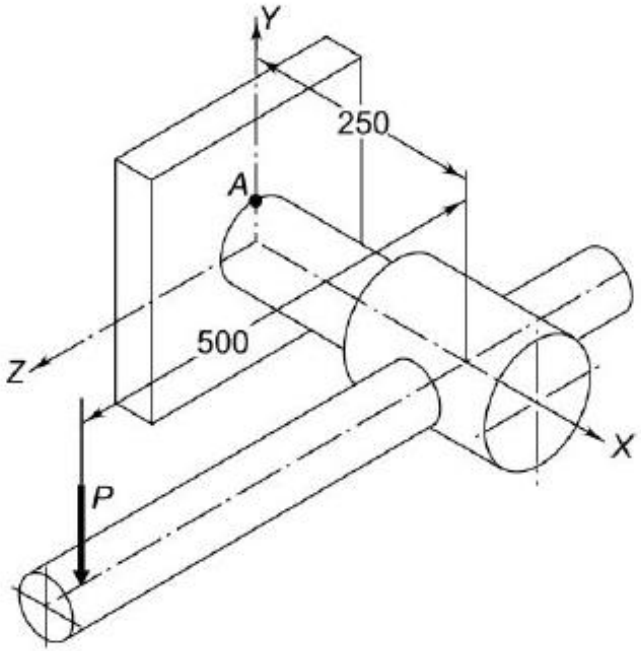
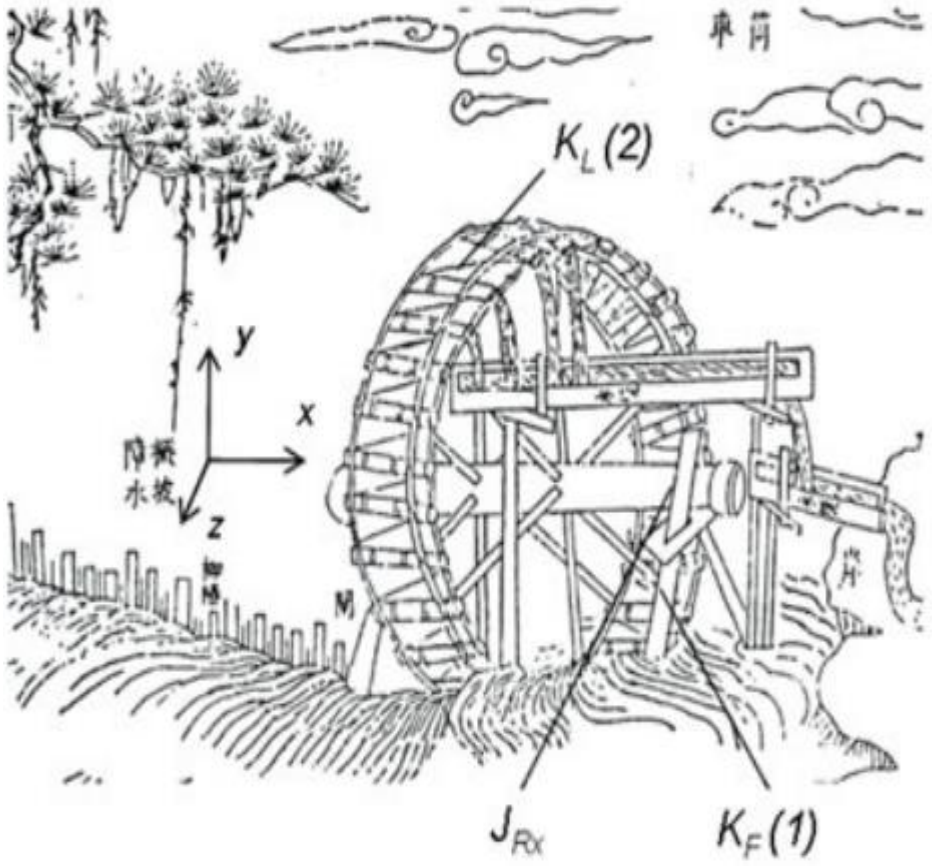
Design exercise

The shaft of an overhang crank subjected to a force *P* of 1kN is shown. The shaft is made of plain carbon steel 45C8 and the tensile yield strength is 380MPa. The factor of safety is 2. Determine the diameter of the shaft if the maximum permissible shear stress is assumed to be half the allowable tensile yield stress (all dimensions in mm)



Ancient Chinese mechanisms

A cylinder wheel Tong Che (筒車)



How would you analyse the stresses in the supporting beam?