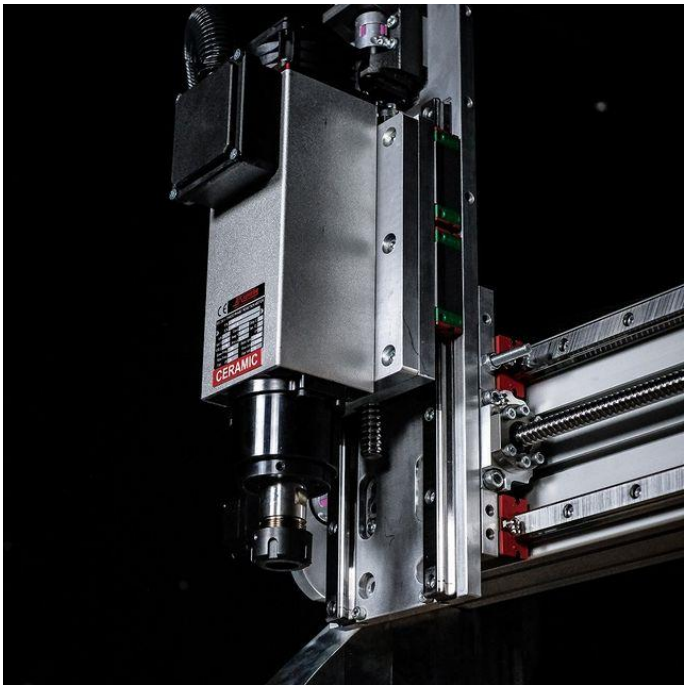
Section 6 - Part Machining and UCCNC Detailed Operation



4.0 ROBOTICS

IMAGINATION TO REALITY

CNCdrive
motion controls

BG Precision
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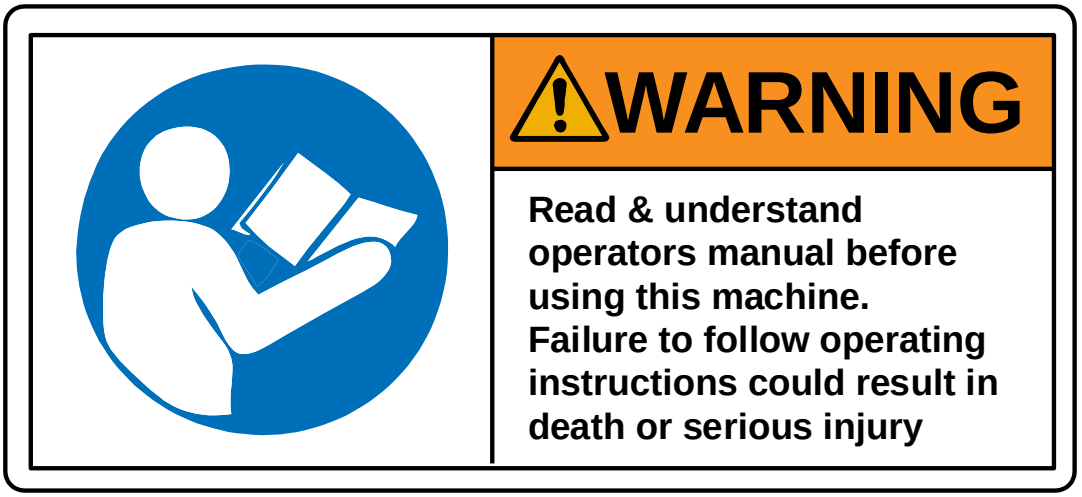

Before using/turning on the machine, the device should be carefully checked to make sure all connections are secure and the device is technically sound.

Ensure You understand the safety considerations of a machine provided in the open configuration without a safety enclsoure

Do NOT Interfere with the machine when under CNC control

NEVER LEAVE THE MACHINE WORKING UNATTENDED

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1 INTRODUCTION

Thank you for purchasing your CNC system from BG Precision. This section of the manual is specific to Part Machining and UCCNC Detailed Operation. Supplementary material will be provided specific to the machine make and model of which you have purchased.

Please ensure you read all the operational manuals for this CNC machine prior to attempting to use the system. Through-out this manual there are references to "A Trained Operator" or "Trained and Experienced personnel". These are defined as follows:

All persons that uses, or comes into contact with, the EXEC CNC router system MUST:

- understand what a CNC router is and can do
- read and understood the content of this user manual prior to using the system
- be able to exercise control of the router system at all times
- follow all the guidelines presented including the use of appropriate PPE
- seek further instruction if anything is unclear
- be sure that you have understood these instructions completely

Responsibility of use or misuse belongs to the end user. BG Precision PTY LTD and its affiliates accept no responsibility for use or misuse by the user. If you may not be able to use this product properly, we recommend that you do not begin use or cease use immediately.

