



TAP lab CNC Safety and Training Guide

Version 3

TAP lab CNC overview	3
Safety when using the CNC (Overview)	5
Training	8
Licence Levels	9
Risk Assessment Method Statement (RAMS).....	13
Standard Operating Procedures (SOP)	16
Before entering the CNC room	16
Reviewing a job	17
Starting a job	18
Completed job	23
Tool change.....	24
Manual operation	26
Maintenance.....	26
Incident (including fire)	27
Failed job	29
Damage to the CNC.....	29
Maintenance Schedule	30
Document Control	33

TAP lab CNC overview

Our CNC is a Zealandia Proteus P3.

We run the machine using their proprietary software, Gladius, which interprets g-code and runs the machine.

We have two approved methods to generate g-code for the machine, using either VCarve or Fusion360. VCarve is the preferred method.

Toolpaths, feeds and speeds should be set to appropriate levels for the material which you are cutting and the bits which you are using. Feeds and speeds are a science and an art, please make sure that you understand the requirements you have for your project.

Bed limits

Recommended: 1.2x1.2m (Actual size 1.32x1.32)
Currently up to 50mm deep (varies with bit size)

Chip load

Feed rate/ (RPM*#flutes)

Materials

The following materials are approved for use on the CNC at TAP lab:

- Wood (be cautious of knots)
- MDF
- Plywood (be cautious of knots)
- Tooling foam

DO NOT USE:

- Any metals

If you have another material you want to use post in #equip_CNC. You will need the approval of 2 trainers in order to try it.

Tool bits

It is recommended that you buy your own bits. If you use the TAP lab ones and break one you will need to replace it. Replacements must be purchased from <https://carbide-tools.nz> and cost approx \$80.

You can purchase your own carbide bits from an alternate supplier overseas for significantly less money. Check slack or the suppliers list in TAP lab for recommendations of where to buy.

Make sure they are 50-75mm length to fit into collet.

VCarve

See the [TAP lab Safety and Learning website](#) for details on vCarve installation and use.

Use your own login or mema@taplab.nz when using VCarve at TAP lab. The pukete login is an ADMIN account and should only be used for administrative purposes (access is restricted to staff or trusted members).

Key CNC machine terms

- **Spoil board:** Sacrificial surface under your material (normally MDF) - you cut into it to protect the machine bed.
- **Collets:** Clamp that holds the cutting bit tightly in the spindle.
- **g-code:** The machine's instruction language, you output this from vCarve or Fusion360.
- **Up cut, down cut, compression cut** – the way the bit will cut, the bit will be designed for one of these.
- **Bit shapes:**
 - Ball nose → Rounded tip, good for 3D carving
 - Tapered → Angled sides, stronger for detail work
 - Flat end mill → Flat tip, for straight cuts and pockets
 - V-bit → V-shaped tip, for engraving and sharp corners
 - Silly bit → Decorative/profile cuts (fun shapes)
- **Tabs:** these are small uncut sections that keep your part attached to the rest of the sheet during cutting. Not necessary when laser cutting but very important if you are cutting out pieces on a CNC. This is because with a CNC the piece will move as it's cutting if it isn't secured with tabs.

Safety when using the CNC (Overview)

Throughout this guide the CNC is to be presumed to be in one of 5 states:

- **Off.** The CNC is powered off at the wall
- **Standby.** The CNC is powered on, but is not currently moving and does not have a job loaded, or the job is paused.
- **Isolated.** One or more Emergency Stops are active.
- **Manual Operation.** The CNC is being driven manually through a controller whether physical or digital.
- **Autonomous Operation.** The CNC has a program loaded and is being driven by control software through the loaded toolpaths. For the avoidance of doubt when autonomous operation is paused, or awaiting a tool change the CNC is considered to be in Standby.

