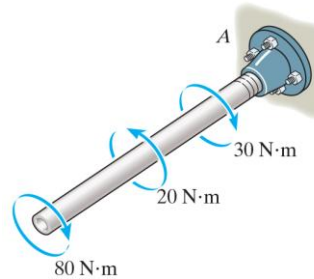
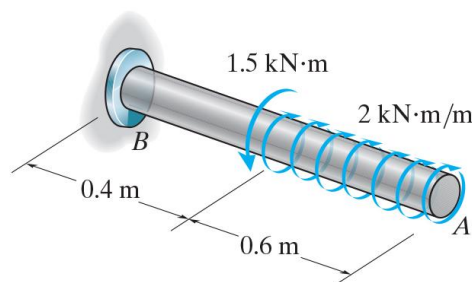


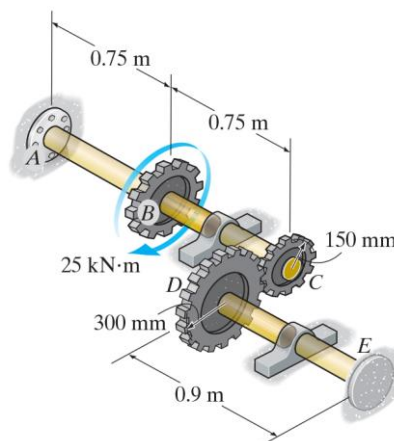
1. The copper pipe has an outer diameter (外直徑) of 40 mm and an inner diameter (內直徑) of 37 mm. If it is tightly secured (緊固定) to the wall at A and three torques are applied to it as shown, determine the absolute maximum shear stress developed in the pipe. [15%] Ans: 26.7 MPa



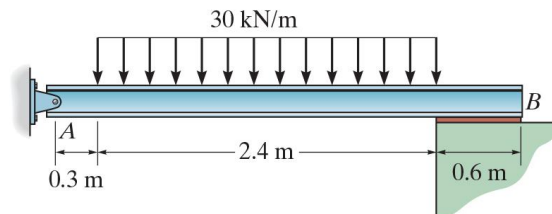
2. The 60-mm-diameter solid shaft is made of 2014-T6 aluminum and is subjected to the distributed and concentrated torsional loadings (分佈力和集中力) as shown. Determine the angle of twist at the free end A of the shaft.  $G = 27 \text{ GPa}$ . [15%] Ans:  $-0.4^\circ$



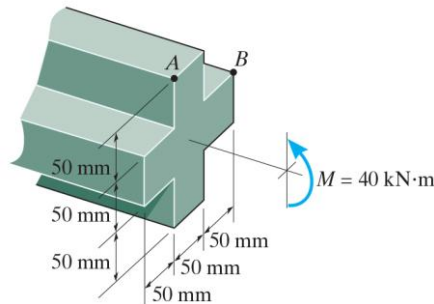
3. The shafts are made of A-36 steel and have the same diameter of 100 mm. A torque of 25 kN·m is applied to gear B. (a) Determine the absolute maximum shear stress developed in the shaft. (b) Determine the angle of twist of gear B. Take  $G_{st} = 75 \text{ GPa}$ . [20%] Ans: 108.6 MPa,  $-1.24^\circ$



4. The beam is bolted or pinned at  $A$  and rests on a bearing pad (支撐墊) at  $B$  that exerts a uniform distributed loading (施加均勻分佈力) on the beam over its 0.6-m length (橘色支撐墊). Draw the shear and moment diagrams for the beam if it supports a uniform loading of 30 kN/m. You must show the values of the shear force and moment at all the transition points. [20%] Ans: V:36, -36, 0, M:0, 32.4, 0



5. The beam is subjected to a moment of  $M=40 \text{ kN}\cdot\text{m}$ , determine the bending stress at points  $A$  and  $B$ . [15%] Ans: 199, 66.2 MPa



6. If the beam is subjected to a moment of  $M=100 \text{ kN}\cdot\text{m}$ , determine the bending stress at points  $A$ ,  $B$ , and  $C$ . [15%] Ans: -122, 51.1, 35.4 MPa

