A Presentation on “Single plate clutch and Multi plate clutch”

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single plate clutch
Single Plate Clutch Working

- A single plate friction clutch consisting of a clutch disk between the flywheel and a pressure plate. Both the pressure plate and the flywheel rotates with the engine crankshaft or the driving shaft. Both sides of clutch disc are faced with friction material (usually of ferrodo).
- The clutch disc is mounted on the hub which is free to move axially along the splines of the driven shaft but not turnable towards the transmission input shaft.
- The pressure plate pushes the clutch plate towards the flywheel by a set of strong springs which are arranged radially inside the body.
- The three levers (also known as release levers or fingers) are carried on pivots suspended from the case of the body.
- These are arranged in such a manner so that the pressure plate moves away from the flywheel by the inward movement of a thrust bearing.
- The bearing is mounted upon a forked shaft and moves forward when the clutch pedal is pressed.
Single Plate Clutch Working

- By pressing the clutch pedal down, the thrust bearing moves towards the flywheel by means of linkage force, and press the longer end of the lever inwards.
- Due to this, the lever turns on their suspended pivot and forces the pressure plate to move away from the flywheel this action compresses the clutch springs which in turn moves the pressure plate away from the clutch plate and remove the pressure from the clutch plate.
- This enables the clutch plate to move back from the flywheel and thus, the driven shaft becomes stationary.
- By moving the foot back from the clutch pedal, the thrust bearing moves back and allows the spring to extend which pushes the clutch plate backwards the flywheel.
- This engages the flywheel and the clutch plate which starts the motion of the driven shaft.
Advantages:

- Simple and inexpensive and need little maintenance.
- Gear changing is easier than the cone clutch because the pedal movement is less.
- It is more reliable because it does not suffer from disadvantages of binding of cone.

Disadvantages:

- The springs have to be more stiff hence greater force required to disengage.
Single Plate Clutch Applications

- Single plate clutches are used where large radial space is available such as: trucks, buses, cars etc.

- As sufficient surface area is available for the heat dissipation in such clutches, no cooling oil is required. Therefore, single plate clutches are dry type.
Multi Plate Clutch Diagram
Multi Plate Clutch Working

- During clutch engagement, spring pressure forces the pressure plate towards engine flywheel. This causes the friction plates and the steel driven plates to be held together.
- Friction locks them together tightly. Then the clutch basket, drive plates, driven plates, clutch hub and the gearbox input shaft all spin together as one unit.
- Now power flows from the clutch basket through the plates to the inner clutch hub and into the main shaft of the transmission.
- The clutch gets released or disengaged when the clutch pedal is pressed. This causes the clutch pressure plate to be moved away from the drive and driven plates, overcoming the clutch spring force.
- This movement of the pressure plate, relieves the spring pressure holding the drive and driven plates together. Then the plates float away from each other and slip axially.
- Thus, the clutch shaft speed reduces slowly. Finally, the clutch shaft stops rotating. Power is no longer transferred into the transmission gearbox.
Multi Plate Clutch Advantages & Disadvantages

Advantages:
- Increase the amount of torque to be transmitted.
- Decrease the pedal effort to operate the clutch.
- Decrease the weight of the clutch.
- Decrease the moment of inertia of the clutch.
- Increase in better acceleration.

Disadvantages:
- Heavy.
- Too expensive.
Multi Plate Clutch Applications

- As there are more number of connecting surfaces in a multi plate clutch, the torque transmitting capacity of the multi plate clutch is higher.
- In other words, for a given torque capacity, the radial size of the multi plate clutch is smaller than that of a single plate clutch, resulting in compact construction.
- However, because of a large number of friction surfaces and the compact arrangement, the heat dissipation is a serious problem in the multi-plate clutch.
- Therefore, multi plate clutches are wet type.
- Multi plate clutches are used where compact construction is required, e.g. scooters and motorcycles.
## Difference between Single & Multi plate clutch

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<thead>
<tr>
<th>Single Plate Clutch</th>
<th>Multi Plate Clutch</th>
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<tbody>
<tr>
<td>Single plate clutch consists of a clutch plate whose both sides are coated with a frictional material.</td>
<td>The multi Plate clutch consists more than one clutch plate.</td>
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<tr>
<td>Torque transmitting capacity is less.</td>
<td>High torque transmitting capacity or multi plate clutch is smaller than the single plate clutch for a given torque capacity.</td>
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<td>Heat generation is less, so there is no need of a cooling medium. It is called “dry clutches.”</td>
<td>Heat generation is more due to more frictional surface. So it needs a cooling medium and referred as “wet type” clutch.</td>
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<tr>
<td>The coefficient of friction is high.</td>
<td>The coefficient of friction is low.</td>
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<td>Faster response; Clutch engagement is almost instantaneous.</td>
<td>Clutch engagement not instantaneous.</td>
</tr>
<tr>
<td>Single plate clutch used where large radial space available. e.g. Trucks, Cars.</td>
<td>Multiple Disc clutch is used where compact construction is desirable. E.g. Motorcycle, Scooter.</td>
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Thank You........