Onefinity Elite Gen 2 CNC

Documentation for the Onefinity Elite Gen 2 Foreman CNC router — hardware, software, job prep, operation, speeds/feeds, and safety.

- Onefinity Elite Gen 2 CNC Router
- Safety Rules
- Hardware and Machine Anatomy
- Software: VCarve and RTS-X
- Speeds and Feeds
- Preparing a Cut File
- Running a Job
- Maintenance and Troubleshooting

Onefinity Elite Gen 2 CNC Router

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Onefinity Elite Gen 2 Foreman

> This tool is restricted to Makerspace Members, and requires a training before use. Request a training on Slack: **#class-requests**

> **Workflow:** (1) Design at home in VCarve Makerspace client edition → (2) Post-process toolpaths at the shop on master VCarve → (3) Run the job on the **dedicated CNC shop PC** via RTS-X. Never drive the machine from a personal laptop.

Model	Onefinity Elite Gen 2 **Foreman** (48×48 / ~49×49" cut area)
Spindle	Redline 80mm 1.5kW air-cooled, 110V, ER20 collet (up to 1/2" shank)
Controller	RealTime CNC (RTS-X) - shop PC only (no built-in HMI touchscreen)
Date Purchased	**TBD**
Status	Operational
Link To Manual	Onefinity Support - Gen 2 Elite
Link to product page	Gen 2 Elite Series

Quick Reference

Category	Details
Critical rules	Training required • Dedicated CNC shop PC only - no personal laptops • Never leave the machine unattended while cutting • Wood and plastics only - **no metals**
Key numbers	~49×49" cut area • ER20 collet, max 1/2" shank • Max ~1.5" bit diameter (VFD fault risk) • 3/4" spoilboard thickness

Category	Details
Workflow	Design at home (VCarve client) → Export G-code at shop (VCarve master) → Run job at shop (RTS-X on CNC PC)
Get help	Slack **#woodworking** • Onefinity support • RTS-X docs

Description

Our Onefinity Elite Gen 2 Foreman is a large-format CNC router for precision 2D and 3D cutting in wood and plastics. Members design projects at home in VCarve, generate toolpaths at the shop, and run jobs on the dedicated CNC computer using RTS-X. This machine replaces our retired homemade CNC router.

Documentation

> **New to this machine?** Start with Safety Rules and read the pages in order - each page links to the next.

- Safety Rules
- Hardware and Machine Anatomy
- Software: VCarve and RTS-X
- Speeds and Feeds
- Preparing a Cut File
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Additional Resources

- Onefinity manuals and support
- RTS-X documentation
- VCarve Pro Makerspace Edition

> **TBD:** Shop photos of installed machine, T-tracks, spoilboard, and control station.

Next: Safety Rules →

Safety Rules

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Safety Rules

> **Read this before operating the machine.** These rules apply every time you use the Onefinity CNC - no exceptions.

- **Training required** - members only; request class on Slack **#class-requests**
- **Never leave the machine unattended** while cutting
- **Approved materials:** wood and plastics only - **no metals**
- Dust and chip hazards; fire risk from fine wood dust - **especially important until dust collection is installed**
- **E-stop** stops machine motion and spindle; does not shut down the shop PC
- Wear safety glasses; hearing protection recommended

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Hardware and Machine Anatomy

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Hardware and Machine Anatomy

Manufacturer Specifications (Gen 2 Foreman)

- **Cut area:** ~49" × 49⅞" (1245 × 1248 mm)
- **Z travel (Z-20 slider):** ~165 mm (~6.5")
- **Gantry clearance:** up to ~160 mm depending on Z-slider mount height
- **Motion:** closed-loop steppers; 60 mm X rail / 50 mm Y rails
- **Spindle:** Redline 80mm 1.5kW air-cooled - ER20 collet (up to 1/2" shank); max ~1.5" bit diameter recommended
- **Power:** 110V spindle

Our Setup (Makerspace)

Setting	Value	Implication
Z-20 mount position	Highest position	Maximizes gantry clearance (~160 mm) but **reduces** effective Z reach to the spoilboard - plan job thickness accordingly
Spoilboard	3/4" (19 mm)	Include in Z-zero and max cut depth calculations; resurfacing removes material over time
Workholding	T-tracks	Use T-track clamps and fixtures (no vacuum table)
Dust collection	Not installed yet	Coming very soon - use shop vac / manual cleanup until installed

Effective max work height also depends on spindle position in the mount and bit stick-out. Tall workpieces may eventually require lowering the Z assembly (trading gantry clearance for more Z reach).

> **TBD:** Exact effective max cut height measurement for our current mount + spoilboard setup.

Bits and Collets

The spindle uses an **ER20 collet system**. Collet size must match your bit's shank diameter exactly - using the wrong size collet is a safety hazard.

Spec	Value	Notes
Collet type	ER20	Standard ER20 collets; select size to match bit shank diameter exactly
Max shank diameter	1/2" (12.7 mm)	Largest ER20 collet size; do not attempt larger shanks
Max bit diameter	~1.5"	Larger bits have excess rotational mass and can fault the VFD - avoid
Installation	Two wrenches required	One wrench on the spindle flat, one on the collet nut; never run with a loose collet

Install and tighten the bit **before** any spindle power. Always inspect the collet for wear or damage before use; replace if needed.

