SHEET (3)
POWER SCREW

1. The 70-mm screw of a 30 kN shop press has a square double Thread. The handwheel has a diameter of 1.6 m and the mean diameter of the thrust collar is 62mm. Determine: Pitch = 12mm
   (a) the force that must be applied to the handwheel assuming that the coefficient of friction is 0.12 in the threads and 0.125 in the thrust collar
   (b) the efficiency of the threads

2. The power screw of a 500 kN screw jack has a diameter of 70 mm and a square thread. Take the coefficient of friction in the threads 0.12 and neglect the collar friction. The thread pitch is 12 mm. Determine :
   (a) the torque required to move the load
   (b) the efficiency of the screw
   (c) the factor of safety for the screw when made of 0. 4% CD steel having $S_y = 605$ MPa
   (d) the bearing pressure in the threads if the height of nut is 240 mm.
   stress

3. A torque applied to the lower end operates the screw shown in Fig. 2.1. The nut is loaded and prevented from turning by guides. Assume friction in the ball bearing to be negligible. The screw has a 45-mm outside diameter and a triple ISO trapezoidal thread. The pitch is 8 mm. Thread friction is 0.15.   *over-hauling*
   (a) Determine the load which could be raised by a torque of 40 J. Would the screw be over-hauling?
   stress
   (b) Determine the bearing pressure between the threads of the screw and nut.

4. The 70-mm double thread screw of a 10 kN shop press shown in Fig. 2.2 has a square thread. The operator's force may be taken 180 N for each hand. The mean diameter of collar is 60 mm. Determine:
   (a) the diameter D assuming that the coefficient of friction is 0.12 in the threads and 0.125 at the collar. The pitch is 12 mm
   (b) the efficiency of the press
   (c) the maximum normal and shear stresses in screw
   (d) the bearing pressure in the threads
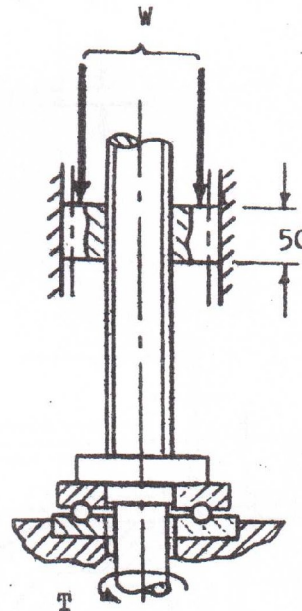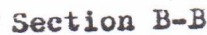   (e) the maximum normal stress in the frame at A-A making 45° to the horizontal and at section B-B.

Fig. 2.1

Section B-B

Fig. 2.2

5. The following data apply to the C-clamp shown in Fig. 2..3: Pitch = 1.75 mm (single threaded). Outside diameter =12mm. Root area = 76.25 mm². Coefficient of thread friction = 0.12. Coefficient. Of collar friction = 0.25. Mean collar radius = 6 mm. Load W = 4 kN. Operator can comfortably exert a force of 80 N at the end of the handle.

= inner

(a) What length of handle, L is needed?

(b) What is the maximum shear stress in the screw body?

Fig. 2.3

What is the bearing pressure on the threads?

(6) It is proposed to make a screw jack in accordance with the sketch of Fig. 2.4. Neither screw rotates. Outer screw diameter is 50 mm. The thread is single and square. The coef-ficient of thread friction is 0.15. Determine the efficiency of the jack. What load can be raised if the allowable shear stress in the bodies of the screws is 28 MPa? Neglect bending stress in the lower screw.
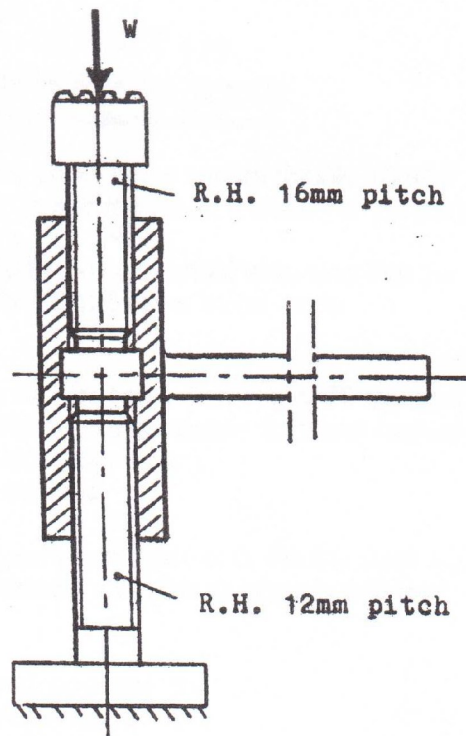
(7) The following data apply to the machinist clamp shown in Fig. 2.5.
 * Outside diameter of screw = 12 mm.
 * Root diameter = 10.16 mm.
 * Pitch (single thread) = 1.5 mm. _=mean_
 * Collar friction radius = 5 mm.
 * Coefficient of collar friction = 0.15.
 * Coefficient of screw friction = 0.15

The machinist can comfort-ably exert a maximum force of 120 N on the handle. Determine:

(a) The clamping force developed between the jaws of the clamp.

(b) The efficiency of the clamp.
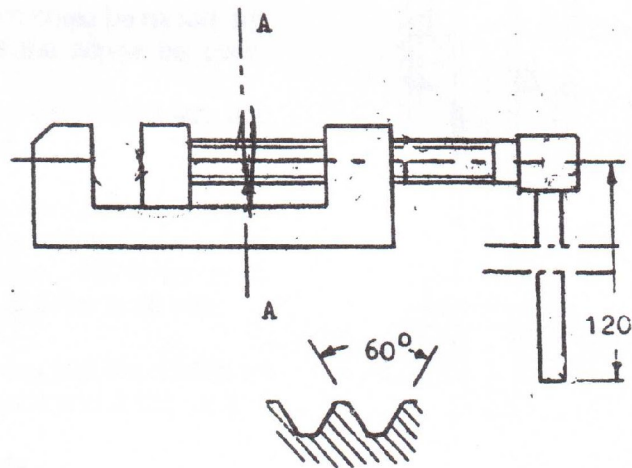
(c) The torque in the screw body at section A-A.

Fig. 2.4

Fig. 2.5