RESTRICTED EQUIPMENT	The CNC can only be operated by approved people. The definitive list of authorised people is stored on TAP lab Safety and Learning.
APPROPRIATE CLOTHING, NO JEWELLERY	When entering the CNC room: • Closed toe shoes must be worn. • Pull long sleeves up, TIGHT long sleeves e.g. undershirts are acceptable to leave down. • Long hair must be tied up and secured (no long ponytails, plaits, or braids) • No loose items of clothing or accessories (ties, scarfs, lanyards, necklaces etc). • No watches. Rings and bracelets are to be removed where practical. Rings left on must be a "band" style with no protrusions.
PPE	Dust masks A P2 or N95 Dust mask must be worn when going into the CNC room following a job to protect from dust. Safety glasses or face shields Safety glasses should be worn following a job, or when doing any work that may cause debris. Gloves Gloves are not to be worn while handling the bits for the CNC; They are recommended for handling materials, particularly if your material will have sharp edges, splinters, or burrs. Closed Toe Footwear Closed toe footwear must be worn at all times. Footwear must be FULLY closed in and should not have any slits or openings other than for your foot. Safety shoes or boots are preferred if you have them.

BUDDY SYSTEM	You must only operate the CNC when another person is present. They do not need to have a license for using the CNC but must be of a level of competency that they could get help if there is an emergency. Your buddy MUST be at least 18 years of age, and MUST NOT be impaired, incapacitated, or under the influence of drugs or alcohol.
FIRE 	Dust creates a fire risk. Monitor the CNC (from outside the room) when operating. Fire extinguishers are available at TAP lab, ensure you know the location of the closest one before using the CNC.
DOOR	The door to the CNC room must be locked when not in use. When the CNC is in Autonomous Operation the door must be closed with NO ONE inside.
MATERIALS	Check the approved and prohibited materials list for what you can and can't use with the CNC. See "TAP lab CNC overview" for the list.
TOOLS	DO NOT program tools to operate faster than specified speeds. DO NOT alter tools to perform beyond their original specification. Tools or tool parts are likely to become a projectile if the speed programmed is too great for the tool. For your own tools it is recommended you get another person to check your specifications.
MONITOR	You must monitor the CNC from outside of the room when it is in operation. Monitor the dust levels in the CNC room when it is operating (look through the window). If excessive dust is in the air the smoke alarm could trigger. If dust levels seem higher than usual ensure the dust extractor is working.
EMERGENCY STOP SWITCH	There are 3 emergency stop buttons. Make sure you know the location of all of them (1 on the machine and 2 outside the CNC room). In case of emergency press the 'STOP' button, this will shut the CNC off at the end of its current path.

OFF	Turn off the CNC at the control box and press the emergency stop on the machine when not in use.
MAINTENANCE	The maintenance schedule must be followed by authorised personnel. Disconnect from power source when performing maintenance. No person is permitted to adjust or manually calibrate the machine unless authorised.
NO HACKING	Any upgrades must be researched and signed off by the executive committee.
REPORT ANY ISSUES	Report issues on slack in #equip_cnc If there is any damage or other issues that could affect operation place the “Out of Order” notice on the door
STORAGE	NO materials are to be stored in the CNC room. You must bring your own materials with you, and remove them when you leave. You may not store materials or projects in TAP lab outside of designated storage areas. The only items permitted to be stored in the CNC room are tools required for maintenance, fixing equipment, and the bits for the CNC.

Training

Job log

<https://safety.taplab.nz/cnc-job-log/>

All CNC users, regardless of their licence level must maintain a log of their jobs. A log will be provided by TAP lab for you to use. Your job log must contain:

- The date of your job
- Your licence level at that date
- The length of your job
- The material used
- Your trainer / person who signed off your tool path (if applicable)
- Any tool changes and a brief description
- Photo of result (optional, but recommended as this will help assess competency)

Licence Levels

Restricted License	
Key Points	- You MUST have someone with a Full or Trainer License present when using the CNC. - You must have your toolpaths checked by someone with a Full or Trainer licence. - You may change the CNC bit and set up stock/your job without supervision, but it must be checked by a person with a Full or Trainer licence before operation.
Training Process	Before you ask a trainer to assess you: - Read all of the TAP lab CNC Safety and Training Guide - You must be able to generate a valid toolpath using VCarve or another approved program. Training Process: - You will be required to set up and run a job under the supervision of a trainer - You will be assessed based on your confidence and competency with the CNC - You must demonstrate a basic understanding of what chip load is, how to adjust it, and how it will likely affect the selected material and router bit. If your trainer is happy that you have understood the safety, have competency with generating a toolpath and understood the items listed above they can award you a Restricted License. Trainer: Add the equipment licence from the "Award Licence" form on the TAP lab Safety and Learning site

