

# CLUTCHLESS TRANSMISSION OF GEARS IN MOTORCYCLES

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## ABSTRACT

Generally, all two-wheelers (except some sports bikes) currently on roads use a manual transmission. They use a sequential gearbox with a clutch system to shift gears by a lever placed near foot (except scooters). Unlike cars, it's not possible in motorbikes to shift gears in any manner, means one can't change gears directly from second to fourth. Shifting of gears in motorbikes and scooters is sequential. Automatic transmissions in motorcycles are less common as compared to manual. A clutchless automatic-manual transmission has many advantages over the other viz. transmission efficiency, shift quality, and also ease to the rider. Conventional two-wheeler vehicles require an electronically controlled clutch for engagement and isolation in the gearbox which will result in smooth shifting. In this study, exploration of the feasibility of the clutchless transmission and its effect on motorbike's efficiency is taken into account.

## General Terms

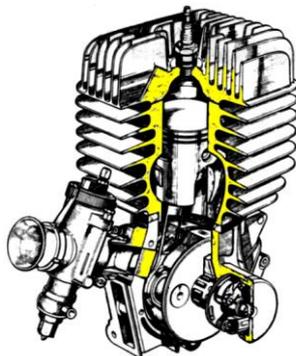
Engines work sequentially as per principle but it's not any rule that it should always be set free before upshifting or downshifting. Other options can be considered too.

## Keywords

clutchless transmission, gears, motorcycle, motorcycle efficiency, feasibility of clutchless over sequential

## 1. INTRODUCTION

The clutchless transmission is also a kind of manual transmission in which the shifting of gears is done by the driver but the main difference is in its working. The engaging and disengaging is handled by hydraulic or majorly by an electronic activator. The placement of gear changing lever can be varied by the producer as per their design requirement, but the fundamental method can be kept same in all of them. Up to now the change of gears is sequential in manner i.e. the transmission runs through the gears in order – the driver is not allowed to skip any gears. A clutchless manual transmission can give the motorist the convenience of an automated gearbox without weakening of the fuel economy. Moreover, it also eases the



task of powertrain design. Since the system uses a manual gearbox, it is also capable of handling of the high torque loads of powerful engines.

## 2. LITERATURE REVIEW

The sequential engine used in motorcycles is capable of creating enormous power. This power further must be delivered to the wheels in a controlled way. All the power is delivered to the rear wheel by the transmission through a structure comprising series of gear set, clutch, and the drive system.

## 3. MODULES

### 3.1 Gear Set

The gear set is the part which allows the rider to move from zero speed to a cruising velocity. The typical motorcycle comprises 4 gears. In conventional motorcycles, gears are shifted with the help of shifting a lever.

### 3.2 Clutch Plates

Clutch plates are for engagement and disengagement of power from the engine crankshaft to transmission. Clutch is mainly the series of plates loaded with springs. When these plates are pressed together, a connection between transmission and crankshaft is established.

### 3.3 Clutch Lever

Most of the motorcycles in today's world have a lever on the left bar which acts as a clutch. It is attached via a hydraulic system or via cable to engage or disengage the clutch. The fundamental is when the lever is out – the clutch is engaged, that means the engine and transmission is rotating together. But, when the lever is pulled toward the rider, the coil springs in the clutch plates been compressed, this further allows the stacked clutch plates to move independently.

