

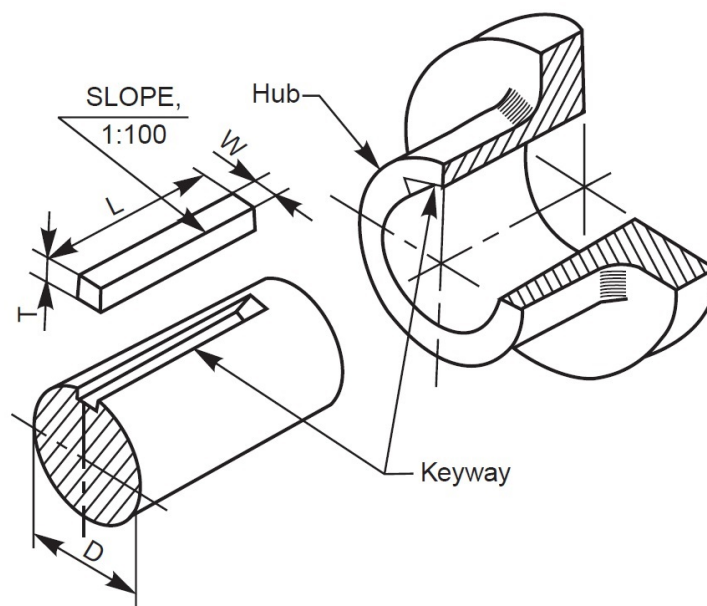
Experiment 2

Keys and Cotter Joints

1. Description

Overview

Keys, cotters and pin joints discussed in this chapter are some examples of removable (temporary) fasteners. Assembly and removal of these joints are easy as they are simple in shape. The standard proportions of these joints are given in the figures.



2. KEYS

Keys are machine elements used to prevent relative rotational movement between a shaft and the parts mounted on it, such as pulleys, gears, wheels, couplings, etc. above figure shows the parts of a keyed joint and its assembly.

For making the joint, grooves or keyways are cut on the surface of the shaft and in the hub of the part to be mounted. After positioning the part on the shaft such that, both the keyways are properly aligned, the key is driven from the end, resulting in a firm joint.

For mounting a part at any intermediate location on the shaft, first the key is firmly placed in the keyway of the shaft and then the part to be mounted is slid from one end of the shaft, till it is fully engaged with the key.

Keys are classified into three types

1. Saddle keys

- (a) Hollow Saddle Key
- (b) Flat Saddle Key
- (c) Sunk Key

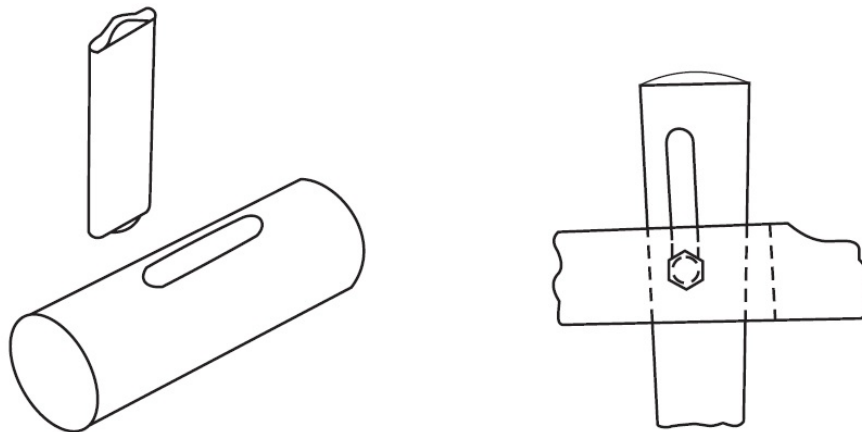
2. Sunk keys

- (a) Taper Keys
 - i. Peg Feather Key
 - ii. Single Headed Feather Key
 - iii. Double Headed Feather Key
- (c) Splines
- (d) Woodruff Key