Full License

Key Points	• You can operate the CNC without another license holder present but you must still have a buddy. See the “Safety when using the CNC” section for details on the buddy system. • You can supervise CNC users who have a Restricted license and sign off their design/toolpaths. If you are not comfortable doing so (e.g. material you’re not experienced with) you should tell them to see a different Full licence holder. • Non-VCARVE toolpaths must be reviewed by a someone with a full or trainer license who is also able to use that software. • You can sign off other people's designs and toolpaths. • You must be at least 18 years of age. • You are eligible for Endorsements. Sign off process The sign off process for reviewing other people’s designs and toolpaths is relatively informal. When you ask someone to do it ensure they realise they are performing this check for you and you will be putting their name in your job log. They don’t have to actually sign anything but it’s important when asking that you are clear this is what you are requesting, so they don’t think you are just showing them your design.
Training Process	• To move from Restricted to Full you must be approved by another trainer (not the trainer who initially trained you). • You must have run enough jobs to have built up a reasonable level of experience. It can vary a lot from person to person but expect to have done around 10 separate jobs and 10hrs of operation. Reasons for variations include: if you have prior experience with CNCing outside of TAP lab, if all your jobs are very quick profile cuts you could have good experience but low hours of use, if your jobs have been very slow 3D carvings you would build a lot of hours quickly not yet have gained enough experienced. • Demonstrate a basic understanding of the properties of materials on the Approved Materials list. • Demonstrate an understanding of what chip load is, how to adjust it, and how it will likely affect the selected material and router bit. • You will be required to run a job under the supervision of a trainer. • You must have demonstrated competence with tool changes. • You should be capable of some troubleshooting. • You must be confident in the set up, operation and shut down of the CNC. • You must know how to secure the CNC room and computer when leaving.

Trainer License

Key Points	• People with a Trainer license must have demonstrated competence with their design and toolpaths as well as a good understanding of the properties of the materials on the Approved Materials list. • You can operate the CNC without another license holder present but you must still have a buddy. See the “Safety when using the CNC” section for details on the buddy system. • Non-VCarve toolpaths must be reviewed by a someone with a full or trainer license who is also able to use that software. • You can sign off other people's designs and toolpaths. • You may train others to use the CNC. • You may award any endorsement that you hold.
Training / Certification Process	• To be a trainer you must be approved by another Trainer, and a member of the Executive Committee. • You must be competent with VCarve, and optionally Fusion 360, or another CAM program and all the processes for completing jobs. • You must fully understand the implication of all the tools that are available, and the settings when using them. This means you must have competence in reading the spec sheets for the tools. • For the level of competency required you will likely have completed at least 20 jobs and have over 20 hours of operation • You must have an understanding of basic g-code commands

Endorsements	
Key Points	• Endorsements can only be received by full licence holders. • Endorsements may allow you additional privileges that are otherwise restricted.
Endorsements	Endorsements are not currently available. <i>When they are available they will be listed here.</i> When developing endorsements the criteria for awarding will them must be approved by the Executive Committee.

Risk Assessment Method Statement (RAMS)

Harm	Hazard	Risk Rating	Controls	Residual Rating
Cuts	- Mishandling of tools - Mishandling of workpiece	MEDIUM	Wear gloves while handling sharp, or burred materials	MEDIUM
Crush risk	- Getting caught in the gantry - Falling materials	MEDIUM	- No person is to be in the CNC room during autonomous operation - Materials are not to be stored in the CNC room - Persons are not to go behind the CNC while powered	LOW
Debris in eyes	Dust	MEDIUM	Safety glasses should be worn when entering the CNC room after cutting dusty materials	LOW
Entanglement	- Getting caught in the toolhead - Getting caught in the gantry	HIGH	- Loose clothing and jewellery is not to be worn - No person is to be in the CNC room during	MEDIUM

			autonomous operation	
Inhalation of particles	Dust	MEDIUM	P2, N95 or higher dust mask must be worn when entering the CNC room after operations	LOW
Trip Hazard	Materials and debris on floor	LOW	- Materials are not to be stored in the CNC room. - CNC room is to be cleaned at the completion of each working session.	LOW
Hearing loss	Operational Noise	MEDIUM	- CNC in an enclosed room (soundproofed) - No person is to be in the CNC room during autonomous operation	LOW
Shrapnel	- Broken bits - Loose Swarf - Bit under load	MEDIUM	- No person is to be in the CNC room during autonomous operation - Glasses should be worn if doing anything where particulate is likely to be in the air or	LOW

			something could break off	
Damage to the CNC	• Misconfigured GCODE • Incorrect materials • Misplaced fixing tools	MEDIUM	• Toolpaths must be checked at lower licence levels, non VCarve toolpaths must be peer-reviewed • All users are to be trained and licensed	LOW
Fire	• Incorrect materials • Incorrect cutting speeds • Dust buildup	HIGH	• Vacuum is to be activated during operation • Toolpaths are to be checked • Materials are to be checked against an approved materials list	MEDIUM

