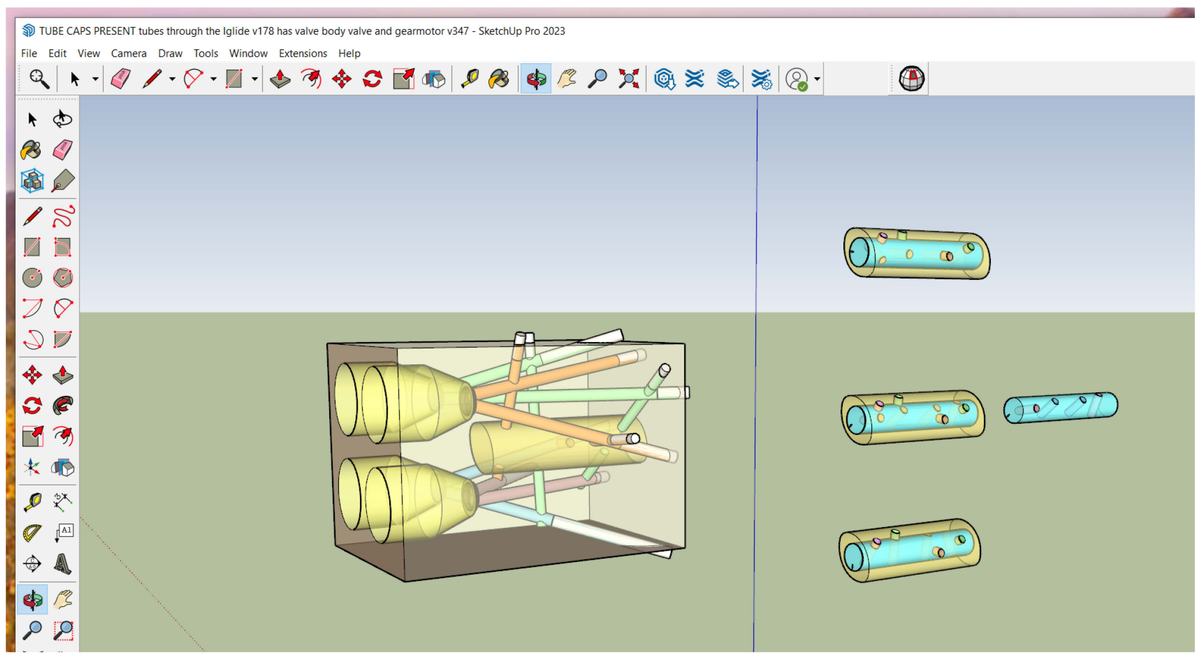
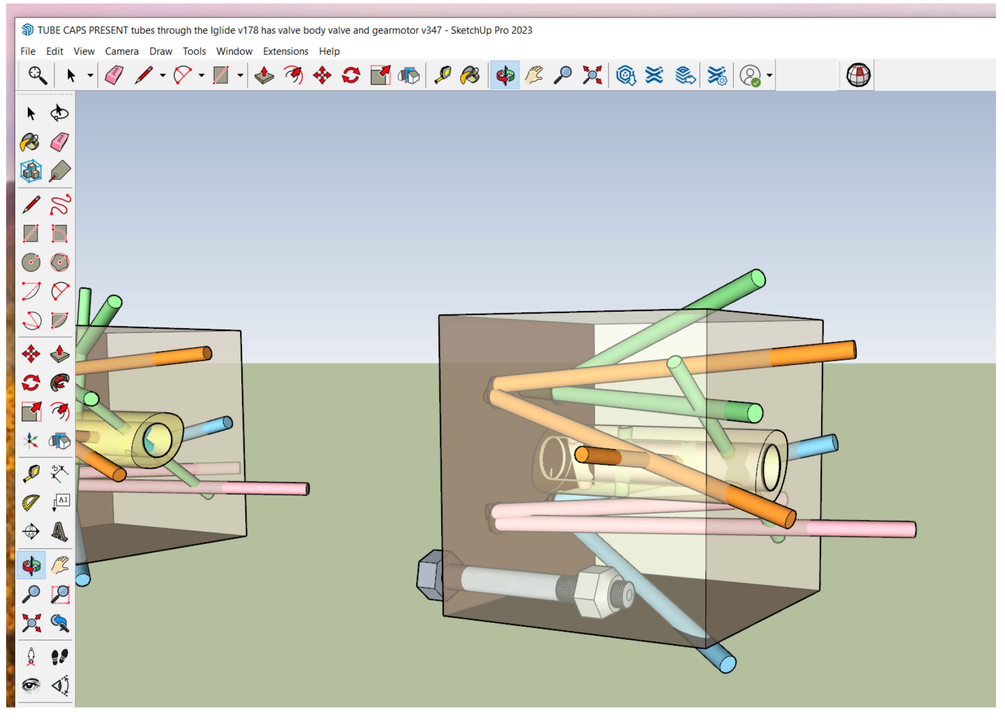
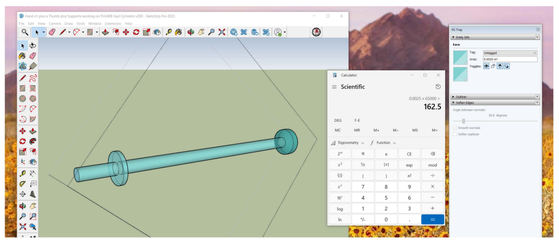
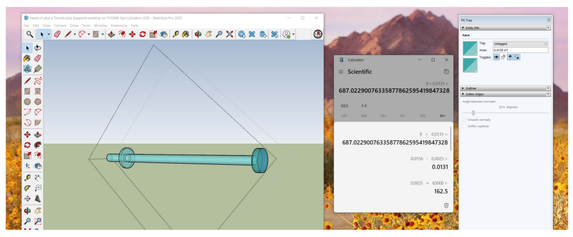
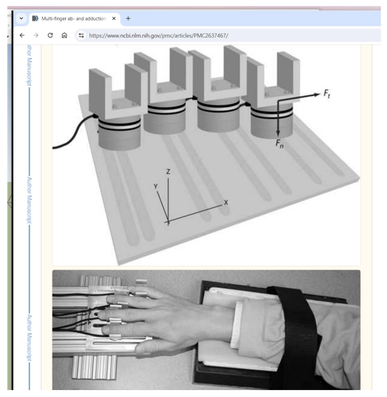
Microvalve Stem Torque Math Calculations

