

Sheet 3: Shaft Design

Problem 1:

A line shaft supporting two pulleys A and B is shown in Figure 1. Power is supplied to the shaft by means of a vertical belt on pulley A, which is then transmitted to pulley B carrying a horizontal belt. The values of belt tensions are shown in the Figure 1. The shaft is made of plain carbon steel ($S_u = 650$ MPa, $S_y = 380$ MPa). Determine the shaft diameter according to the ASME code.

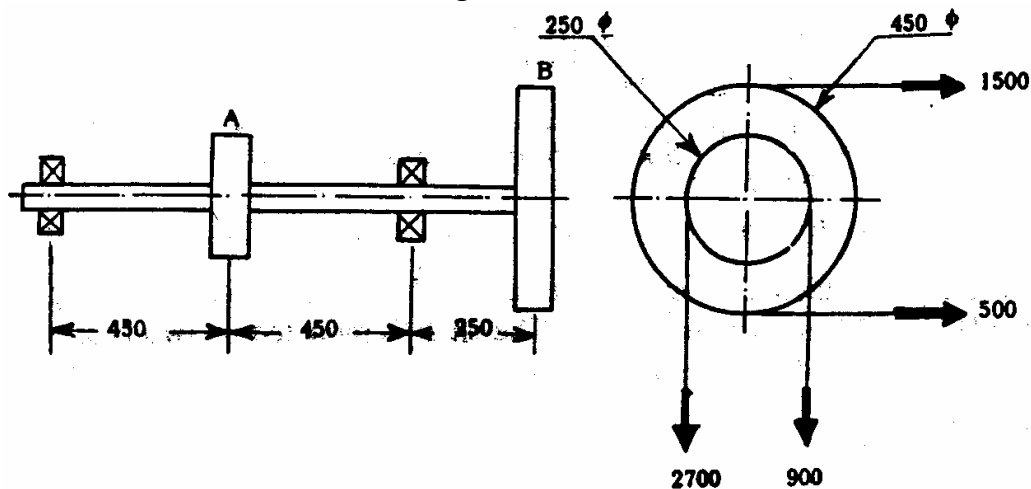


Figure 1

Problem 2:

The layout of an intermediate shaft of a gear box supporting two spur gears B and C is shown in Figure 2. The shaft is mounted on two bearings A and D. The pitch circle diameters of gears B and C are 900 and 600 respectively. Determine the shaft diameter according to the ASME code. The shaft material is St 50 ($S_y = 350$ MPa).

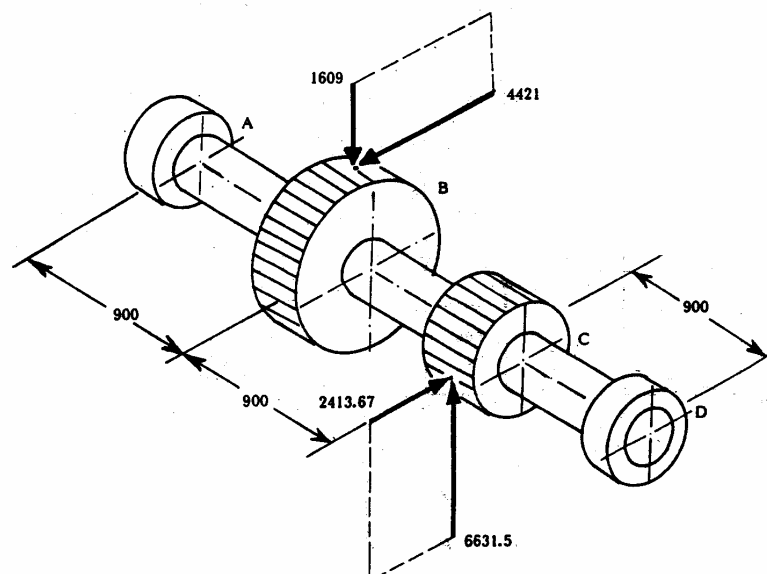


Figure 2

Dimensions are in mm, Forces are in N