Standard Operating Procedures (SOP)

SOP	Before entering the CNC room
APPLICATION	Any person entering the CNC room regardless of whether they intend to use the CNC or run a job.

Check Your Person

- **No loose clothing** (check belt tails, pull up loose long sleeves, shirt tails, and any clothing ties).
- Ensure you are wearing **closed toe shoes**.
- **Tie up any long hair** (nothing below shoulder length, a close-fitting hair style. No long ponytails/plaits).
- Remove all lanyards, necklaces, and keys.
- Remove any jewellery (rings, loose earrings, bracelets etc.) and watches. Exception for band style rings (no protrusions) that the wearer is unable to remove.
- Put on **PPE as required** (mask, other PPE as required).
- **DO NOT proceed if you are too tired**, under the influence of drugs or alcohol, incapacitated, or impaired in any way.

Check Your Environment

- **Check exits** are clear and there is a clear path from the door.
- **Check the fire extinguisher** is in place and unobstructed.

Check The Equipment

- Ensure the **CNC is OFF**, ISOLATED, or in STANDBY
- Lock the CNC computer or turn off the mouse and keyboard.

SOP	Reviewing a job
APPLICATION	To be completed before any job is loaded into Gladius.

Checks

- Check for any **collisions**
- **Check fixing points** won't be in the way of the head (eg. cutting too close to the edge of the material could hit a screw head)
- Check parts are not cut loose, remember to **use tabs**
- **Check tool parameters** are appropriate for your material and job
- Have your job **peer reviewed** if you are not using VCarve
- If you have a **Restricted licence** make sure your job is **checked by someone** with a Full licence

SOP	Starting a job
APPLICATION	Any person preparing to start a job on the CNC

Check your file

- Perform checks including sign off (if required), see SOP “Reviewing a job”.

Turn on the CNC

- Turn on the CNC (yellow switch on the box on the wall). If the green light is lit up it means the CNC is on.



- Release the emergency stop on the machine (pull out to use machine).

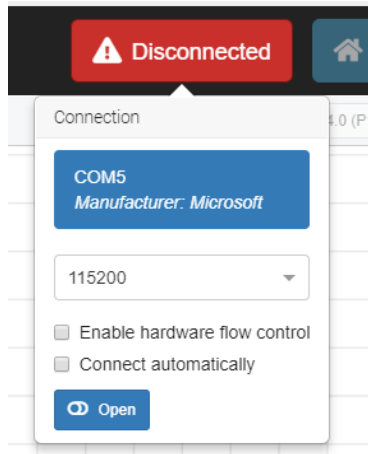


- Check the probe tool is in.

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Connect the computer to the CNC

- Open Gladius, click 'Disconnected' to open the popout, it should have 'COM 5', click 'Open' to connect it.

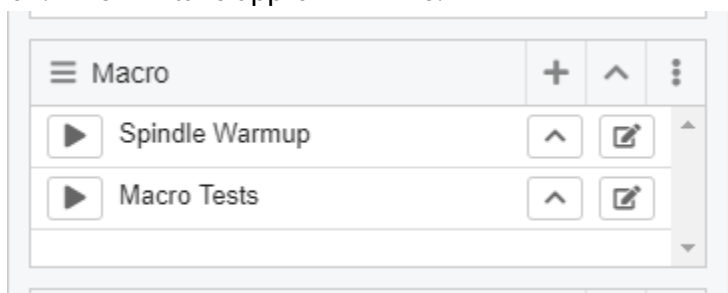


- Click 'Homing' to home the machine.
- Click 'Tool change' but don't actually change the tool – leave the probe bit in.
- If you haven't already, check the probe tool is in the CNC (not a tooling bit, it should always be left with the probe tool in it).
- Click 'Resume' to be able to move onto the spindle warm up.

