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# AUTOMATIC GEAR TRANSMISSION SYSTEM

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## ABSTRACT

*The automatic transmission in automobiles is a unit which supplies the power from the clutch to the differential.There are some types of gear transmission system.These transmission system help to improve the economy and efficiency of the work transfer.some machines with limited speed ranges,such as few forklifts and lawn mowers only use torque convertor.Besides the traditional automatic transmission,there are also other types such as continuously variable transmission ,dual clutch transmission and automated manual transmission system.gear shifting strategy is the core of intelligent control of any automatic transmission used in modern vehicles.It directly influences the vehicle performance,drivers feel and fuel economy seperately.the comparison between automated manual transmission and automatic transmission system is essential.the strategy of the gear shifting in maunal trasnmission syetem is specified.*

***Keywords: Automatic Gear Transmission System,Comparison Between AMT And AT,Gear Shifting Strategy,Toroidal Transmission Drive,Variable Diameter Elastomers Belt.***

## I. INTRODUCTION

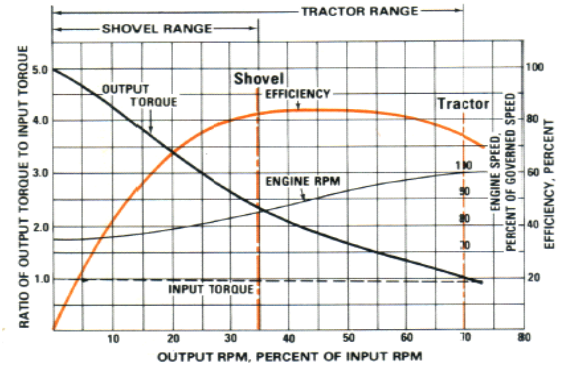
Now days to facilitate and simplify the process of driving the automatic transmission control is connected to vehicles.There are few types of the automatic transmission system that providing high economic,dynamic and excellent performance and reducing the impact of human factors on the control processes.due to this the driver is free from having to shift gears manually by using the transmission computer to change the gears.automatic transmission ,automated manual transmission and intelligent gear shift shedules are key systems to improve the benefits and performance of a vehicle.the manual transmission is advance technology now days.It is more comfertable yo opertare.the engineers are continue to improve the fuel economy,efficiencies,performance of the gear transmission system.The CVTs have been used in decades but the limited torque,reliability have inhibited there growth.Torque convertor acts as simple fluid coupling.These system consisting of planetory gear train.these systems gives some gear ratios.thwe comparison between automated manual transmission and automatic transmission is also required for showing which is the better and suitable transmission for advance technology.

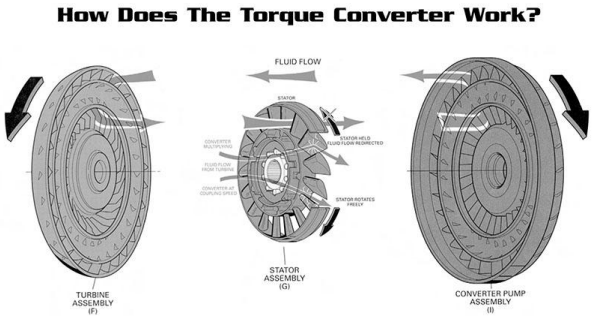
## II. HEADINGS

1.torque convertor-

torque convertor is generally a type of fluid coupling which is transfer the rotating power from a prime mover such as an electric motor ,to rotating a driven load.torque convertor allows the load to be the seperate from

power source and it takes place of a clutch in vehicle .Power is transmits and decouples to the planetary gears with allowing the vehicle to stop with the engine still running without stalling.In torque convertor the impellar connnected with an output shaft of engine to be driven.the torque convertor has an ability to multiply the torque.it consists three rotating elements first is impellar which is driven by prime mover mechanically,turbine which drives the load and stator which is inserted between impellar&turbine hichcan change the flow,which is returning from turbine to the impeller.the fluid is circulated by impeller pump through the turbine runner.when impeller and turbine are rotating at similar speed then at that time fluid coupling works in good manner.Stator is acts as a to modify the fluid flow depending on the relative rotational speeds of impeller and turbine.the stator does not rotate itself,but its vanes are so shaped that during process the impact of fluid flow will takes place on the vanes of the turbine due to this torque multiplication is applied.this causes turbine to start rotating at high speed which accelerates vehicle.the speed of the pump impeller is greater than turbine runner then this torque amplification is done.Some times the slippage between the turbine runner and pump impeller causes decrease in transmission efficiency and fuel economy.the maintenance are more simple than any other gear type.This torque converter type give a jolt every time when we change the gear,hence the gaining speed feeling are maintained.It didn't offer comfert and smoothness.It also consume more gasoline in stop and run position.the examples of cars that are using torque converter transmission honda jazz GE8,suzuki Ertiga,chervolet spin,etc.

