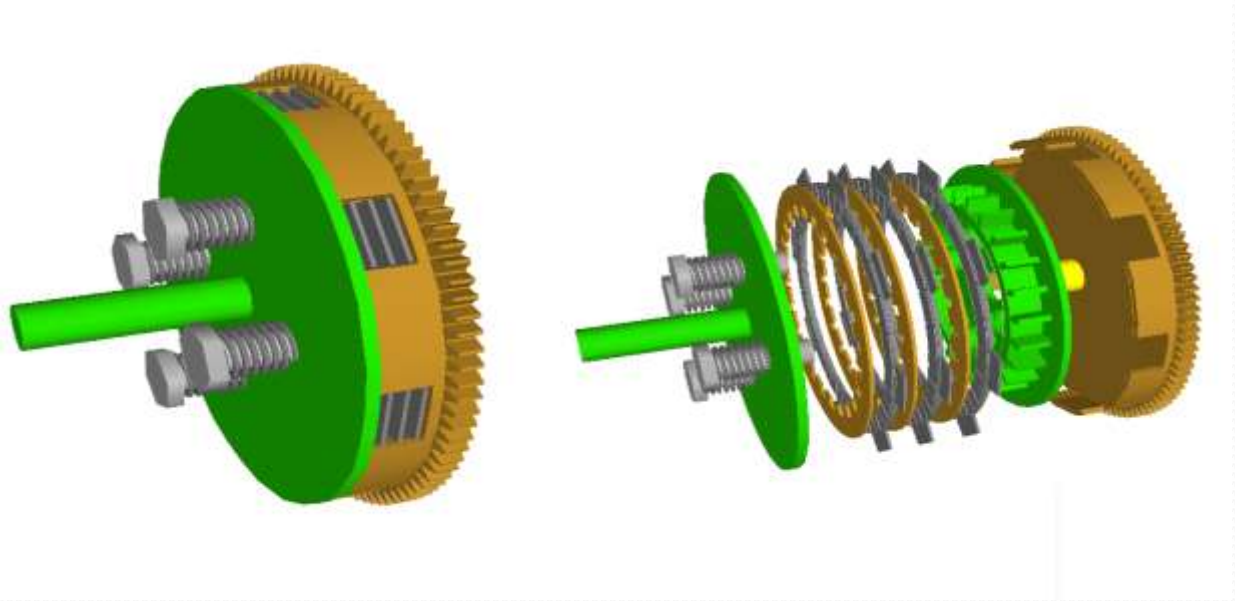
# Unit 2

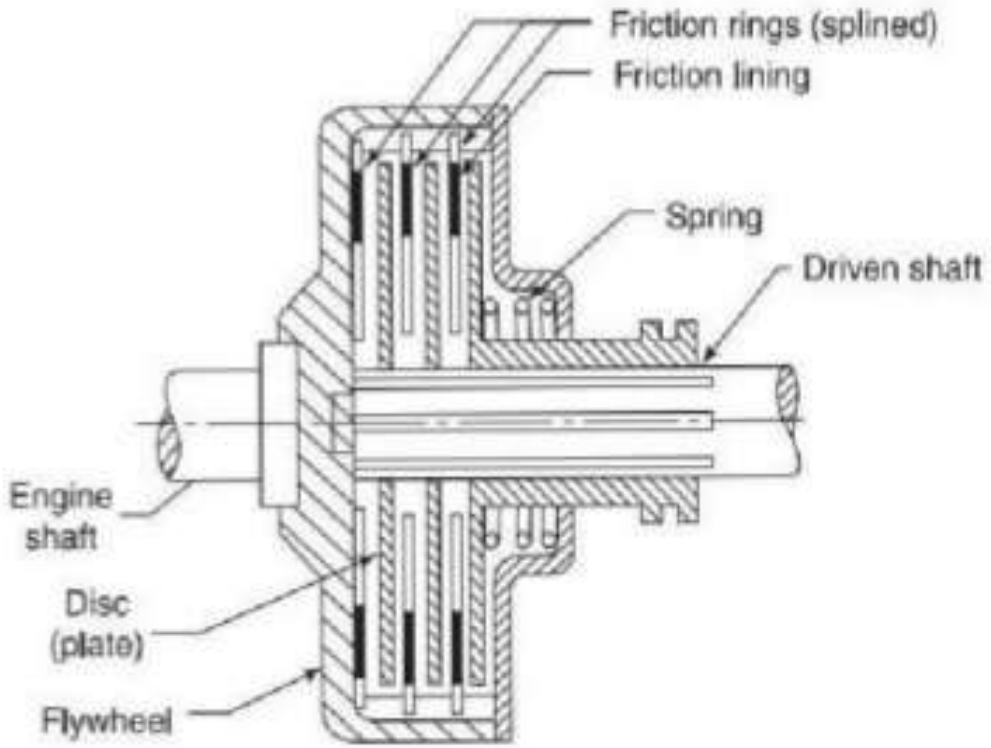
# Single plate clutch:

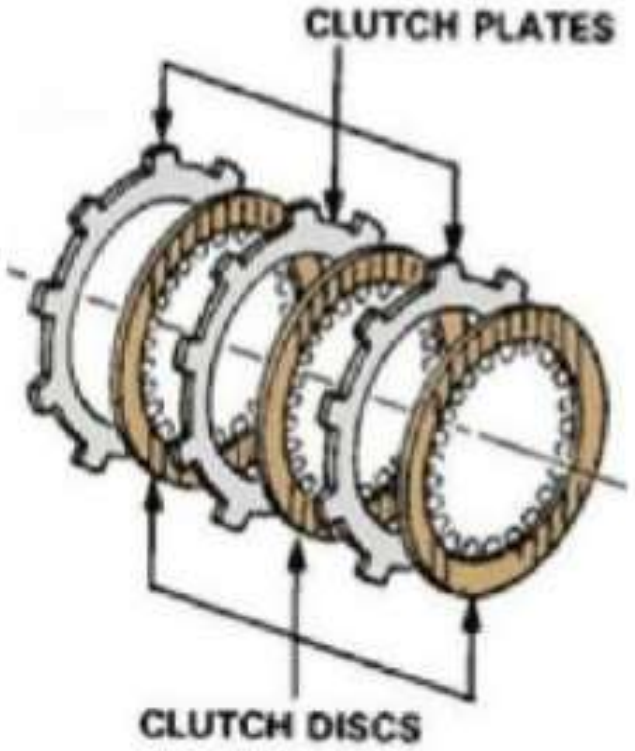
In the single plate clutch a flywheel is fixed to the engine shaft and a pressure plate is attached to the gear box shaft. This pressure plate is free to move on the spindle of the shaft. A friction plate is situated between the flywheel and pressure plate. Some springs are inserted into compressed position between these plates. When the clutch pedal releases then the pressure plate exerts a force on the friction plate due to spring action. So clutch is in engage position. When the driver pushes the clutch pedal, due to its mechanism, it serves as the disengagement of clutch.

## Multi-plate clutch:

Multi-plate clutch is same as the single plate clutch but there is **two or more clutch plates** are inserted between the flywheel and pressure plate. This clutch is compact then single plate clutch for same transmission of torque.



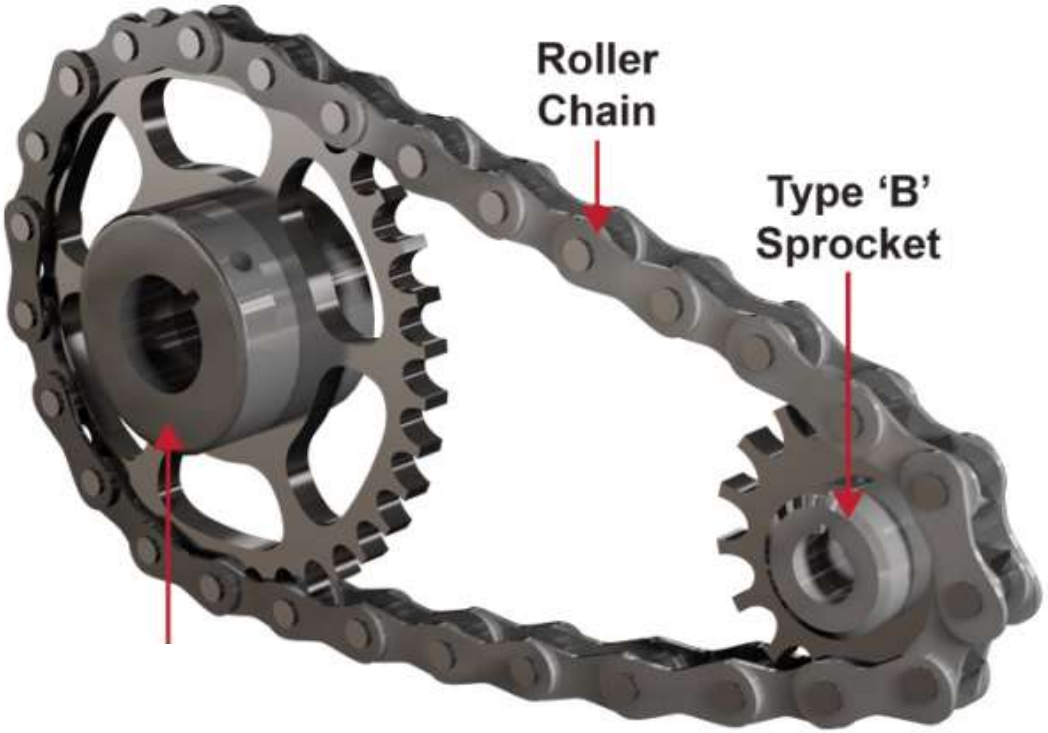

Friction rings (splined)
Friction lining
Spring
Driven shaft
Engine shaft
Disc (plate)
Flywheel


CLUTCH PLATES
CLUTCH DISCS

# Need of Primary Reduction


Belt drives

# Chain Drives




# CONTINUOUSLY VARIABLE TRANSMISSION (CVT)

# INTRODUCTION

CVT is an advanced technology of automatic transmission.

