

# A REVIEW ON CENTRIFUGAL CLUTCH

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**Abstract:** The centrifugal clutch offers many advantages in motor and engine drive applications. Utilizing the centrifugal clutch enables the selection of normal torque motors for running loads rather than the selection of high torque motors for starting loads. The world is advancing technically in the field of Automatic and Technology is never at a standstill. In recent time it has gained greater momentum than ever before. As demand for time increases, people require something less time consuming as time is money, something more precise, something accurate, meaning something automatic which can serve the people comfortably. On this path, the science and engineering field is always under development and discoveries having come to the people and serves for their betterment and welfare. In many applications, compliant mechanism can maintain or even improve performance relative to conventional rigid body designs. It is cost benefitted. Also conventional clutch is expensive rather than compliant clutch. This paper presents basic information of centrifugal clutch and its working.

**Keywords:** -Centrifugal clutch, Transmission, Torque, Clutch engagement and clutch disengagement.

## XII. INTRODUCTION

The clutch is an important part in the transmission system of automobiles. It transmits power from the engine to gear box at various speeds. No shock is caused during this transmission of power. The clutch works on the principles of friction. When two friction surfaces are brought in contact with each other and pressed they are united due to the friction between them. If now one is resolved, the other will also revolve. The friction between the two surfaces depends upon the area of the surfaces, pressure applied upon them and coefficient of friction of the surface materials. The two surfaces can be separated and brought into contact when required. The driving member is kept rotating. When the driven member is brought in contact with the driving member, it also starts rotating. When the driven member is separated from the driving member it does not revolve. This is the principle on which a clutch operates.

An automatic transmission or gearbox is a type of motor vehicle transmission that can automatically change gear ratios as the vehicle moves, freeing the driver from having to shift gears manually. The automatic transmission was invented in 1921 by Alfred Horner Munro of Regina, Saskatchewan, Canada, in 1923. In such a way in 1977 Mr. Ray Hill an American Automobile Engineer successfully developed an Automatic Gearbox of constant-mesh transmission type working on the principle of centrifugal clutches.

The present automatic gearbox is an automatic transmission in which increased rotation of the input shaft causes the engagement of a first centrifugal clutch assembly which, in turn, drives a planetary gear reduction assembly and, as speed picks up, a second centrifugal clutch assembly of similar construction comes into engagement to change the drive of the input shaft to a direct drive arrangement with the output shaft whereby the whole transmission rotates as a unit.

## XIII. REQUIREMENT OF A CLUTCH

1. **Torque transmission:** - The clutch should be able to transmit maximum torque of the engine.
2. **Gradual engagement:-** The clutch should engage gradually to avoid sudden jerks.
3. **Heat dissipation:** - The clutch should be able to dissipate large amount of heat which is generated during the clutch operation due to friction.
4. **Dynamic balancing:-** The clutch should be dynamically balanced. This is particularly required in the case of high speed engine clutches.
5. **Vibrating damping:** - The clutch should have suitable mechanism to damp vibrations and to eliminate noise produced during the power transmission.

6. **Size:-** The clutch should be as small as possible in size so that it will occupy minimum space.
7. **Free pedal play:** - The clutch should have free pedal play in order to reduce effective clamping load on the carbon thrust bearing and wear on it.
8. **Easy in operation:** - The clutch should be easy to operate requiring as little exertion as possible on the part of the driver.
9. **Lightness:-** The driven member of the clutch should be made as light as possible so that it will not continue to rotate for any length of time after the clutch has been disengaged.