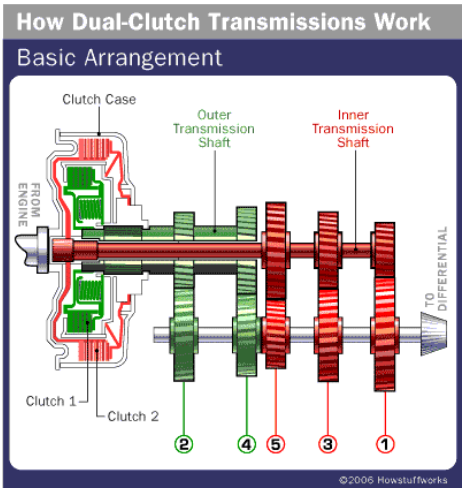


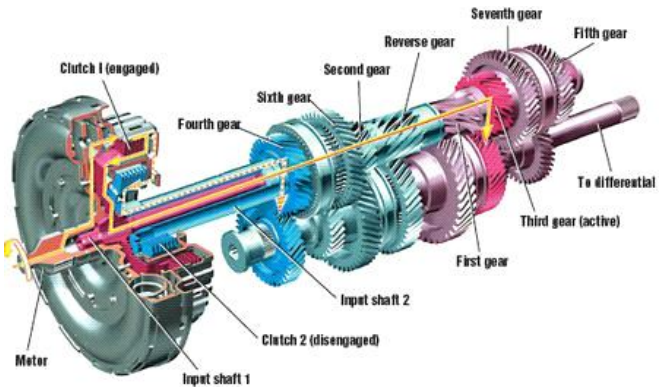




2.Dual clutch transmission-

Dual clutch transmission is also called as Twins clutch transmission.It consist of function of two manual gear boxes in one.This dual clutch transmission uses two seperate clutches for odd and even gear sets.This system is operated fully in automatic mode and it has an ability to allow the driver to shift gear manually in semi automatic mode.Smaller inner clutch drives the even numbered gears and outer larger clutch drives the odd numbered gears and clutches are placed concentrically.the shifting of the gear may not disturb the torque and disrtibution to the driven roadwheels.once we applied torque to the one clutch at same time it is being disconected from other clutch.this system is able to shift the gear quickly and suitable for conventional road vehicles.This system consisits of two fundamental types first is two wet multi plate clutches,bathed in oil and second is two dry single plate clutches.The wet multiplate clutches are used for higher torque engines that can generate 350 Nm.where dry clutches are used for the lower torque output upto 250 Nm for small vehicles.for installation of clutch there are three variations.As the clutches are placed cocentrically,both clutches are in same plane when viewed perpendicularly from the transmission input shaft as in line with cranckshaft,when viewed head on along the length of the input shaft.Due to which one clutch is observed larger than other.Again by

sharing the center line of the crankshaft can implement two single plate dry clutches side by side veiwed from perpendicularly.Third implementation uses two single plate dry clutches.It is driven via gear from the crankshaft of the engine.this system came with the two clutches to help the engine to turn the wheels.It has an ability to change the gear fast and smoothly.This transmission is considered as most responsive transmission compare to other transmission such as CVT and TC,etc.Hence lots of sports car fix this kind of transmission.The construction is very complex and it consists so many components and it bulky also.The repairing costs are so expensive and required long time for it.The dry clutch transmission has tendency to makes the car feels judder in stop and run condition but this not found in wet clutch type.Ford fiesta,Lamborghini huracan,BMD M series,porsche 911,etc are examples that are using this kind of transmission system.




3.continously variable transmission

Another type of AT is Continously variable transmission (CVT) it is smooth and feels comfort by using it in driving as compare to torque converter.The continously variable transmission changes the continous range of gear ratios.Push belt is the common type of CVT which have steel ribbon on which steel blocks are arranged.This belt is used to transmit the power between the two sheaves or two conical pulleys.Now days because of advancening in belt design this push belts have appearing the attention of automakers in worldwide.This belt were made decades ago.The one pulley is driven by the engine and other is mounted on the drive shaft.due to which an number of ratios can be produced.examples of cars which having the CVT transmission system are audi A4,audi A5,Lexus HS,mercedes benz A-class.

3.1.toroidal transmission drive-

In this transmission for transfering the torque between an output torus and input torus it uses the high shear strength of viscous fluid.the torus is movable which slides linearly and roller changes relevant to shaft position.It results in change in gear ratio.Between these torus rollers are present which vary the gear ratio and transmit the power from one torus to another.the movement of the rollers is along the axis of the near conical parts.At the same diameter location it contacts the near conical parts and gives 1:1 gear ratio.Partial toroidal has lose efficiency and full toroidal has more efficiency.

