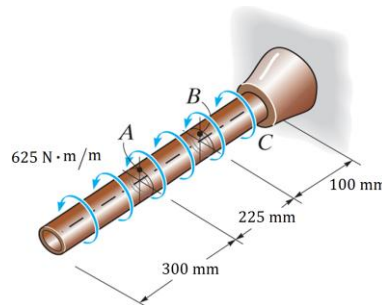
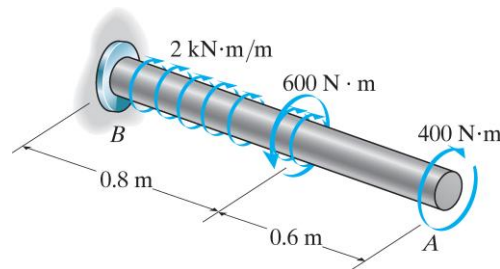


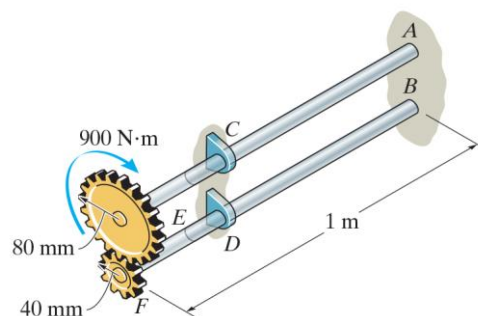
1. The copper pipe has an outer diameter (外直徑) of 62.5 mm and an inner diameter (內直徑) of 57.5 mm. If it is tightly secured (緊固定) to the wall at *C* and a uniformly distributed torque (均勻分佈扭力) is applied to it as shown, determine the shear stress developed at points *A* and *B*. These points lie on the pipe's outer surfaces (外表面). [15%] Ans: 13.79, 24.14 MPa



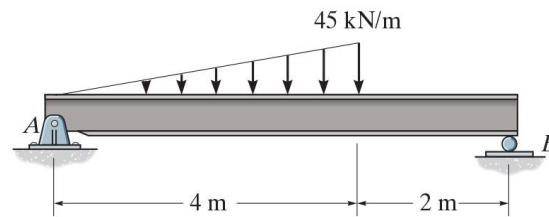
2. The 60-mm-diameter solid shaft is made of a-36 and is subjected to the distributed and concentrated torsional loadings (分佈力和集中力) as shown. Determine the angle of twist at the free end *A* of the shaft. $G=75$ GPa. [15%] Ans: -0.007545 rad



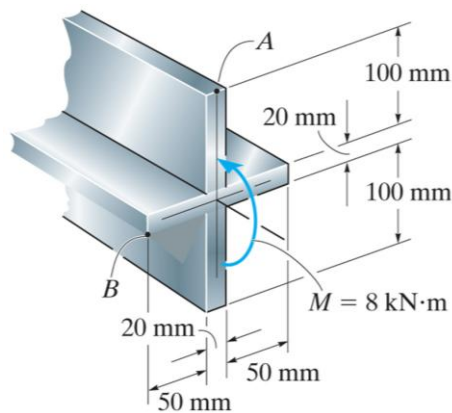
3. The two 1-m-long shafts are made of 2014-T6 aluminum. Each has a diameter of 30 mm and they are connected using gears (齒輪) fixed to their ends. Their other ends are attached to fixed supports at *A* and *B*. They are also supported by bearings (軸承) at *C* and *D*, which allow free rotation (自由旋轉) of the shafts along their axes. If a torque of 900 N·m is applied to the top gear as shown, determine the maximum shear stress in each shaft. Take $G=75$ GPa. [20%] Ans: 67.9, 34.0 MPa



4. Draw the shear and moment diagrams for the beam. You must show the values of the shear force and moment at all the transition points (轉折點). [20%]



5. The aluminum strut has across-sectional area in the form of a cross. If it is subjected to the moment $M=8 \text{ kN} \cdot \text{m}$, determine the bending stress acting at points A and B. [15%] Ans:-49.401, +4.491 MPa



6. The aluminum machine part is subjected to a moment of $M=75 \text{ N} \cdot \text{m}$. Determine the bending stress created at points B and C on the cross section. [15%] Ans:-3.612, -1.548 MPa