Unlike traditional automatic transmissions, continuously variable transmissions don't have a gearbox with a set number of gears.

Varies the transmission ratio continuously. Shifts automatically with an infinite number of ratios.

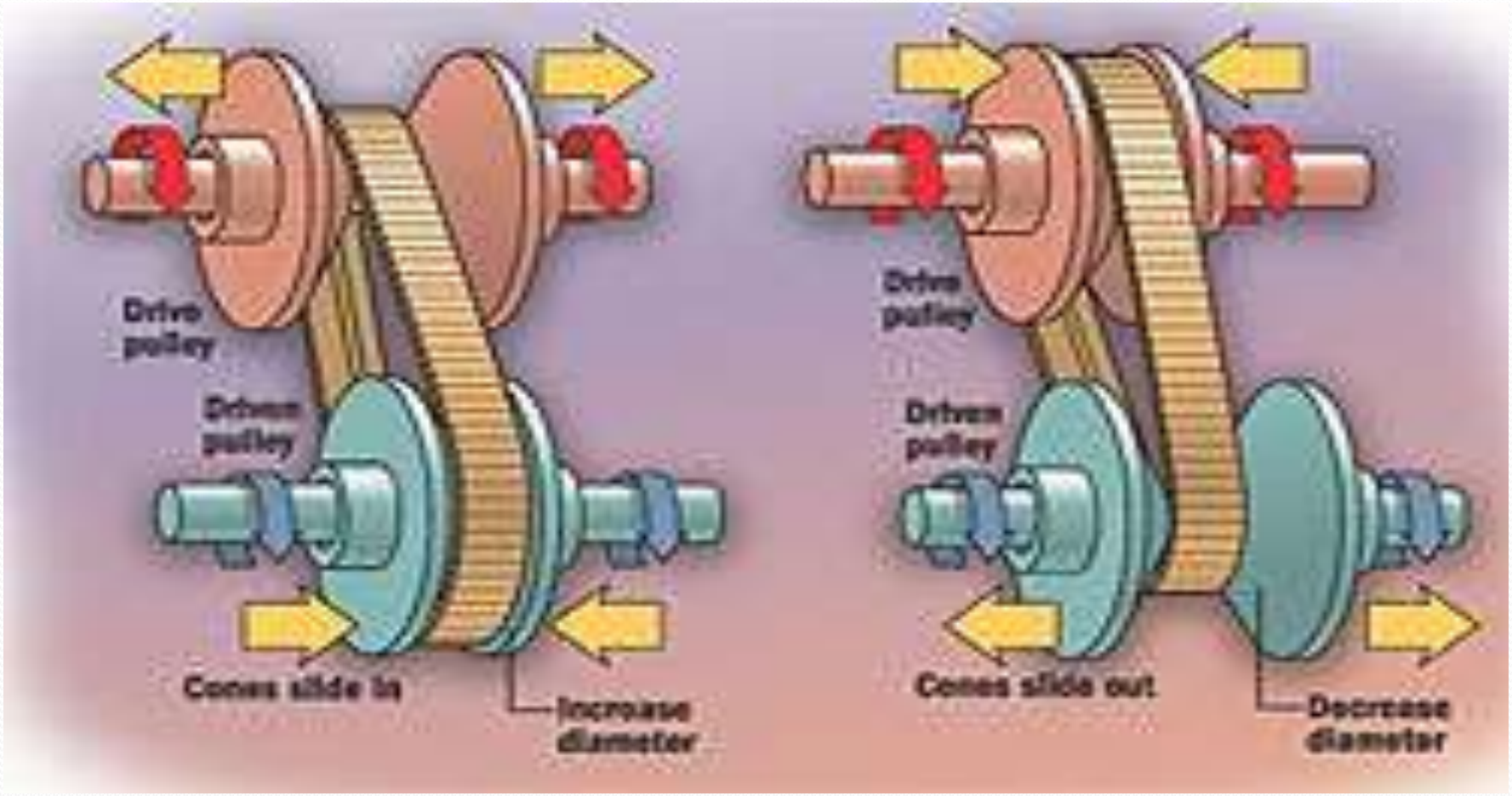
A continuously variable transmission -CVT, (also known as single-speed transmission, gearless transmission, one-speed automatic, variable pulley transmission, or

in case of motorcycles, a twist-and-go) is a transmission that can change seamlessly through an infinite number of effective gear ratios between maximum and minimum values.

