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AUTOMATIC KINEMATIC LINKAGE TRANSMISSION USING OVERDRIVE

[1]Kedar Pimparkar [2]Mayur Rajput [3]Chandrashekhar Sonawane [4]Amit Sonawane

[1, 2, 3] Department of Mechanical Engineering,

zeal college of Engineering and Research,

Pune, India

ABSTRACT :

In this paper we have tried to explain combined use of lesteran's concept of automatic transmission and overdrive mechanism. In lesteran's concept he replaced gearbox with automatic mechanical torque convertor assembly. While overdrive consists of an electrically or hydraulically operated epicycle gear train bolted behind the transmission unit which allows the engine to operate at a lower RPM for a given road speed. This allows the vehicle to achieve better fuel efficiency, and often quieter operation on the highway

Keywords: *Lestran's concept of automatic transmission, overdrive mechanism, etc*

I. INTRODUCTION

In present scenario of all over the world, there is huge number of people who are using vehicles in their day to day life. In which majority of vehicle are assembled with conventional gear box transmission system. Conventional system uses single plate clutch to engage or disengage transmission system. The problem with this system is efficiency of clutch plate is less than 70%. The patented Lestran Orbital IVT (Infinitely Variable Transmission) is a novel transmission design that transmits mechanical power through oscillating torque, rather than traditional speed ratio methods. This unique approach combines the high mechanical efficiency of fixed gear ratio transmission with the high engine efficiency obtained using a Continuously Variable Transmission (CVT) in a lightweight, rugged, and high-torque package. Overdrive mechanism provides better fuel economy and often quieter operation on the highway. To tell more about Overdrive is the highest gear in the transmission.

II. LESTRAN AUTOMATIC TRANSMISSION VEHICLE

The Lestran's automatic transmission vehicle design is simple and posses high efficiency.

In comparison to other competitive options it is small in size. The main problem in conventional transmission system is reduced efficiency due to the use of clutch plate(less than 70%). If we consider a example of manual transmission gear box in which if someone wants to move from 0 to 5 that is to top gear he will have to perform several operations. The operation will include disengagement of clutch, change of gear and then gradual engagement of clutch. Thus three

operations are to be performed while moving from one gear to another, hence in all 15 operations are performed to move to the top gear. The IVT drive having the masses which interact with arm assembly. This masses and arm assembly allow generating the torque by centrifugal action of the mass rotation into the output shaft.

In the figure (II) given below it shows the conventional way of transmission in automobile transmission system.

By the use of Lestran's IVT design concept we can effectively achieve not only elimination of clutch plate but also we can achieve higher transmission efficiency. Apart from this, his design provides benefit of small size design which is not available in conventional transmission system hence provides less system weight and space occupied.

Due to high efficiency design it allows the L-IVT to support high load, large vehicle applications. The L-IVT can scale to support nearly any size application such as Heavy Trucks, Main Battle Tanks or Earth Movers. Unlike conventional transmissions, this infinitely variable transmission (IVT) controls the output torque as opposed to the output speed ratio. Infinitely variable torque, from zero torque to the full capability of torque output, can be produced with no clutching or torque conversion required at the input.

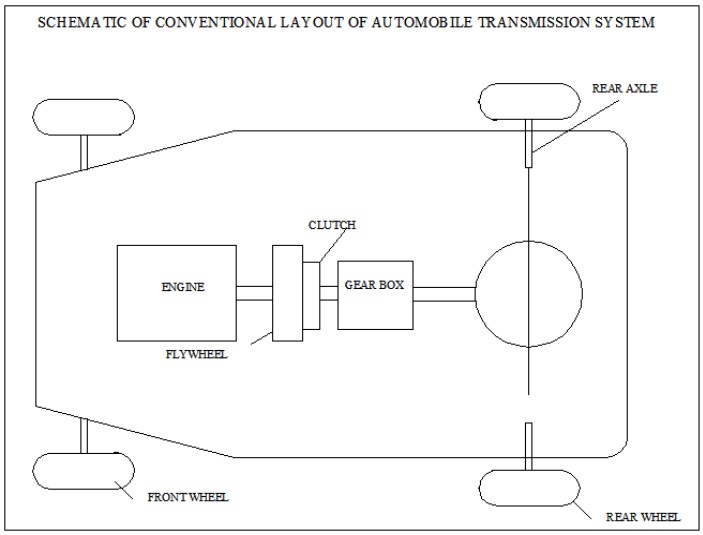

Figure II: conventional layout of automatic transmission system.

