

APPLIED MECHANICS LAB.

INSTRUCTION SHEET WORM GEARED SCREW JACK.

1. AIM:

To determine Mechanical Advantage (M.A), Velocity Ratio (V.R), efficiency (η) and to check Law of machine of a worm geared screw jack.

2. EQUIPMENT REQUIRED.

- 2.1 Worm geared screw jack.
- 2.2 Weights.
- 2.3 Vernier caliper
- 2.4 Rope.
- 2.5 Effort pan & hanger.

3. DESCRIPTION ABOUT MACHINE.

Pitch of screw jack (p) =

Diameter of screw head (D) =

No of teeth on the gear wheel.(T) =

4. THEORY.

Worm geared screw jack is a combination of worm gearing and a simple screw jack. The worm gear consists of a worm axle and a gear wheel. The gearwheel is rigidly attached with the lifting screw. The worm axle is provided with a effort wheel, if the effort is applied on the pan, the worm axle will rotate and it will rotate the gearwheel. Ultimately the lifting screw will rotate. As the nut is fixed and the screw is rotating, the Screw will move up or down. The worm has single started thread,i.e, when the worm axle rotates one revolution the gear wheel moves by one teeth.

4.1 MECHANICAL ADVANTAGE

The Mechanical Advantage is the ratio of Load (W) lifted to Effort (P) Applied.

$$\text{Thus, M.A} \Rightarrow W/P$$

4.2 VELOCITY RATIO

The Velocity Ratio (V.R) is the ratio of the distance moved by effort (y) to the distance moved by Load (x).

$$\text{Thus, V.R} \Rightarrow y/x$$

$$\Rightarrow y/x = \frac{T \cdot \pi D}{P}$$

where, T = No of teeth on the gear wheel.

D = Diameter of effort wheel

p = Pitch of screw.

4.3 EFFICIENTY(η):-

$$(\eta) = \text{output} / \text{input}$$

$$= \frac{\text{load lifted} \times \text{distance through which load is lifted}}{\text{effort applied} \times \text{distance covered by the effort}} = \frac{W \times X}{P \times Y} = \frac{W/P}{Y/X} = \frac{M \cdot A}{V \cdot R}$$

4.4 LAW OF MACHINE

It provides the relationship between effort and the corresponding load lifted by the application of effort.

$$P = MW + C \text{ ----- (1)}$$

- where P = Effort applied
M = Const. called coefficient of friction which equal to slope of the line.
W = Load lifted.
C = Const. called machine friction.

5.PROCEDURE:

- 5.1 Measure pitch of screw, dia of pulley and no. of teeth on the gear wheel then find out V.R.
- 5.2 Measure machine friction ‘C’ at no load condition.
- 5.3 Take ten readings taking different loads and efforts.
- 5.4 Calculate efficiency in each time and calculate mean efficiency.
- 5.5 Draw the graph between load Vs effort.
- 5.6 Determine the coefficient of friction ‘M’ from the graph.
- 5.7 By putting the values of ‘M’ and ‘C’ in equation (1) we determine from which the law of machine, we can find out the amount of effort required to lift any load.

4 OBJERVATION:

Sl no	‘C’ Machine friction	‘M’ Coefficient Of Machine friction	V.R	W in (kg)	P in (kg)	Mechanical Advantage W/P	η efficiency	Mean (η)

7. CALCULATION:

8. CONCLUSION:

Because of the worm and worm wheel the velocity ratio is T times bigger that of a simple screw jack.