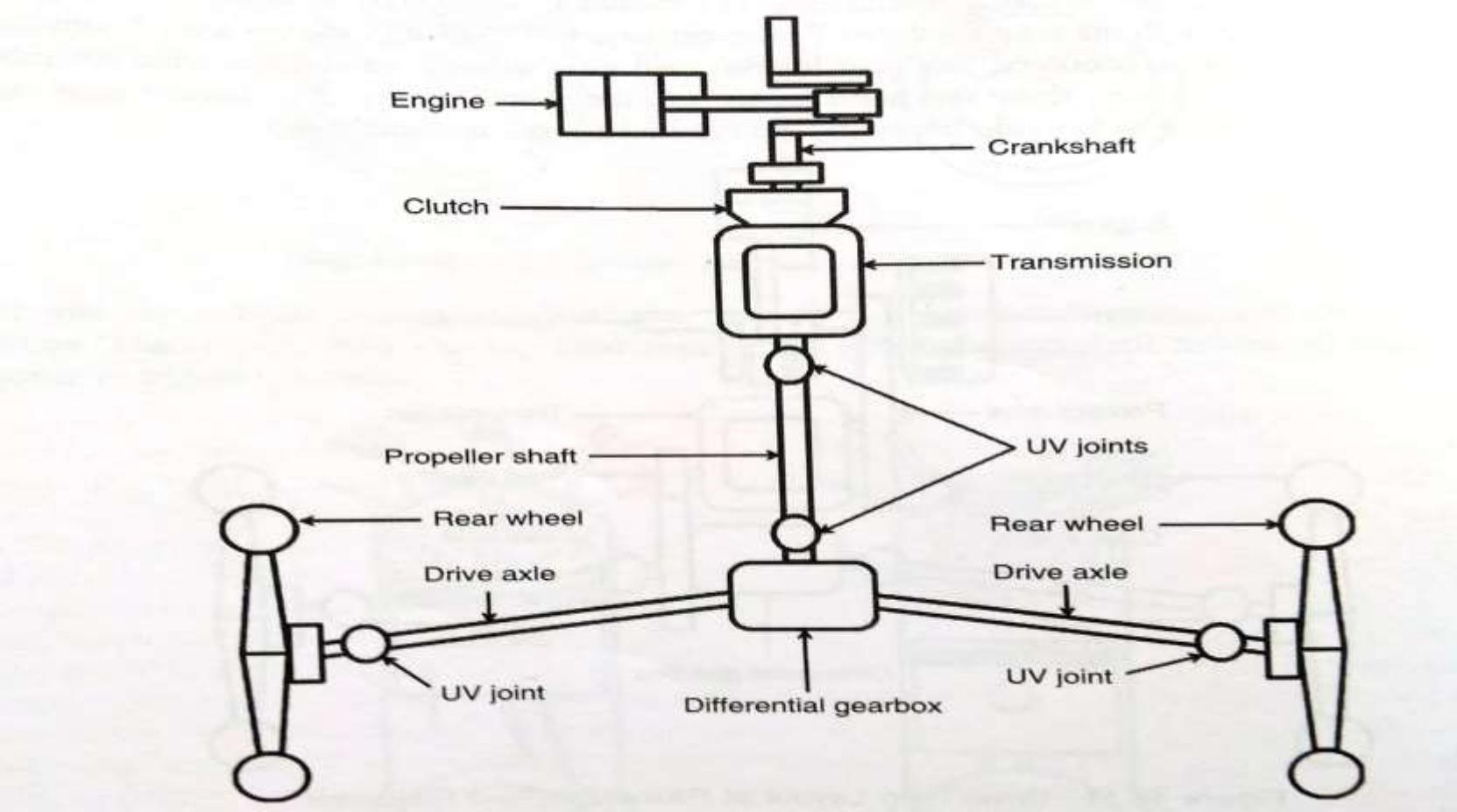
# HISTORY OF CVT

- Leonardo da Vinci sketches is the basis for the first continuously variable transmission in 1490.
- First patent for the CVT Transmission was made by Daimler & Benz in 1886.
- The first workable belt driven CVT was designed and built by the Dutch man Huub van Doorne in 1958.
- In Early 1990's Nissan introduced CVT in their Nissan March
- 2004 - Ford begins offering a CVT

