# MIET2510

## Mechanical Design

## Week 8 – Belt and Chains – Part 1

School of Science and Technology, RMIT Vietnam

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# Introduction

- The primary function of a belt or chain drive is identical to that of a gear drive. All three of these mechanisms are used to transfer power between rotating shafts.
- The use of gears becomes impractical when the distance between the shafts is large. Both belt and chain drives offer the flexibility of efficient operation at large and small center distances.

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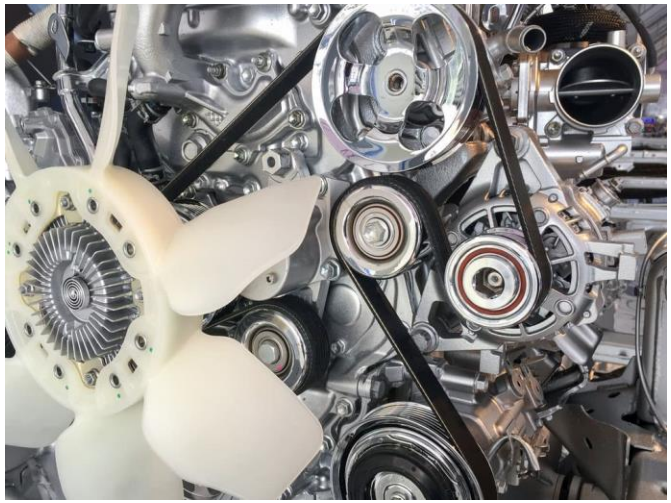
# Belt Benefits

The function of a belt drive is to transmit rotational motion and torque from one shaft to another, smoothly, quietly, and inexpensively. Belt drives provide the best overall combination of design flexibility, low cost, low maintenance, ease of assembly, and space savings.



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# Belt Benefits

Belt compared to other forms of transmission:

- Belts have flexible shaft center distances, where gear drives are restricted.
- Belts can be designed to slip when an overload occurs in the machine.
- Belts require no lubrication.
- Belts require little maintenance.
- Belts can absorb shock loading.

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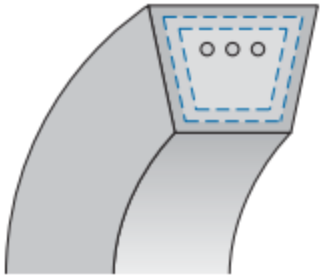
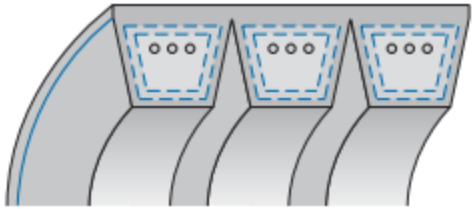
# Types of Belts

