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A Review Paper on Continuous Variable Transmission (CVT)

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Abstract - *This paper deals with technique and working of continuous transmission. CVTs have been used in vehicles for a significant long time, compelled torque limits and defective relentless quality have frustrated their improvement This pattern of progress will in the long run give CVTs a solid foundation on the planet's vehicle system. CVTs may empower IC vehicles to meet the chief rush of new fuel rules while improvement of crossbreed electric and force module vehicles continues.*

Key Words: Transmission system, Speed ratio, Torque converter, Constructional Features, Actuators.

1. INTRODUCTION

One ability solution for this mileage problem is the continuously issue transmission (CVT), an old concept that has as of overdue grow to be a bastion of would really like to automakers. CVTs might permit IC vehicles to meet the predominant wave of recent gas guidelines while development of 1/2 breed electric powered and strength module automobiles proceeds[1].

As an alternative of choosing one in every of 4 or 5 apparatuses, a CVT constantly switches its tools percentage to beautify motor proficiency with a beautifully smooth torque-velocity bend. This improves the two fuel mileage and growing pace contrasted with customary transmissions.[2] Regardless of the fact that CVTs had been applied in cars for quite a long term, confined torque capacities and faulty unwavering best have hindered their development.

1.1 About CVT

How CVTs work and how they improve performance, etc….

- The purpose of CVTs-To vary the transmission ratio continuously.
- Working of CVT depends on the type of CVT: Friction CVTs vary the radius of the contact point between two rotating objects, thus the tangential velocity; o Hydrostatic CVTs vary the fluid flow with variable displacement pumps into hydrostatic motors Ratcheting CVTs vary the stroke of a reciprocating motion, which is connected to a free-wheel, resulting unidirectional rotation.[2]
- CVT improves efficiency by allowing the engine to operate always in its optimum R.P.M., whatever the vehicle's speed.[5]
- Lower consumption;
- Less greenhouse gas emissions;
- Better performance;

CVT is the ideal transmission, so why are there so few CVT cars?

The existing inventions are based on

- Friction
- Hydrostatic
- Ratcheting which are all mechanical systems with inherent limitations, (compared to traditional transmissions).

2. WORKING

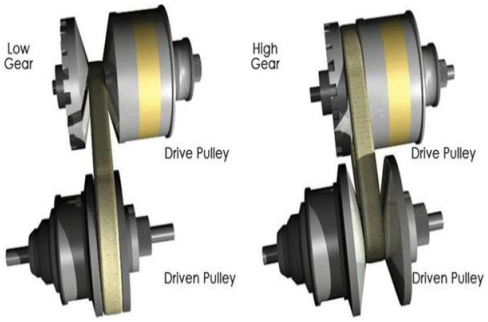

Fig-1: working principle of CVT[9]

A continuously variable transmission operates by using various the running diameter of the two primary pulleys in the transmission. The pulleys have v-formed grooves on which the connecting belt is installed. One facet of the pulley is fixed; the opposite facet is portable, operated by a hydraulic actuator. The hydraulic actuator can boom or decrease the amount of space between the 2 facets of the pulley. This makes the belt to trip decrease or better along the inner walls of the pulley, relying on riding situations,

thereby converting the tools ratio.[3] This motion is infinitely variable with no "steps" in between. Therefore a cvt can preserve the engine in its choicest rpm range, in turn boosting the performance and gas mileage. As defined above the two pulley widths are adjusted by oil pressure inside the hydraulic actuator which responds to position of the throttle, speed, and different situations, which can be sensed by using microprocessors & other sensor.[2]

3. SCHEMATIC DIAGRAM

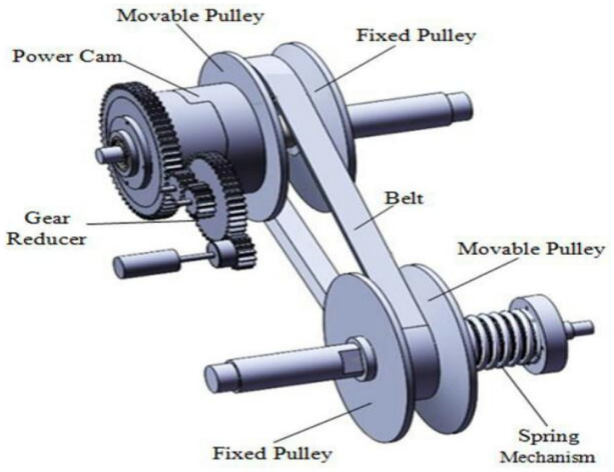

Fig-2: Schematic diagram of CVT[10]

In pace, the force on spring pushed movable larger than centrifugal pressure performing at the weight curler. After the movable pushed face narrows then pressed v-belt force closer to the outdoor in order that the radius of v-belt force to be superb. At the same time as inside the movable force face, v-belt power radius to be reduced.

