



The given drawing shows the basic features of a hydraulic crane with a lifting capacity of **W= 0.5 ton**. The crane is composed of a hydraulic cylinder **(1)** manufactured from AISI 1030 steel, a high carbon steel hook **(2)** by which the objects are carried, steel boom **(3)** and a frame fabricated from carbon steel **(4)**.

You are required to:-

1- By assuming the hydraulic cylinder used for operating this crane has a bore diameter of 80 mm, find the following:

- a- The oil pressure required to operate this cylinder
- b- Cylinder wall thickness, its material has **S_y = 320 MPa** and safety factor= **5**
- c- Pin diameter **(# 5)**, its material is **St 50** and safety factor= **5**

2- Design the boom **(3)**, assume its cross section is hollow square box with **100** sides and its material is **St. 1020 (S_y= 340 MPa)** and safety factor = **5** , (find the section thickness of boom)