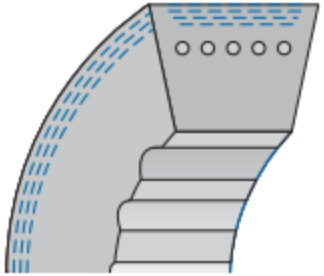
(a) Flat belt



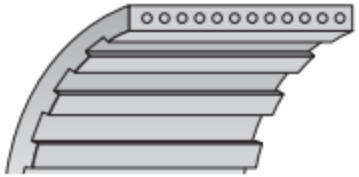
(b) V-belt



(c) Multi-V-belt



(d) Cog belt



(e) Timing belt

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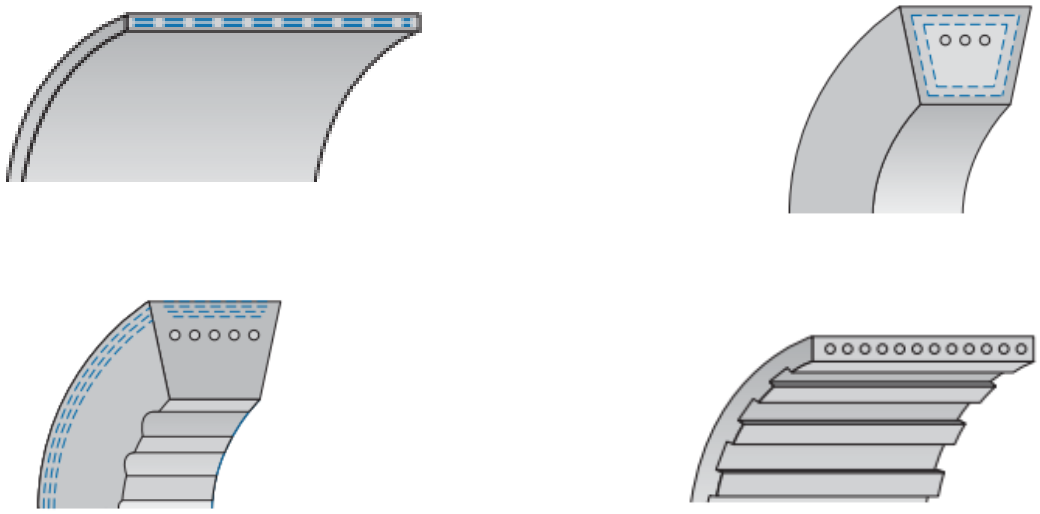
# Types of Belts

Find an application using each of the belt types below and explain why the type of belt has been chosen.



https://bamason2.github.io/miet2510-module/notes/belts_and_chains.html

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# Flat Belt

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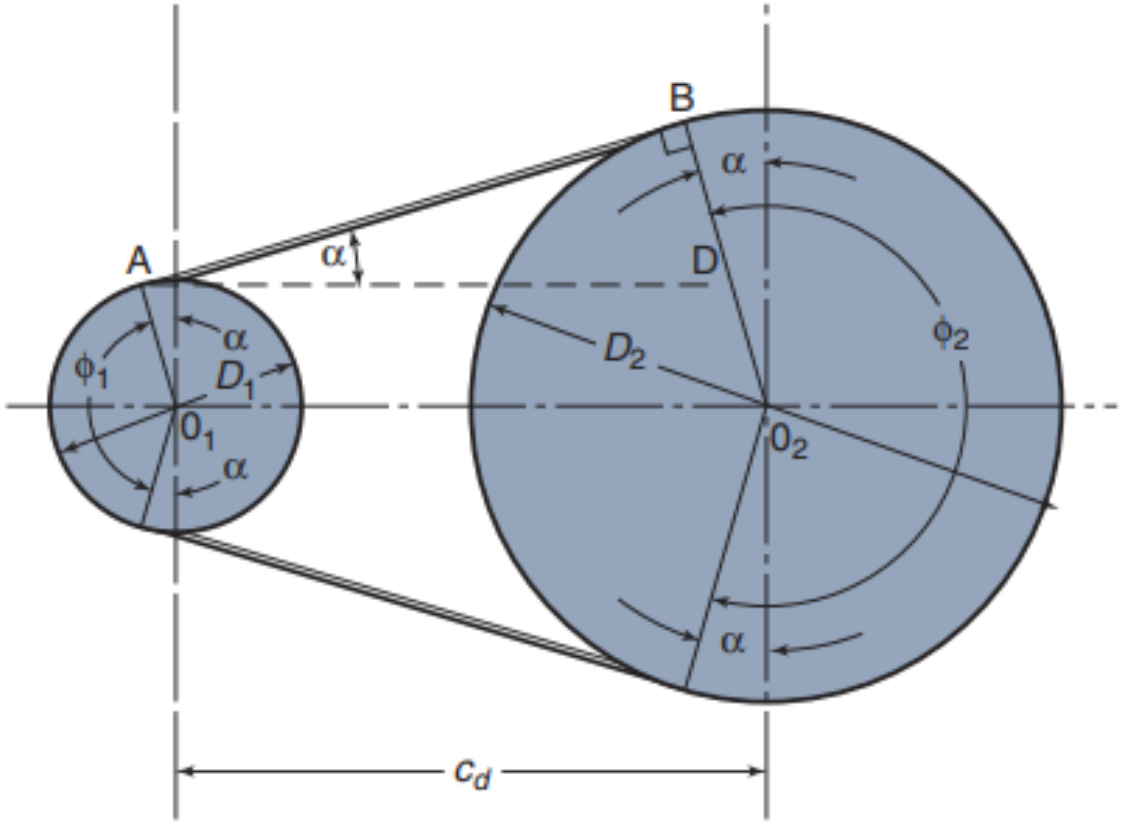
# Open Flat Belt

