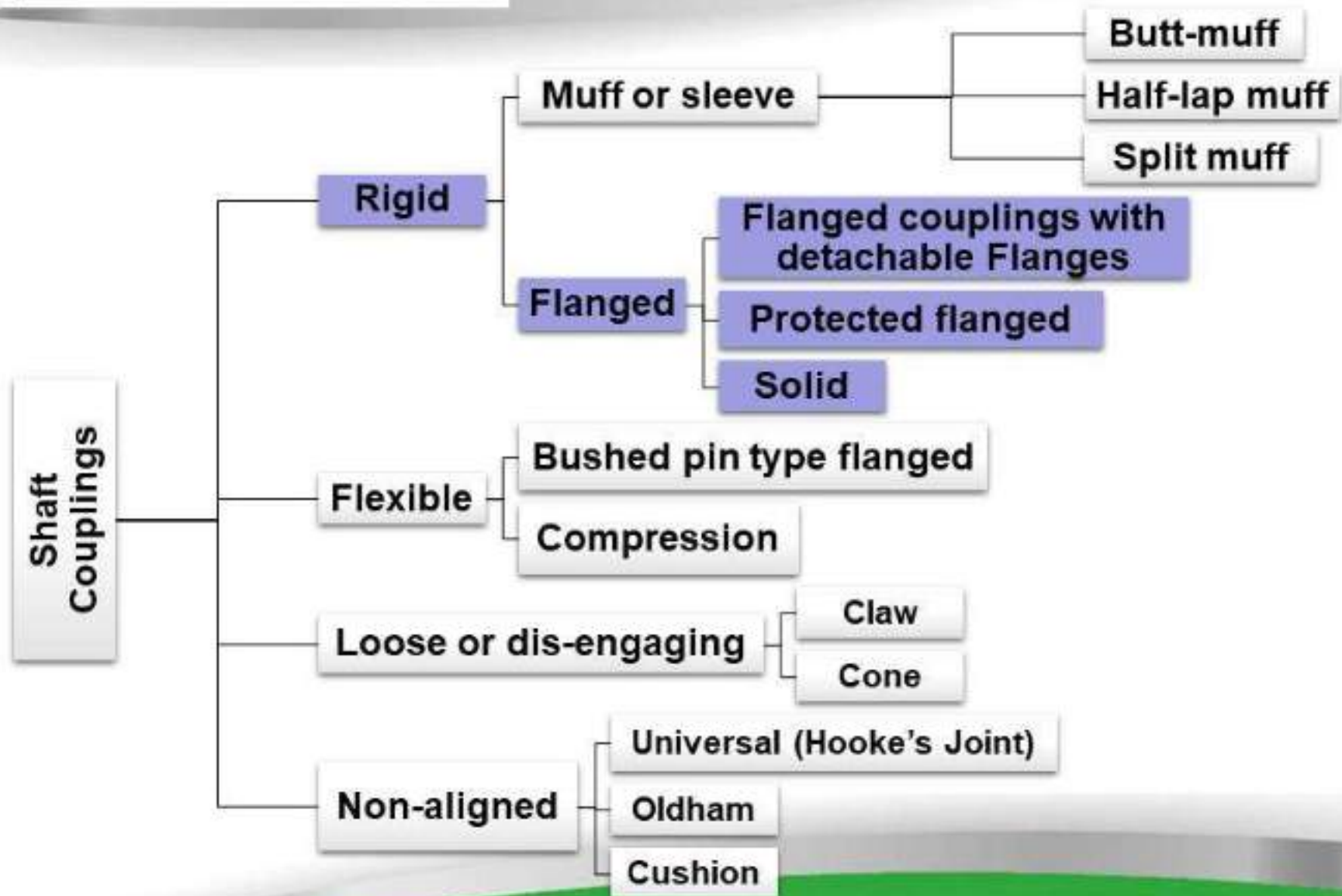


Mechanical Drawing II

Code: MAE227

Mechanical Connections **(Shaft Couplings)**

Shaft Couplings:



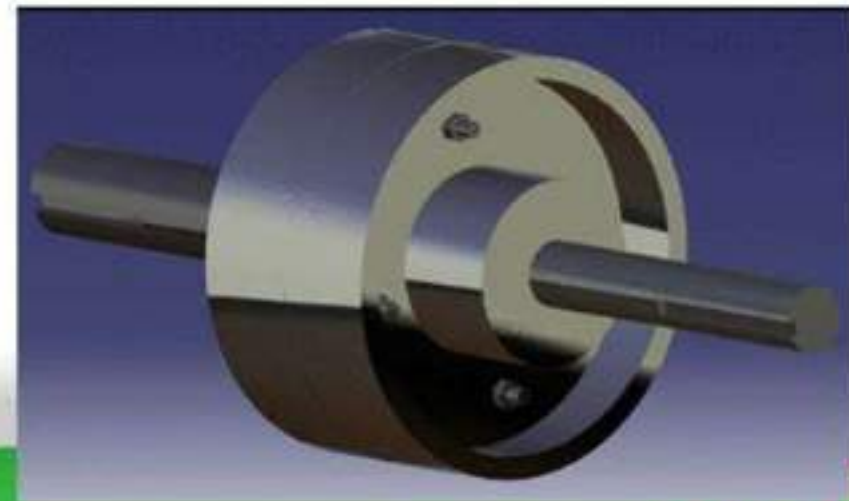
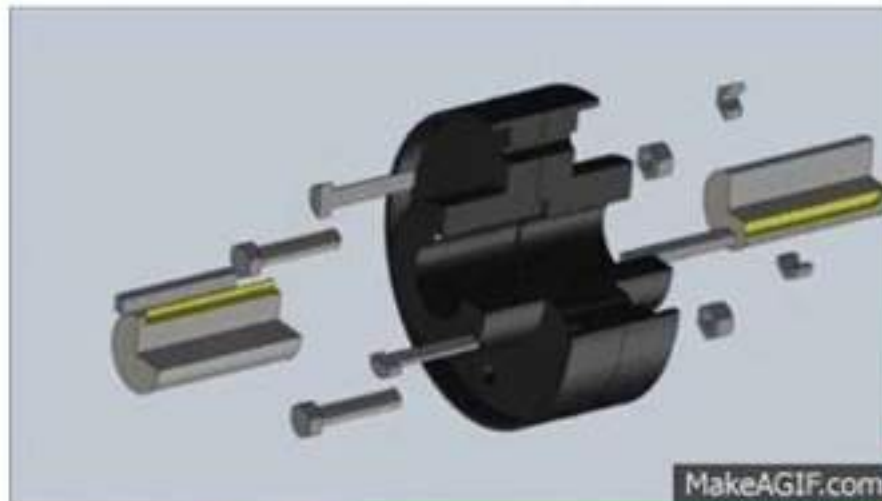
Shaft Couplings:

1. Rigid couplings:

1.2. Flanged couplings:

These are the standard forms of couplings, most extensively used. In a flanged coupling, flanges are either fitted or provided at the ends of shafts.

The flanges are fastened together by means of a number of bolts and nuts. The number and size of the bolts depend upon the power to be transmitted and hence, the shaft diameter.



Shaft Couplings:



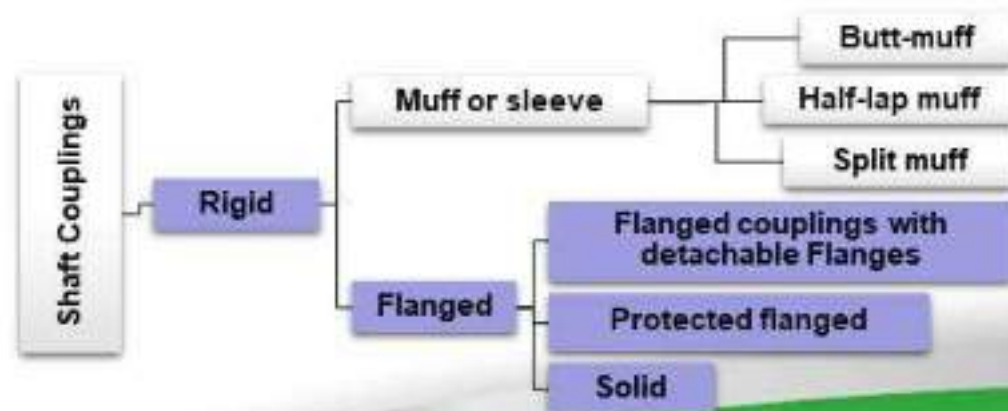
1. Rigid couplings:

1.2. Flanged couplings:

1.2.1. Flanged couplings with Detachable Flanges:

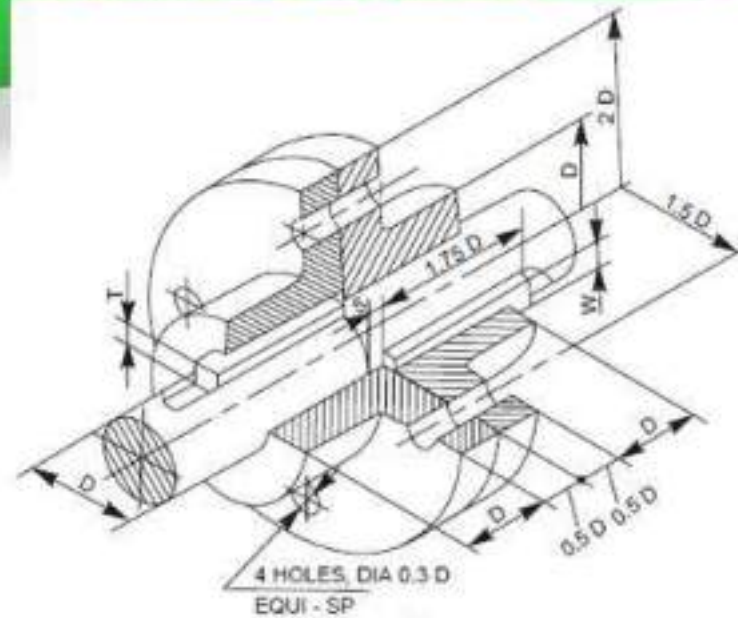
In this, two flanges are keyed, one at the end of each shaft, by means of sunk keys.

