



Section VII

Coupling Design

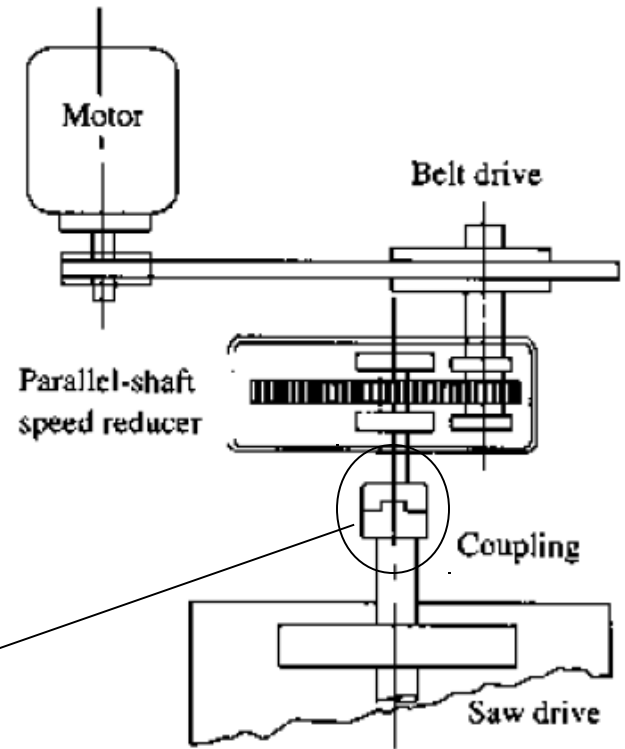


Talking Points

- Coupling?
- Classifications of Coupling
 - A) Rigid Coupling
 - B) Flexible Coupling
- Analysis of Bolts

?Coupling

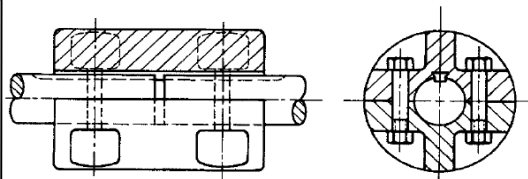
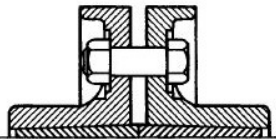
- Couplings are used to connect sections of shafts or connect the shaft of a driving machine to the shaft of a driven machine



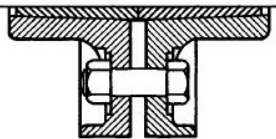
Classifications of Coupling

A) Rigid Coupling

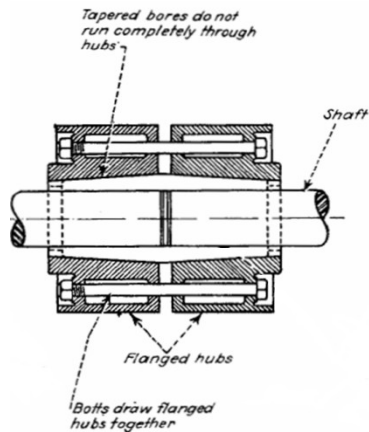
- Low rotational speed &
- Accurately aligned shafts



Clamp or compression Coupling



Flange Coupling



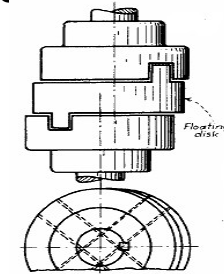
Tapered-Sleeve Coupling

B) Flexible Coupling

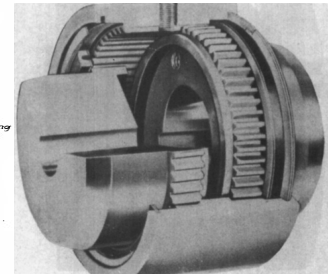
- Take care of small amount of unintentional misalignment.
- Provide for “end float”; i.e. axial movement of shaft.
- Alleviate shock by providing transfer of power through springs or to absorb some of the vibration in the coupling



Falk Coupling



Oldham Coupling



Gear Coupling



Roller Chain



Silent Chain

Classifications of Coupling – Cont



- Since rigid couplings can transmit bending in the shaft, stresses may be induced which can cause fatigue failure. It is therefore desirable to provide for good alignment and location of the coupling where **the bending moment is practically zero**. Thus **rigid couplings**, as well as **flexible couplings**, are **usually analyzed for torsion only**.



Analysis of Bolts

- It can be made in any one of several different ways:
 - Assume that the bolts are just finger-tight and the load is transmitted from one half of the coupling to the other half by a uniform shear stress in the shank of the bolts.
 - Assume that the bolts are just finger-tight, and the load is transmitted from one half of the coupling to the other half with a maximum shear stress in the shank of the bolts equal to $3/4$ times the average shear stress.
 - Assume that the bolts are tightened sufficiently so that power is transmitted from one half of the coupling to the other by means of friction.
 - Assume that the bolts are tightened and that a part of the power is transmitted by means of friction, and the rest of the power is transmitted by shear in the bolts.
- In the first two assumptions, it is usual practice to assume that all the bolts share the load proportionally for finished bolts in drilled and reamed holes. (***If the bolts are set in clearance holes, it is also usual practice to assume that half the bolts are effective.***)