First job of the day

- Ensure the door is closed and the 'CNC Operating' sign is displayed.
- Click '**Spindle warm up**' (right bottom of screen), then run. This will take approx 12 mins.

WARNING:
AUTONOMOUS OPERATION
Door closed & sign displayed



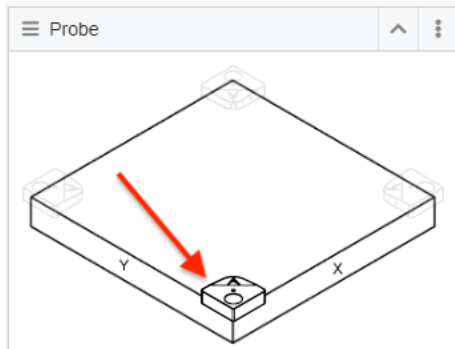
- Once it has finished you can continue.

Check your material and secure it, collect your tool bits

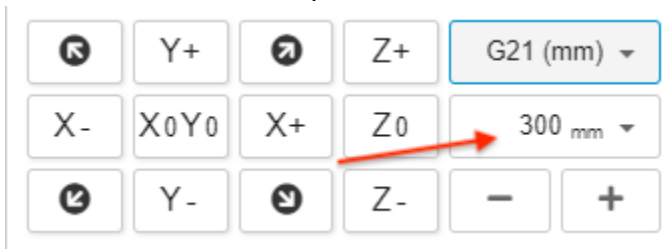
- Ensure your material is free from defects, or the defects have been accounted for in your toolpaths.
- Ensure your material is fixed securely to the bed, and fixing materials are clear of toolpaths. Our standard method of securing is to **screw the material down to the spoil board with 4 screws** (one in each corner).
- Get all the **tool bits and collets** you will need ready. vCarve gives you the order for tool changes.

Set origin

- In Gladius select a corner of the material inside the widget, normally x&y (bottom left). This sets the project origin.



- Move the toolhead to the general area of the bottom left (300mm increments is a good amount for this). Use the plus and minus buttons to change the amount it will move. Use the X and Y, plus and minus buttons to move the toolhead.



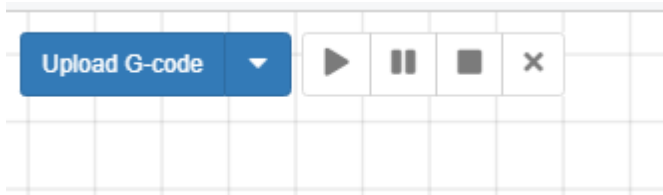
- Change it to 3mm increments. Turn off the keyboard. Take the mouse with you, go into the CNC room and turn on the screen.
- Remove dust jacket.
- Place z-probe square on the bottom left corner of your material and hold it in place.



- On Gladius position the probe so that the tip of it is just inside the probe square cut out area. Use the Z plus and minus buttons to raise and lower it.
- Click 'Probe' on Gladius. The probe bit will touch all sides in the inset area of the z-probe square.
- Remove z-probe when complete.
- Put dust jacket back on.
- Leave room taking the mouse with you.

Start job

- Upload your g-code to Gladius.



- Run the job by clicking the play button (see screenshot above), you will be prompted to do a tool change.

Tool change

See the **SOP “Tool Change”** for full details on how to perform a tool change, below is just a summary.

- Go into the room, remove the dust jacket
- Change to the correct tool.
- Attach dust jacket.
- Turn on the dust extractor.
- Leave the room, close the CNC door and display the “CNC Operating” sign on the door.

Pre-run checks

Check the equipment and set up before the CNC starts autonomous operation.

- Ensure the **dust jacket and dust extractor are on.**
- Ensure the CNC bed is clear of any materials other than your stock and fixing equipment.
- Check the CNC gantry is clear of obstruction and items that may enter the path of the gantry.
- **Ensure no person is in the CNC room.**
- Ensure the CNC door is closed.
- Ensure the “CNC Operating” sign is on the door.