Component Glossary

Component	What it is	Controlled by
Spindle	Motor that spins the cutting bit	VFD + RTS-X
VFD	Variable Frequency Drive - converts power and sets spindle RPM	RTS-X (must **not** be in manual/local mode during jobs)
Z-20 slider	Heavy-duty vertical axis assembly	RTS-X motion firmware
RTS-X controller	Real-time motion controller (closed-loop on Elite)	RTS-X firmware
Shop PC	Dedicated CNC computer at the makerspace	RTS-X Windows app *(sole interface - no HMI touchscreen)*
VCarve Pro	CAM/design software - creates toolpaths, does not run the machine	Separate from RTS-X

Note: This machine does **not** have the optional Redline HMI touchscreen. All homing, zeroing, file import, simulation, and job execution happen through RTS-X on the dedicated shop PC.

> **TBD:** Physical layout diagram - shop photos of spindle, VFD, e-stop, shop PC station, and work area. Link stock Onefinity manual diagram until then.

> **TBD:** Shop-specific power outlet / breaker labeling.

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Software: VCarve and RTS-X

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Software: VCarve and RTS-X

Getting Access

1. Request CNC training on Slack: **#class-requests**
2. Complete the CNC checkout/training class
3. After checkout, an admin sends your **Vectric/V&Co Makerspace invite** so you can use the VCarve client edition at home

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Two separate software systems are involved: **VCarve Pro** for design and toolpath generation, and **RTS-X** for actually running the machine.

VCarve Pro Makerspace Edition

Our makerspace uses VCarve Pro Makerspace Edition. Members get a free client license for home use after training.

At home (Client Edition)

1. Install VCarve Pro from Vectric
2. Sign in with your V&Co account after accepting a makerspace invite
3. Design your project and run 3D preview/simulation
4. Save your `.crv` project file
5. **Cannot** save toolpaths or G-code from home - that requires the shop master edition

At the shop (Master Edition)

- Licensed on makerspace computers (up to 5 installs)
- **Installed on:** the dedicated CNC computer(s) **and** the vinyl cutter computer
- Open the member's `.crv` file (USB or cloud)
- Verify tooling and machine profile
- **Save toolpaths** → export G-code
- Transfer G-code to the dedicated CNC PC running RTS-X

Helpful links:

- Vectric Makerspace login docs
- Vectric Makerspace overview video

RTS-X (Realtime CNC)

RTS-X is the only software that runs the machine. It handles homing, zeroing, spindle control, file import, simulation, and job execution.

- **Rule:** Always drive the machine from the **dedicated CNC shop PC** - never from a personal laptop or phone
- **No HMI:** We do not have the optional Redline touchscreen; the shop PC is the sole control interface

Documentation and downloads:

- RTS-X Documentation Hub
- System Overview
- Settings reference
- Software downloads and updates
- Onefinity - Redline / Realtime Controller Manual
- Realtime Resources FAQ

See also: Preparing a Cut File for post-processor setup.

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Speeds and Feeds

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Speeds and Feeds

Use this page as a reference when setting up toolpaths in VCarve. Start conservative - increase feed rate only after successful test cuts on scrap material. Match RPM to material type and bit diameter.

> **1.5kW spindle limit:** Avoid bits larger than ~1.5" diameter - excess rotational mass can fault the VFD.

Starter Values (Not Yet Shop-Verified)

Values below are placeholders derived from manufacturer guidance and Vectric defaults. They will be replaced after test cuts at the makerspace.

Material	Bit type	Diameter	RPM	Feed (IPM)	Depth/cut	Notes
Hardwood	Up-cut end mill	1/4"	**TBD**	**TBD**	**TBD**	From manual - verify at shop
Plywood	Up-cut end mill	1/4"	**TBD**	**TBD**	**TBD**	From manual - verify at shop
MDF	Up-cut end mill	1/4"	**TBD**	**TBD**	**TBD**	From manual - verify at shop
Plastic	Up-cut end mill	1/4"	**TBD**	**TBD**	**TBD**	From manual - verify at shop

> **TBD:** Shop-verified speeds and feeds after test cuts. Rows will be tagged "shop-verified" when confirmed.

General Guidance

- Always confirm units (IPM vs mm/min) match your G-code post-processor
- Use VCarve’s tool database as a starting point, then verify on scrap material
- Reduce depth per pass if you hear chattering or see poor chip evacuation
- Refer to bit manufacturer recommendations for your specific cutter

Preparing a Cut File

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Preparing a Cut File

Design at Home Checklist

1. Confirm project units (**inches vs mm**) - must match your post-processor choice
2. Set up the correct **machine profile** in VCarve (per the Onefinity + Vectric setup guide):
   1. VCarve → **Machine → Machine Configuration Management**
   2. Click **Download from the Cloud** (upper-right corner) → Yes
   3. Manufacturer: **Onefinity**
   4. Series: **Elite Redline** (correct for Gen 2 Redline/Realtime)
   5. Model: **Foreman 48×48**
   6. Configuration: **Defaults** (unless rotary added later)
   7. When saving toolpaths, choose: **Onefinity Redline/Realtime (inch)** or **(mm)** - match your project units