III. CONSTRUCTION AND WORKING OF LESTERAN'S AUTOMATIC TRANSMISSION (IVT)

When input is given to the 'mechanical torque convertor', the motor then produces a power while the torque output is constant with respect to time, at a given speed. This constant power and torque, is transmitted to the arm assembly via the input assembly. In case of IVT it converts the constant input into a sinusoidal, oscillating torque via its specific mechanism; the clutch assembly of the mass-inertia drive converts the oscillating power output from the arm assembly into unidirectional power pulses. The 'mechanical torque convertor' can be considered to consist of four main parts. These are

1. input assembly
2. arm assembly
3. clutch assembly

4. Output shaft.

All of these areas serve a specific purpose in the operation of the mass-inertia drive.

The input assembly delivers the input from the engine, the arm assembly generates oscillating torque, the clutch assembly rectifies that oscillating torque to a consistent direction, and the output shaft delivers the output to the rest of the drive train. These sections and their associated functions can be seen in Figure

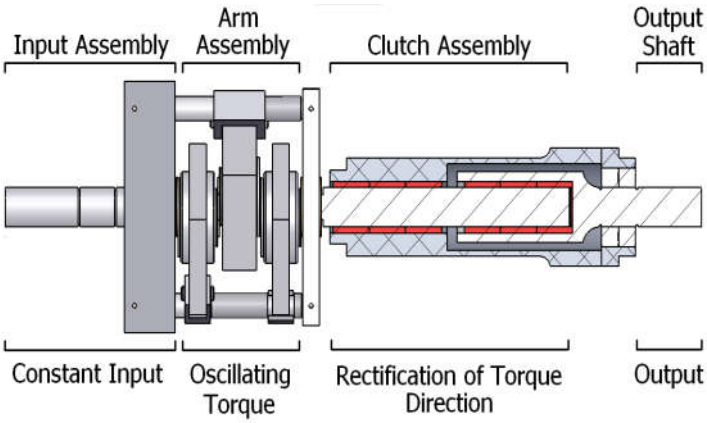

Figure III: Mechanical Torque Convertor Assembly

In this case, the 'mechanical torque convertor' will receive input power from the motor through the use of a spur gear pair which is placed between the motor shaft and the input shaft of the mass-inertia drive. This input shaft then transmit the torque to a yoke, which has two pins projecting from it. The yoke pins connected to links, which are in turn pin-connected to three masses. These masses are attached as well to the arm assembly. The 'mechanical torque convertor' has two sets of one-way clutches which are used to convert the oscillating torque into unidirectional motion. The first set of clutches is between the arm assembly shaft and the case. This set of clutches converts the oscillating torque into torque pulses. The second set of clutches operates between the arm assembly shaft and the output shaft. Its purpose is to allow the output shaft to continue to rotate between torque pulses.

IV. OVERDRIVE MECHANISM

Overdrive is the highest gear in the transmission.

Overdrive is a term which is used to describe the operation of an automobile cruising at sustained speed with reduced engine speed, leading to better fuel consumption, lower noise and lower wear.Overdrive allows the engine to operate at lower RPM for a given road speed. This enables to achieve better fuel efficiency and quieter operation on highway. In order to achieve overdrive mechanism, small separate gear box is used in the system. It can be attached to the rear of the main gearbox and can be controlled by its own shift lever.

V. WORKING OF OVERDRIVE UNIT

Generally the overdrive consists of an hydraulically or electrically operated epicyclic gear train bolted behind the transmission unit. To talk more about epicyclic gear train, it consists of two gears which revolve around the center of the other. It can either couple the input driveshaft directly to the output shaft (or propeller shaft) (1:1), or increase the output speed so that it turns faster than the input shaft (1:1 + *n*).

