Session 2
AVID General Mechanical

- **The machines motion Axis should not be moved manually. Always use the software.**
- **The machines general location on the floor of the shop should not be altered in any way.**
- **If you think there is something wrong or broken with the machine, do not attempt to perform maintenance without first discussing with the shop manager. (See Slack)**

Identify the Greased areas of the machine.
- Motor Gear tracks X,Y, and Z
- Spindle

Identify the pinch points on the machine.
- X,Y,Z Axis Travel and End points
- Drag Chain X,Y, and Z
- Point out the cables. Note that they should not be moved or adjusted.
- Point out motor pinch points for X Axis behind the Z Axis.

How to power on the table
- Location of disconnects
    - Control box 1 - 120V: This supplies power to the main motion and computer control
    - Control box 2 – 220V: This supplies power to the spindle motor.
- Location of power plugs (Both must be plugged in for the machine to work)
    - 220v(spindle) is at back of machine
    - 110v(motion and control) back of the machine.
- E-Stop and what you should do with it.
    - How to reset after E-Stop (don't forget to push the reset button)
- Signing into the PC (Maker/Make312!)

Warming up the spindle (This takes about 5 minutes to run)
- Run the spindle warm up process using the Mach4 software.
    - **There should not be a bit in the spindle. There should not be a collet on the spindle**
      Link to a good overview of how to run this process:
      https://www.youtube.com/watch?v=htEH2ablRWU&list

Table coordinate system (3 Axis) ; X , Y, Z **(review picture on wall)**
- X and Y directions. Where is XY Zero.
- Table limit switch stops (X[3], Y[2], and Z[1])
- Table hard stops

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Concord Makerspace

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How to change a bit

- Choosing a collet, Currently the space has only imperial units. Metric collets can be used but the space does not currently have any.
- .125(1/8)", .25(1/4)",.5(1/2)" NOTE: you **cannot** use a 6mm,12mm bits in imperial collets

Using Metric bits in an imperial collet is dangerous and will damage the collet.

How to zero the position of the bit

- Advise where the table Zero is. When facing the spindle, x-y (0) is the left corner.
- Be sure to HOME the machine to allow the machine to know where the xyz zero(0) points are this is done in the Mach4 software there is a button to the left of the coordinates readout.
- Use the Zero block to set your project zeros offset. Be sure that your material is properly oriented with the table. You want it to be square on the table compared to the X and Y Axis.
    - Using the zero block to set the X and Y Zero is the easiest way to set your offset.
    - Measuring can also be used to set your project zero.

How to move the machine to specific locations.

- Demonstrate the Jog controls in Mach4.
- Demonstrate the Vacuum gate operation
- Demonstrate how to connect and remove the vacuum boot skirt.
- How to turn on the Vacuum system. Currently a manual process. (Turn it on at the machine)
    - Be sure to give the boot skirt enough clearance under the bit when removing or attaching.
- True Max Z height is depend on the bit length and material thickness. Max movement is 7"

How to secure your material to the bed

- Screws (take it easy… Clean up if needed)
- Double sided tape (not recommended)
- Extra sacrifice board Use one if;
    - Underlayment or OSB are inexpensive and work well.
    - You know you are going to cut into the surface of the spoil board
    - You have multiple moves or material changes.
    - Use double sided tape or Blue tape and CA Glue trick
- Push Latch (use spacers/supports)

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Chip load (review)

- Primary heat dissipation for bit and spindle
- Dust collection is better with bigger chips.

Understanding bits (basic)

- Up cut
- Down cut
- Compression
- Reminder about imperial only.
- **Large diameter bits should be run at low RPMs see manufacturer for details on max RPMs.**
    - **Running a large bit at high RPMs will damage the spindle bearings and is dangerous. The outer speed of the bit becomes very high and that could cause it to break apart and fly out of the collet.**
- Replicable edges

Dry run Pirate Pumpkin (Demo)

- Demo how to attach material to the spoil board using a secondary spoil sheet.
- Demonstrate how to export the Gcode from VCarve
- Demo how to load and run Gcode into Mach4
- Demo Collet and bit loading.

Clean up. Leave machine in proper state for next user.