

Robotics Alliance Project Design Guide

Assigned Reading & Reflection
Questions

Set #2



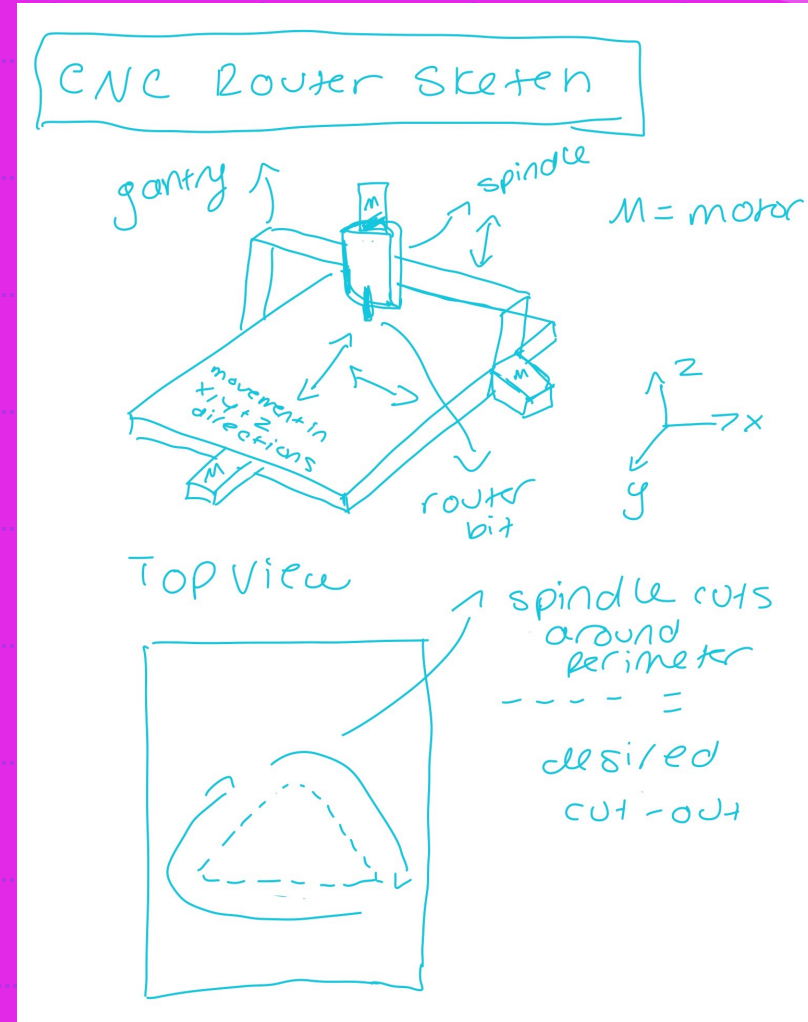
Reading Assignment #2

- Section 3 (pages 31-56)
- Reflection questions (listed on following slides)
- 14 questions x 5 points/question = 70 points

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. CNC Router
2. 3D Printer



Question 1: INSERT CNC ROUTER
SKETCH HERE

Question 1: INSERT 3D PRINTER SKETCH
HERE

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 3: INSERT SCREENSHOT OF
MODEL HERE

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.