This manual was not intended to cover every facet of machine operation. This manual serves to provide the information needed to safely operate and maintain the EXEC CNC router system. This manual has been designed to be used as an instruction tool as well as a reference tool for everyday work. Step by step instructions are provided where possible to help all levels of users understand the machine.

NOTE: Important aspects of machine use and best practice are highlighted and should be adopted where possible to maximise the machine tool life and performance. It is VERY IMPORTANT that all personnel read and understand the safety chapter BEFORE operating the machine. All Warning and Caution notices must be noted before interacting with the machine. Please refer to STEP 1 – Introduction to CNC for all safety considerations.

If there are any further questions or if anything is not clear, please contact us at info@bgprecision.com.au

The final stage is to machine your part and make some chips. To machine your part, we recommend you carry out the following steps in the following order:

1.1 HOME THE MACHINE

You must reference the machine each time the machine gets turned on or your start a fresh version of UCCNC to tell the software where the edges of the machine movement are each time. This can be done by using the "Home All" Command as you can see in Figure 1.

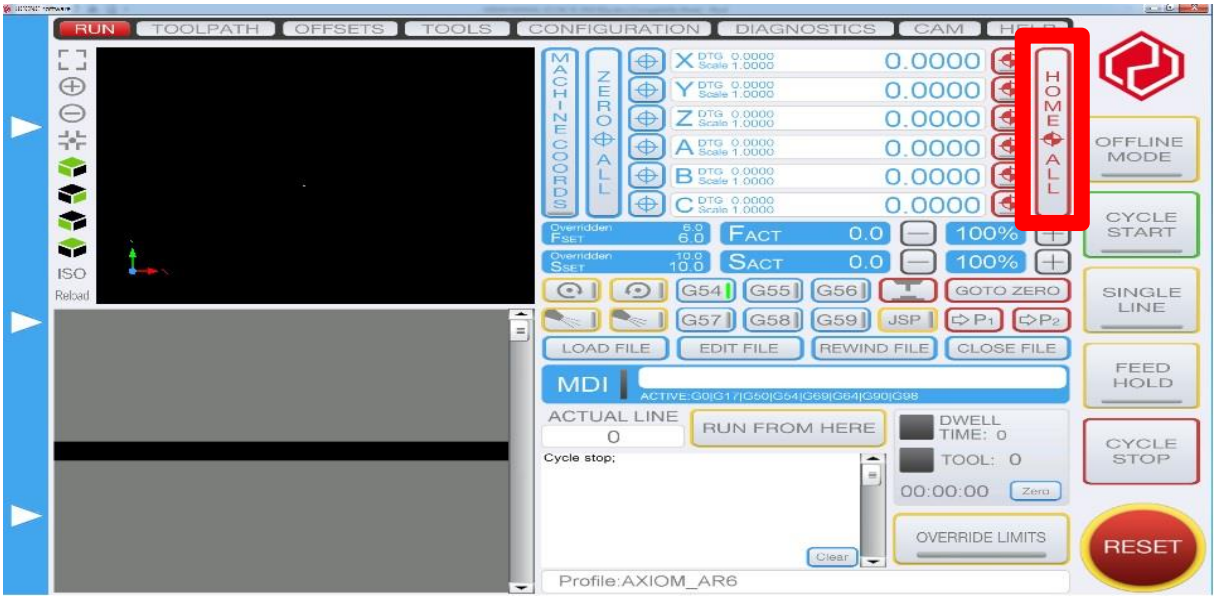

Figure 1: UCCNC Home All Command

This function aligns the software limits (or softlimits) for your machine with the actual working boundary on your table. For the softlimits to work properly you must home the machine every time you turn the machine on. Soft limits are explained in Section 2 in greater detail

1.2 LOAD YOUR GCODE FILE

The G-code file is generated from Cut2D/Vcarve and from there loaded into the UCCNC software

