Other Operations - Staff Only

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~~REVEAL~~

Other Operations - Staff Only

includes

- Daily Setup
- Daily Machine Pack Down
- Supervisor pre-flight check
- Tool Change
- Seeking a Shape
- Multicam CNC Tangential Knife Operations

Other Operations - Staff Only - Continued

- Manual Tip-Off
- Planning the Wasteboard
- Full List of A2MC Tabs and Functions
- Multicam CNC Incident & Issues Log
- Multicam CNC Operations FAQs
- Machining Small Objects*

Daily Setup

Prepare Space

- Sign out Pit Key
- Establish Comms via walkie talkie (Channel 21)
- Open Roller Door
- Place bollards out for CNC work area
- Check dust extractor bag /Empty if required

Prepare Space Continued

- Turn on compressor
- Ensure required PPE is available and that the space is tidy enough to commence work.
- Remove MDF cover board from waste board.**(2 person lift recommended)**
- Check the condition of waste board for high spots and lightly sand where necessary
- Turn on the CAD Computer, digital signage, lights and fan where necessary

Setup Machine

- If there is a cutting tool/bit on the machine - ensure it is secure.
- Ensure Spindle is clear for warmup procedure.

- Test Vacuum Bed Compressor
- Test Dust Extractor

Setup Machine Continued

- Turn on CNC machine and wait for it so go through its start up procedure
- Home the machine
- select Warm up spindle and OK (5 Mins)

Daily Machine Pack Down

Cleaning up

- Throw away any off-cuts or larger debris
- Use extraction tube to vacuum the material before removing, once removed vacuum the waste board. Use the dust pan to remove any debris still stuck on the board by scraping it off lightly.
- Use compressed air clean around and underneath the machine.
- Use compressor to clean the machine, most importantly the linear rails.
- Replace Night Cover on Wasteboard
- Return tools to tool storage
- Tidy up work bench (dust, wipe if needed)
- Make sure space is tidy for next person to use
- Bring the barriers back in, shut the door and turn off the light

Shutting Down

1. Return the Machine to Home position
2. Turn off machine by pressing the Off button

3. Turn off Vacuum bed and Extraction fan on the wall
4. Shutdown CAD Computer via Windows menu
5. Turn off Monitor, Fan, Lights, Compressor and WAP

LINKS

CNC Router Operations

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Multicam CNC Induction

Supervisor Preflight Check

Just like the supervision of the Laser Cutter there are a number of critical factors that a Fab Lab Supervisor needs to satisfy for themselves before *Green Lighting* a job. it is not a question of skill or experience (newbie or an experienced machinist) - Only a recognised Fabrication Lab Supervisors have the delegated authority to supervise the use of Edge Fabrication Lab tools and approve the safety of each and every job.

As such the Supervisor on duty must satisfy for themselves

Safety

- The area is clean and safe to operate the machine in
- Everyone in the area is wearing the correct PPE
- Everyone in the area is has received a safety brief.
- The Machine is maintained and safe to use

Preflight Check - Machine physically ready to use

- An appropriate cutting tool has been selected for the job
- The cutting tool is correctly fitted on the machine
- The material is appropriate to be cut on this machine and is secure on the bed
- There is no tools clamps or fixings in the path of the tool or that will obstruct the movement of the gantry.

Preflight Check - BEFORE EXPORTING JOB AS NUMERICAL CODE - Check Job is Programmed Correctly//

- Feeds and speeds are appropriate for the material being machined and the cutting tool being used.

- Depth settings hare appropriate for the thickness of the material.
- Maximum Depth of cut has been verified.
- Correct Plate dimensions have been verified.
- Program Simulation has been run to verify correct programming of job.

Preflight Check - Last checks before go

- Verify that correct version of the NC file has been sent to machine.
- Ensure machine has been homed.
- Ensure correct tool has been verified.

During the Job

- Ensure participant is actively observing progress of job.
- Ensure participant is watching for small parts being sucked up by/ stuck in the vacuum extractor.
- Ensure participant is watching that vacuum hose and extractor/ guard assembly does not foul with material.
- Ensure only one person inside yellow line when machine is operating.
- Ensure that operators are verifying that the spindle has completely stopped before approaching machine (encourage use of ***Point & Shout*** technique).

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Tool Change

Changing of tool is an operation only to be carried out by a Level 2 certified user or the Fabrication Lab Supervisor.

