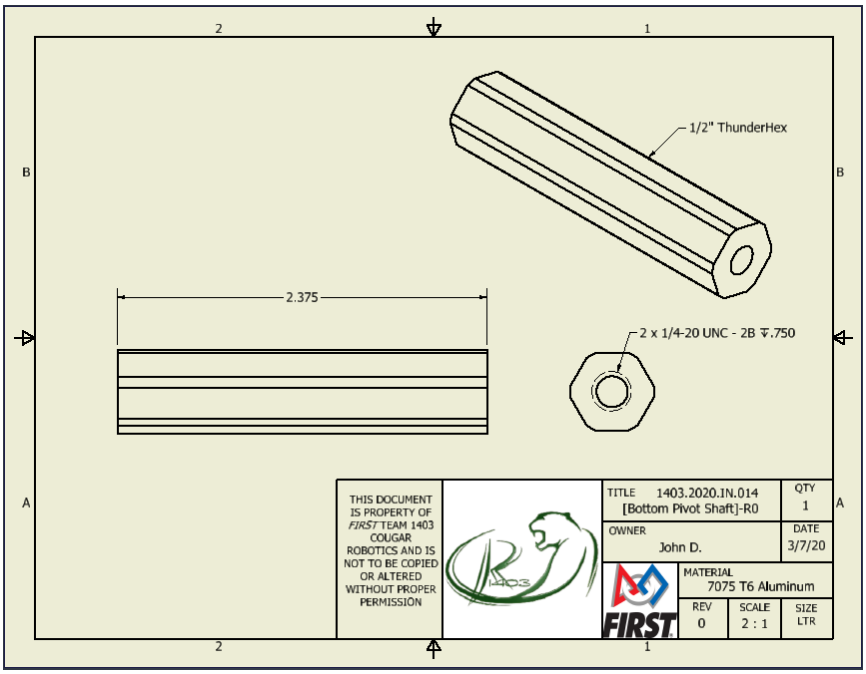
DRAWING STANDARDS

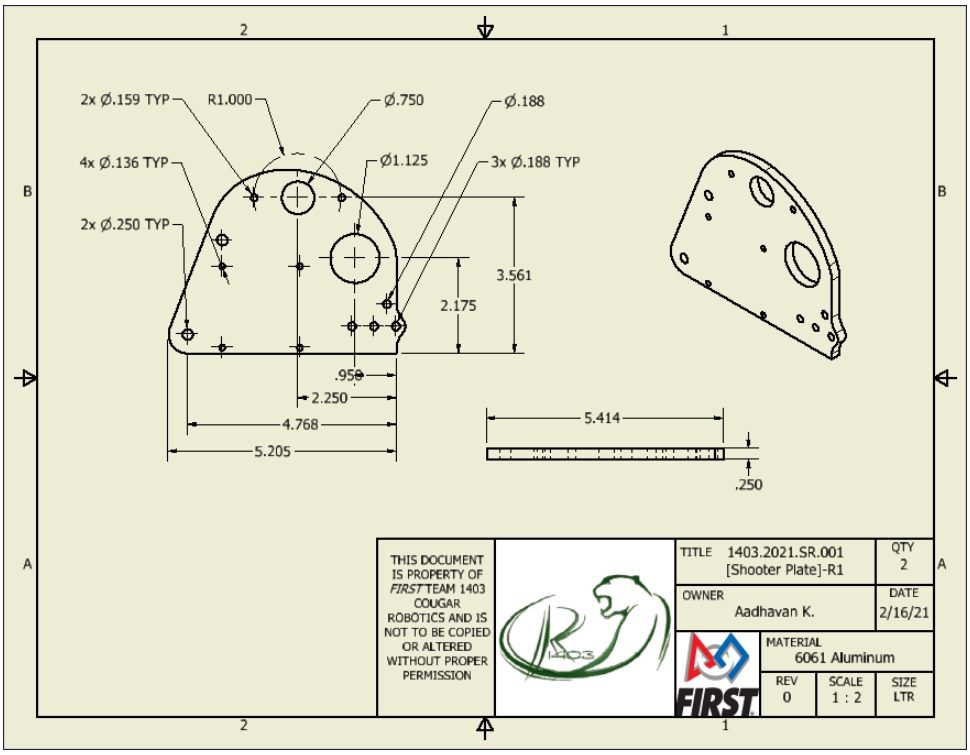
Part Drawings

1. Functions of Drawings
    a. Drawings are made for any part that is manufactured by the team
    b. Components off the shelf (COTS) such as gears and belts do not require part drawings unless modified
        i. If modifications must be made to the purchased parts, they should be marked using leader text on its 3D View in drawings
        ii. 