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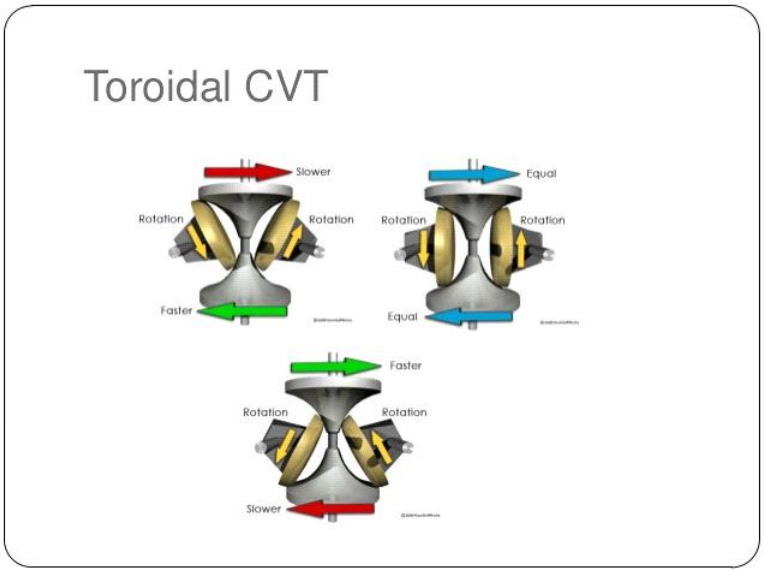



3.2.variable diameter elastomers belt-

This type of CVT uses flat and flexible belts mounted on the movable supports.At higher gear ratio these supports are seperate which tends to form discontinous gear path,which causes slip and creep problems.

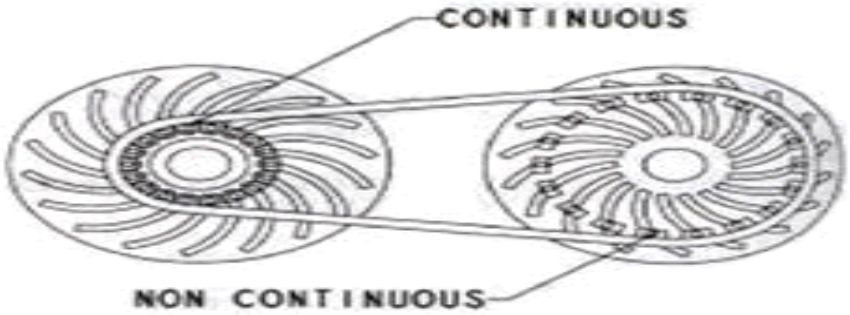



Figure (3) – Variable Diameter Belt CVT
From [3]


Figure (1) – Metal Push Belt CVT
From [3]

Some other types of CVT's are not important as so much as push belts and toroidal CVT's.Due to change in the angle of the cone the outlet radius increases and inner radius decreases and infinitely variable gear ratio is obtained.

3.3.Advantages and performance-

It has a better fuel consumption than regular automatic transmission.It always used to keep the car in its optimum power range regardless of speed.the power loss experienced lower hence acceleration is improved.CVT's always offer improved efficiency and benefits.It has stepless transmission.Less green house gas emission and good emission control because of improved control of speed range of the engine.faster responce to the changing driving conditions.the energy losses are eliminated.

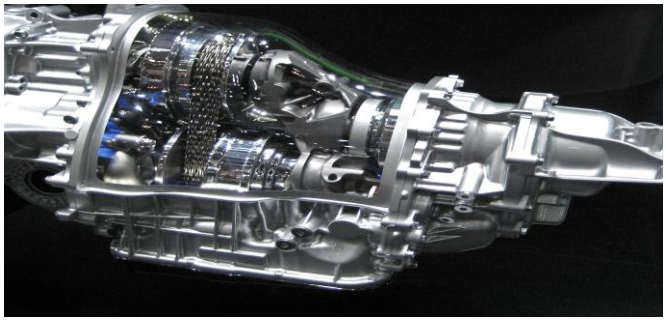
3.4.Disadvantages-

It causes wear due ro friction.other materials and special oil is required.high cost.driving with CVT is so much difficult because driver may not feel the engine is accelerating hence they dont like it,however the technology is constantly being improved.engine breaking is not provided.

Between the elements of the pulleys micro slip occurs which tends to increase the transmited torque sharply up to certain numbers for the compressive belts.