For ensuring correct alignment, a cylindrical projection may be provided on one flange which fits into the corresponding recess in the other.

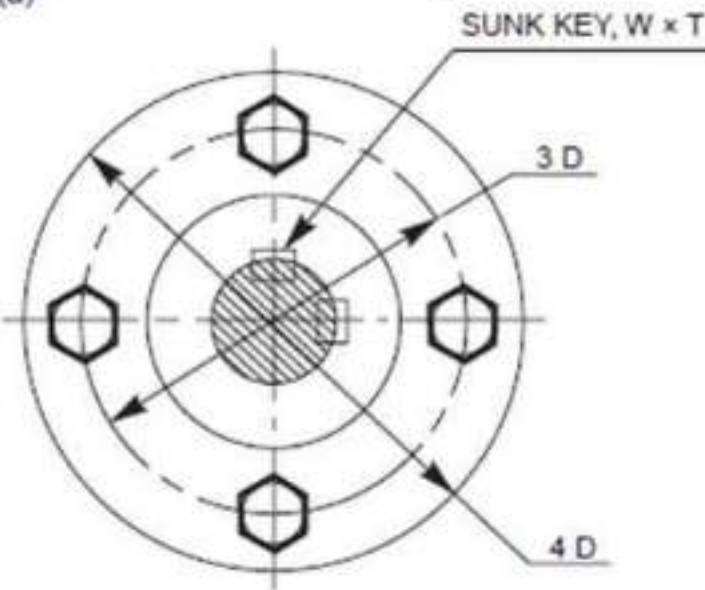
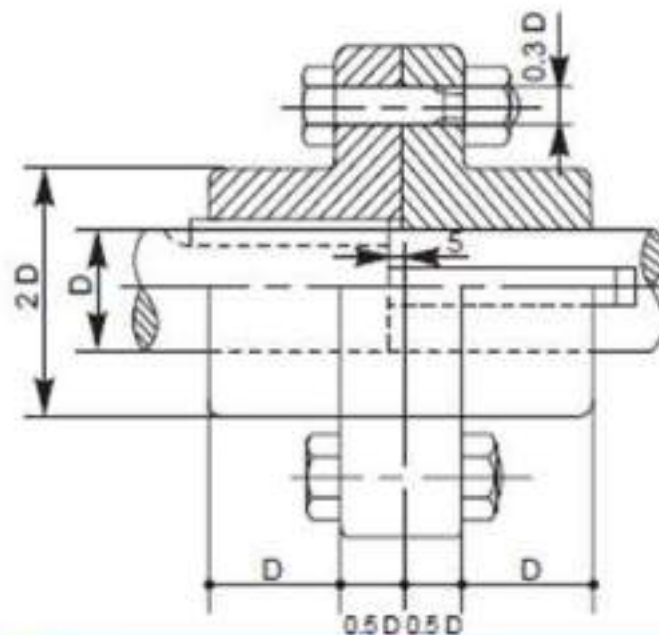


Shaft Couplings:

- 1. Rigid couplings:
 - 1.2. Flanged couplings:
 - 1.2.1. Flanged couplings with Detachable Flanges:



(a)

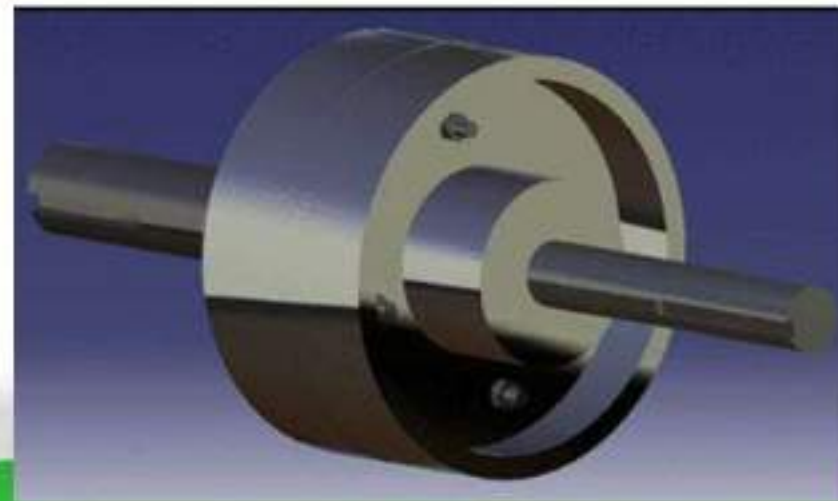
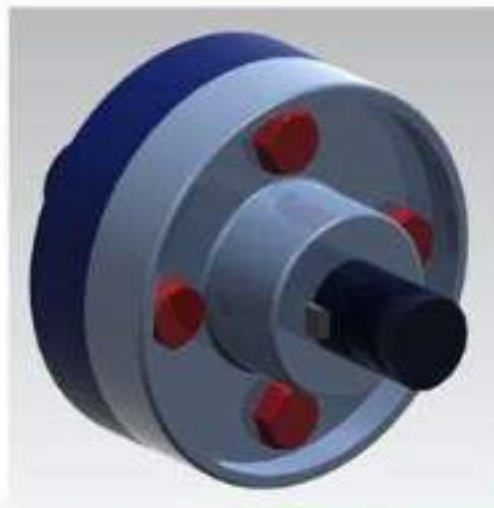


(b)

Shaft Couplings:

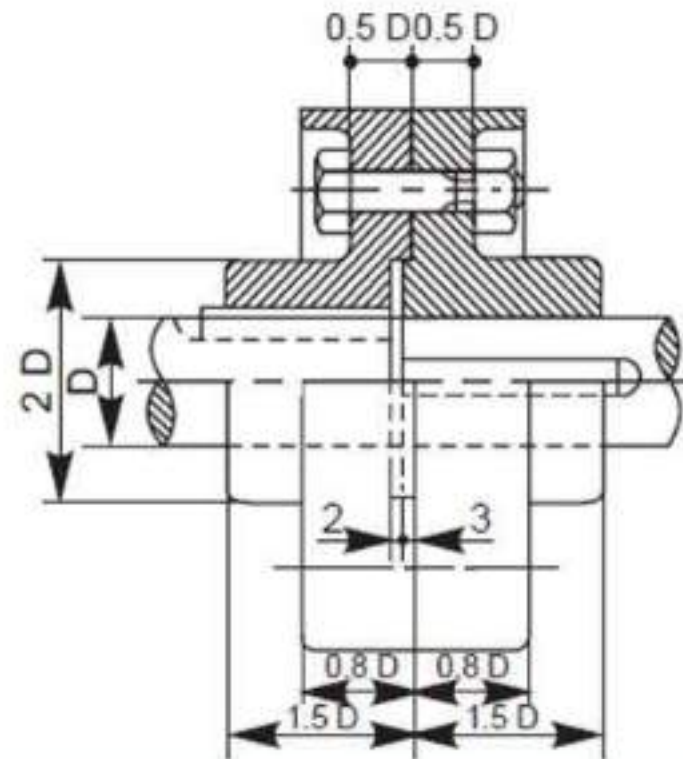
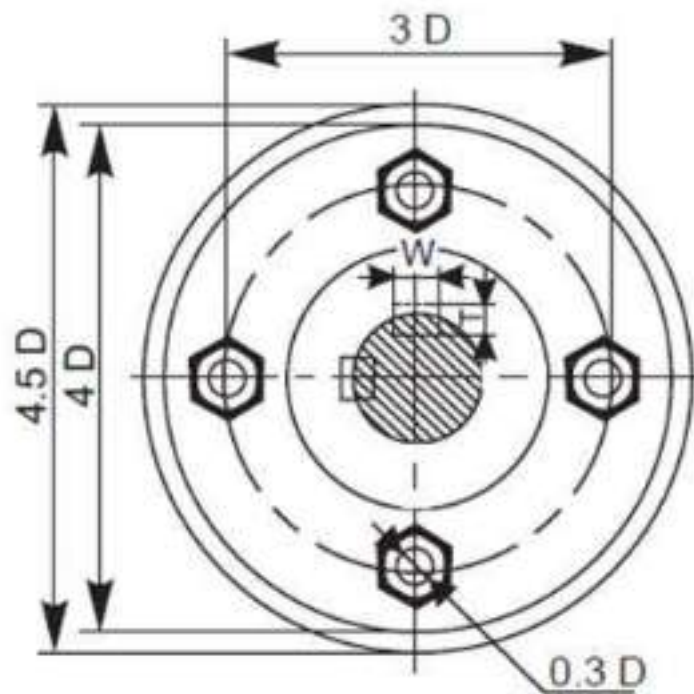
1. Rigid couplings:
 - 1.2. Flanged couplings:
 - 1.2.2. Protected flanged:

In the design shown in figure, the bolt heads and nuts are exposed and liable to cause injury to the workman. Hence, as a protection, the bolt heads and nuts may be covered by providing an annular projection on each flange.