2. Setup
    a. Template Size
        i. Part drawings themselves can have two template sizes
            1. 8.5”x11” (Usual)
            2. 11”x17” (With Permission)
    b. There should be at least two views: A 3D View and 2D View(s) with dimensions
        i. Additional 2D views are added for any dimensions that are not visible through the base 2D view
        ii. 3D views should not be dimensioned
    c. Views with a different scale should specify the scale used next to it unless the view is a detail (Figure 4)
3. Dimensions

a. Dimensions should reference the corner that fits best and be organized in increasing size (Figure 1)
b. Dimensions should be arranged diagonally in ascending order if possible (Figure 1)
c. Multiple geometries with the same X or Y position should share the same dimension line (Figure 1)
d. Holes should be dimensioned with their diameter unless it is tapped
    i. All tapped holes should be specified using the Hole and Thread tool (Figure 2)
    ii. When dimensioning, add ↧ after the value
        1. If the thread is applied throughout the hole, then add THRU after it. Otherwise, write how much it is applied through
            a. *Ex:* 1/4-20 UNC - 2B ↧ .750
e. If multiple holes in the same hole pattern have the same diameter, Typical ("TYP") should be written after the diameter (Figure 3)
    i. If there is more than one similar hole dimension, then group hole dimensions that are colinear, and dimension all other holes
        1. *Ex:* 3x Ø.188 TYP
f. The exact length of a dimension should be rounded to the thousandths place (Figure 3)
g. If the holes are in a bolt pattern, the circular pattern tool must be used
h. Fillets should be dimensioned with their radius dimension
i. Markups
    i. All Holes should be marked with centerlines (Figure 5)
j. CNC Drawings
    i. All regular drawing standards apply except for the following
        1. Do not dimension outer radii edges
        2. If the diameter of the hole is smaller than 0.5 in, then do not dimension the position of the hole

ii.



4. Title Block (Figure 7)
    a. All text should be centered in their respective boxes
    b. Part name
        i. Should follow team's naming standards/part catalog
            1. Formatted Name:
            1403.YEAR.SubassemblyCode.Part#[Descriptive Part Name]-R#
                a. *Ex:* 1403.2021.SR.001 [Shooter Plate]-R0
    c. Drawing author
        i. Allows the mechanical team to have a person to consult with questions about the part
        ii. If people have the same first name and the same first letter of their last name add one more letter to the initial
        iii. The author should change only if a major revision is made to the part
        iv. Can have multiple authors separated with an & symbol
    d. Date of drawing creation
        i. Helps prevent the use of outdated drawings
        ii. The drawing date should be changed when a revision is made to the drawing
    e. Scale of drawing
        i. Important to maintain the accuracy of drawings
        ii. Scale in the Title Block should match the scale of the base view

iii. There should be spaces between the numbers and the colon
1. *Ex:* 1 : 2

f. Revision number
i. Helps prevent the use of outdated drawings and allows for comparison of different part iterations as it is modified
ii. The revision number should only change if the design is changed after a design is released
iii. The revision number of the drawing should be the revision number of the part

5. Review and Release
a. Every drawing must be reviewed by the design captain
b. The drawing release form must be used after a subassembly's drawings are finished
i. They should be signed in order of the drawing author, design captain, mentor, then mechanical member (after the part is manufactured)

Assembly Drawings:

1. Assemblies have their own drawing template
2. There are no dimensions in an assembly drawing
3. Balloons
a. There should be a balloon for each part on the parts list
b. If needed, there can be balloons on the 3D view as well
c. Use the section and detail tools accordingly
i. Sections should be used when no views cannot show a part in the Parts List
ii. The detail view should be used when a region of the assembly needs to be magnified for clarification purposes

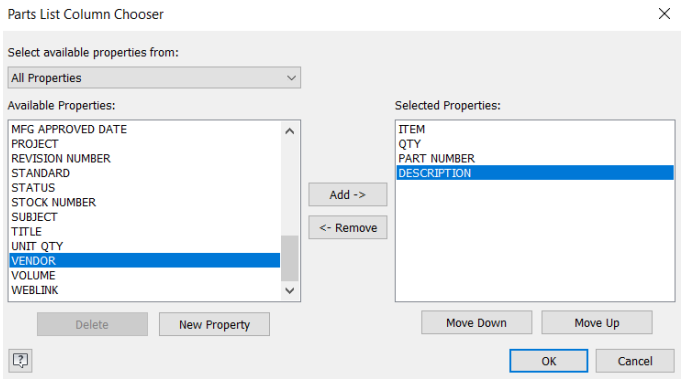
4. Parts List
a. Organization
i. The Parts List should be organized by 1403 assemblies first, then 1403 parts (these two should be organized by the first letter), then the rest should be organized by first letter order of vendors
ii. Once organized, the Item Column should be renumbered in descending order
iii. The Parts List itself should be in the bottom right corner of the drawing template, above the Title Box
b. COTS
i. COTS should have the same format
1. X inch Product Name (Product Key)

a. Only include measurement if there is one in the original name

c. Vendor

iii. The third column label should be changed from “Description” to “Vendor” by clicking on Column Settings

iv.



v. If it is a 1403 part, the vendor should be 1403. If not, then it should be the vendor’s name (like VEXPro)

d. Material

i. The material in the Title Box should be “Refer to Parts List”

ii.