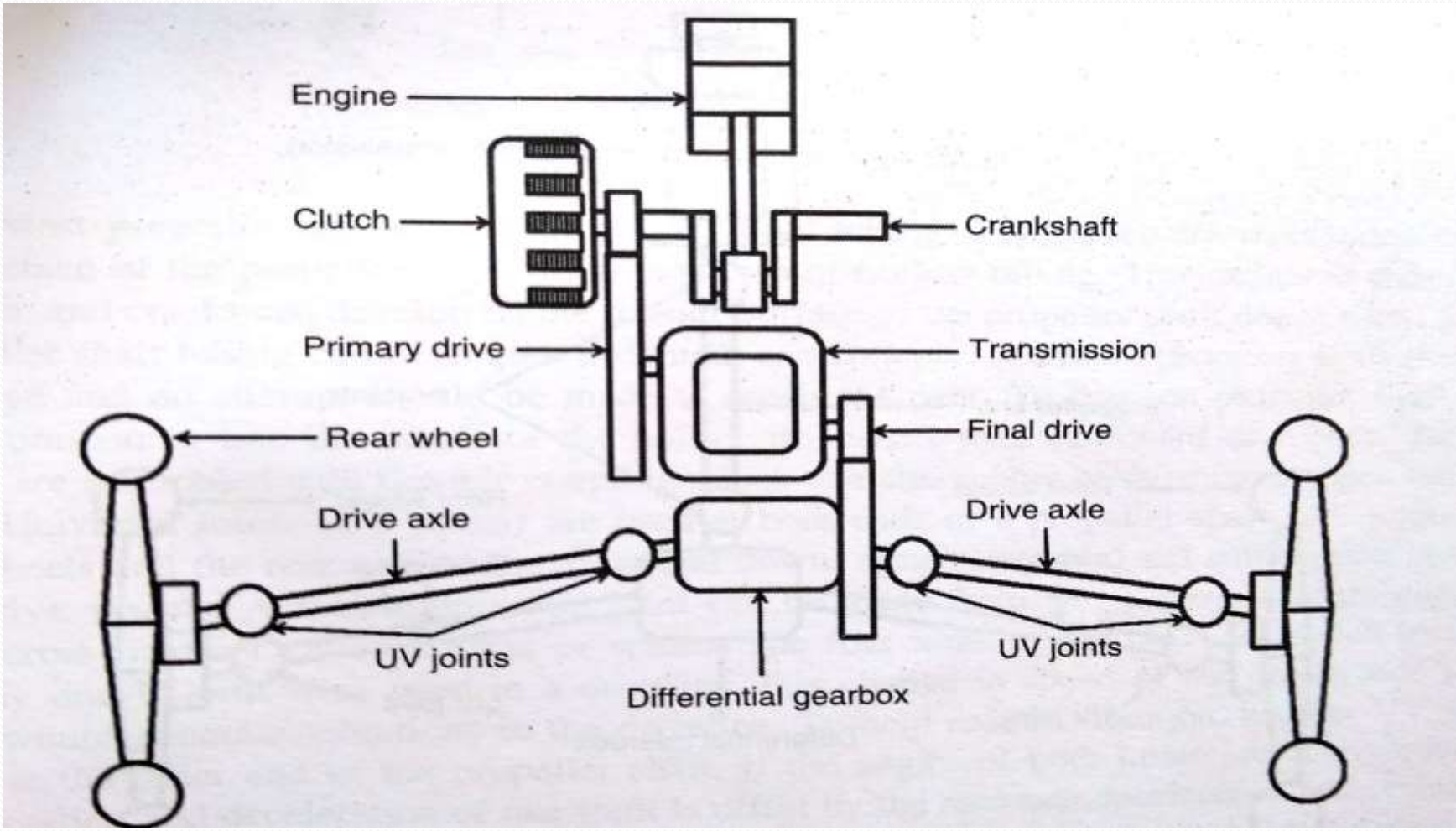
# Working of CVT



# Drive Train Layout for Loading Auto Rickshaws



# Drive Train Layout for Passenger Auto Rickshaws



## FUNCTION OF LUBRICATION SYSTEM

**LUBRICATION:** The main function of lubrication system is to reduce the friction between two parts having relative motion between them.
This has been accomplished by providing smooth thin layer of viscous lubricant between two surfaces.

**COOLING:** Lubricant which comes in contact with two surfaces also carries the heat and provides cooling. This cooling takes place simultaneously with lubrication. Generally, lubrication system absorbs57c to 10% of the total heat generated in the cylinder. So lubricating oil also requires some means of cooling if it is circulated again in the system.

**CLEANING:** Various components like piston, piston rings, piston pin bearing are exposed to combustion chamber and directly endure the combustion of fuel. This results as a high carbon deposition on surface of these components. To improve life of components, it is necessary to remove or reduce the carbon deposition. Lubricating oil helps to wash out these deposits and clean these components.

**SEALING:** A thin layer of lubricating oil between piston and cylinder forms a seal by filling minor leakage paths and surface irregularities on cylinder, piston and piston rings.

**NOISE REDUCTION:** As friction between two surfaces is reduced, the overall noise level of engine also decreases.

# TYPES OF LUBRICANTS

**Two-stroke Engine Oils:** Nowadays, two-stroke engines are used in small capacity mopeds and on some old scooters.

In two-stroke engine, lubricating oils is supplied in the engine either by premixing with petrol or injected in the petrol.

In both the cases, lubricating oil has to lubricate the various components first and then it is supposed to burn with air fuel mixture without leaving any ash behind.

**Dry Lubricants :** A dry lubricant is used as powder or thin film to provide protection from damage in the environments where liquid lubricant cannot be used.

It is also known as **solid lubrication, dry film lubrication and solid film lubrication.**

A combination of solid and liquid lubrication is also feasible and may have a beneficial effect on the friction and wear performance of sliding surfaces.

Dry lubricants can be distributed in water, oils, and greases to achieve improved friction and wear properties under conditions of extreme pressures and temperatures.

Dry lubrication can be implemented where unusual conditions exist which make oils and greases unsuitable.

