



BELT DRIVE



A belt is a **looped strip** of flexible material, used to mechanically link two or more rotating shafts.

They may be used as:

1. a source of motion,
2. to efficiently transmit power,
3. or to track relative movement.

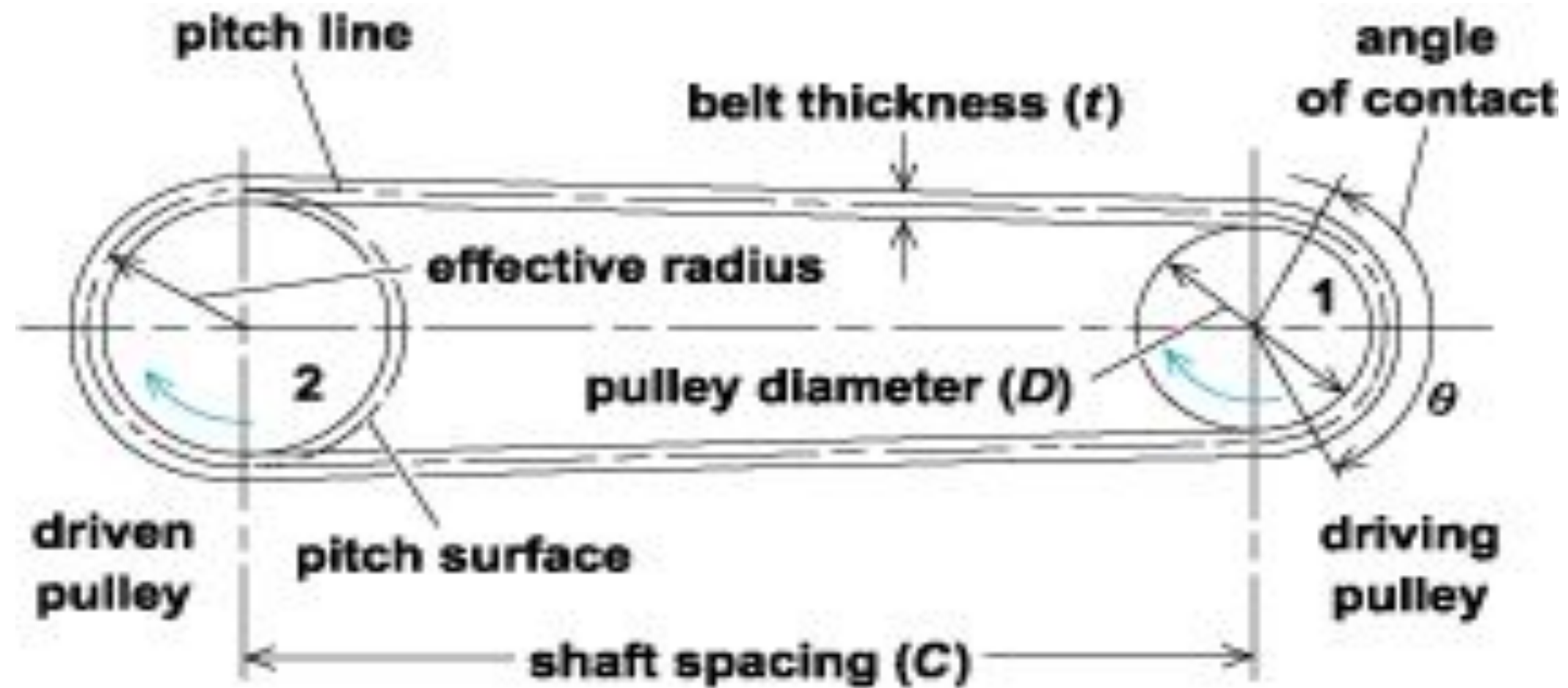
Belts are looped over pulleys.

In a two pulley system,

4. the belt can either drive the pulleys in the same direction,
5. or the belt may be crossed, so that the direction of the shafts is opposite.



OPEN BELT DRIVE





PROBLEM (2 MARKS)



Q1:

Following are the details of a crossed belt drive. Calculate the length of the belt?

Diameter of the driver	:	200 mm
Diameter of the follower	:	400 mm
Center distance of the drive	:	2m
Speed of the driver	:	400 rpm
Angle of contact	:	197.3

Determine the length of the belt.