Shaft Couplings:

- 1. Rigid couplings:
 - 1.2. Flanged couplings:
 - 1.2.2. Protected flanged:



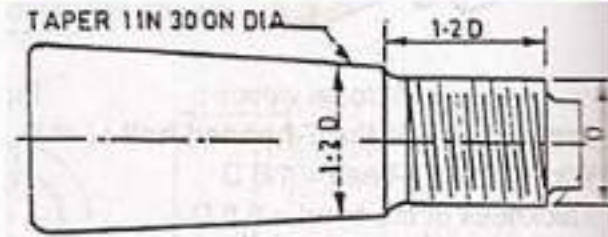
Shaft Couplings:

- 1. Rigid couplings:
 - 1.2. Flanged couplings:
 - 1.2.2. Solid flanged:

Couplings for marine or automotive propeller shafts demand greater strength and reliability.

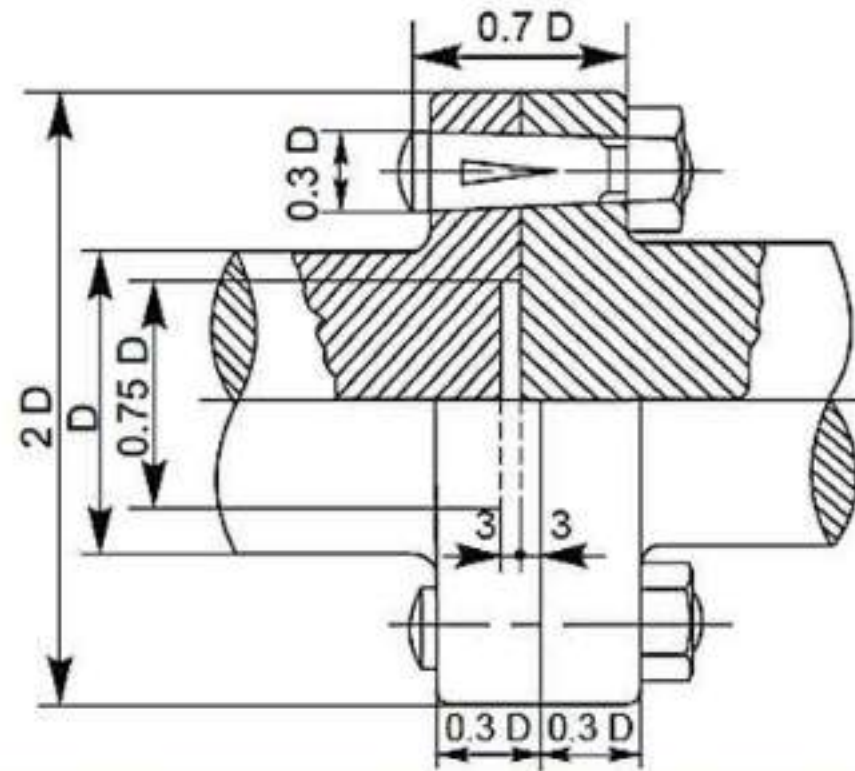
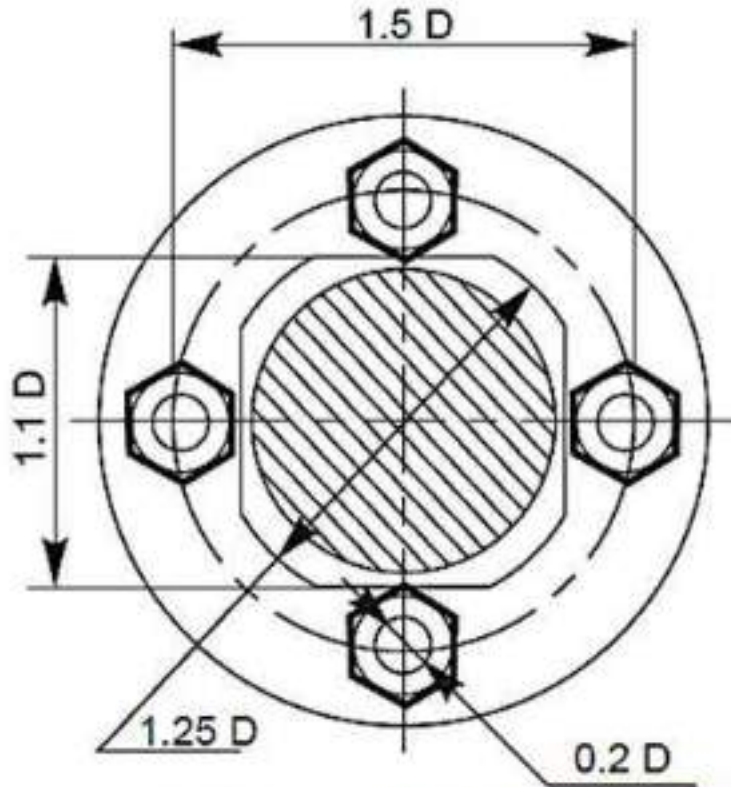
For these applications, flanges are forged integral with the shafts. The flanges are joined together by means of a number of headless taper bolts.

HEADLESS TAPERED BOLT

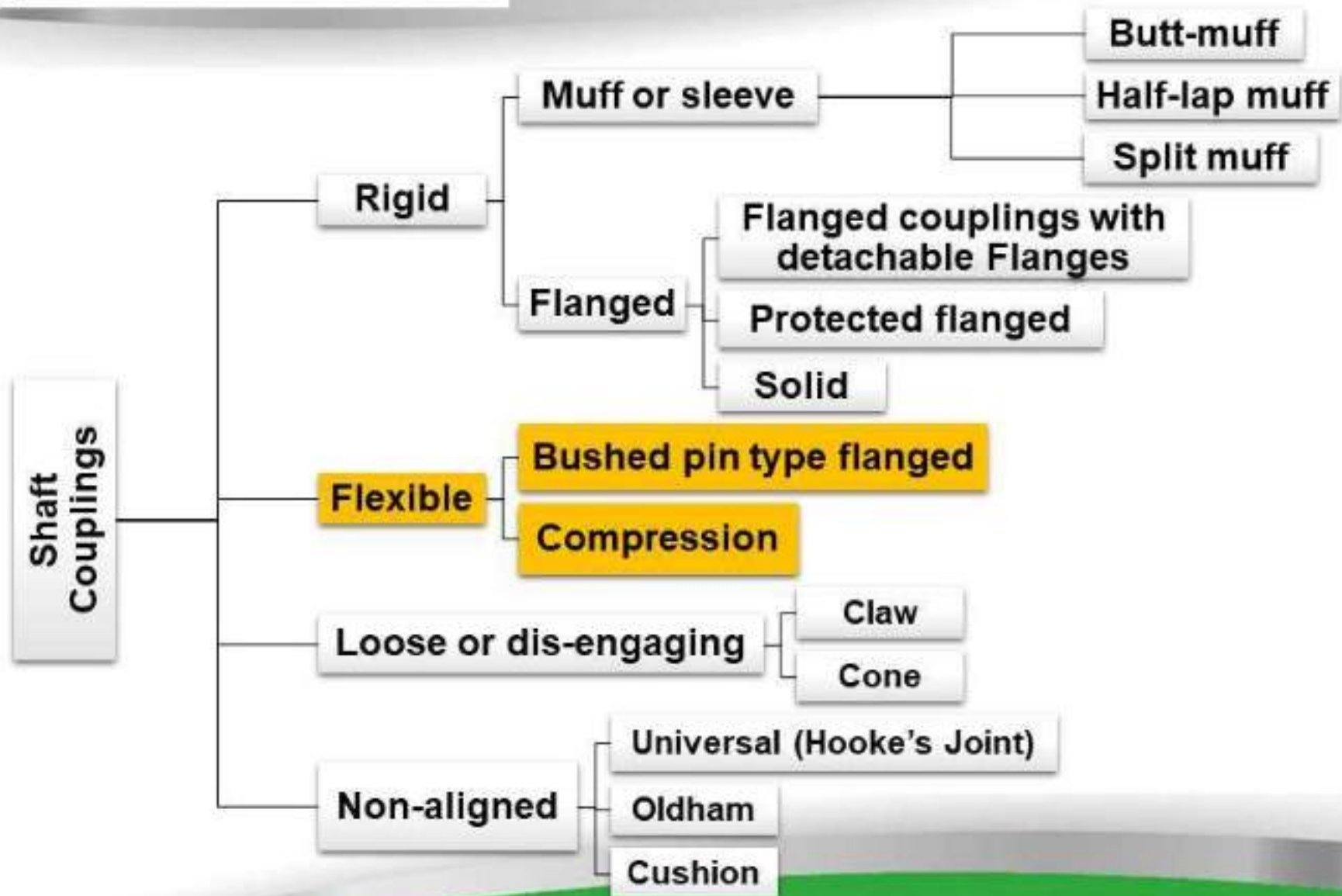


Shaft Couplings:

- 1. Rigid couplings:
 - 1.2. Flanged couplings:
 - 1.2.2. Solid flanged:



Shaft Couplings:



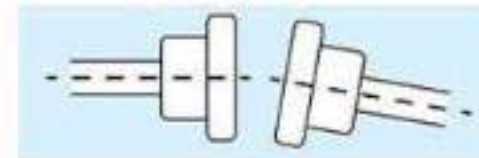
Shaft Couplings:



1. Flexible couplings:

Perfect alignment of two shafts is impossible to achieve and difficult to maintain, because of unavoidable bearing wear and other reasons. To overcome the trouble, flexible couplings are employed.