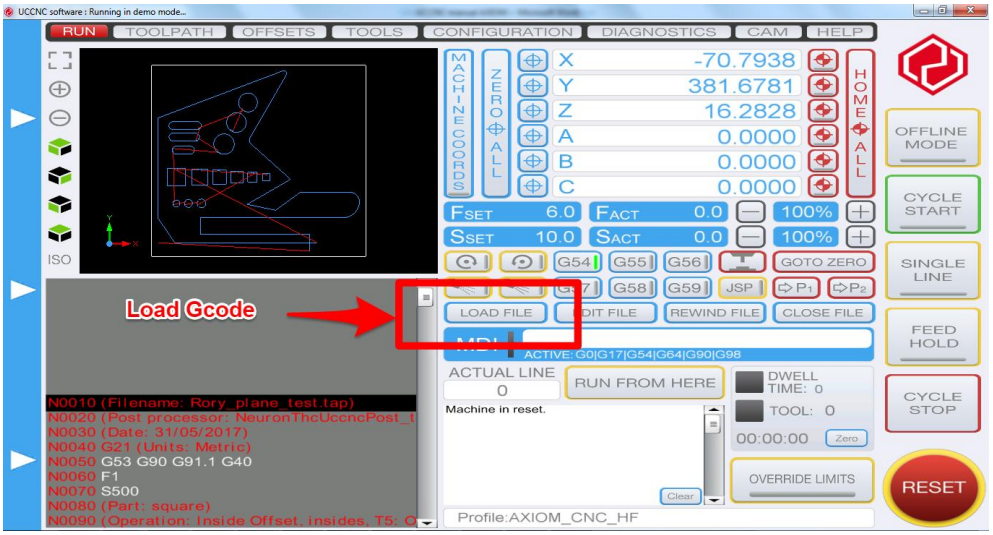

Figure 2: Load Gcode into UCCNC

1.3 CLAMP YOUR WORK PIECE TO THE MACHINE TABLE

WARNING: Very important the work piece is clamped securely. Refer Section **Error! Reference source not found.** for more details

Figure 3: Clamping methods

1.4 LOAD YOUR TOOL AND SPECIAL NOTES ON COLLETS

Before loading any tool or touching the spindle refer to Figure 70 and press the reset button BEFORE attempting to change the tool.

Figure 4: Reset to disable spindle relay

DO NOT TOUCH the spindle unless the reset button is flashing red and yellow on UCCNC control interface on your PC.

The HF spindle use collets to load the cutters into the spindles. The HF spindle uses an ER20 collet system. You must disable the spindle system before you handle the collet mounting system by pressing the reset button on the UCCNC front panel.

Figure 5: HF ER20 Collets

The procedure for mounting the collets is important

- Choose the correct collet for your tool. Always stick to the cutter spec. If using a 3.175mm collet (1/8th inch) then use a 1/8th inch collet. Using the correct collet for your cutter will make safe tool mounting easier and safer.
- Make sure the collet and collet nut are clean and debris free
- Insert the collet into the collet nut until the collet seats. You should hear a “click”. NOTE: if you mount a collet incorrectly into the spindle it will damage the collet.
- Mount the collet nut (now with seated collet) into the spindle head fixture and loosely tighten by hand only – just so the collet is on the threads of the spindle.
- Insert the tool you wish to use (NOTE: you should have pre- selected your collet size for your tool choice)
- Mount the tool so that you have enough tool stick out to carry out your machining operation.
- You must now lock the spindle head in order to tighten the collet nut
    - On the HF spindle you must use the spanner to lock the head

- The collet nut can now be used to tighten the collet into the spindle head securing the cutter. The HF spindle needs a special ER20 collet spanner. (NOTE: be careful as you do this as you can slip and damage the cutter or cut/injure yourself. You will be exerting a tightening force with the locking spanner around and near a sharp cutter. So be careful!)

- Check the cutter is seated in the spindle and collet correctly by eye after you have installed the cutter and tightened the collet.
- Carry out steps in reverse to remove the cutter.
- Never use undersized tools for collets. Always use the correct collet for the correct tool
- Never us a tool beyond its recommended RPM.
- Always expect the unexpected.
- Take extra care when loading a tool and ensure the tool is mounted correctly prior to running a tool path and turning on the spindle.

1.5 SET X AND Y WORKING ORIGIN

Jog the machine such that the centre of the spindle is in line with the defined origin position you have set in the “Job Setup” in Vectric.

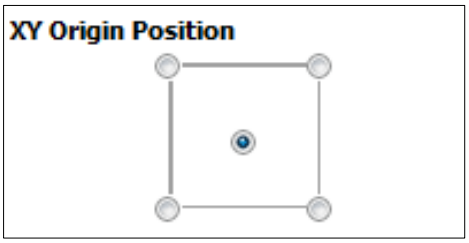

Figure 6: Vectric XY Origin

When in position you can select the set axis origin button for the applicable axis as below:

Figure 7: UCCNC Set workpiece origin button

1.6 SET Z WORKING ORIGIN

To set the z working origin, plug in the Touch off puck provided with your machine into the back of the left side upright. Place the puck either on the material surface or the table surface as per your defined origin position you have set in the “Job Setup” in Vectric.

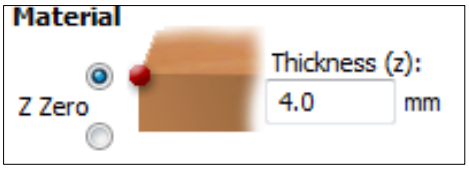

Figure 8: Vectric Z Zero Position

Jog the machine over the puck with your selected tool in place and run the auto touch off command ensuring you keep clear of machine at this point:

Figure 9: UCCNC AUTO Touch off button

The machine will automatically reduce the Z height until it touches the puck. When contact is made the machine will retract 10mm and set the Z working coordinate to 35. This takes into account that the puck is 25mm. The tip of your tool should now be 35mm from your required z origin position.