For example. **lubrication to chain**, a chain with dry lubricant won't pick up as much duct as oil lubricated one.
Dry lubricants can be applied to a surface in a variety of forms.

The oldest and simplest method is to rub the fine powders of dry lubricants on surfaces to be lubricated.

Certain dry lubricants have been blended in a vaporized vessel and sprayed directly onto the surfaces to be lubricated.
This thin solvent penetrates deeply and quickly.

**Grease Lubrication:** Thin lubricating oils cannot be used where components are subjected to heavy cyclic loads.
Moreover, it is very difficult to penetrate the dry lubricants in the components which are not so easily accessible. To overcome these difficulties, different types of greases are used as lubricant.

Grease is a **semi-solid form of lubricating oil** which is prepared by dissolving a thickening additive in mineral lubricating oil.
The fibres of thickening additive trap the oil and provide bonding by creating solid boundaries.
Molecules of oil provide lubrication and fibres provide strength to withstand heavy loads.

Grease can be trapped between two surfaces or components by providing mechanical sealing arrangements.

**Synthetic Oils:** It is possible to improve properties of mineral oil to get maximum advantage but dispersion of all the additives is not possible.
Compromise has to be done with mineral oil as it has reactive nature with many additives.

Moreover, even with proper additives, mineral oil cannot be used reduced **chemical compounds are blended with each other** to produce lubricating oil known as synthetic oil.

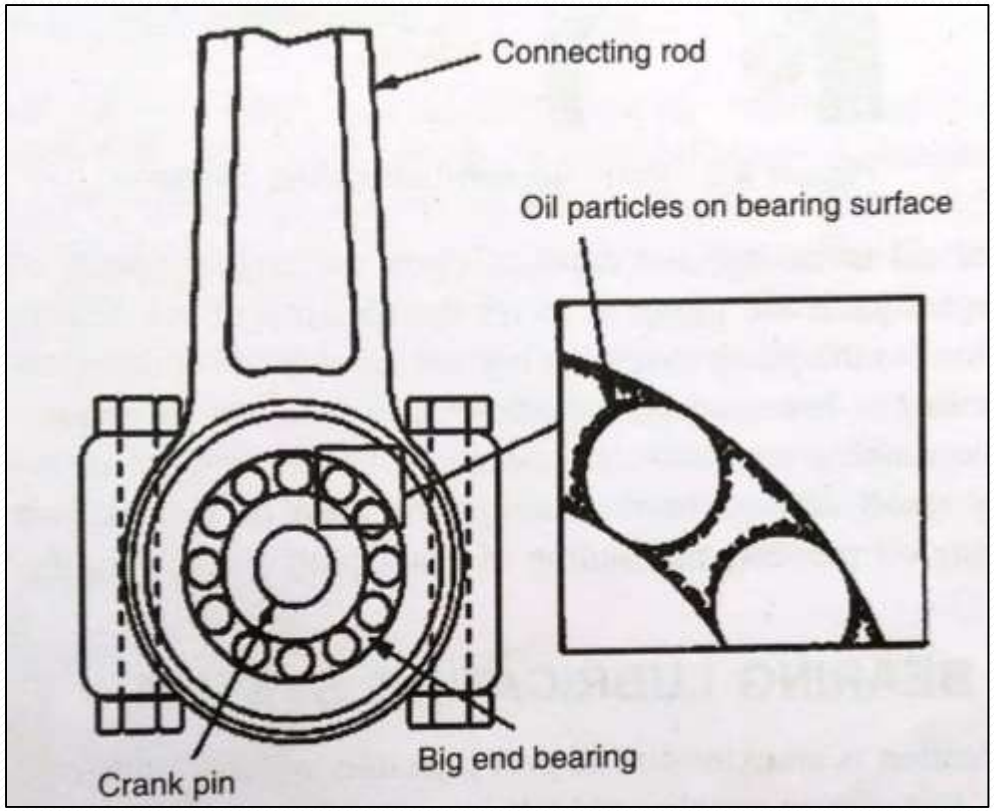
Synthetic oils are used as a replacement of conventional mineral oils.

Synthetic oil contains perfect blending of specific chemical compound as per the working conditions.

# TWO-STROKE PRE-MIX LUBRICATION

Oil-fuel pre-mix lubrication is the oldest and simplest approach of engine lubrication and used for two-stroke engines.