- Move router to over bed (this is so if the bit drops it doesn't hit the ground)
- Pair the right sized collet for the cutting Tool you have selected
- Blow collet out clean with compressed air
- Blow Collet nut out clean with compressed air and inspect (clean collet nut with steel wool if required).
- Inspect Clamping nut surfaces on the Spindle (clean with steel wool if required and blow out clean with compressed air)
- Fit collet in Collet nut with an audible *click*

Tool Change Continued

- Hand tighten collet nut (and collet) onto spindle - *take care not to cross thread*
- Place Bit into clamping hole of collet and hand tighten until collet begins to grip bit.
- Adjust bit so that approx 5mm of bit shank is exposed below collet (ensuring swarf will clear flutes of bit without feeding up into collet.
- Tighten Collet nut using Collet nut Spanner and Spindle Spanner. **Note** not too tight.

  To Tighten - Squeeze the Tools together.

- On CNC Control Console go to TAB 6 and select appropriate tool for the job

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Tangential Knife Operations

Step 1 - Swap out sacrificial boards

Swap the sacrificial MDF Board used with the spindle for the sacrificial Polystyrene Board used with the knife.

Step 2 - Remove AXYZ Spindle Unit

1. Move machine head to a position that is convenient for making changeover of the different tools.
2. remove the vacuum hose as safety collar.
3. With an allen Key loosen the 5x Hex Studs securing the Spindle mounting plate to the machine head mounting plate.
4. Disconnect control cables connecting spindle to the machine head by turning the aviation connector plug sleeve anticlockwise.
5. Support the weight of the spindle while simultaneously completely removing the hex studs.
6. Now place spindle unit safely to one side.

Step 3 - Install Multicam Tangential Knife Works

1. align the holes on the Knife Works mounting plate with the holes on the machine head mounting and insert the 4x hex studs and tighten.
    1. Use the lowest holes available
    2. **Do not use the cross-threaded hole 2nd from the bottom on the left-hand side**

Step 3 - Install Multicam Tangential Knife Works - Continued

1. When tightening bolts
    1. support the knife with another pair of hands - or your gut hand
    2. get the top left and bottom right screws 3/4 threaded.
    3. make sure the knife plate is **flat** against the machine head mounting plate.
    4. Thread the bottom left, then top right screws 3/4 threaded
    5. Finger tighten all screws in the same order
    6. Use the 3mm Allen Key to fully tighten.

Step 3 - Install Multicam Tangential Knife Works - Continued 2

1. Connect the control cable via the aviation plug.
2. Connect the air supply hose;
    1. push the socket down
    2. jam the hose in - the socket has teeth that will grip the hose.

Step 3 - Install Multicam Tangential Knife Works - Continued 3

1. Add 2 drops of machine oil to oil nipple (2 drops to be added every 2 hours of operation)
2. Execute function F58 - Changes A2MC from Spindle control to Tangential Knife control setting. At this point the machine will reboot
3. Allow the machine to home the knife on the X&Y axis

Step 4 - Fit Knife Blade

WARNING - KNIVES ARE EXTREMELY SHARP

Move Machine head to middle of table and place scrap foam on knife as guard whenever knife is not in use.

Extreme care should also be exercised when handling Knife blades as they are expensive and fragile and are likely to break if dropped.

Only remove them from their packaging over the sacrificial board

Step 4 - Fit Knife Blade - Continued

- Wear protective gloves whenever handling the knife. - Select specific knife blade appropriate for your cutting requirements. - The knife cutting length should be as close as possible to the thickness of material - Again, position Machine head over sacrificial board in a convenient position for installing the required knife blade. - Execute Function F42 to 90 deg to expose the knife retention grub screw and remove grub screw with 3mm Allen Key. - Insert Knife blade with into holder with keyway oriented to the grub screw hole. Screw in grub screw and tighten.

MAKE SURE THE KNIFE IS FITTED STRAIGHT The grub screw should only contact the flat area **of the knife blade hilt**

Step 5 - Set Knife Length

The machine head needs to be calibrated to the correct Z axis value so that the knife tip's highest point of travel is level with the upper surface of the sacrificial board. This requires the operator calibrate the z axis manually (or by eye) while the knife is reticulating.

1. Now move Machine head over sacrificial board.

WARNING **the next Step Starts the Knife**

Step 5 - Set Knife Length - continued

- Execute Function F24 - Set Knife Length. This will start the knife's reticulating movement.