#### XIV. CENTRIFUGAL CLUTCH

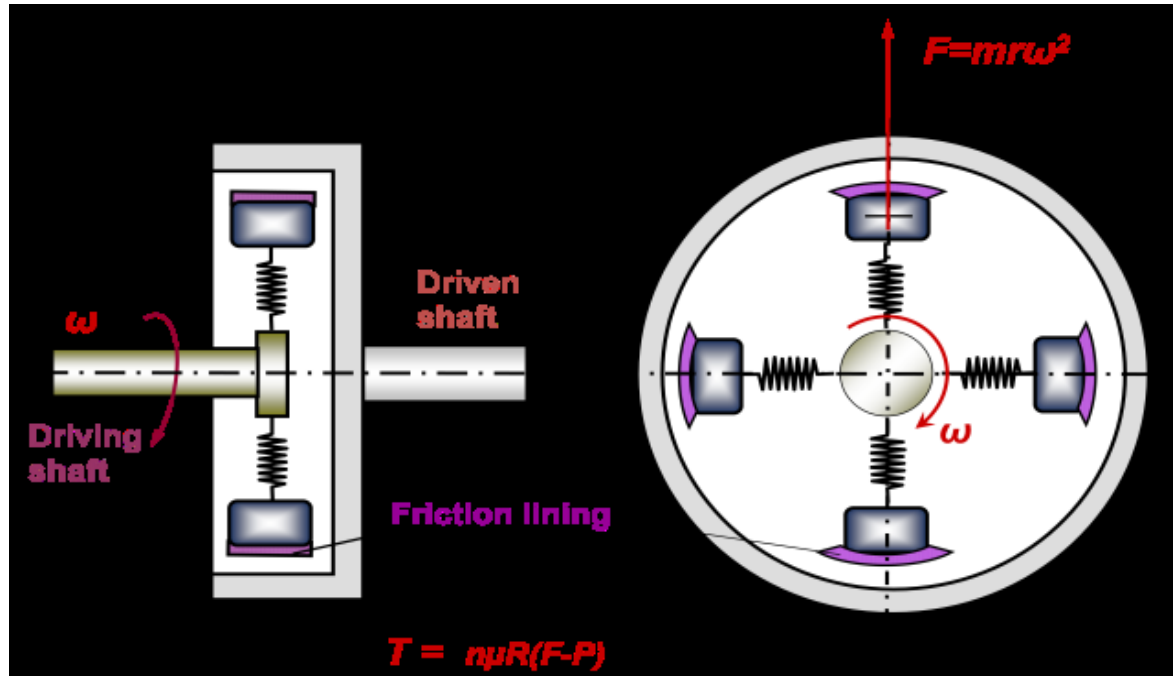


Fig. 1 Centrifugal Clutch

A clutch is a machine member used to connect the driving shaft to a driven shaft, so that the driven shaft may be started or stopped at will, without stopping the driving shaft. A clutch provides an interruptible connection between two shafts. The centrifugal clutch is usually used into motor pulley. It consists of number of shoe on the inside of a rim of pulley. The outer surface of pulley is covered with friction material. These shoes which can move radially in guides are held against the boss on the driving shaft by means of springs. The spring exert a radially inward force which assumed to be constant.

The weight shoes when revolving cause it to exert a radially outward force (centrifugal force). The magnitude of centrifugal force depended on speed at which shoes are revolving. A little consideration show that when centrifugal force is less than the spring force, the shoes remain same position as when driving shaft was stationary, but when centrifugal force is equal to spring force, spring is floating.

When centrifugal force exceed the spring force, the shoe moves outward and comes in contact with driven member and press against it. The force with which the shoe press against the driven member is the difference of the centrifugal and spring force transmitted. The increase of speed causes the shoe to press harder and enables to be Centrifugal clutches are often used in mopeds, underbones, lawn mowers, go-karts, chainsaws, mini bikes, and some abruptly disengage loads when starting and idling. paramotors andboats to keep the internal combustion engine from stalling when the output shaft is slowed or stopped. In fully centrifugal type of clutches, the springs are eliminated altogether and only the centrifugal force is used in the required pressure for keeping the clutch in engaged position.

The advantage of the centrifugal clutch is that no separate clutch pedal is required. The clutch is operated automatically depending upon the engine speed. This means that can be stopped in gear without stalling the engine. similarly while starting, the driver can first select the gear, put the car into the gear and simply press the accelerator pedal. This makes the driving operation very easy.

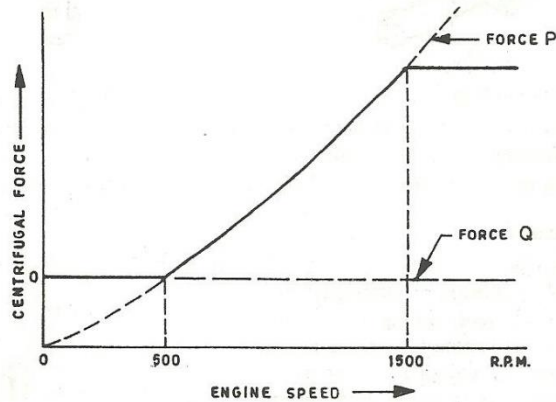


Fig.2 Characteristic curve of centrifugal clutch

The operating Characteristics of Centrifugal Clutch shown in fig. The curve is drawn engine speed w.r.t to centrifugal force as shown above fig.2. Force P is proportional to the centrifugal force at a particular speed, while force Q exerted by spring is constant at all speeds. The firm line in the figure shows the net force on the plate D for various engine speeds. At the upper end the curve is made flat by means of stop H.