Lubricating oil is mixed with petrol in the ratio of **1:20**

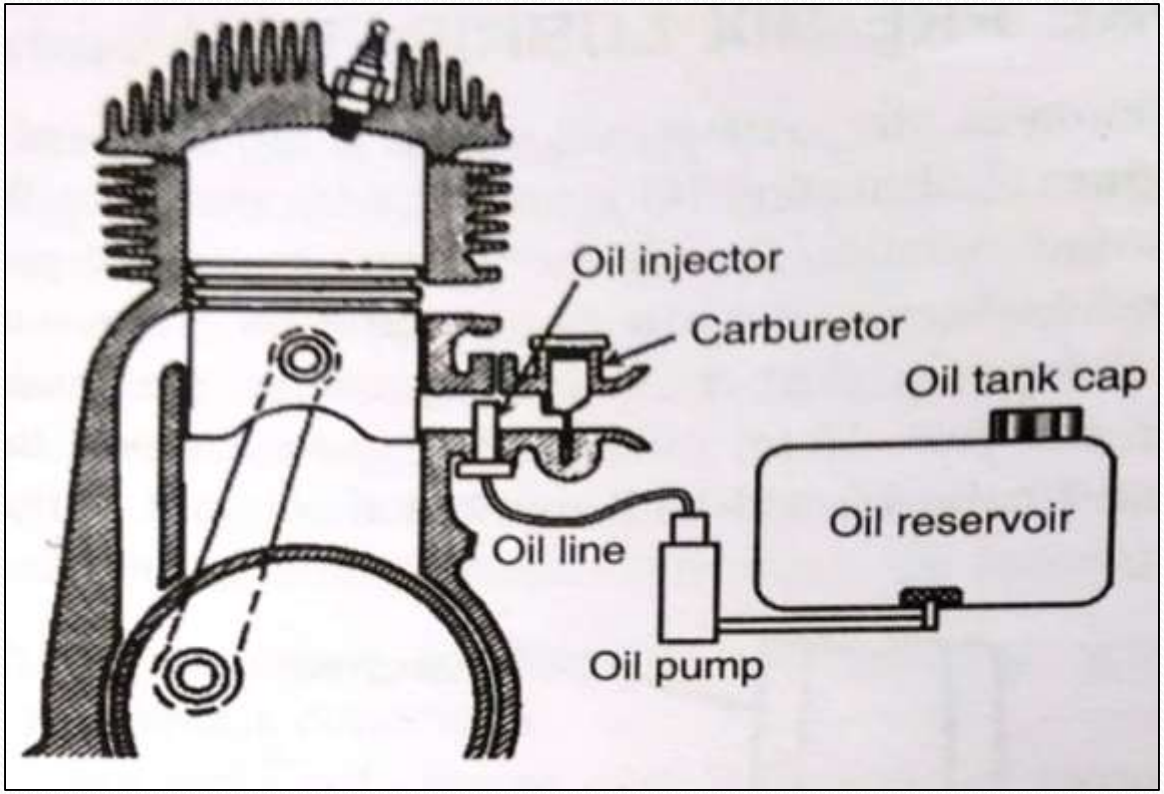


# PORT INJECTION LUBRICATING SYSTEM

To overcome the difficulties with pre-mix system, port injection system was introduced in 1960s.

It injects the lubricating oil into the intake manifold instead of pre-mixing with fuel.

This system makes use of **pump** and **injector** to inject the oil.



