CHAIN DRIVE

A **chain drive** is a Mechanically operating system where we used different types of chains to transmit the power or for movement of somethings.

Generally, a chain drive is used where the distance between the power produced and where it to be transferred is less, however, this is not applicable for all. In some cases, we can use a chain drive for longer distances power transfer.

In belt or rope drive we see there is some percent of slip occurs, but in the chain, there will be no slip. But this does not mean that 100% power is transmitted from one to another device due to friction loss some amount of power loss we can generally see.

In **chain drive**, the speed ratio remains constant which is a major advantage of chain drive and here there is no slippage and in case of belt drive, there is slippage so speed ratio changes as per slippage.

A chain is made by a number of links and those are connected by the help of a pin.

Chains are run over a wheel named sprocket which has several amounts of teeth around the circumference of that to grip the chain, however, not all the chains need that sprocket to run over. We will further see the different types of chains and where we used that below in this article.

Types of Chains:

In the field of Mechanical Engineering chains drive can be classified into three broad categories and those are:

- *Hoisting Chains*
- *Conveyor Chains*
- *Power transmission Chains.*

Hoisting Chains:

Let me tell you what is hoist? A hoist is a mechanical device which is used to lift a load or lowering a load, it can be used for shifting of some heavy product from one place to another place in a workstation.

The chains used in this type of devices is named hoist chain, these chains are quite strong to handle heavyweight.

Hoist chains can be classified into two categories:

1. ***Oval-Link Chains.***
2. ***Stud-Link Chains.***

Oval-Link Chains:

It is one of the common types of chain used in hoist, it consists of many oval links attached to each other. These types of chains are also called Coil Chains. Links of this type of chain is oval. However, there are square link types of chains that are also available., but the kinking is occurred easily due to high loading.

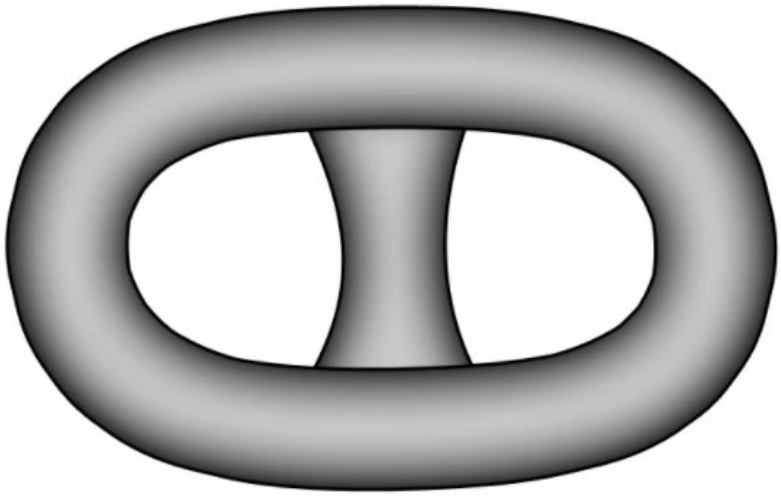
Generally, we used these types of chains at low speeds only.

Stud-Link Chains:

The stud-link chains used to minimize the deformation and link or tangle easily.

In this type of chain, a round bar or stud is used to fit inside the oval-link chains to provide more strength to the chain.

It is used in Ship to up and down the anchor of the ships, and some crane hoist where we need to lift a very high amount of load.



Conveyor Chains:

As the name suggests conveyor chains, that means these types of chains are mostly used in the conveyor. If you don't know the conveyor, it is a mechanical device system that is used to move the materials from one place to another.

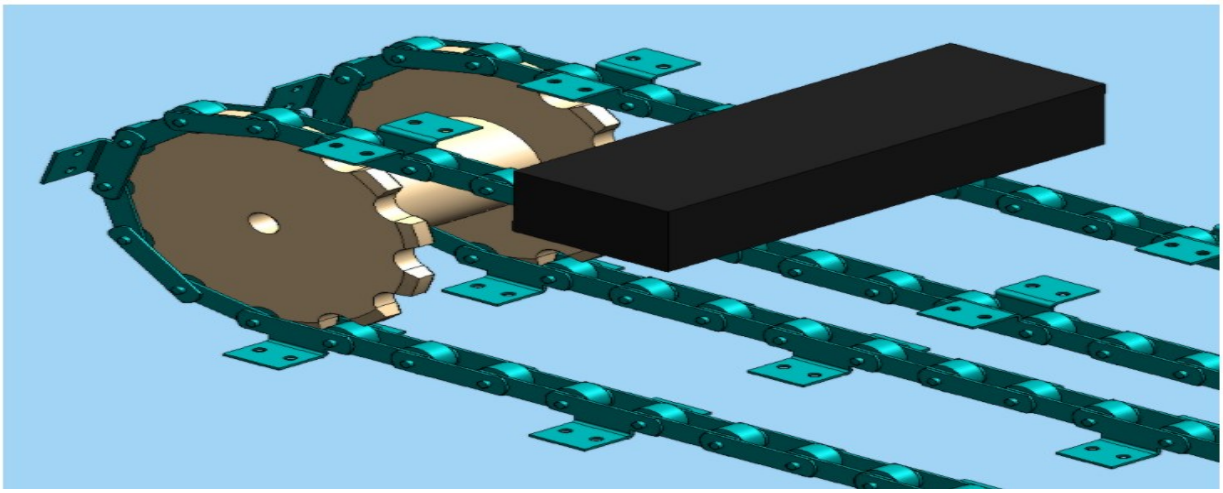
This type of chain is well shaped that it can easily run over the sprocket.