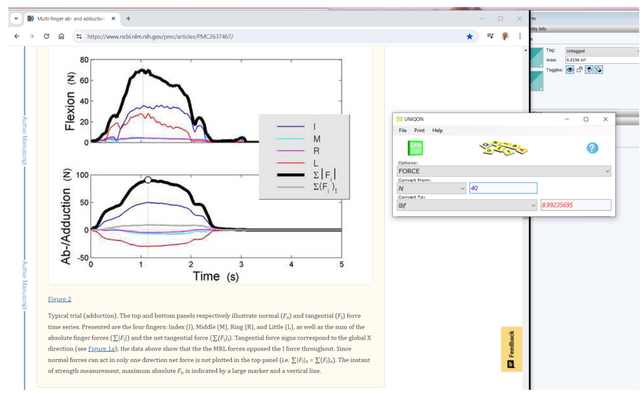


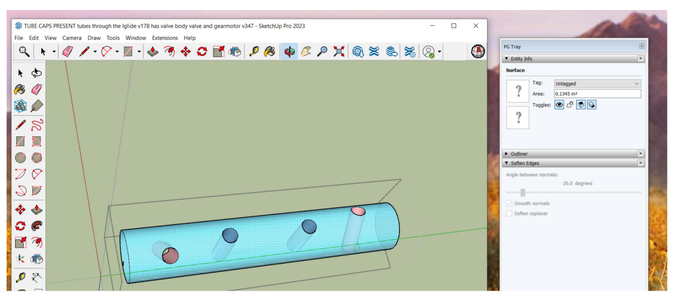


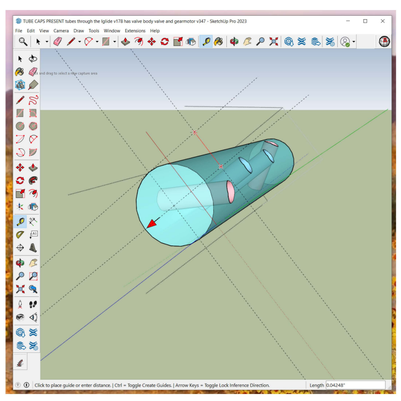


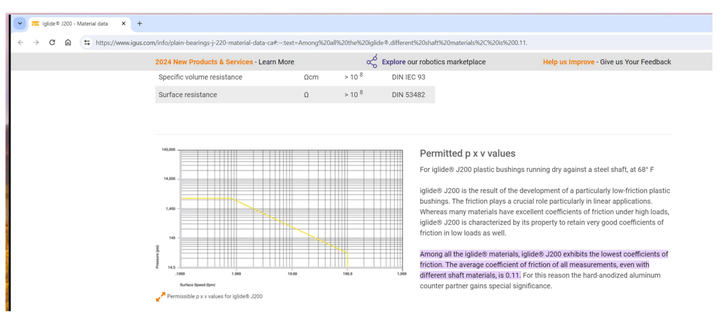


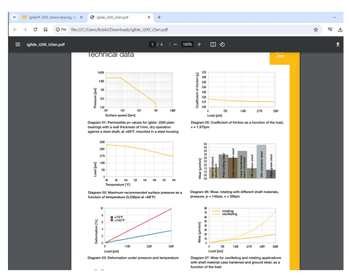


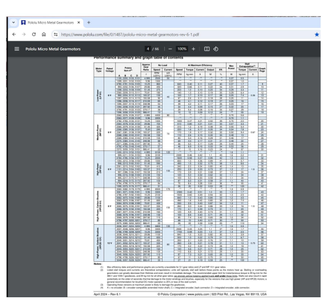


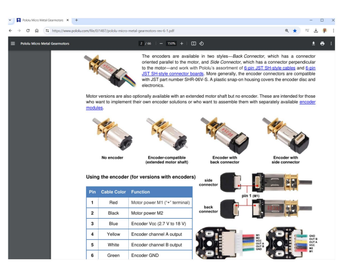


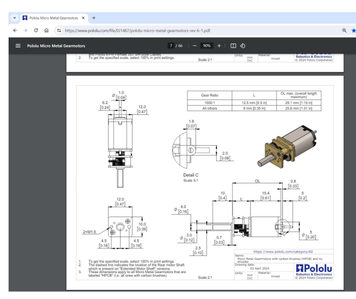












Piston rod tensile strength 0.0025 in² x 65000psi = 162 lbs
Piston rod compressive strength = 162/2 = 81 lbs

Force needed from the piston rod = 40 N = 9 lbs

Piston head on the rod side area = Piston head area - rod area
this is 0.0156 in² - 0.0025 in² = 0.0131 in²

9 lbs force from 0.0131 in² = (9)/(0.0131) = 687 psi (will use 900psi)

Surface area of stem = 0.1345 in² 0.1345 in² x 900psi = 121 lbs force
121 lbs force x friction coefficient of 0.11 = 13.3lbs to turn stem

This 13.3lbs to turn stem is applied at radius of stem = .0425 inches
This torque of 13.3lbs at 0.0425 in = (13.3)x(.0425) = 0.565 inch-lbs torque
0.565 in-lbs torque = 650 gm-cm = 0.65 kg-cm = 6.5 Kg-mm = 65 mNm