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# Synchronous Belts – Timing Belts

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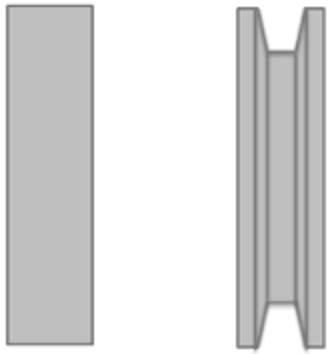
# V-Belts

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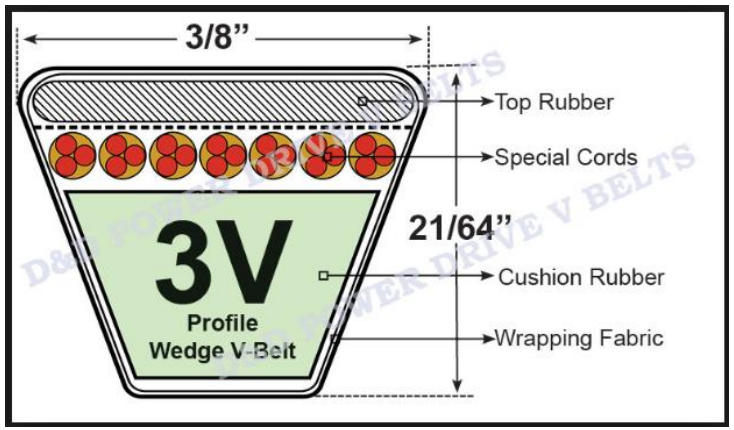
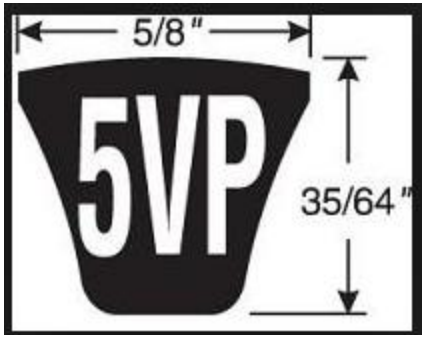
# V-Belts









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# Problems in Belt Design

There are two typical problems in belt design:

- Determine the belt length and applied forces.
- Belt design given operational condition.

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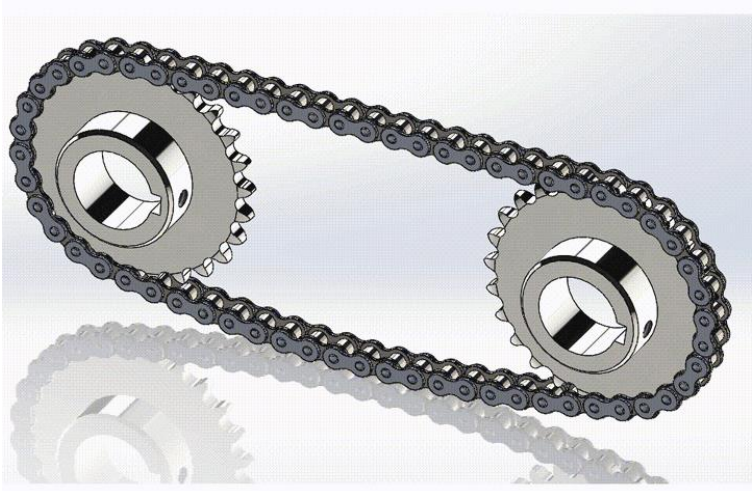
# Chain Drives

- Rolling chains are used to transmit power between two sprockets rotating in the same plane.
- Very similar to belt functionally, but torque generated by direct normal contact (not friction) of chain roller on sprocket teeth



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# Chain Drives

- What are the main types of chains?
- For each type of chain drive investigate an application, what are the reasons for the choice of this type of chain?
- Why is chain drive chosen over belt drive?

https://bamason2.github.io/miet2510-module/notes/belts_and_chains.html

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# Chain Drive Advantages

- The major advantage of using a rolling chain compared to a belt is that rolling chains do not slip.
- Large center distances can be dealt with more easily with rolling chains with fewer elements and in less space than with gears.
- No initial tension is necessary, and shaft loads are therefore smaller than with belt drives. The only maintenance required after careful alignment of the elements is periodic lubrication, and with proper lubrication, a long life can be attained.

