCB
	0.8 mm * 5.5 mm		
	1 mm * 7 mm		
	2 mm * 10.5 mm		
	3 mm * 12 mm		
Chamfering Bit – 1/8" Shank	90°	28 mm	Aluminum, Brass, Copper, Carbon Fiber, PCB, Hardwood, Softwood, Plastic
Thread Milling Bit – 1/8" Shank	M3 (2.42 mm) * 9 mm	28 mm	Hardwood, Softwood, Plastic, Aluminum, Copper, Brass
	M4 (3.15 mm) * 12 mm		
	M5 (4 mm) * 15 mm		

***The shaft diameter for all tools is 3.175 mm – which includes the clearance length.*



***Some available tools are not shown in the image, refer to table if you need something else.*