These permit relative rotation or variation in the alignment of shaft axes within certain limits.

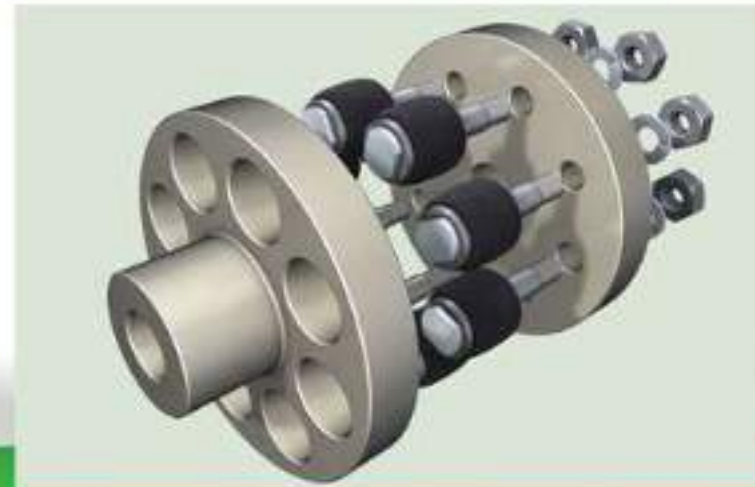


Shaft Couplings:

2. Flexible couplings:

2.1. Bushed pin type flanged.

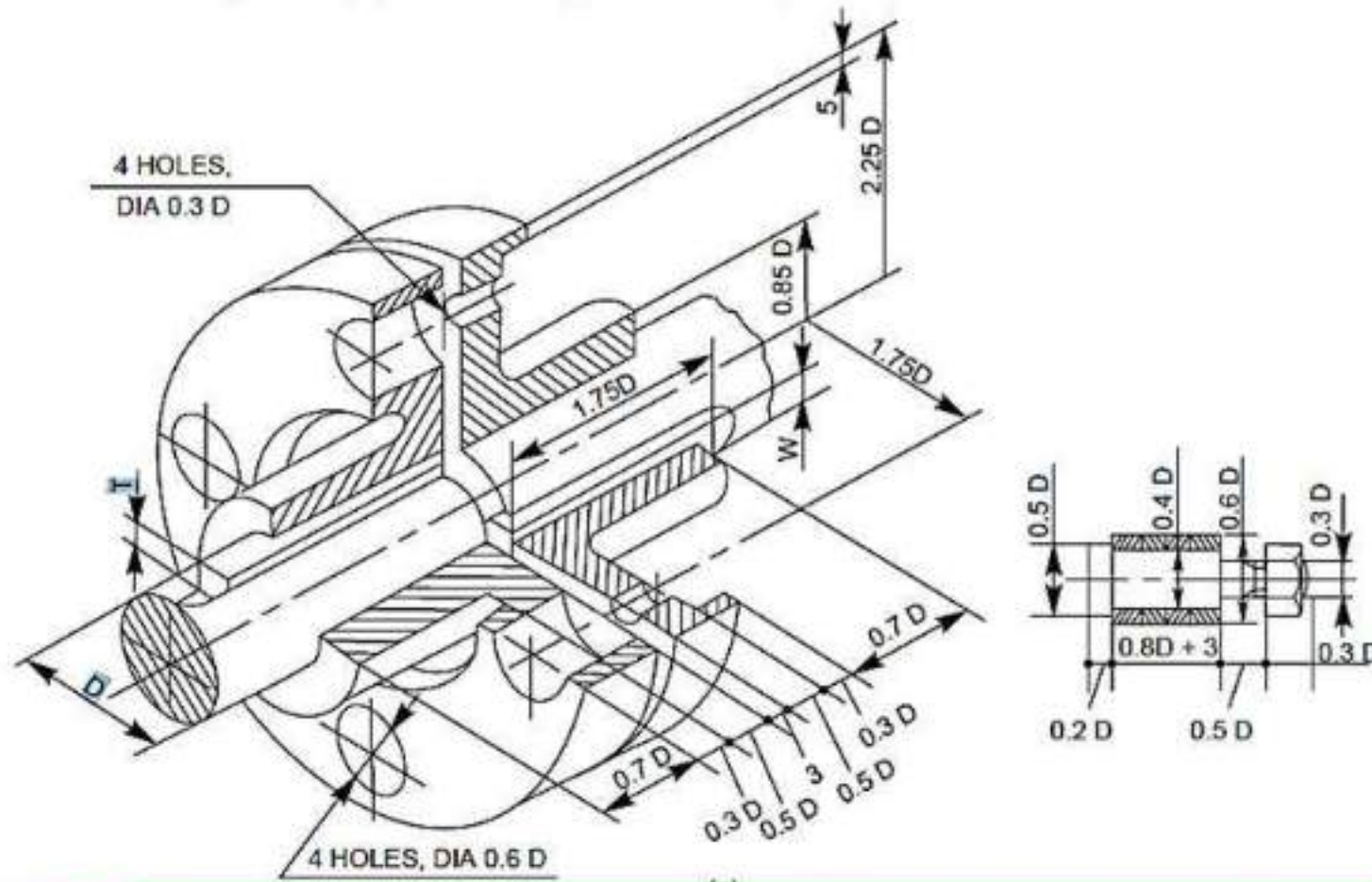
In this, bolts are replaced by bushed pins. The smaller ends of the pins are rigidly fastened by nuts to one of the flanges, while the enlarged ends are covered with flexible material like leather or rubber bushes, in the other flange. The flexible medium takes care of misalignment, if any, and acts as a shock absorber. These couplings are used to connect prime mover or an electric motor and a centrifugal pump.



Shaft Couplings:

2. Flexible couplings:

2.1. Bushed pin type flanged coupling.



Shaft Couplings:

2. Flexible couplings:

2.2. Compression coupling:

This consists of a compressible steel sleeve which fits on to the ends of the shafts to be coupled.

The sleeve corresponds to the shaft diameter and its outer surface is of double conical form.

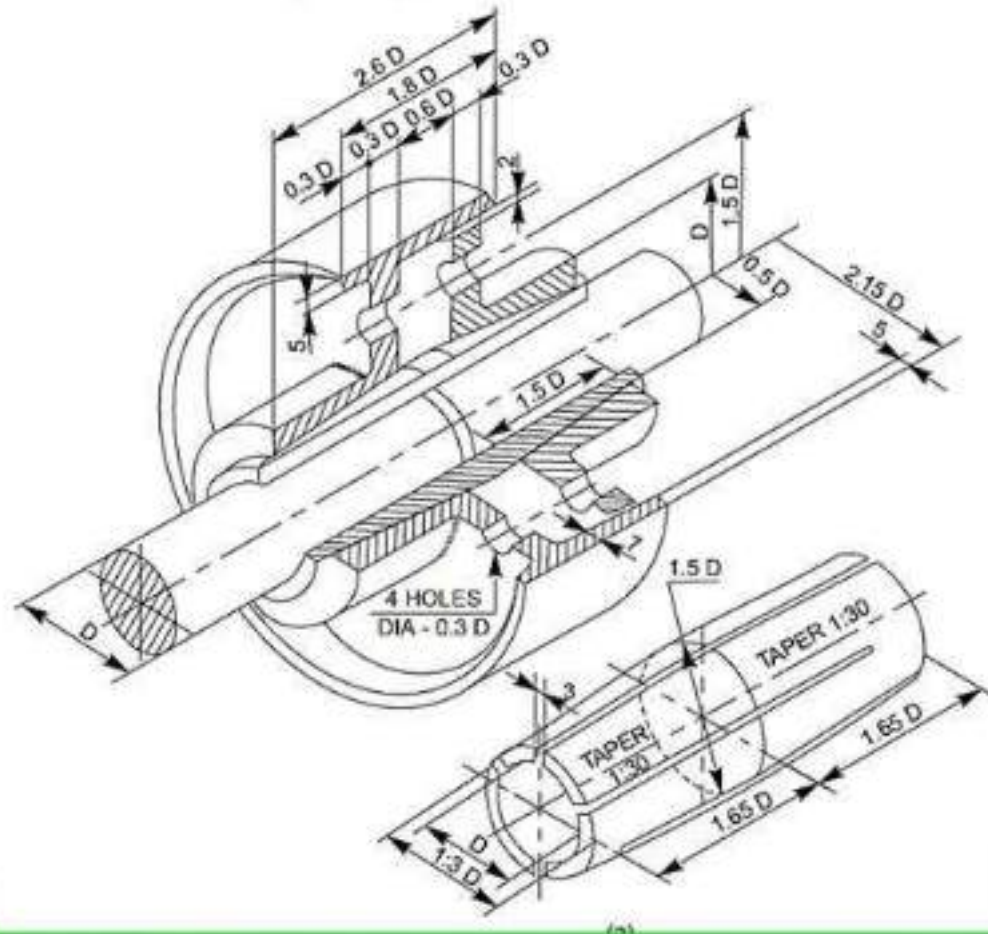
The sleeve has one through cut longitudinally and five other cuts, equi-spaced, but running alternately from opposite ends to about 85% of its length; making it radially flexible.

