

Robotics Alliance Project Design Guide

Assigned Reading & Reflection
Questions

Set #2

Due Wednesday, 10/27



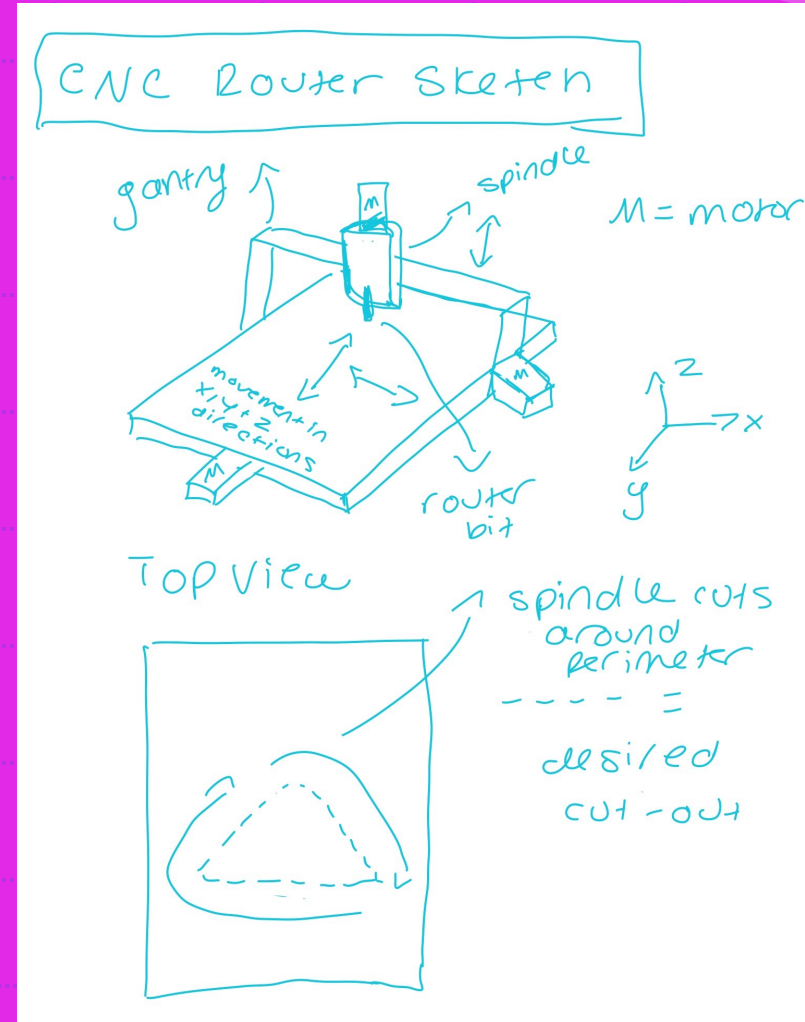
Reading Assignment #2

- Section 3 (pages 31-56)
- Reflection questions (listed on following slides)

Question 1: Manufacturing Methods

- Draw hand sketches with labels of how the machines listed below work. An example for the CNC router is provided for you.

1. Waterjet
2. Lathe
3. Mill
4. 3D Printer
5. Laser Cutter



Question 2: Box Tube Construction

- Define "box tube construction"

Question 3: Versa Chassis CAD

- Define the word "chassis."
- CAD a Versatube chassis constructed with gussets that has a frame perimeter less than 120"
- Versa info from VEX:
<https://www.vexrobotics.com/pro/versaframe>
- Do not include wheels, motors or gearboxes yet, just CAD the frame.

Question 4: Round Tube Construction

- What is round tube construction and what are the benefits of it?
What do you think are some of the cons?

Question 5: Welding

- Describe how welding works. What is TIG welding versus MIG welding (hint, you may need to consult the Google!)

Question 6: Plate & Standoff Construction

- What is plate and standoff construction? Sketch an example assembly by hand.

Question 7: Standoffs & Spacers

- When would you use standoffs and when would you use spacers?

Question 8: Sheet Metal Bend Radius

- Why is the bend radius important when designing for sheet metal?

Question 9: Shrinking & Stretching

- What is shrinking and stretching in sheet metal? What is the K-factor and what is the formula for calculating K-factor?

Question 10: 3D Printing

- When is 3D printing a useful manufacturing method?

Question 11: 3D Prints & Threading

- What hardware should be used when threaded holes are needed in a 3D printed part? Link an example of this hardware from McMaster Carr.

Question 12: Lightning Patterns

- List types of lightning patterns and create hand sketches of each style.

Question 13: Lightning Feature Script

- Design a drivetrain tube in CAD and lighten it using the Lightning Pattern Feature Script.
- <https://onshape4frc.com/getting-started> --> *how to use and install this Feature Script is listed on this webpage*

Question 14: BB2 Drivetrain Shafts

- Navigate to the BB2 CAD in Onshape
- Identify the shafts that will need to be manufactured to re-create the drive gearboxes. Create formal part drawings for each shaft.