

## ME478 - Project 2

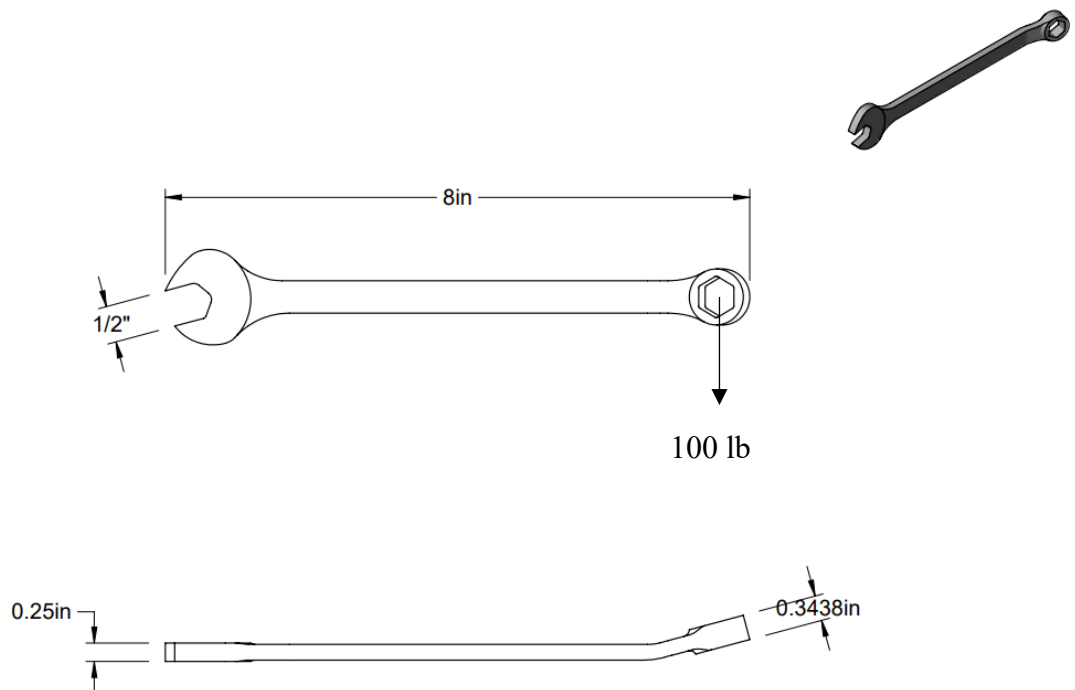
Spring 2024

Assigned: 4/3/2024

Due: 4/12/2024

Number of team members =2

1. You bought a new steel wrench and now you want to analyze the stresses and deformation that occurs when you loosen a bolt. The wrench is shown below:



Material properties of steel:

$E = 30 \text{ Mpsi}$

Poisson's ratio = 0.3

Simulate using ANSYS and determine the maximum principle stress on the wrench when you apply a 100lb of force at the end of the wrench to loosen a bolt.

Note: You can get the exact model of your wrench here:

<https://www.mcmaster.com/56945A24/>

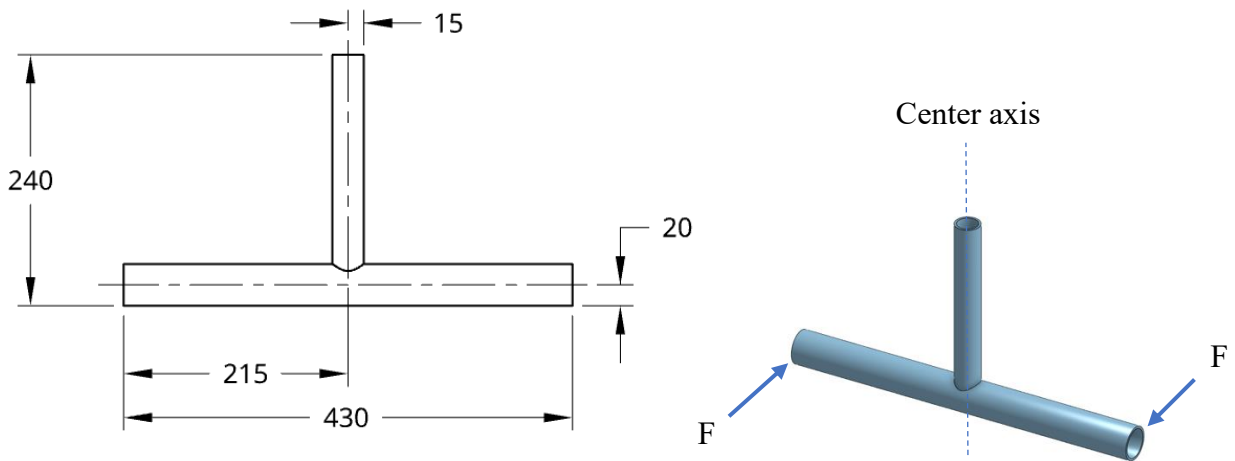
2. You have a customized T-key as shown below (dimensions are in mm). The key consists of hollow pipes of different diameter, all with a thickness of 4mm.

Material properties:

$E = 205 \text{ GPa}$

Poisson's ratio = 0.3

Yield strength = 250 MPa



Analyze the principal stresses and deformation around the connection between the two different pipes of the key if a load of  $F = 500\text{N}$  is applied at the ends of the bigger pipe as shown. Assume that the (upper) end of the smaller pipe is fixed. What is the maximum force that you can apply to the handle without yielding the material.