The two flanges used have conical bores and are drawn towards each other by means of a number of bolts and nuts, making the sleeve firmly compressed onto the shafts. Here, the friction between the shafts and sleeve assists power transmission and the bolts do not take any load. Because of the presence of flexible sleeve, the coupling takes care of both axial and angular misalignment of shafts .

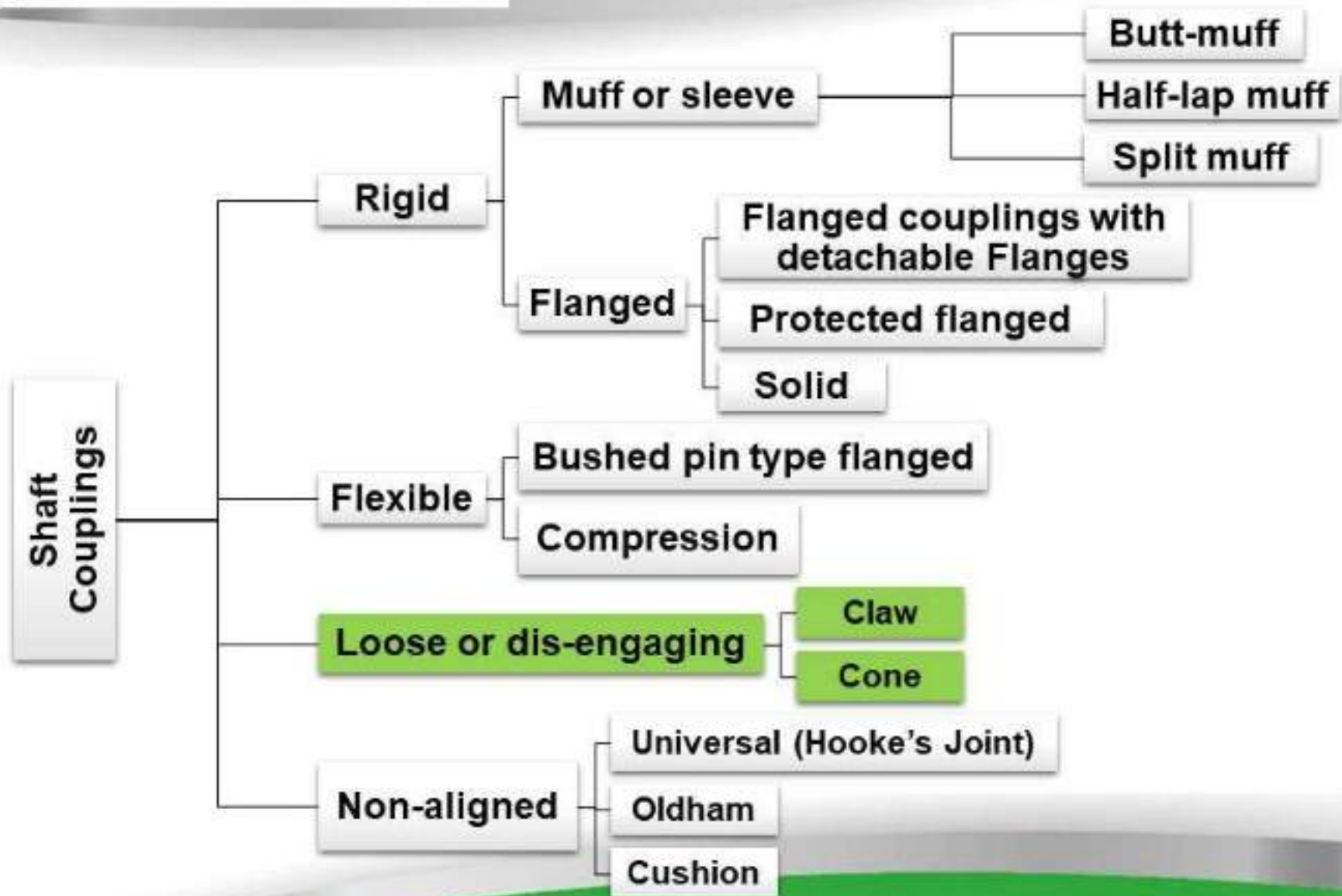
Shaft Couplings:

2. Flexible couplings:

2.2. Compression coupling:



Shaft Couplings:



Shaft Couplings:

3. Loose or dis-engaging coupling:

Disengaging couplings are used when power transmission from one shaft to another is sporadic. With this, the shafts can be engaged or disengaged as and when required, even during rotation.



Shaft Couplings:

3. Loose or dis-engaging coupling:

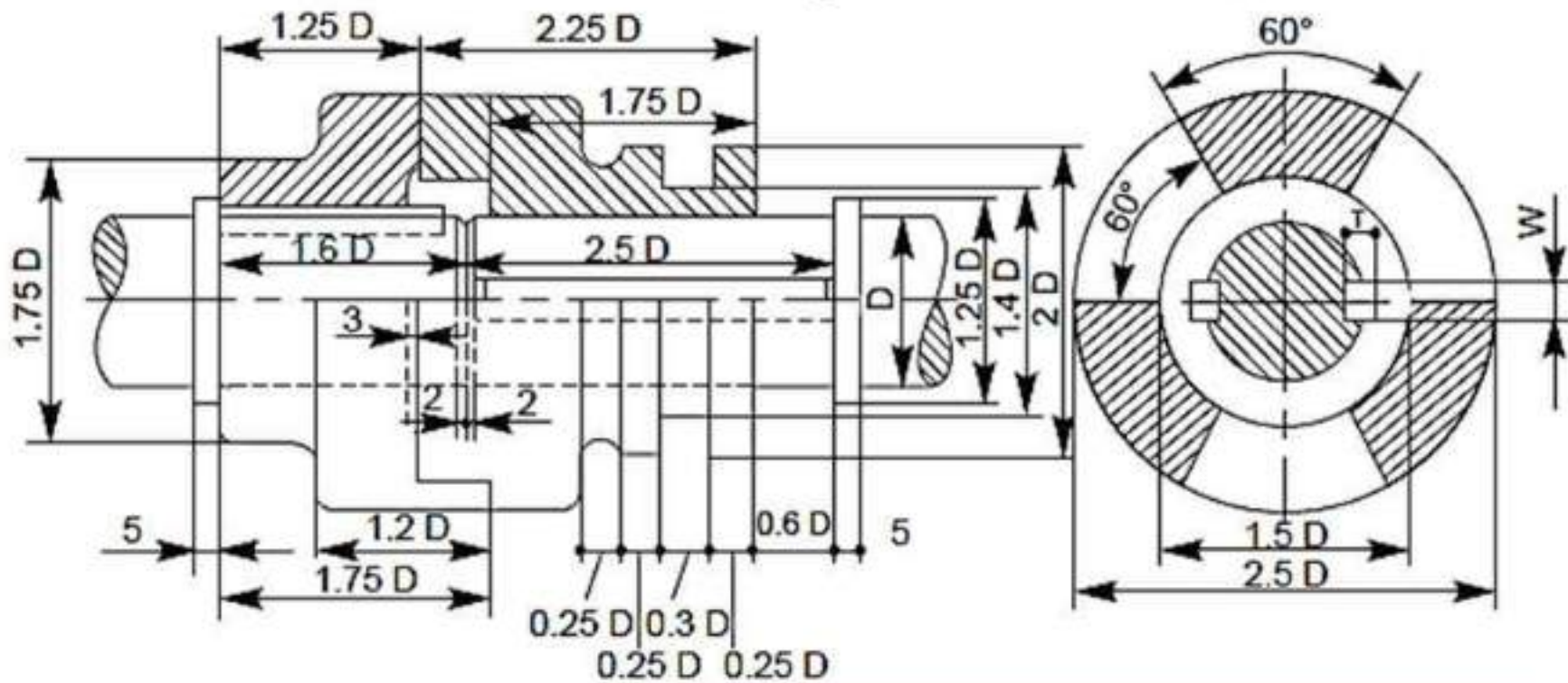
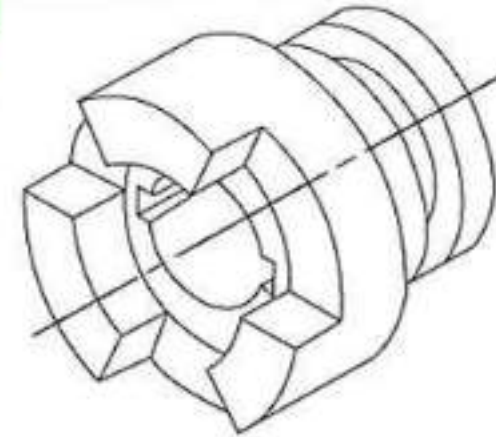
3.1. Claw coupling:

In this, each flange has a number of identical claws which engage into the corresponding recesses in the flange. One flange is firmly fitted to the driving shaft by means of a taper sunk key. The other one is placed over the driven shaft by two feather keys, so that it can slide freely on it. The sliding flange has a groove on the boss, into which the forked end of a lever fits. By operating the lever, the sliding flange may be moved so as to engage with or disengage from the fixed flange. This type of coupling is generally used on slow speed shafts.