Start the job running

- Click ‘Resume’ in Gladius.
- The toolpaths will run until there is either another tool change or the job is complete. If you need to do a tool change you will need to **put on a dust mask.**

WARNING:
AUTONOMOUS OPERATION
 Door closed & sign displayed

Monitor The Job

- Ensure no person enters the CNC room during operation.
- If there is a buildup of dust or swarf that is not being cleared by the vacuum, and that could interfere with operation.
 - Stop the CNC
 - Sweep the bed using a brush or use the vacuum cleaner. DO NOT use your hand
- If there is chattering of the bit, unusual noises, deviating from the set toolpaths or similar issues
 - Stop the CNC
 - Check code and toolpaths
 - Check the bits, and replace if needed
 - Only resume the job after all toolpaths and code have been verified to be accurate and it is safe to do so.
- **If the Community Centre needs to be evacuated during a job**
 - Activate the Emergency Stop
 - Leave

WARNING:
AUTONOMOUS OPERATION
Door closed & sign displayed

SOP	Completed job
APPLICATION	Any person upon the completion of running a job.

Remove your job and turn off machine

- You must put a **dust mask on** before entering the CNC room after it has been running.
- Turn off the dust extractor.
- From Gladius click 'Tool change' and put the probe tool in. Click 'Resume', the toolhead will return to the top left of the machine.
- Remove your job and store any TAP lab owned fixing materials (eg screws).
- **Turn off** the CNC machine.
- **Isolate** the CNC by activating the **emergency stop** located on the CNC machine.

Clear the work area

- Store any bits used. Check the bits for any damage
 - Report any damaged bits in slack #equip_cnc, place the damaged bits to one side with a "damaged" label on them so they are not used
- Clear the bed of materials and stock
- Sweep or vacuum the bed of debris. DO NOT use your hand
- Sweep the floor and clear any debris
- Turn the warning sign on the door back around

Lock up

- **Lock the CNC room door**
- **Lock the CNC computer**

Admin

- **Log your job**
- **Report** any incidents, near misses, or damage

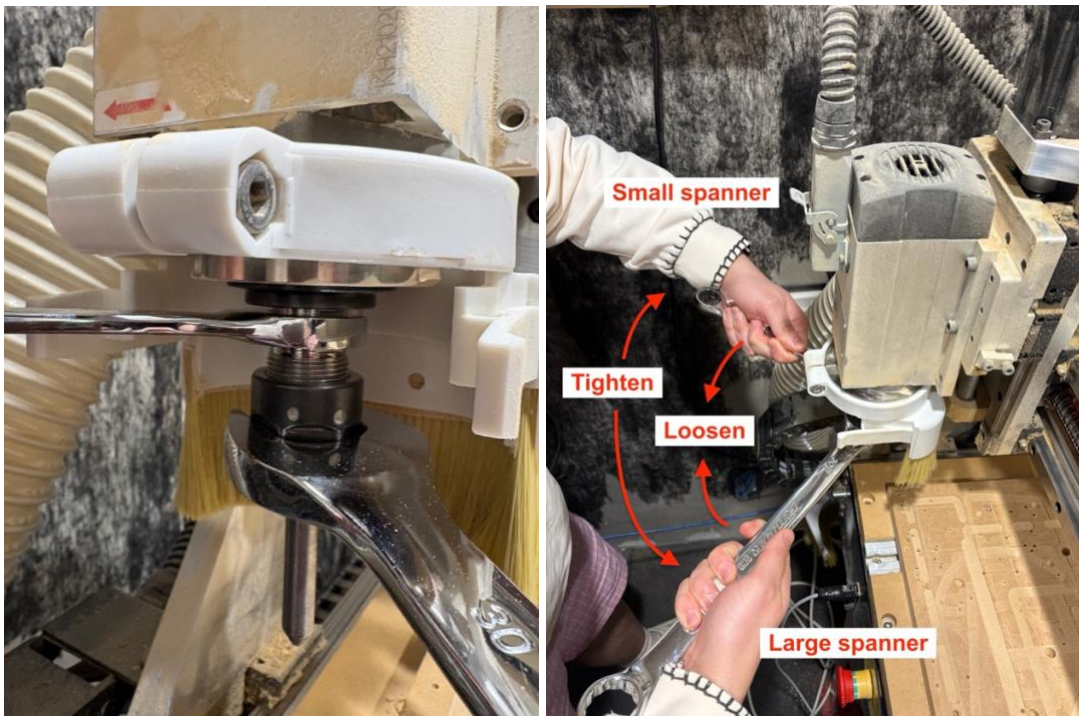
SOP	Tool change
APPLICATION	Any person changing a bit on the CNC

Prepare

- Ensure the **CNC has stopped moving**.
- **Turn off the keyboard and mouse** on the CNC computer.
- Follow the SOPs for entering the CNC room. Remember a to wear a dust mask if it has been running.