3. Round keys

3. COTTER JOINTS

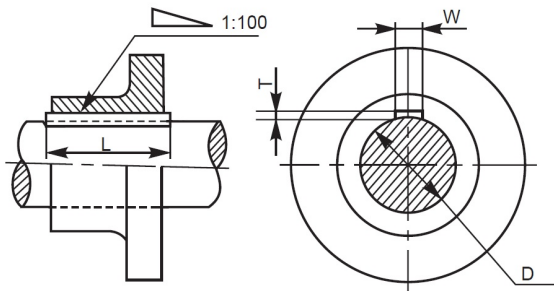
A cotter is a flat wedge shaped piece, made of steel. It is uniform in thickness but tapering in width, generally on one side; the usual taper being 1:30. The lateral (bearing) edges of the cotter and the bearing slots are generally made semi-circular instead of straight. This increases the bearing area and permits drilling while making the slots. The cotter is locked in position by means of a screw as shown in Fig.



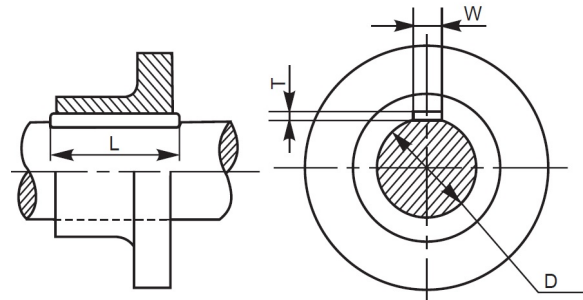
The following are some of the commonly used cotter joints:

1. Cotter Joint with Sleeve
2. Cotter Joint with Socket and Spigot Ends
3. Cotter Joint with a Gib

4. Exercise Problems

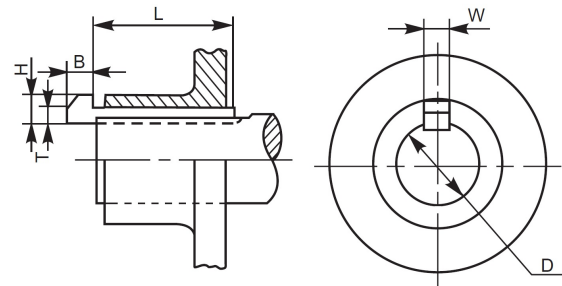


Hollow Saddle Key



Flat Saddle Key

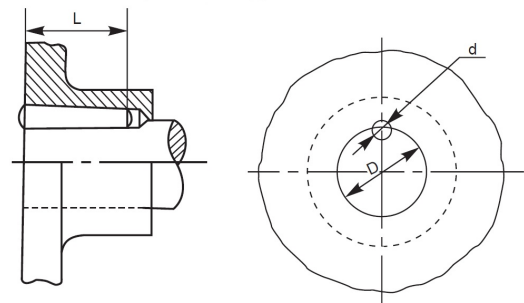
Width of key, $W = 0.25 D + 2 \text{ mm}$
 Thickness of key, $T = 0.67 W$ (at the thicker end)
 Standard taper = 1:100
 Height of head, $H = 1.75 T$
 Width of head, $B = 1.5 T$