Generally, this type of chain is made of malleable cast iron and used in Low-Speed Machinery approx 2 m/s.

The one major disadvantage of this type of chain is the motion of the chain is not smooth, there are chances of wear and tear out.

Conveyor Chains are categorized into three types:

1. ***Detachable or Hook Joint types Conveyor chain.***
2. ***Closed-end pintle type conveyor chain.***



Detachable or Hook Joint types Conveyor chain:

Detachable or Hook Joint types Conveyor chains are used in a conveyor where the length between power transmission is short.

Closed-end pintle type conveyor chain:

This type of chain is consists of a barrel and link and made in a single casting, then the chain is heat-treated to provide higher strength.

Power Transmission Chains:

You can easily find out by name of the chain that it is used to transmit the power.

This type of chain is made of steel and sometimes it heats treated to minimize wear and tear.

This type of chain has greater accuracy and can easily run over the sprocket.

Power Transmission Chains are categorized into three types:

1. ***BlockChain***
2. ***Roller Chain***
3. ***Silent Chain or Inverted tooth Chain***

BlockChain:

This type of chain is used in low-speed areas and will produce noise due to the sudden contact between sprocket and chain, however, this is used in some low-speed conveyor machines.

Roller Chain:

This type of chain is constructed by:

1. *A bush*
2. *Inner Link*
3. *A pin*
4. *Outer Plate*
5. *Inner plate*
6. *Rollers*

In this type of chain, a bush along with the roller is fitted inside both the plates then a pin is passed through both the end of the roller to fasten it.

The rollers are free to rotate inside the bush so that when it contacts between the sprocket the wear tear would be minimized.

Generally, it is made of steel.

It is soundless and wears less as compared to the blockchains and used in any circumstances and this type chains gave much service area if proper lubrication is maintained.

It is used in high-speed power transmission devices, like a motorcycle.

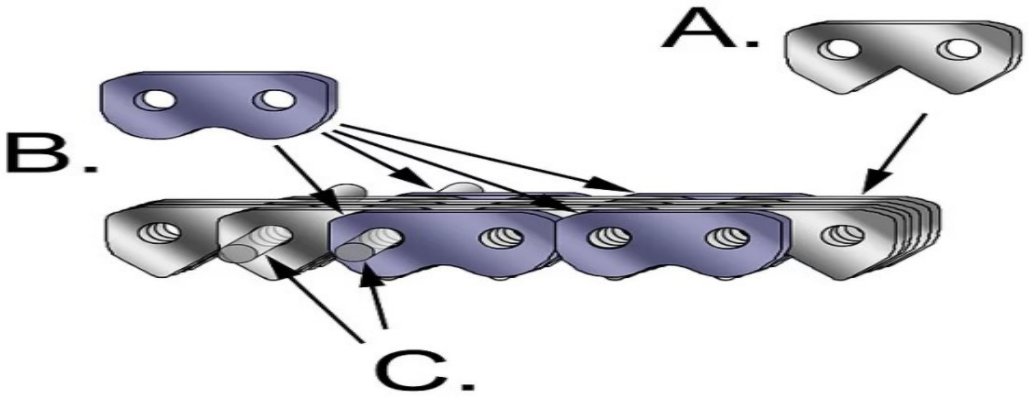
This is how a roller chain looks like. (By Ralf Roletschek – Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=350118)

Silent Chain or Inverted Tooth Chain:

The operation of this type of chain is quite silent and can be used in high-speed power transmissions areas.

This type of chain does not have any roller, it is accurately shaped that it can easily sit over the sprocket.

However, lubrication is an important factor for this type of chain otherwise it will wear and tear out.



Advantages of Chain drive:

A chain drive has several advantages like:

- *Low maintenance.*
- *Greater efficiency up to 97 percent.*
- *Slipping is negligible*
- *Chain drive can operate in wet conditions too.*
- *It can withstand abrasive conditions.*
- *The chain drive is easy to install.*
- *Initial tension is not required in chain drive.*
- *Even in fire hazards it does not faces any bad problem.*
- *Multiple hafts can be driven from a single chain drive.*
- *Chain drive requires less space and it is more compact than belt drive.*
- *It produces less stress on the shaft because the sprockets are lighter than pulleys.*
- *Transmit higher power compared to belt drive.*
- *Chain drive, the speed ratio is good as compared to belt drive.*
- *It can be used in reversing drives.*
- *It can be operated at a high temperature Like a belt which cants not operate at high temperatures.*

- *Chain drive can be used up to 3 m in distances between small and large centers.*

Disadvantages of Chain drive:

These are some disadvantages of using Chain:

- *The major disadvantages are here it requires more and frequent lubrication otherwise rust problem comes.*
- *It cannot be used where there is a requirement of slips.*
- *We can't keep chain drive-in open. It needs housing or covering.*
- *It cannot be used for précised motion requirements.*
- *It is noisy and therefore there is a problem of vibration too.*
- *The installation or initial cost is more.*
- *The velocity fluctuation is more.*

Application of chain drive:

There are plenty of applications of a chain drive some of them are:

- *Chain drive used for transmission of power.*
- *It is used for lifting loads and also used to carry material.*
- *This is also used in woodworking machinery*.

Chain drive used in several industries for several purposes like:

- *Transportation Industry*.
- *Agriculture Machinery*.
- *Material Handling Equipment*.
- *Building construction*.

So this is all about the Chains, if you have any other knowledge regarding chains do share in the comment section. I will love to see those.

Else if you like the article do spread this article in your favorite social media, and below is your PDF downloadable link, you can download the PDF from there.