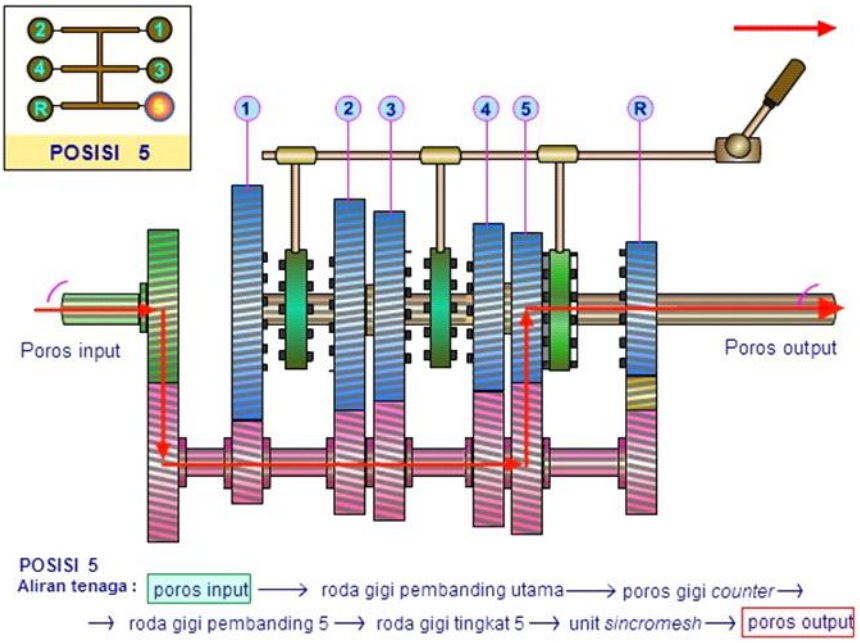
3.5 research and increment-

CVT research and development is spreading so quickly.The automakers are unveiling the new designs.Germany and japan both are leading countries in CVT development.The increment of the applications and performance of CVT is depends on todays research and development.



4.Automated manual transmission

An automated transmission system is combination of automatic and manual transmission.It gives more comfert and convenience with individual control of manual transmission.During idel condition clutch open and utilize all the energy which is generated when it is closed.It does not have clutch pedal,there is only break and accelerator pedal.all u have to do worry about when to start and when to stop.It has tendency to give better economy and acceleration hence this transmission is most efficient.th transmission allows more energy of an engine to flow dirctly to the wheels.It combine the fuel economy and performance of a true manual with an automatic convenience everyday.the repairing cost is so expensive and system is complex.It is a low cost solution that is also convenient which are mostly used in race cars.This mechanism has two major parts - A hydraulic system and electronic control unit.It engages and disengages the clutch and gears.it has sport mode in which enables the driver to move to manual transmission.AMT is a clear victory for automotive progress.




5.Gear shifting strategy in manual transmission:

Clutchless transmission is same at the manual transmission ,in this case,the operation is done by automated.the gear has to selected by the driver depending on the selection and timing of th changing the gear without operating the clutch lever.electronically controlled system is used to locate when the driver changes the gear.This system presses the clutch automatically when gear is changed.The components are same as manual transmission system.this system is used for giving the feeling of comfort to the driver.the efforts are reduce by just selecting the gear options due to which system will able to change the gear.In nutshell,it takes out the tiring part of the driving from the manual transmission and still leaves the choice of changing gears with the driver.

It gives the freedom from operating the clutch lever.Comfertable in go and stop condition alos in traffic.

6-comparison between manual transmission and automatic transmission:

manual transmission costs are less than automatics to begin with when you go to a car dealer you will notice that the stick shift version of the same model is about cheaper than actual price.In long run ,manuals require less service,thus maintainance cheaoer too.

Working on the manual transmission is easier than working with automatic gear boxes.maintainance costs for automatic transmission is higher than manual transmission.

To reduce the maintainance costs some caring and controls are also required.which will help you to keep the value of cost low.

The automatic manual transmission system is better to drive than AT.During with AT operations at stop condition we have to keep our foot on break pedal otherwise the start keeps rolling forward.the main difference is when we need to shift the gear based on the speed the vehicle it requiers clutch pedal,when clutch pedal is pressed the clutch is disengaged the engine and the transmission is seperated .gears can be selected at this time.the automated manual transmission gives more comfert than AT.

## III. CONCLUSION

Automatic gear transmission system consists of mechanical systems,hydraulic systems,electrical systems and computer controls all working are together in this research paper.Increasing development will create compitition among manufacturers.some automatic transmission systems are specified.All the cars in india are changing to automatic transmission.They are better than manual transmission both in performance and pick up on normal roads.optical speed sensors are essential for automatic transmission.

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