#### XV. ENGAGEMENT OF CENTRIFUGAL CLUTCH

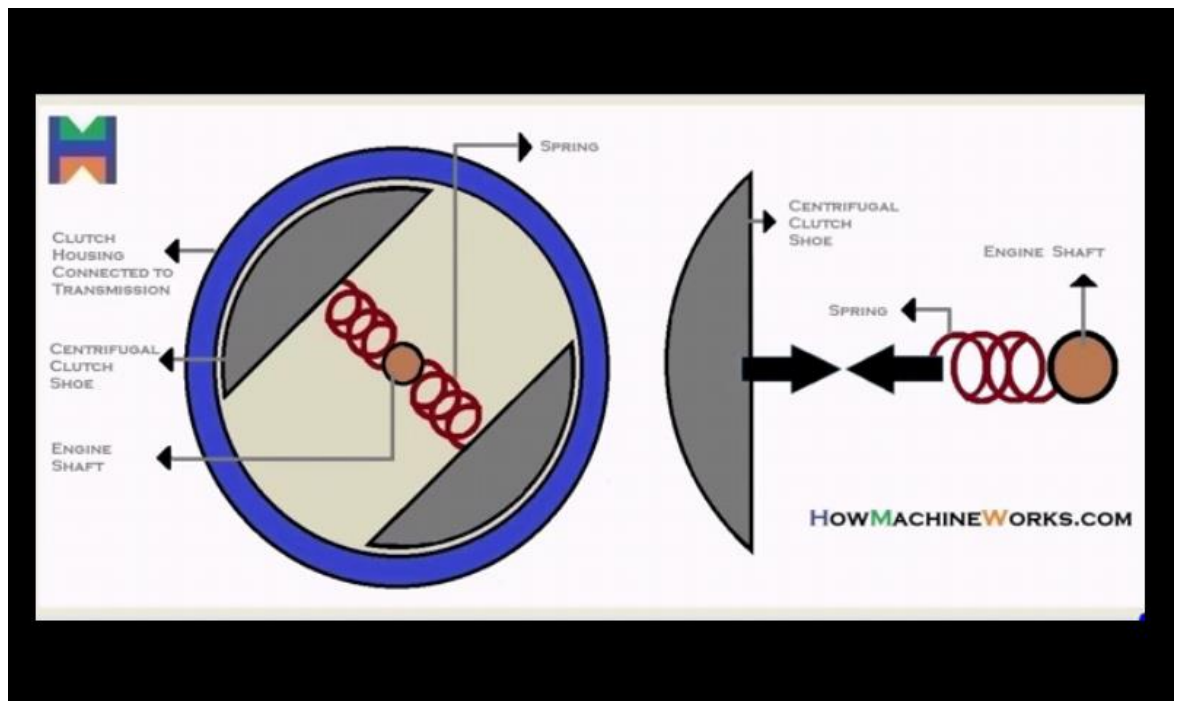


Fig.3 Engaged centrifugal clutch

The above fig. 3 shows centrifugal clutch at engaged position. For transmitting power from engine to shaft centrifugal clutch is necessary to get engaged. Because there is no gear box is used to transmit the power. When centrifugal clutch is get engaged then the engine power is transmitted to shaft and shaft get rotated which results in rotating wheel.

By using centrifugal clutch driven shaft may be started at will, without stopping the driving shaft. This can be done by engaging of centrifugal clutch. A clutch provides an interruptible connection between two shafts. The centrifugal clutch is usually used into motor pulley.

