SNS COLLEGE OF TECHNOLOGY

(*An Autonomous Institution*)

E.V TRANSMISSION CHARACTERISTICS

INTRODUCTION

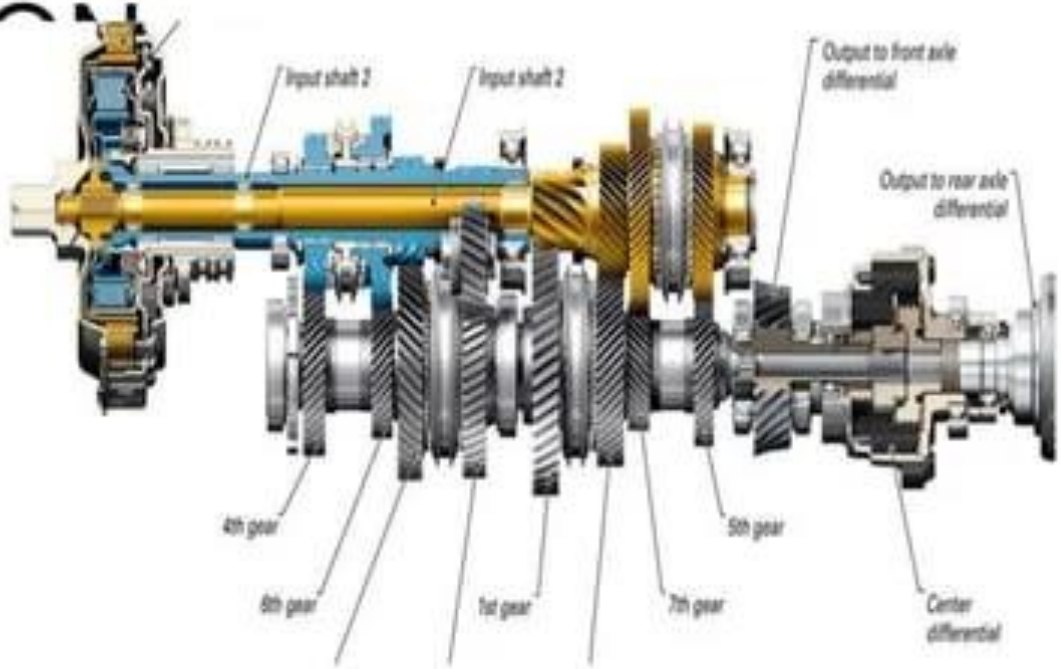
- The vehicle transmission regulates the transfer of power (torque and speed) from the power plant (prime mover) to the driveline and the wheels. In the case of hybrid vehicles, the transmission becomes even more complex than in conventional or electric vehicles with two or more prime movers (inputs) and an output to the driveline/wheels.
- It consists of a power plant (IC engine), drivetrain (transmission, final drive, differential, driveshaft), and drive wheels.
- The transmission system plays a central role in determining the tractive force and the fuel consumption and energy regulation in the overall system.

CHARACTERISTICS OF TRANSMISSION

The transmission basically consists of a gearbox (set of gear trains with different gear ratios) and a power interruption device (clutch mechanism) that can be actuated mechanically, electrically, or hydraulically. The transmission requirements of a vehicle depend on the characteristics of the power plant and the performance requirements of the vehicle. Dedicated hybrid transmission (DHT) refers to purpose-built, full-hybrid transmissions that are introduced as the transmission system for electric/ IC engine hybrid vehicles