Change the bit

1. Remove the dust jacket.
2. Loosen the collet nut. Use the 2 spanners that are kept on the side of the CNC machine. The smaller one goes on top in your left hand, the larger one below in your right hand – turn them towards each other to loosen.



3. Pull out the bit.
4. If the bit you will be using requires the same size collet you can leave the collet in, skip to step 8. If you need to change the collet keep loosening the collet nut until it comes off with the collet inside it.

5. Push the collet out.



6. Put the correct size collet in.
7. Put the collet nut back on the machine and tighten until it is on and you can insert the tool bit into the collet.
8. Inspect the bit you are using for signs of damage.
9. Insert the bit into the collet, make sure the grooves of the tool bit stop before the collet.
10. Use the 2 spanners to secure the tool bit. See photo from step 2 for tightening.

Check and leave room

- Ensure all the tools and bits have been cleared from the bed.
- Close the door, display 'CNC Operating' sign.

SOP	Manual operation
APPLICATION	This SOP applies to any person manually driving the CNC whether through software or hardware means.

Preparation

- **Ensure no person is in the CNC room** except for you, or persons directly involved in its immediate operation that have been suitably trained.
- **Do not activate the spindle** at any time while any person is in the room, or the door is open.
- Close the door if no person is in the CNC room.
- Check the bed is clear from items other than stock
- Ensure the gantry is clear of obstructions

Controlling

- **Operate** the CNC at only low speeds

SOP	Maintenance
APPLICATION	This SOP applies to any person completing maintenance on the CNC or related equipment UNLESS the maintenance requires the CNC to be running.

- **Isolate** the CNC with one of the emergency stops
- **Disconnect** the CNC from power

SOP	Incident (including fire)
APPLICATION	This SOP is to be followed in the case of any injury or incident involving the CNC.

Preliminary steps

- **Isolate** the CNC using the nearest **emergency stop**
- **Check** there is no immediate danger to your person (moving items, items under tension/load etc.)

IF THERE IS AN ONGOING RISK TO YOUR SAFETY

- **Do not** approach the CNC or attempt to remove any person or item from the CNC
- **Contact** emergency services as required
- **Notify** a member of the Executive Committee, completing the incident form will send a message to the slack executive channel <https://taplab.nz/safety>

IN THE EVENT OF A MINOR INJURY (cuts etc.)

- Provide first aid as required
- Complete the incident form <https://taplab.nz/safety>

IN THE EVENT OF A NOTIFIABLE INCIDENT, NOTIFIABLE INJURY, OR NOTIFIABLE EVENT

If an event, injury, or incident defined as notifiable by the Health and Safety at Work Act 2015 or its subsequent amendments, or by WorkSafe occurs:

DO NOT put yourself in danger while attempting to help another person

- Engage one of the **emergency stops** to isolate the CNC
- **Remove** the affected person from the CNC room ONLY if it is safe to do so
- **Contact** emergency services as required
- **Provide** immediate first aid as practical
- **Notify** the Chairperson, Treasurer and Secretary as soon as practical
 - The Chairperson is to notify WorkSafe and the Executive Committee. The Treasurer and Secretary are to ensure this is complete and follow up as required
- **Power off** the CNC ONLY if it is safe to do so
- **LOCK** the CNC room and place the "Out of Order" sign on the door restricting access.
- **No person** is to enter the CNC room until further direction is received from WorkSafe, and clearance is received from the Executive Committee.
 - The executive committee is to evaluate the cause of the incident, and whether it was preventable as well as next steps for the equipment.

Fire

In the event of a fire during operation:

- Engage one of the **emergency stops** outside the CNC room to isolate the CNC
- **Extinguish** the fire if it is safe to do so
- **Turn off** power at the CNC ONLY if it is safe to do so
- **Notify** the executive committee
- Complete the **incident form** <https://taplab.nz/safety>
- **Post** on slack that the CNC is unavailable for use

If the fire is not able to be extinguished safely

- **Evacuate** the building
- **Activate** the nearest fire alarm
- **Call** emergency services

SOP	Failed job
APPLICATION	This SOP applies to any CNC user when a job fails mid-job. This includes broken bits, moved work pieces and other scenarios. The job may or may not be recoverable.