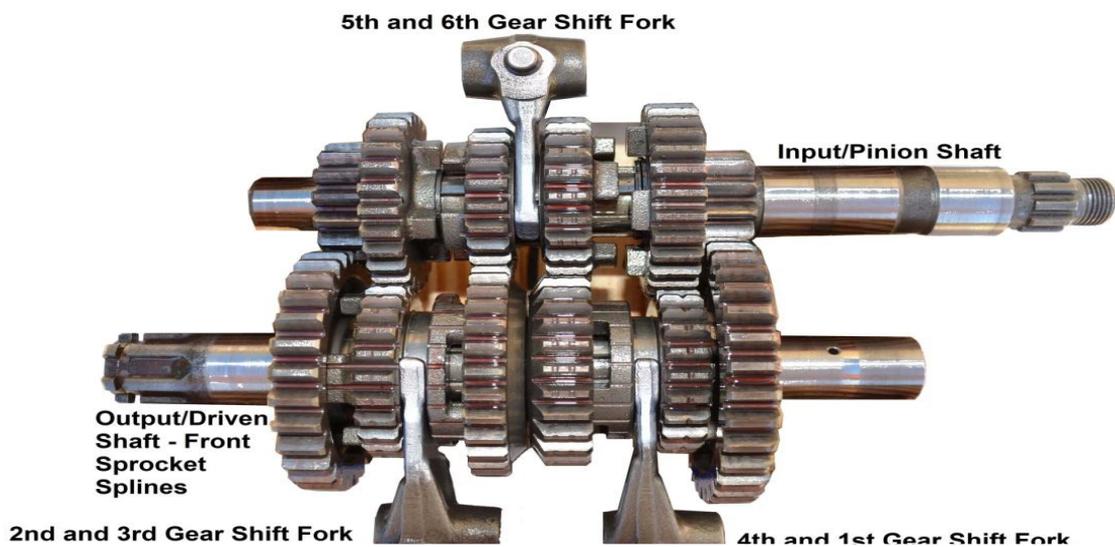


## 4. FUNCTIONING

The clutch plates are mainly a stack with an alternate arrangement of steel plates and friction plates. One type of plate is connected to the crankshaft with help of splines while

the other plates are connected to the input shaft of the transmission via an outer basket. When the clutch lever pulled in, the springs are compressed. This allows the plates to spin freely while the engine and transmission are able to spin at

different speeds. This makes gear shifting possible while at a reasonable speed and also allows the motor to run freely when the bike is not moving at all.



**Fig : A general sequential gear box of a motorcycle**

## 5. METHODOLOGY

The main advantage of the clutch is more control on street. While using conventional machine clutchless up shifting can allow for quicker shifts, often smoother. But this requires the rider to shift in right rpm, else it can damage the gearbox. In these machines, clutchless downshifting is not preferred since there's a chance of engine breakage to happen. Whenever the gas is let go, the engine starts working against the rear tire and slows down the speed. While at high speeds, tires are under hard breaking; this can lead to the lightening of the rear tire which can subsequently result in locking up. This is where clutch is needed.

## 6. WORKING

While using a non-conventional machine which works on clutchless transmission, a microprocessor based system is used. This system identifies that when the rider changes the gear. An electrically operated system is there which depressed the clutch automatically when the gear is changed by the rider. The components of this system are almost same as the manual transmission. But here, an automated clutch mechanism is added for the comfort of the rider. The most tiring part of the manual transmission is its clutch part. It is eliminated here, so this becomes simpler and comfortable as the effort is reduced to just selecting the right gears.

## 7. REVIEW

In recent years, some advancement is done in this field. In the era of modernization and ease to the customer, many companies are working with this type of transmission. One such system, which was developed by Bosch, was known as "eClutch", it worked upon the same principle clutchless transmission, and rather it is electronically controlled. TVS Motors has also presented a bike in name of 'TVS Jive', with a no clutch transmission. This bike has a scooter-like easy drivability along with a bike-like mileage and handling. It can be started from a zero velocity to any speed in any of gears

without any loss of mileage. It's a perfect non-noisy and no tension bike.

## 8. CONCLUSION

The most tiring part for the motorist in a manual transmission is choosing the suitable gear according to the speed needed, else the engine starts producing a noise. In clutchless transmission, the rider can get rid of this part and still have a choice of changing the gears. This gives freedom from regular operation of clutch lever and is very comfortable for stop and go traffic. This transmission can give a better mileage than fully automated system (like in scooters and mopeds) and sometimes also better than manual transmission depending on the roads and driver. This transmission is a bit expensive than the conventional manual transmission but has its costs still lower than the automatic transmission. This can be more efficient in a way as there is less wearing of gears. In nutshell, this type of transmission deals with easiness and better mileage options, this concept is more than capable of blending together the best of both the worlds.

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