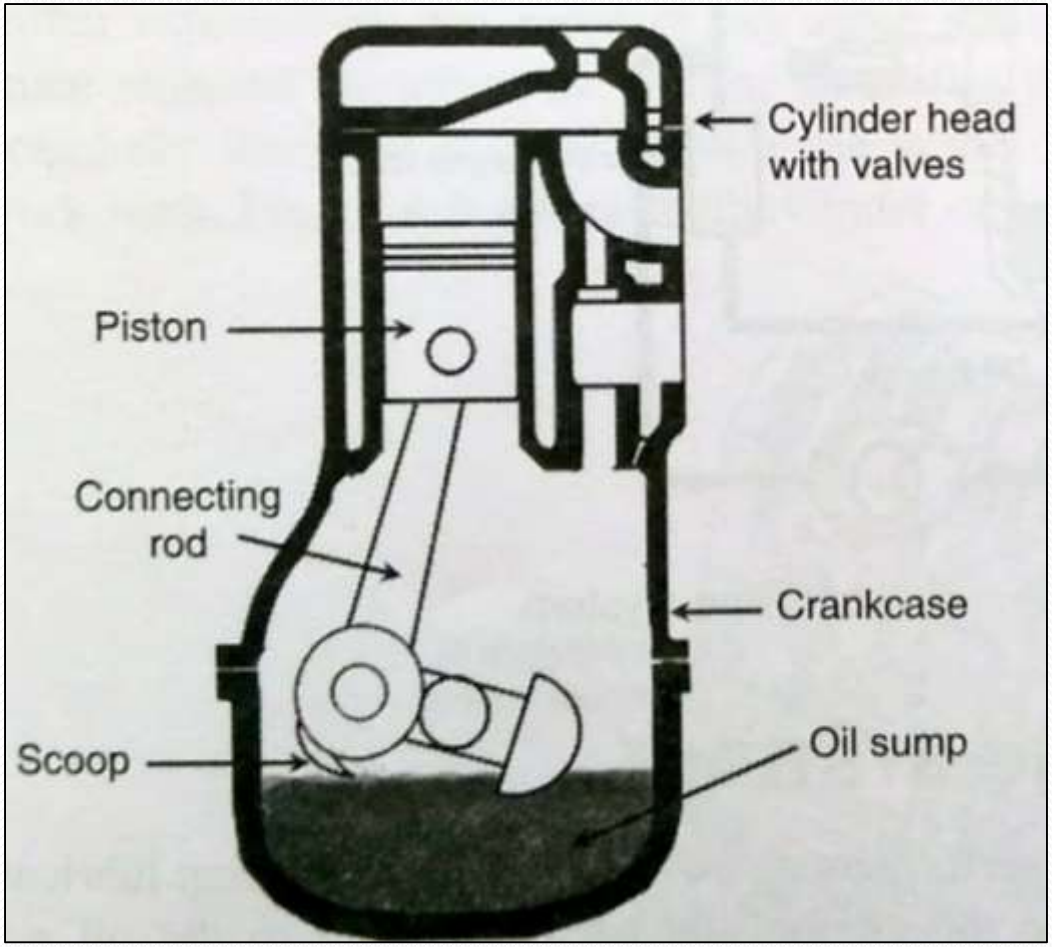
# SPLASH LUBRICATING SYSTEM

Small capacity single cylinder engines use splash lubricating system.

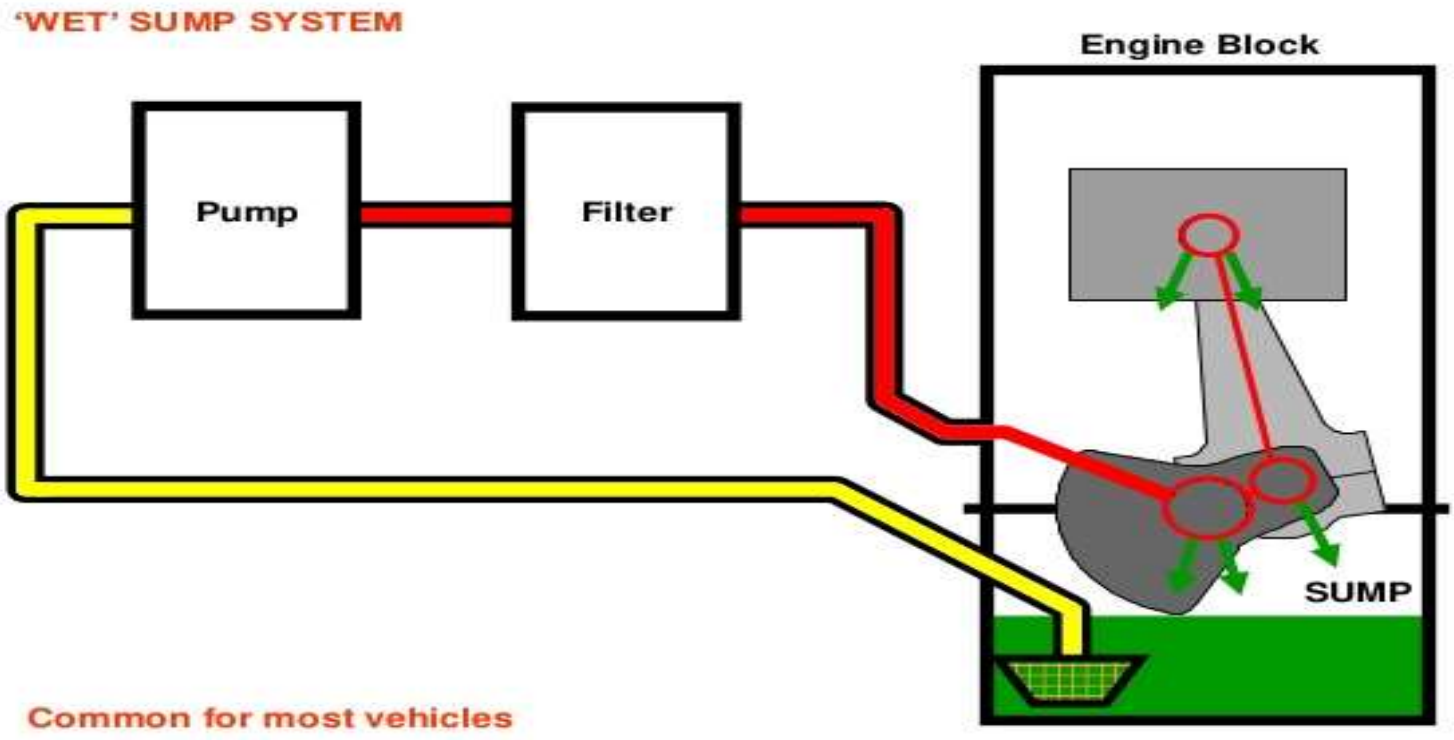
The crankcase is provided with special shape to form oil sump.

Lubricating oil is squelched to the components with the help of connecting rod.

Connecting rod is provided with the scoop and hollow pipe in the direction of rotation.



# WET SUMP LUBRICATION SYSTEM



# DRY SUMP LUBRICATION SYSTEM