Solution:

$$D1 = 200 \text{ mm}$$

$$D2 = 400 \text{ mm}$$

$$C = 2 \text{ m}$$

$$N1 = 400 \text{ rpm}$$

$$\begin{aligned} \text{Length of the belt} = L &= 2C + \pi / 2 (D1 + D2) + (D1 + D2) / 4C \\ &= (2 \times 2) + \pi / 2 (0.2 + 0.4) + (0.2 + 0.4) / 4 \times 2 \\ &= 4.99 \text{ m} \end{aligned}$$

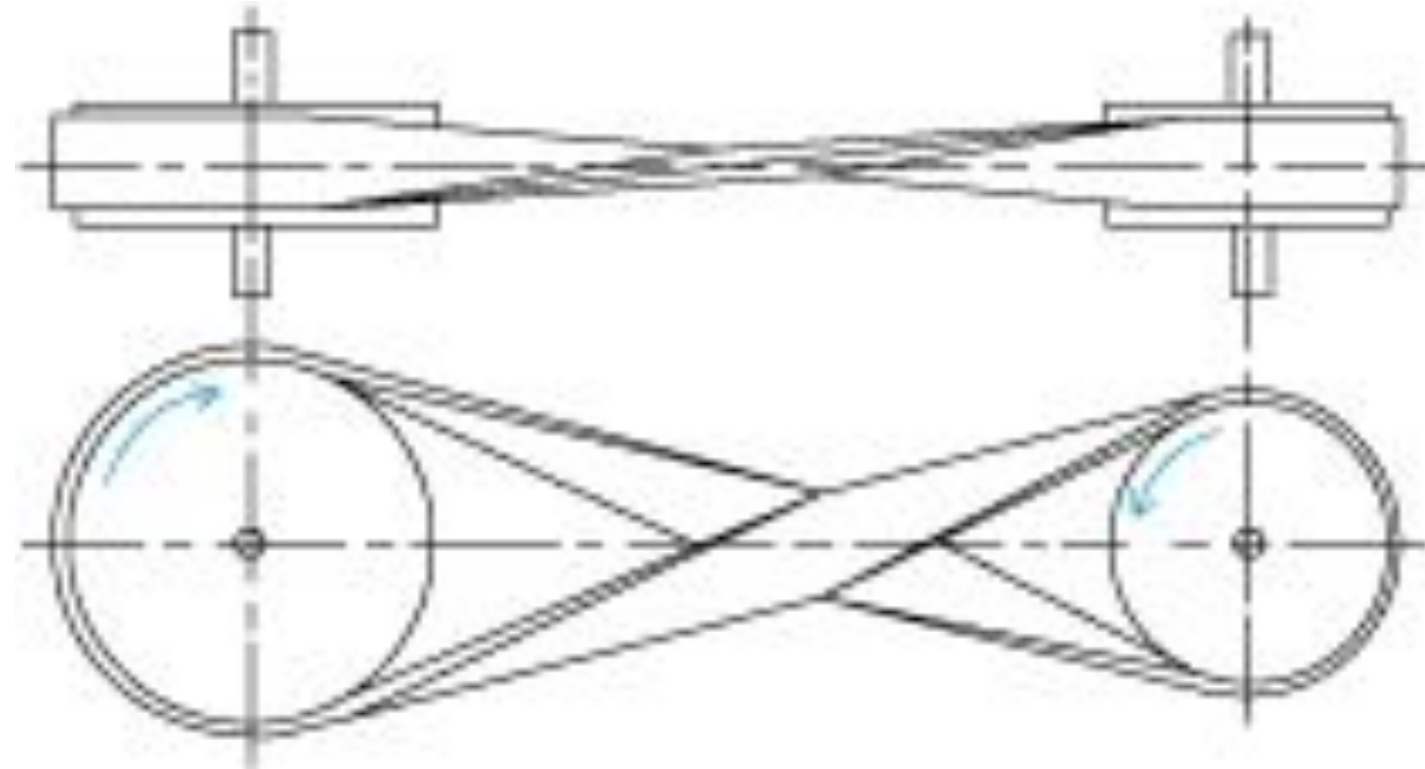


Belts on a Yanmar 2GM20 marine diesel engine





CROSSED BELT DRIVE





TYPES OF BELT DRIVES



FLAT BELT DRIVE





V BELT DRIVE





TIMING BELT DRIVE





**WHEN SHOULD
WE USE BELT
DRIVES?**



Advantages of belt drive

1. They are **simple**. They are economical.
2. **Parallel shafts** are not required.
3. **Overload** and **jam protection** are provided.
4. Noise and vibration are **damped out**. Machinery life is prolonged because load fluctuations are cushioned (shock-absorbed).
5. They are **lubrication-free**. They require only low maintenance.
6. They are **highly efficient** (90–98%, usually 95%). Some misalignment is tolerable.
7. They are **very economical** when shafts are separated by **large distances**.



Disadvantages of belt drive

1. The angular-velocity ratio is not necessarily constant or equal to the ratio of pulley diameters, because of **belt slip and stretch**.
2. **Heat buildup occurs**. Speed is limited to usually 7000 feet per minute (35 meters per second). Power transmission is limited to 370 kilowatts (500 horsepower).
- 3.
4. Operating temperatures are usually restricted to -31 to 185°F (-35 to 85°C).
5. Some **adjustment** of center distance or use of an idler pulley is necessary for wear and stretch compensation.
6. A means of **disassembly** must be provided to install endless belts.



CHAIN DRIVES



Roller chain and sprocket





References



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Thank You!
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