1. Using the Z axis jog buttons (and =/- buttons to adjust jog speed -fast, medium or slow) to lower the tip of the blade slightly into the sacrificial board.
2. When you have adjusted the Z axis to the correct depth the tip should be just under (by the smallest fraction possible) under the surface of the sacrificial board at the highest point of travel.
3. When you are happy with the calibration of the Z axis select enter.
4. A2MC will now ask if you want to Set Knife? Perform a visual check of whether the knife is running parallel to the X axis. If the knife is aligned on the X axis Select **no**. If the Blade is not aligned select **Yes** and perform the Set Knife procedure.

Other Knife Operations

- |Adjust over/under cut
- set_knife

Manual Tip-Off

This Function is used for tool tip off if the tool is physically bigger the the touch disc mounted on the gantry or when planning the waste board.

1. Change the tool using Tab 6 → Change → Select Tool eg 45mm Surface planer (Tool 10)
2. Insert the 45mm Surface Planer and press ok.
3. Move the spindle roughly 300mm x 300mm in from the home position
4. Key in F24 to select Manual Tip-off
5. Drive the head physically down to touch the wasteboard. use the +- button to cycle through the speed options (Fast, Medium, Slow, Step). Once touched the board press ok.

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Planeing the Wasteboard

1) Position the wasteboard hard into the corner and location blocks

2) Turn on the vacuum pump!

3) **Remove location blocks!!!`**

For a new board both sides need to be dressed to remove wax coating and level the board. 1.5 to 2 months under heavy use. 1mm deep initially on first side on a fresh board .5mm deep on second side on a fresh board From this point the board should need not flipped until a new board is used. .2mm deep there after on the same side

Planning the Wasteboard

4) Key in F28 on A2MC Console

- Set waste board **No**

  Wasteboard must be set AFTER the planing table or machine bed damage may result!

- Plane table yes

- Tool Diameter 45
- Overlap 50%
- Length (X Axis) 2420mm
- Width (Y Axis) 1230mm
- Z depth .5 mm
- Feed rate 12000mm
- Spindle RPM 10000
- Set origin NO
- Plane table Yes

Set the Wasteboard

When planing is complete replace location blocks.

Now you need to set the waste board (ie zero the Z Axis)

5) Key in F28 on A2MC Console

- Set waste board Yes

Jog tool down to complete a manual tip off (as per manual tip off) and press OK when you are have *just touched.*

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Full List of A2MC Tabs and Functions

Original file

FUNCTION	NOTES
Function 01 - Machine Properties	
Function 02 - Verify Job	
Function 03 - Machine Limits Control (Co-ordinate display)	
Function 05 - Execute M-Code	
Function 06 - Execute G-Code	
Function 07 - Enable/Disable Machine's Motors	
Function 09 - Abort Job	
Function 10 - Set User XY Origin“	

Full List of A2MC Tabs and Functions Continued

FUNCTION	NOTES
Function 11 - Choose Current Origin	
Function 12 - Seek Machine Origin	
Function 13 - Go to Current Origin	
Function 16 - Set Parking Position	
Function 20 - Set Material Thickness	
Function 24 - Set Tool Height of tangential knife heads	
Function 25 - Set Tool Height ”	
Function 26 - Set ATC Tool Heights	ATC not fitted
Function 27 - Set User Z Origin	
Function 28 - Set and Plane Waste Board“	
Function 30 - Edit Tools	
Function 31 - Change Active Tool	
Function 34 - Unload Spindles	ATC not fitted
Function 35 - Set dual carriage spacing	ATC not fitted

Full List of A2MC Tabs and Functions Continued 2

FUNCTION	NOTES
Function 40 - Current Job Properties	
Function 41 - Feed Speed	
Function 42 - Spindle Control	
Function 43 - Job Repeat ”	
Function 44 - Job Array “	
Function 45 - Plunge Speed	
Function 46 - Measured Move	
Function 47 - Cut Rectangle”	
Function 50 Vacuum Pump, Dust Collector and Mist Control	Not Fitted
Function 51 - Digitise 2D & 3D Jobs.“	
Function 54 - Safety Interlock	
Function 56 - G41/G42 Compensation	
Function 58 - Multi XML ControlFunction	
Function 59 - G41/G42 Modal Preset ”	
Function 801 - Set Static IP Address	
Function 821 - Set up Tool Tip Sensor	
Function 822 - Setting up Tangential Knives	

Common Tabs and Function Keys

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