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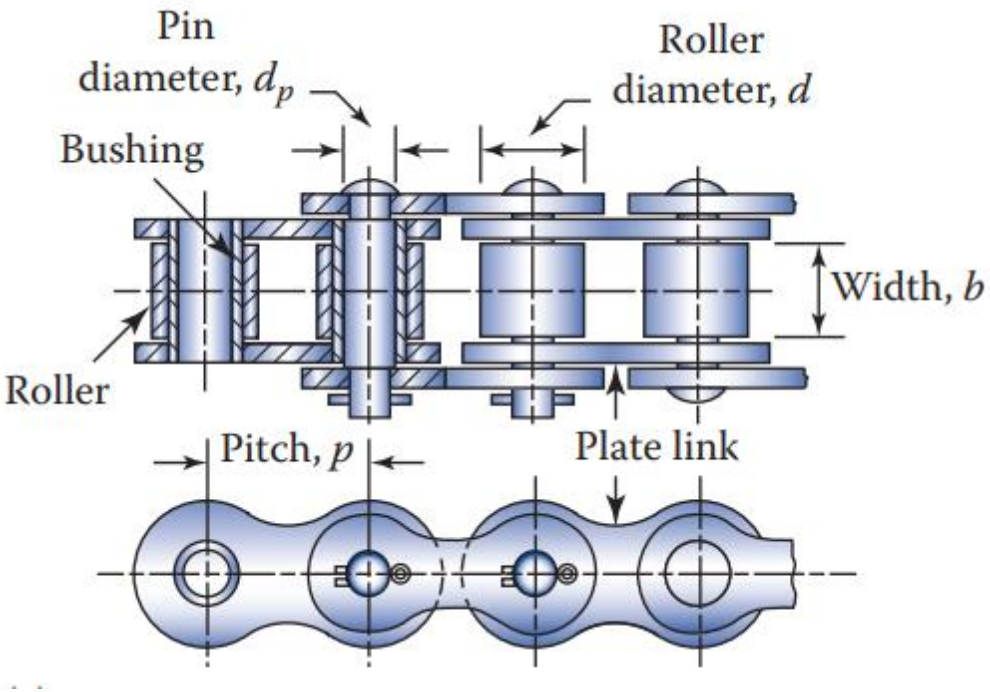
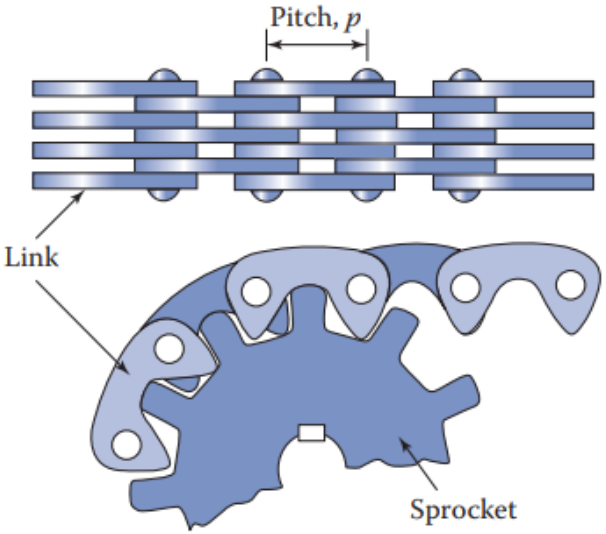
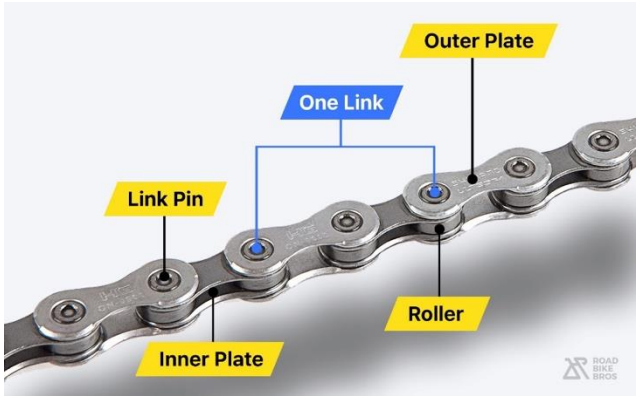
# Chain Drive Nomenclature