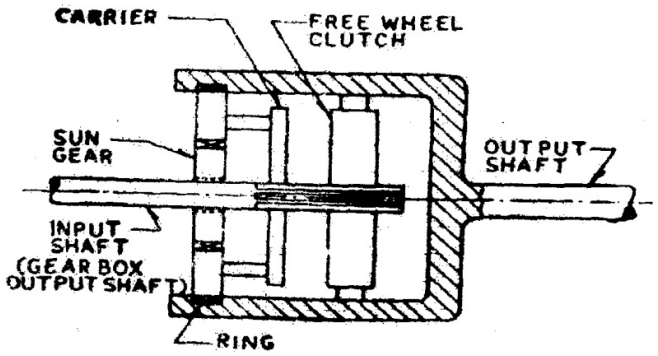

Figure V: Schematic of cut-away view of Overdrive

Thus the output shaft may be "overdriven" relative to the input shaft. In newer transmissions, the overdrive speed(s) are typically as a result of combinations of planetary/epicyclic gear sets which are integrated in the transmission. In these cases, there is no separately identifiable "overdrive" unit. In older vehicles, it is sometimes actuated by a knob or button, often incorporated into the gearshift knob, and does not require operation of the clutch. Newer vehicles have electronic overdrive in which the computer automatically adjusts to the conditions of power need and load.

VI. Reasons to switch to Overdrive Mechanism & Lesteran's Automatic transmission (IVT) in our Project

In China and India the vast majority of economy/ regular car market is of manual transmission, with torque converter automatics making in ways. The driver's education nearly always requires manual car training first (ditto in most European countries), so we don't see this changing in the near future. In the farther future, CVTs with hybrids and non-gasoline engines will make the biggest difference. The CVT will gradually replace the conventional manual transmission due to its high fuel efficiency and the driver can be focused on driving efficiently. This is where concept of our project comes in the picture. Following are the reasons for switching to automatic kinematic linkage transmission using overdrive,

1. It will enhance energy efficiency.
2. Highest speed can be effectively achieved
3. It will lower the risk of accident by lowering the degree of driving difficulty.

4. It will provide better operation on roadways.

VII. CONCLUSION

So in this paper we've tried to summarize the concept of the Lesteran's Automatic transmission Gear box with the attachment of over drive. The main purpose of this project was to eliminate clutch from the system and make the transmission automatic by selecting the gear ratios which we've successfully achieved.

The other objective of obtaining maximum efficiency, output of the engine (nearly 70 %), high speed and reduction in noise level with the use of additional attachment - over drive have been achieved as well.

REFERENCES

1. Hero Honda splendor maintenance catalogue for E-10 transmission.
2. Robotic Engineering Klafter/Negin/Chmielewski.
3. Design of machines elements.
4. P.S.G Design Data.
5. https://en.wikipedia.org/wiki/Overdrive_(mechanics)
6. Tracy, David. "Thisishowan automatictransmissionworks". *Jalopnik*. Gawker Media. Retrieved 6 October 2014.
7. Co, Brent. "Of fluids and automatic transmissions". *Autoindustrya.com*. Retrieved 11 October 2014.
8. Amjad M. Abood, "A Novel Cam-Based Infinitely Variable Transmission", Journal of Kerbala University, 2010; 8(4): 61-74
9. Dr. N. Arunkumar, "Infinitely Variable Transmission Using Four Bar Mechanism", International Journal of Engineering Science and Technology (IJEST) 2014; 6(4):170-176
10. Mangialardi L., Mantriota G., "The Advantages of Using Continuously Variable Transmission in Wind Power Systems", Renewable Energy, Vol.2, No. 3, pp. 201-209, 1992.
11. F.G. Benitez, J.M. Madrigal, J.M. del Castillo, "Infinitely variable transmission of Ratcheting drive type based on one-way clutches", Journal of Mechanical Design, July 2004; 126:.673-682.