Flat Saddle Key

For all cases take $D = 25 \text{ mm}$

for Round key
 $d = 0.25 \times D$



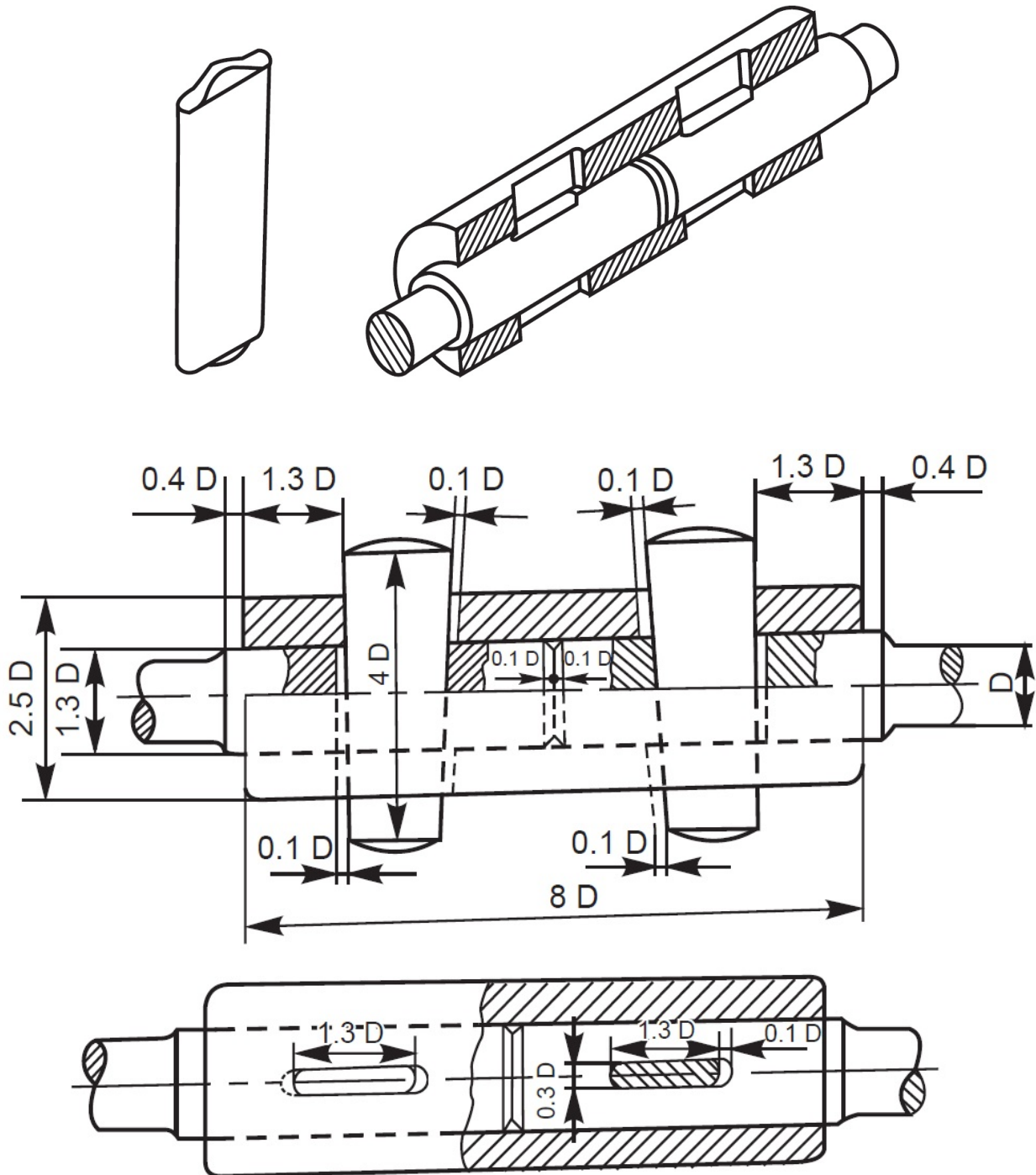
Round Key



Proportions of taper sunk keys for various shaft sizes is shown in the below table.

Shaft diameter (mm)		Width, W (mm)	Thickness, T
Over	Upto and including		(average value) (mm)
6	8	2	2
8	10	3	3
10	12	4	4
12	17	5	5
17	22	6	6
22	30	8	7
30	38	10	8
38	44	12	8
44	50	14	9
50	58	16	10
58	65	18	11
65	75	20	12
75	85	22	14
85	95	25	14
95	110	28	16

Cotter joints are used to connect two rods, subjected to tensile or compressive forces along their axes. These joints are not suitable where the members are under rotation. The following are some of the commonly used cotter joints:



Cotter joint with sleeve



5. VIVA QUESTIONS

1. What is a key and what for is it used?
2. What is the amount of taper usually provided on the face of a key?
3. What is the difference between a saddle key and a sunk key?
4. What is the purpose of providing a head at the end of a taper sunk key ?
5. Give the proportions of a gib head, in terms of shaft diameter.
6. Where and why the woodruff key is used?
7. What is a feather key and what are its uses?