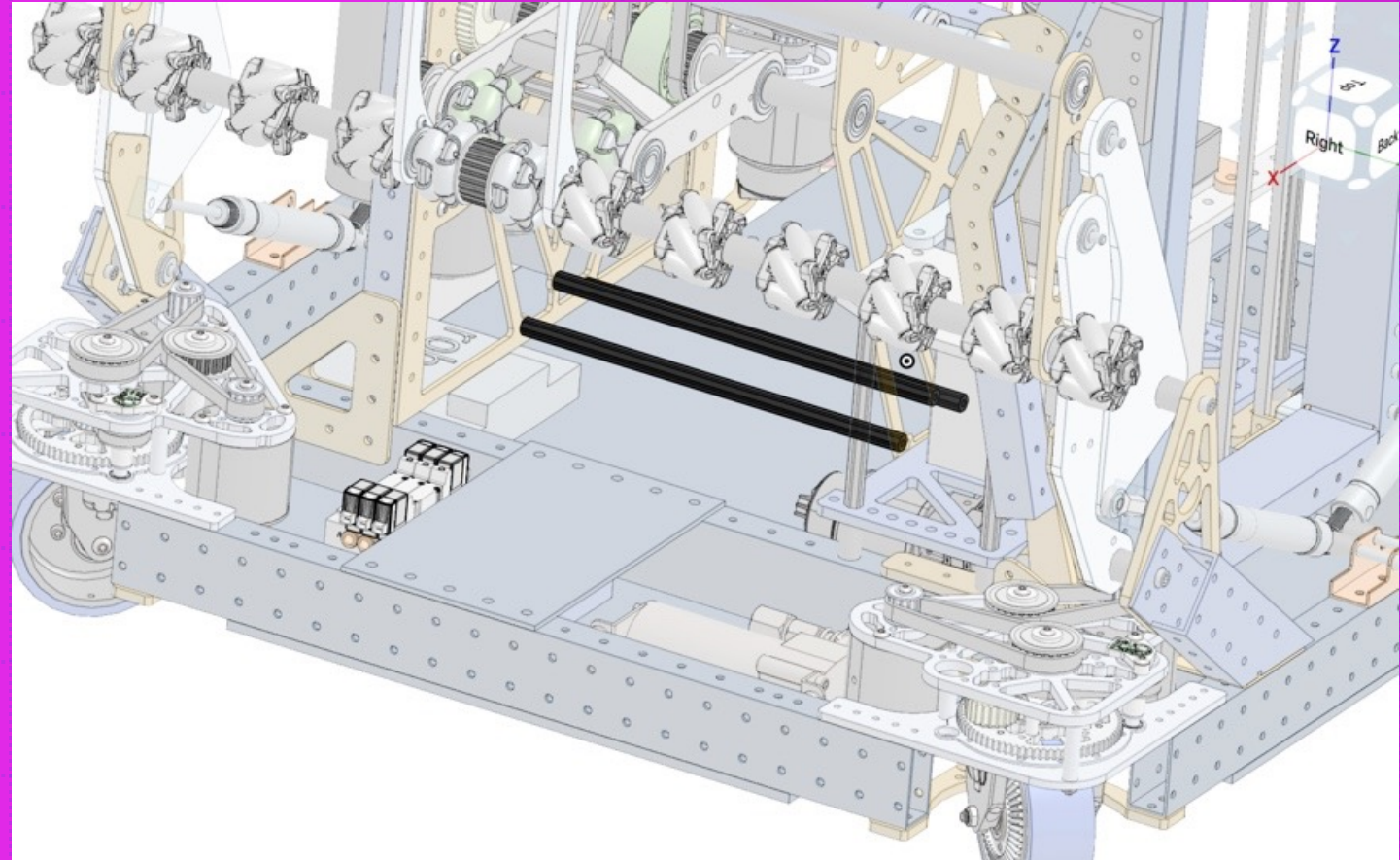
Question 13: Lightning Feature Script

- Use one of your drivetrain tubes from question 3 and lighten it with an isogrid pattern 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 13: INSERT IMAGE OF
LIGHTENED TUBE HERE

Question 14: Ball Tunnel Shafts

- Navigate to the CAD model of the entire robot in Onshape
- <https://cad.onshape.com/documents/5d38ac872f492af82733f56d/w/4af9dd916c9a9c90f0b68f54/e/7d75120ac9f3c690d0761aa4?renderMode=0&uiState=62c061c3d84ac347f991c81f>
- Identify the shafts that make up the bottom of the ball tunnel (highlighted in screenshot)
- Create formal part drawings for these shafts (they are all the same so only need 1 drawing)



Question 14: INSERT DRAWING HERE