# Numbers of strand

One-strand Rolling chain and Three-strand Rolling chain

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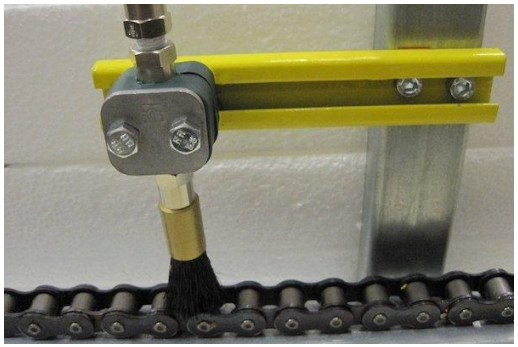
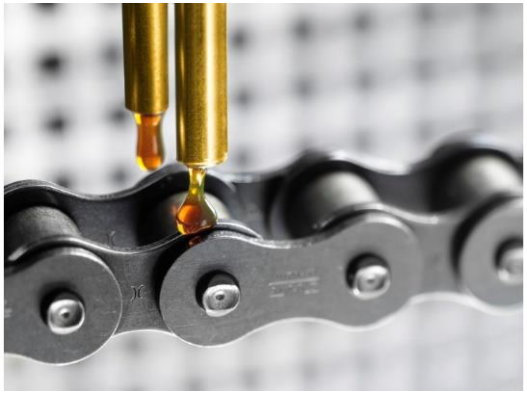
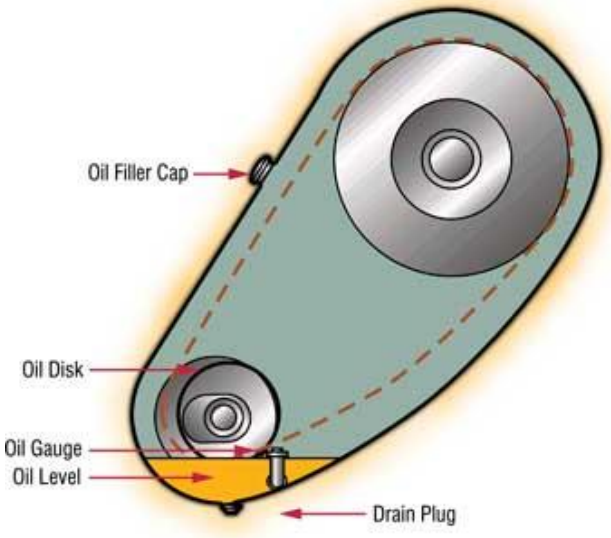
# Chain Lubrication





Passive Lubrication




Active Lubrication

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# Fundamental Parameters

| | |
|---|---|
| Number of teeth | Service factor for a chain |
| Roller Diameter and Width | Power rating |
| Pin Diameter | Tension or force along the chain |
| Chain Length | Speed ratio |
| Pitch | Number of links |
| Chain number | Centre distance |

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# Thank you for your attendance :D

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# Reference


- *Mechanical Design of Machine Components (2nd) by Ansel C.Ugural.*
- *Mechanical Engineering Design (10th) by Richard G.Budynas and J. Keith Nisbett.*
- *Theory of Machines and Mechanisms (5th) by John J.Uicker, Gordon R.Pennock, Joseph E. Singley.*


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