   Backup/manual post-processors: RealTime CNC
3. Design your part and assign toolpaths - see Speeds and Feeds for starter values
4. Run **3D preview / simulation** in VCarve - check for unexpected plunges, tabs, and rapid collisions
5. Save your `.crv` project and bring it to the shop via **USB drive or cloud** (either works)

At the Shop - Export Toolpaths

1. Open your `.crv` file on a **master VCarve** computer (CNC PC or vinyl cutter PC)
2. Re-check tooling and run 3D preview again
3. **Save toolpaths** → export G-code with the correct post-processor
4. Transfer G-code to the dedicated CNC PC running RTS-X (USB or cloud)

Once G-code is on the shop PC, continue to Running a Job for simulation, machine startup, and job execution.

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Running a Job

Follow this checklist every time you run a job. Complete Preparing a Cut File and have your G-code on the shop PC before starting.

Before Power-On (Safety-Critical)

- **Install and tighten the bit first** - before any spindle power; see Hardware and Machine Anatomy for collet and installation details
- Select the correct **ER20 collet** for your bit's shank diameter
- Use **two wrenches** on the spindle nut; never run with a loose collet
- Clear the spoilboard area and confirm your workholding plan
- Wear safety glasses; hearing protection as needed
- Know the **e-stop** location

Power-Up Sequence

1. Verify **e-stop** is released
2. Turn on main machine power
3. Turn on **VFD**; confirm it is in **automatic/remote mode** (NOT manual/local)
4. Boot / wake the dedicated CNC shop PC; launch **RTS-X**
5. Connect to the controller; **home the machine**

> **Dust collection not yet installed** - use shop vac for cleanup after cuts. Dust collection is coming soon.

> **TBD:** Preferred power-down order (VFD → main power). Shop-specific e-stop / power switch labeling.

Job Setup

1. Secure the workpiece (T-tracks)

- Use **T-tracks** with appropriate clamps, hold-downs, or toe clamps

- Screwing into the 3/4" spoilboard is acceptable when clamps won’t work - avoid excessive holes
- Keep clamps and track hardware **clear of the toolpath** - check rapids in simulation
- Mind "no-go" zones near table edges where tracks may not reach

2. Set work zero (WCS)

Standard practice for most jobs:

- **XY zero:** front-left corner of your workpiece - match the origin you set in VCarve
- **Z zero:** top surface of the material (most common), or spoilboard surface for through-cuts - match your VCarve setting
- In RTS-X: jog the bit to your XY zero point and zero the X and Y axes; lower the bit to just touch the material surface and zero the Z axis
- Use a paper slip or touch-off block for Z precision; avoid crashing the bit into the spoilboard

> **TBD:** Document our specific step-by-step touch-off procedure in RTS-X, with screenshots. Spoilboard is **3/4"** thick.

3. Import G-code into RTS-X (USB or cloud)

4. Run simulation/preview in RTS-X

- Open the file in **RTS-X** and run the built-in preview/simulation before starting
- Confirm the bit does **not plunge through material or into clamps/fixtures** on the first rapid approach
- Verify the toolpath boundaries stay within your workholding setup
- Check that the first plunge point and rapid moves look correct relative to your zeroed position
- Consider watching the first few seconds of the cut at **reduced feed override (e.g. 50%)** until you are confident the job is running correctly

5. Position spindle over safe start point; confirm feed/speed in file

During the Cut

- **Remain at the machine and supervise the entire job.** Zero tolerance for leaving unattended or leaving the room.
- Keep hands clear; never adjust clamps while the spindle is running
- Be ready to hit **e-stop** or feed-hold

Shutdown

1. Stop spindle; return to safe park position if applicable
2. Remove workpiece and clean up

3. Vacuum chips; check spoilboard for damage
4. Power down VFD, then main power
5. Log any issues on Slack

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Maintenance and Troubleshooting

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Maintenance and Troubleshooting

Maintenance

- **Collet:** Clean and inspect regularly; replace if worn or damaged
- **Spoilboard:** 3/4" board - monitor thickness as holes and resurfacing accumulate; resurface when uneven
- **Dust collection / dust shoe: TBD** - coming soon; add maintenance steps when installed
- **Linear rails:** Wipe down per Onefinity manual
- Report problems on Slack or to a shop officer

Troubleshooting

Symptom	Likely cause	Action
VFD fault on start	Manual mode, wrong startup order, oversized bit	Check VFD is in remote/auto mode; press reset; verify bit size
Homing fails	Obstruction, e-stop engaged, limit switch	Clear axis path, release e-stop, re-home
Wrong cut size	Inch/mm post-processor mismatch	Re-export G-code with correct post-processor
Crashes into clamps	Wrong zero or skipped simulation	Re-zero work coordinates, re-run RTS-X simulation
Loose collet / bit pull-out	Insufficient tightening	Stop job; re-seat bit with two wrenches

> **TBD:** Dust collection troubleshooting once system is installed.