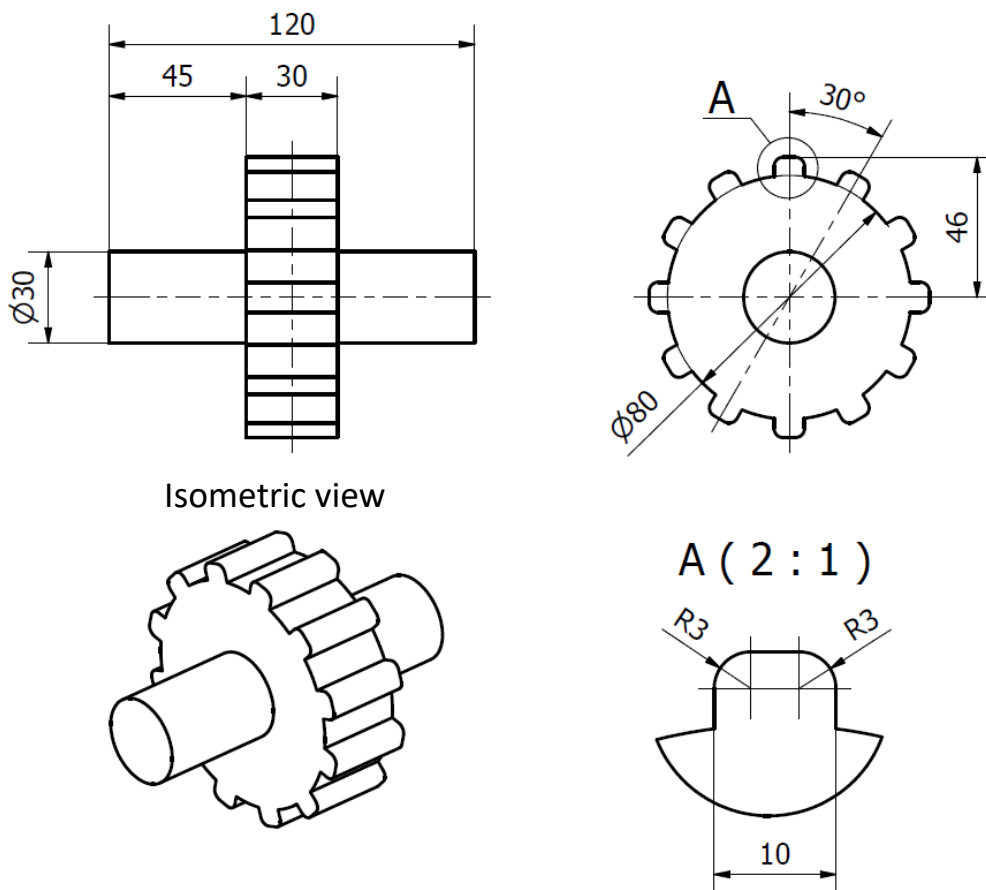


List 13

Task 1

According to the dimensions shown in the figure below, a model of the shaft segment along with the toothed pulley gear wheel should be prepared. Assume the component is made of structural steel (Young's modulus $E = 200 \text{ GPa}$; Poisson's ratio $\nu = 0,3$). The toothed belt causes the pulley gear wheel to rotate with a torque of $M_1 = 1000 \text{ N}\cdot\text{m}$, while the belt tension force is $F_1 = 500 \text{ N}$. Due to a failure, the shaft has become blocked, resulting in the shaft and the toothed pulley gear wheel remaining stationary despite the applied torque M_1 . For the analyzed structure, the total displacements and the reduced stresses according to the Huber-von Mises hypothesis should be determined.



Do the considered operating conditions lead to exceeding the allowable stresses? What potential design modifications could increase the strength of the analyzed component?