Shaft Couplings:

- 3. Loose or dis-engaging coupling:
 - 3.1. Claw coupling:



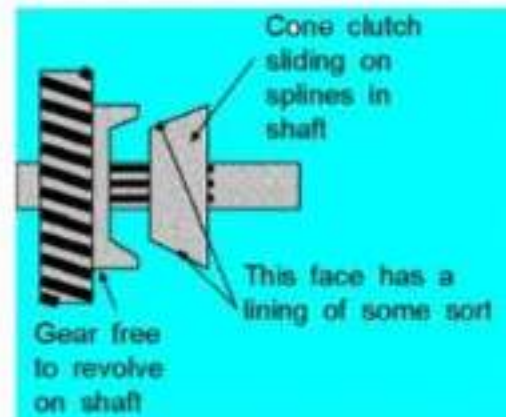
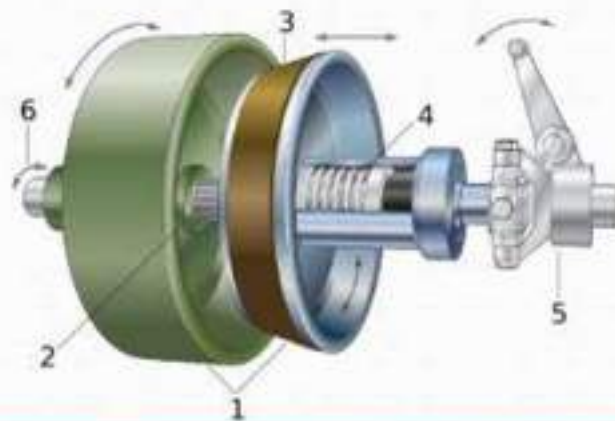
Shaft Couplings:

3. Loose or dis-engaging coupling:

3.2. Cone coupling:

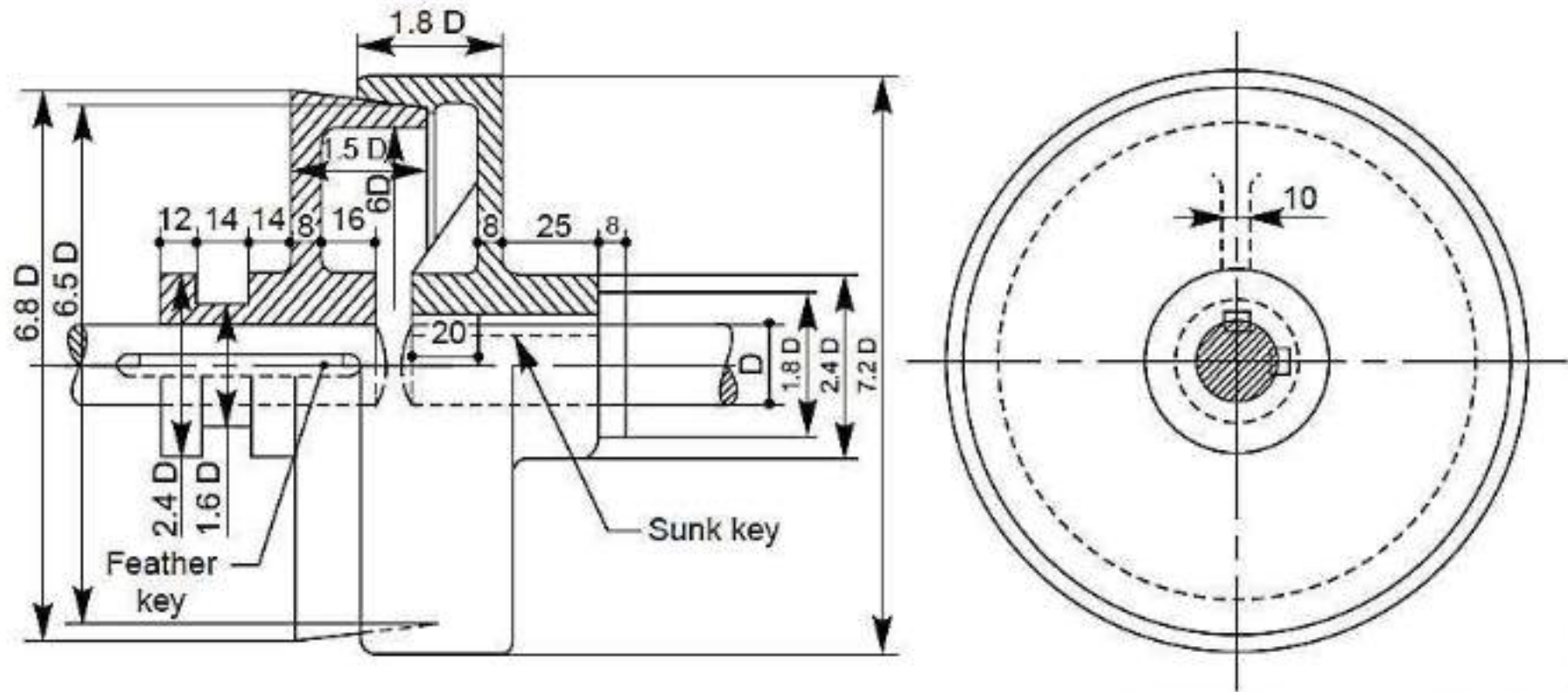
In this, two shafts may be coupled together by means of two flanges with conical surfaces (on the inside of one and on the outside of the other) by virtue of friction.

Here too, one flange is firmly fitted to the driving shaft by means of a taper sunk key, **whereas** the other slides freely over a feather key fitted to the driven shaft. The sliding flange may be moved by means of a forked lever fitted into the groove provided on it.

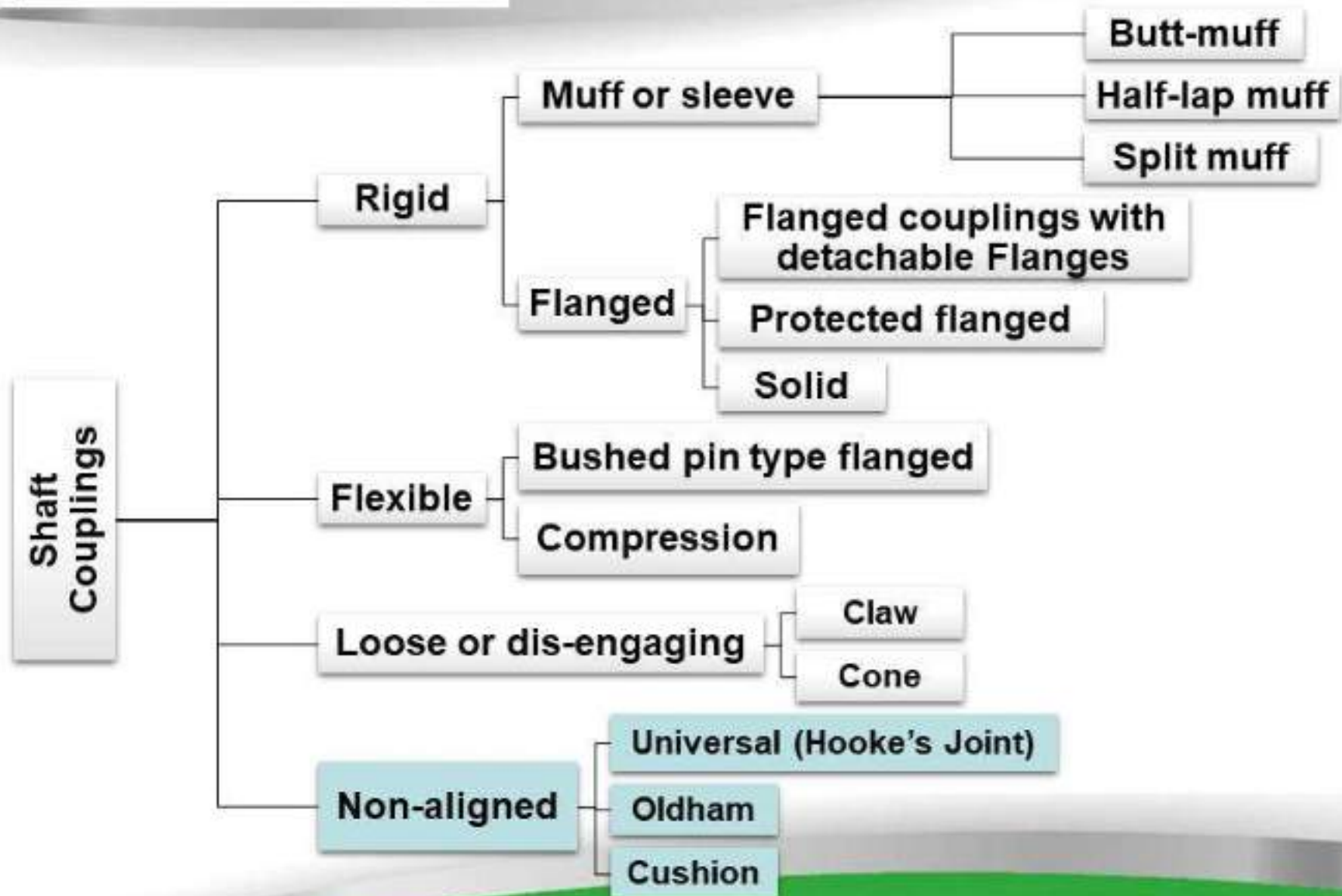


Shaft Couplings:

- 3. Loose or dis-engaging coupling:
 - 3.2. Cone coupling:



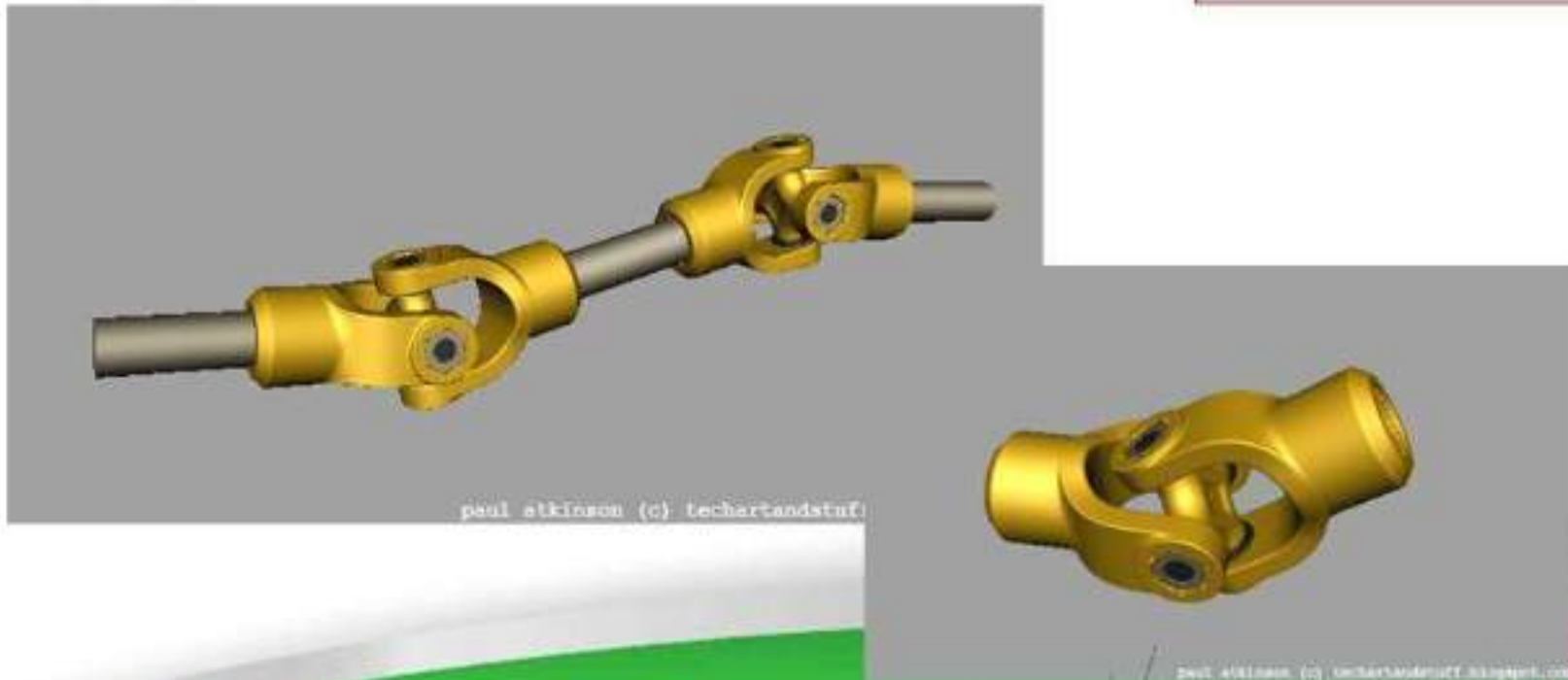
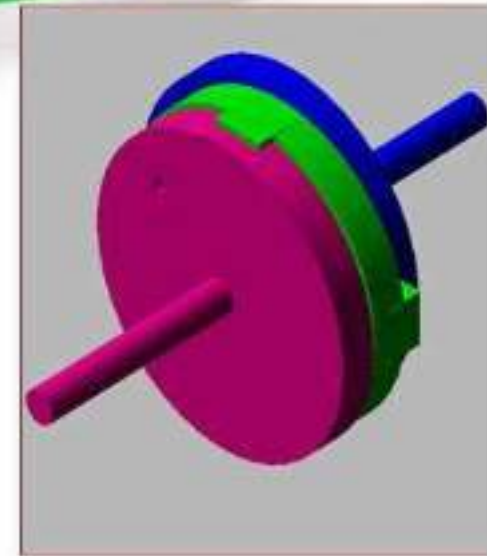
Shaft Couplings:



Shaft Couplings:

4. Non-aligned coupling:

Non-aligned couplings are used to transmit power between two shafts which are not coaxial. The following are the examples of non-aligned couplings:

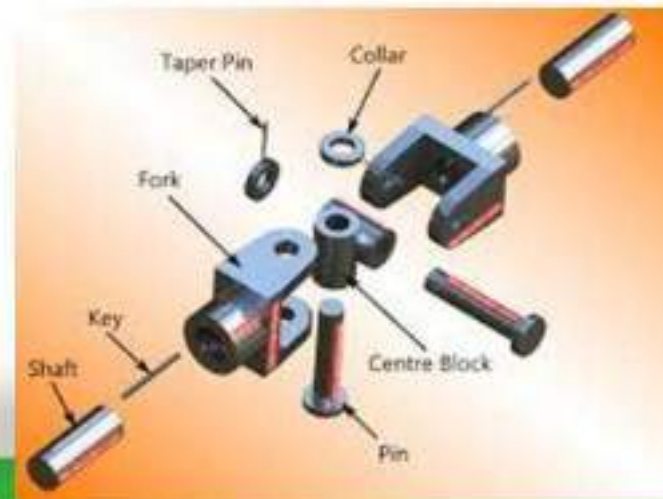
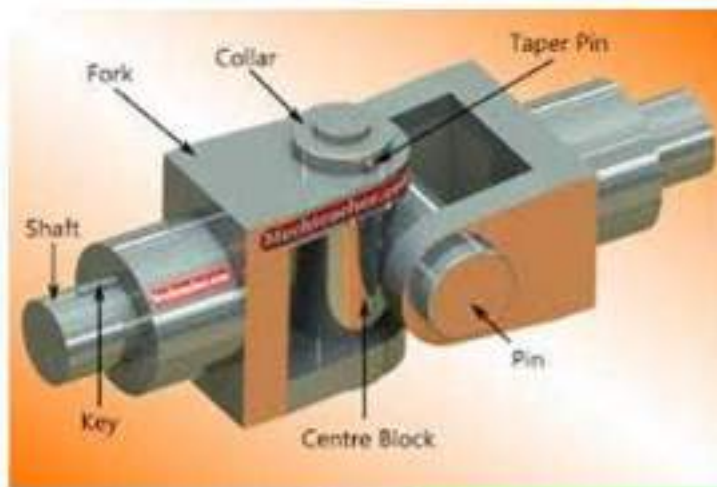
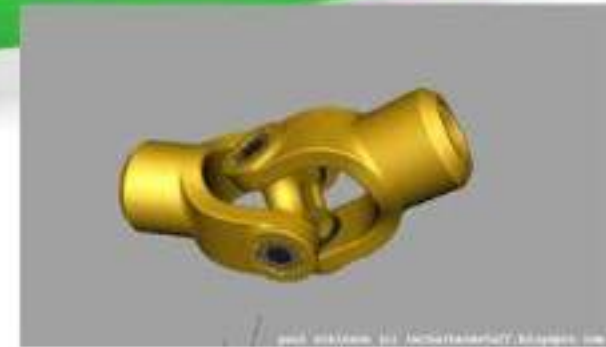


Shaft Couplings:

4. Non-aligned coupling:

4.1. Universal (Hooke's Joint) coupling:

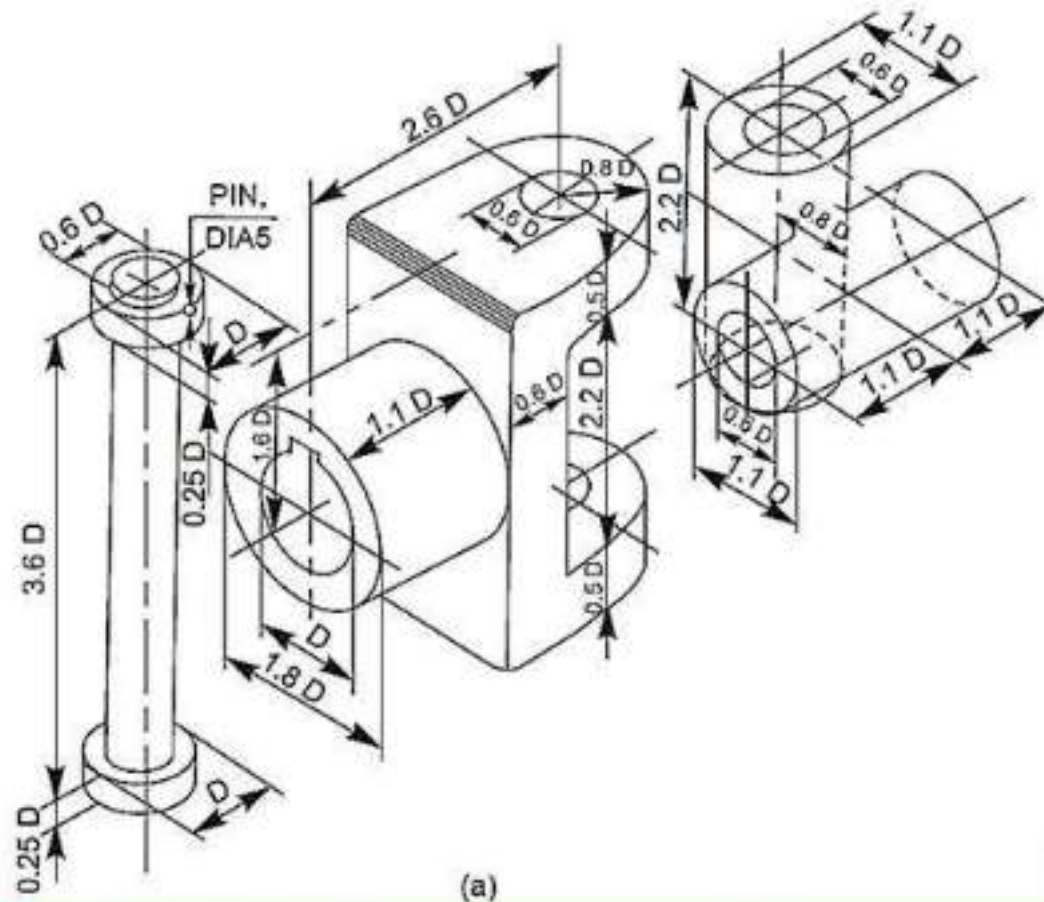
It is a rigid coupling that connects two shafts, whose axes intersect if extended. It consists of two forks which are keyed to the shafts. The two forks are pin joined to a central block, which has two arms at right angle to each other in the form of a cross. The angle between the shafts may be varied even while the shafts are rotating.



Shaft Couplings:

4. Non-aligned coupling:

4.1. Universal (Hooke's Joint) coupling:

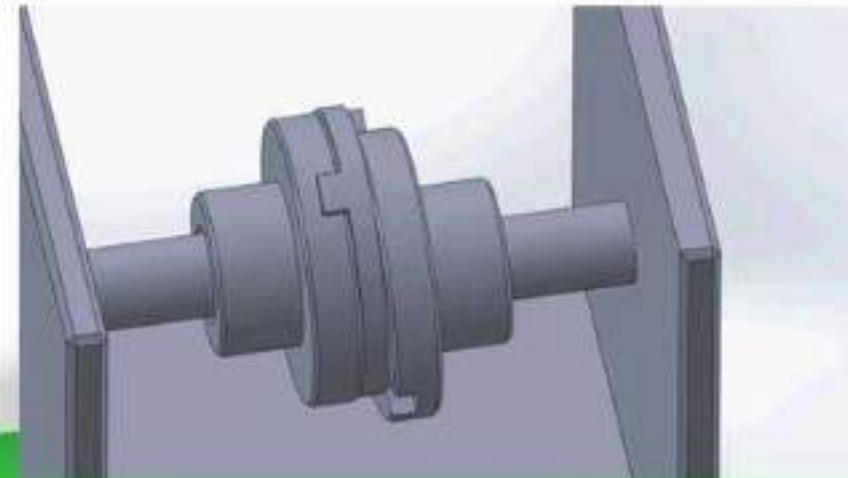
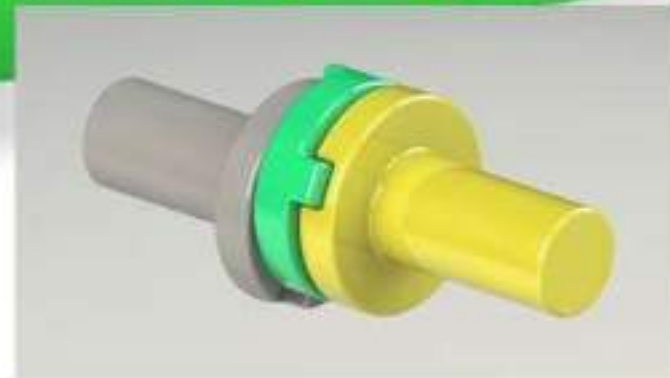


Shaft Couplings:

4. Non-aligned coupling:

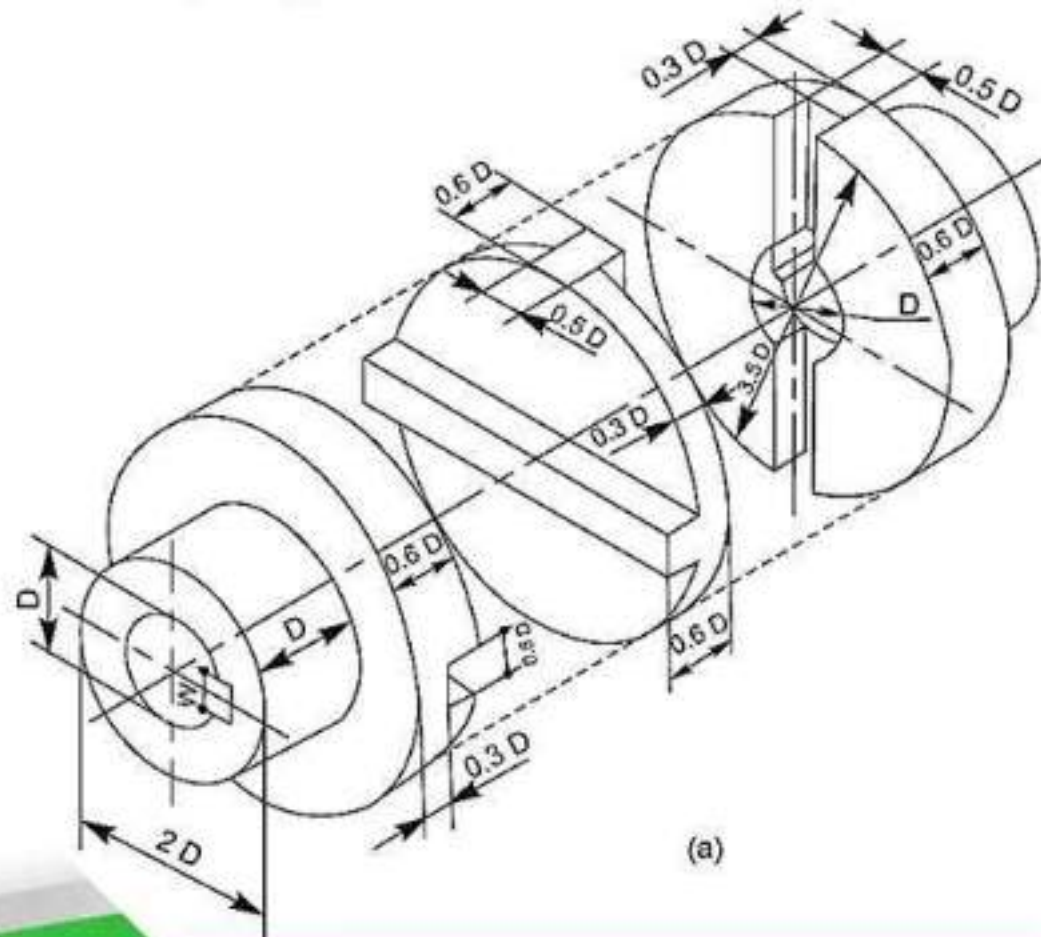
4.2. Oldham coupling:

It is used to connect two parallel shafts whose axes are at a small distance apart. Two flanges, each having a rectangular slot, are keyed, one on each shaft. The two flanges are positioned such that, the slot in one is at right angle to the slot in the other. To make the coupling, a circular disc with two rectangular projections on either side and at right angle to each other, is placed between the two flanges.



Shaft Couplings:

- 4. Non-aligned coupling:
- 4.2. Cushion coupling:



Shaft Couplings:

4. Non-aligned coupling:

4.3. Cushion coupling:

One of the most commonly used flexible couplings now-a-days is the cushion coupling. They are used for various speeds.

The tyre of the coupling is made of natural and synthetic rubber, impregnated with canvas or rayon. The hubs are made of C.I. or steel.