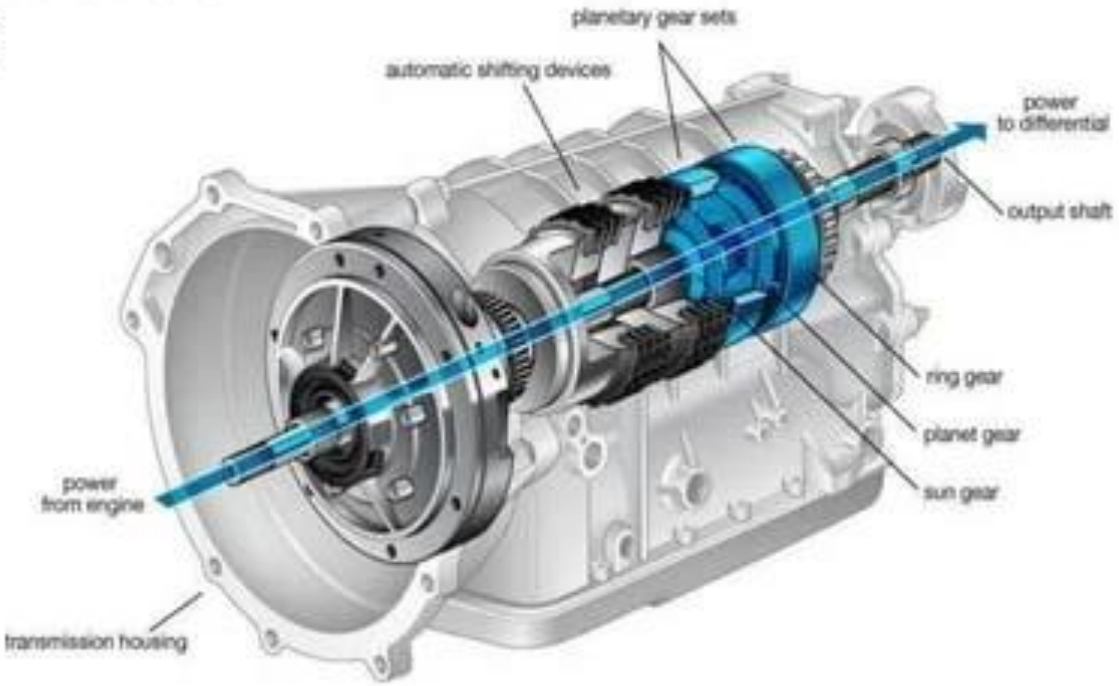
MANUAL GEAR TRANSMISSION

A manual gear transmission (MT) consists of a clutch, a gearbox, a final drive, and a driveshaft. The final drive has a constant gear ratio. Manual and automated manual and dual-clutch transmissions generally use a layshaft (or countershaft) design gearbox transmission, schematically for a typical five-speed MT gearbox, where all the gears, including reverse, use synchronizers. The friction clutch in an MT enables the gradual establishment and interruption of power flow from the engine to the gearbox, and it controls the engagement of the gearbox to the engine flywheel. The power enters the gearbox and transfers to the layshaft through the selected meshed gears to the output shaft of the transmission.



AUTOMATIC GEAR TRANSMISS

This type of transmission can automatically change gear ratios without any manual input from the driver. It can be broadly divided into a conventional automatic transmission (CAT) or hydrodynamic automatic transmission, automated manual transmission (AMT) and dual-clutch transmission (DCT), continuously variable transmission (CVT), infinitely variable transmissions (IVT), and dedicated hybrid transmission (DHT).



CONTINUOUSLY VARIABLE TRANSMISSION

A CVT has a gear ratio that can be varied continuously within a certain range, thus providing an infinite number of gears. The continuous variation makes it possible to match virtually any engine speed and torque to any wheel speed and torque. It is, therefore, possible to achieve an ideal torque–speed profile (constant power profile). The design has been improved using metallic belts that provide better solidity and improved contact. Furthermore, an interesting concept has been developed and is being used by Nissan. This concept uses three friction gears: one is connected to the engine shaft, another to the output shaft, and the third grips on the particular profile of the other two gears.

INFINITELY VARIABLE TRANSMISSION

The IVT provides the full range of forward and reverse speeds, as well as neutral gearing continuously without the need for a clutch or torque converter. It is a split-path design CVT that can provide unlimited transmission gear ratio span without any need for a clutch or torque converter using a device called a "variator." The IVT has two power transfer paths in parallel between the input and the output, and it transfers the minimum energy through one of the paths that contains the variator. The main path controls most of the energy transfer from input to output.

DEDICATED HYBRID TRANSMISSION

By integrating an electric motor and a generator in the transmission system and using planetary gear sets, the power from the electric motor and an IC engine could be combined to provide a hybrid transmission system capable of operating in different drive modes. For example, the DHT enables the IC engine to drive the vehicle in combination with an electric motor or drive the generator and charge the batteries. The Toyota Prius transmission is one of the earliest developed DHT concepts.

TRANSMISSION IMPROVEMENT

1. 

The Series - Parallel HEV system could be considered as an electric CVT between the engine and wheels.

2. 

Recall that the Fuel Consumption value of an SP HEV with transmission is 4.06 L/100 km, and that of a P2 HEV with transmission is 4.09 L/100 km.

3. 

Note that the Parallel HEV system is constructed with fewer components, that is, engine, motor, and transmission.

“CONCLUSION”

Development trends of HEV transmissions based on this new function were predicted, that is, that fewer gears will be used in HEV transmissions, but the gear ratios will be optimized. This conclusion is based on several HEV models, an energy management strategy considering total efficiency, and an engine working point distribution analysis.

THANK YOU!