- Pause, stop, or emergency stop the job and WAIT. Once autonomous operation of the machine has ceased, the machine is either ISOLATED, or in STANDBY, and the SOP for manual operation can be used.
- **Remove** your job.

SOP	Damage to the CNC
APPLICATION	This SOP applies at any time damage is caused to the CNC, or if the CNC gantry or toolhead experiences a significant or high impact collision.

- **Report** any damage on slack (#equip_cnc)

If there is visible damage to the CNC or the CNC needs calibration

- **Report** any damage on slack (#equip_cnc)
- **Place** the “Out of Order” notice on the door notifying of damage and that the CNC is not to be used until it is checked
 - A member of staff is to update the equipment status on TAP lab Safety and Learning website

Maintenance Schedule

Important Note: Frequency is taken from Zealandia or other sources that have a usage level higher than at TAP lab. Adjusted frequency is what we have come up with based on how much we use it. If CNC usage at TAP lab increases move to the original frequency.

Job	Frequency	Adjusted frequency	Who	Details	Log it
Pre-Operation Checks	Before use	-	All CNC users	Visual inspection of critical components and check safety features. Check all the tools and collets you will be using. Check the spoil board is still usable, report to Technician and on slack #equip_cnc channel if it needs levelling or replacing soon.	
Dust extractor bag	Before use	-	All CNC users	Check how full the dust extractor bag is. Change it when it reaches the visual indicator on the wall (approximately 15cm from the top).	
Spindle Warmup	Before use. Do it before the first job of the day or again on the same day if the machine has had a long gap after being run.	-	All CNC users	The spindle warmup should be performed before use to increase the longevity of your machine. A script has been set up to perform this task in Gladius. The script is set to: Go through each stage, hold for 120 seconds (two minutes): 7,500 RPM, 9,000 RPM, 11,500 RPM, 15,000 RPM, 18,000 RPM	
Post-Operation Cleaning	After use	-	All CNC users	Clean work table, cutting head, and spindle; remove chips and dust.	

Software Updates	Weekly	Monthly	Technician or staff with computer admin access	Check for software updates; apply as needed. VCarve needs updating frequently.	
Lubrication	Weekly	Quarterly	Technician (or other approved person)	Lubricate lead screws, linear guides, and ball screws as per manufacturer guidelines.	Yes
Spoil board		Quarterly	Technician (or other approved person)	Check if the spoil board is still level. When too used either level using the level tool or replace.	Yes
Full Machine Inspection	Monthly	Quarterly	Technician (or other approved person)	Inspect the CNC router's systems for signs of wear or damage and tighten loose connections. Test emergency stops. Check all TAP lab tooling bits for signs of wear, replace as needed. Check all collets are clean and functioning properly.	Yes
Dust Collection System	Monthly	Quarterly	Technician (or other approved person)	Clean or replace filters; inspect hoses and connections for blockages and ensure proper attachment.	Yes
Electrical Inspection	Quarterly	Yearly	Electrician or other suitably qualified person	Have an electrician inspect the CNC router's electrical components, connections, and wiring. Grounding and Protection: Test grounding and circuit protection devices.	Yes

Calibration	Quarterly	Yearly	Technician (or other approved person)	Verify and calibrate machine accuracy, including zero points, tool offsets, and feed rates.	Yes
Machine Alignment	Quarterly	Yearly	Technician (or other approved person)	Inspect overall machine alignment and adjust accordingly.	Yes
Comprehensive Review	Annual	Yearly	Technician (or other approved person)	Inspect all machine components and systems; replace worn parts.	Yes

Document Control

Version	Description	Author	Approved
1	Initial Draft	To check	To check
2	Rewrite with SOPs	Alex S, Corinne K (2024/05/10)	Rolling update
2.1	Incorporated changes from Health and Safety Committee (2024/06/07)	Alex S (2024/06/09)	
2.1.1	Adaptations to allow training to begin before entering operational phase; Add links to Job Log, Adjust list of authorised users	Alex S, Corinne K (2024/11/07)	Executive Quorum 2024/11/07
2.2	Added CNC overview, updates to align with current set up phase training, move document control to the end, Implementation phases moved to separate document	Alex S, Corinne K	
3	Many changes. Prepared document for sign off to moving out of draft and set up phase.	Corinne K	Signed off by Executive Quorum 1/10/2026