3.1. CVT control

The manipulate element of attaining a favored tools ratio profile by using pulley actuation forces has also been an inevitable part of CVT research over the last two decades. The development of an premier CVT control strategy isn't an easy undertaking as a result of in part contrary features that have to be glad: the reduction of fuel intake and the requirement of appropriate drivability/acceleration performance. The superior control method must put into effect an correct model of transmission transferring dynamics which will foresee the real clamping forces needed to exchange the CVT velocity ratio and the axial role of pulley sheaves. So, the demanding situations for an efficient CVT controller generally are to growth the torque capacity of a CVT gadget, limit belt slip losses, and maximize vehicle gasoline economic system and acceleration overall performance. In an effort to achieve minimal fuel consumption relative to the numerous degrees of desired power torque, each engine speed and engine torque wishes to be controlled simultaneously, thereby requiring the implementation of an included engine transmission manage.[3]

3.2. Main Components

The prototype of CVT consists:

1. Fixed pulley
2. Output Shaft
3. Single row deep groove ball bearing
4. Belt
5. Spring
6. Movable Pulley
7. Handle
8. Input shaft
9. Single thrust ball bearing
10. Power Screw

3.3. Material selection

The hit design is closely associated with the correct choice of substances for each of the additives. With thousands of substances to select from, a tool to help with the fabric choice might be required.

In addition they show particularly high elastic moduli because of this stiffness. In a natural shape, metals are gentle and easily deformed. The tensile strength of a metal may be elevated by way of alloying with other factors. Strength also can be multiplied thru warmth remedy procedures.

All through this process, the metal stays ductile letting them be fashioned by way of deformation processes. Before a steel fails, it shows elongation called yielding earlier than it fractures. Greater than different fabric companies' metals are least proof against corrosion and additionally be afflicted by fatigue because of their ductility.

3.4. CAD Model

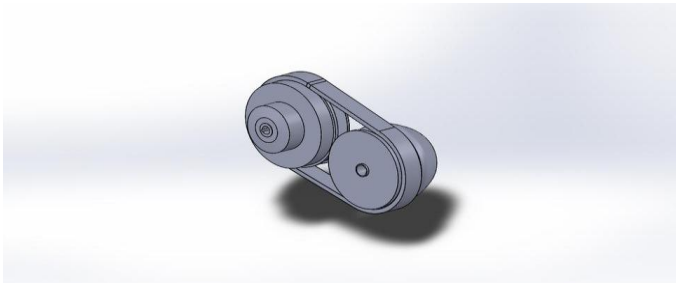

Fig-3: CAD Model

4. APPLICATIONS

All the scooters available in the market use CVT drive. Apart from them many four wheeler manufacturers too employ CVT drive. They are:

Table-1: Application of CVT in cars

Manufacturer	Model
Nissan CVT	Micra
Maruti Suzuki	Baleno
Hyundai	Elite
Honda	Jazz

5. ADVANTAGES

1. CVTs provide unlimited tools ratios and advanced performance.
2. Pulleys and a belt inside the CVT seamlessly change the gear ratios with none "shift surprise" or postpone.
3. The countless ratios help in maintaining a constant cruising speed, reducing the fuel emissions and hence enhance gas economic system.
4. Because of its ability to change the ratios constantly, a CVT allows to maintain the engine in its top-quality rpm variety, thereby increasing the fuel efficiency.
5. The 2012 version of the Honda jazz sold in the United Kingdom definitely claims marginally better fuel consumption for the CVT version than the guide version.
6. CVTs offer quicker acceleration than a traditional automatic.[9]
7. A key advantage of a CVT for a producer is that its production expenses lesser than a traditional multispeed automatic because it makes use of fewer components.
8. CVT gets rid of the tools shifts of a manual transmission and the accompanying upward push and fall of engine speed.

6. CONCLUSIONS

A continuously variable transmission or CVT blends the ease of an automated transmission with the performance of a manual transmission." this announcement made by means of the Honda motors absolutely summarizes the concept of CVT.

CVT is genuinely a era of the destiny with its higher gasoline efficiency, limitless tools ratios, decrease production costs, constant cruising speeds & higher acceleration skills. This era has located such wide applications simplest these days. For this reason maximum folks must get used to the dynamics of a CVT-equipped vehicle for its higher appreciation.

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