Please note this is an automatic operation and the machine will not stop until the cutting tool makes contact with the puck. To abort the operation hit “Cycle Stop” or the “Reset” button.

1.7 VERIFY THE WORKING AREA IS SUFFICIENT FOR MACHINING

With the live 3D toolpath viewer on UCCNC which can be found on the run tab or toolpath tab, you can see the current spindle location (yellow dot) with respect to the toolpath (blue line) you are about to cut.

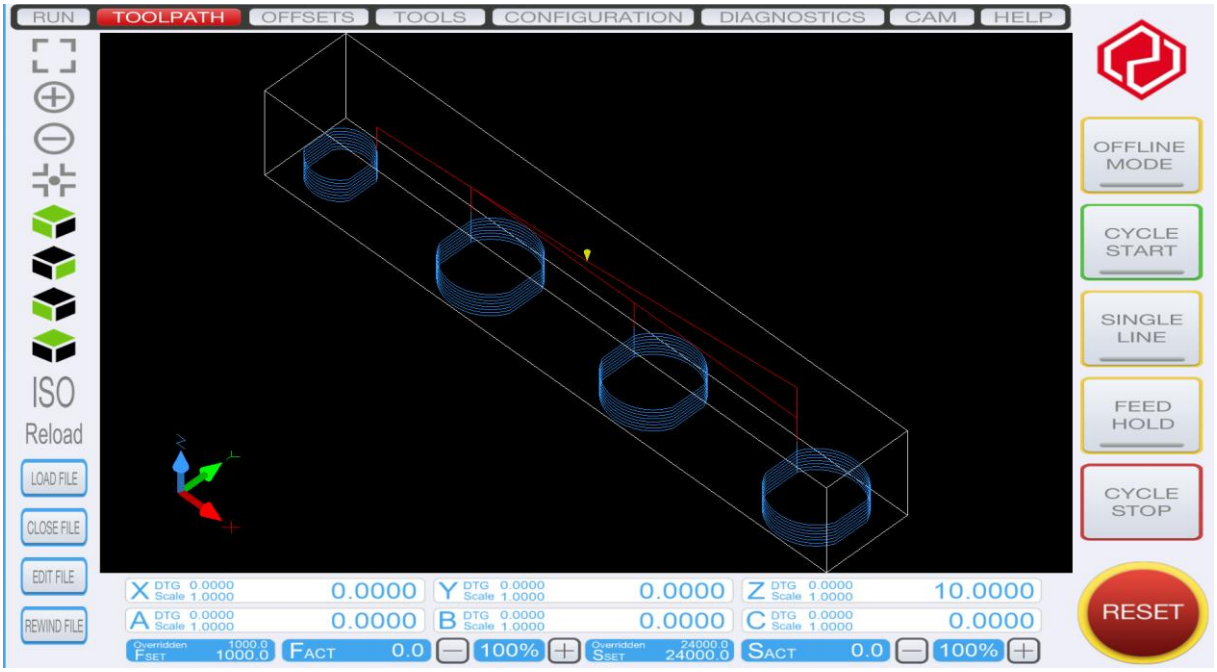

Figure 10: UCCNC Toolpath view

The red lines are rapid movements where the machine will move full speed prior to picking up your set federate in Vectric for machining. The white box is a boundary created by UCCNC and does not represent any part of the Vectric CAD/CAM setup. It signifies there is no movements outside this boundary.

Prior to starting your cycle, this is an opportunity to manually jog your machine within this boundary to ensure the following:

- Verify the working area is sufficient for machining
- Ensure there are no clamps or fixings in the boundary area
- Ensure the machine can travel within the boundary and the work doesn't extend the size of your machine
- Ensure the Material is large enough to be machined

1.8 Reduce Feed rate %

Prior to starting the cycle you can override and reduce the feed rate set in your G-Code by clicking the "-" button on the Fset line.

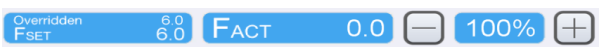

Figure 11: UCCNC Fset Override

This will slow the machine down giving you more reaction time if your set-up in incorrect for machining.

1.9 Start cycle

Figure 12: UCCNC Cycle start

- Verify the working area is sufficient for machining
- Start Cycle
- Observe and listen

1.10 Increase Feed Rate %

After you have observed the start of your cycle and believe you set-up is correct and the machine is preforming appropriately, you can increase the feed rate set in your G-Code by clicking the “+“ button on the Fset line.

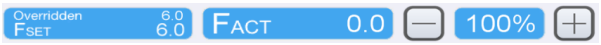

Figure 13: UCCNC Fset Override