### XVI. DISENGAGING OF CENTRIFUGAL CLUTCH

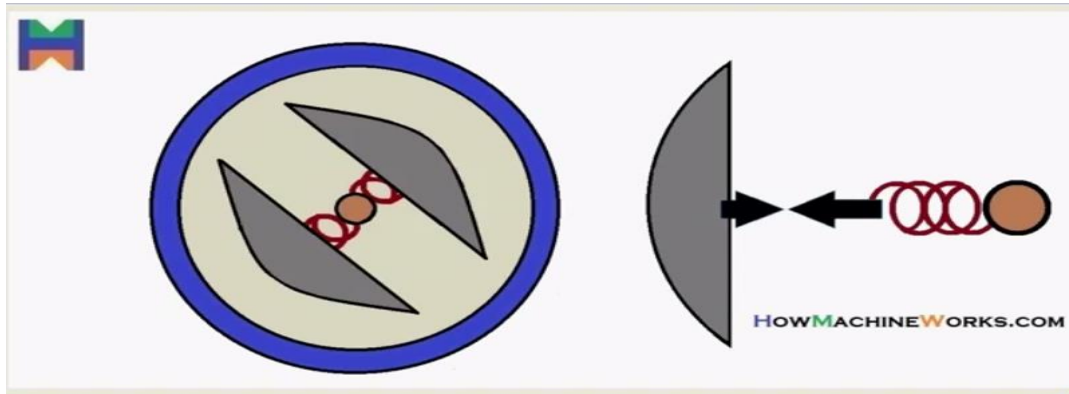


Fig. 4 disengaging of centrifugal clutch

The above fig shows disengaging of centrifugal clutch. Disengaging of centrifugal clutch is necessary to control the speed by disconnecting the power transmission from engine to shaft. By using centrifugal clutch driven shaft may be stopped at will, without stopping the driving shaft. This can be done by disengaging of centrifugal clutch.

### XVII. AUTOMATIC TRANSMISSION WITH CENTRIFUGAL CLUTCHES

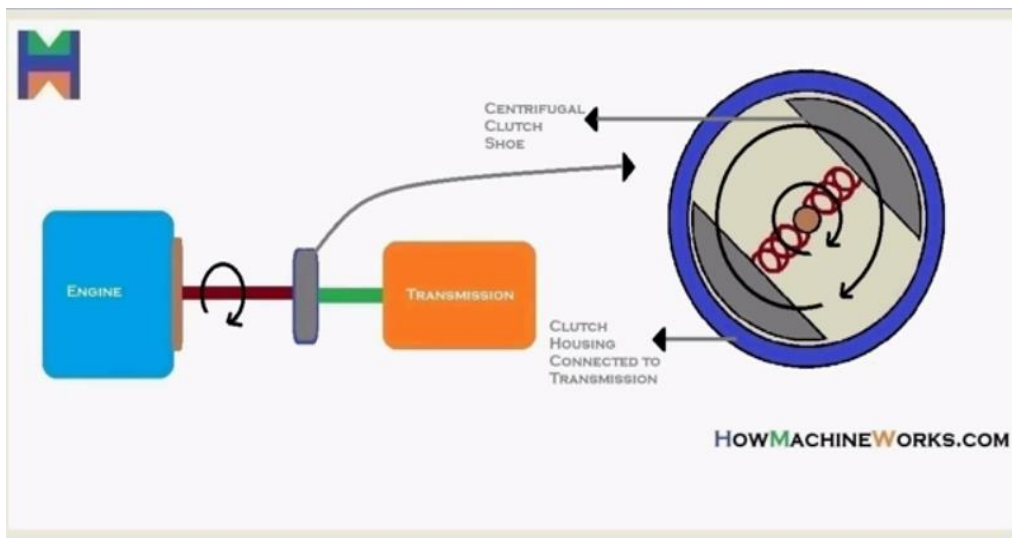


Fig 5: power transmission through centrifugal clutch

The above fig.5 shows how power is to be transmitted from engine to shaft through the centrifugal clutch, it takes place as follows.

The automatic gearbox with centrifugal clutches relates to an automatic transmission; more particularly, the invention describes a transmission for producing a variable speed drive to light-weight vehicles, such as motorbikes.

### XVIII. CONCLUSION

Centrifugal clutches are used in transmission system where the gear box is not used. Without gearbox power is transmitted through centrifugal clutch by engaging and disengaging of centrifugal clutch. As the speed increases clutch get engaged and on reducing the speed clutch get disengaged. This centrifugal clutches are used in moped bikes, gokart, boats ( activa, access, spirit etc).

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