

Review on design And Manufacturing of Single Ball Traction Drive

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Abstract- There are many machines and mechanical units that under varying circumstances make it desirable to be able to drive at a barely perceptible speed, an intermediate speed or a high speed. The primary motions of machine tools are power driven. Thus an infinitely variable (step less) speed variation in which it is possible to get any desirable speed. Traction drive system has been used for various purposes and in various environments. Mainly Traction drive is used for CVT (continuously variable transmission) applications. Traction drive systems can be alternative to the gearing system. The advantage of Traction drive is the smooth traction surfaces that provide more variability ratio and capability for higher and lower speeds than gears. The aim of this project is to manufacture & Experimental Analysis of STEPLESS FRICTION DRIVE for the purpose of Power Transmission. We mount a Rope Type Brake Dynamometer to calculate the speed variations and thus various operating characteristics and we can thus able to show experimentally the efficiency of the Drive is good for low speed application.

Keywords- Bearing, Cones, Pulley, transmission.

I. INTRODUCTION

Machine tools are précised and complex machine machines that are produce various types, which are used to produce various types of components by metal cutting for removing the metal from work piece, a relative motion is necessary between the tool and job. The various motion characteristics of machine tools are work motion and auxiliary motions.

II. LITERATURE REVIEW

A good history of the development of traction drives is presented by Heilich and hube (1983). It is claimed here that CVTs have enjoyed moderately wide-spread industrial use since the 1930s, whilst the automotive industry, notorious for being slower to react to new technologies, never really adopted their use, despite the obvious advantages discussed previously. The reluctance of the automotive industry to react to new technologies is highlighted in Figure (from Hellman and Heavenrich, 2001).

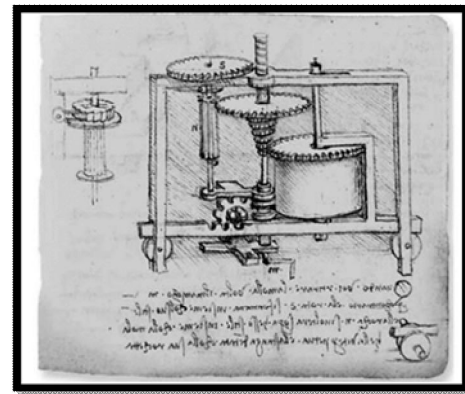


Fig. One of the earlier designs of a CVT

D. S. Welkar, (2014)

It has completed research and analysis on single ball traction drive. In the era of development of continuously variable transmission system the development of simple and proficient system would always be considered on priority. The new inventions will be followed in the future only if they possess few or all of the characteristics mentioned earlier. Researchers have been continuously taking efforts towards development of such efficient system. The existing systems could also be developed for better efficiency. It may include the improvements and efforts towards making existing systems, balanced and smooth. The methodology aims towards the development of single ball traction drive with shock-less and singular control and compactness of size.

Avinash Ashokrao Uthale-

Recently a novel type of toroidal CVT has been developed that is capable of automatically adjusting the transmission ratio as a function of the resistive torque. The device consists of two input discs, one conical, fixed to the shaft and the other toroidal, which has axial but not rotational mobility relative to the shaft. An inverted conical output disc is connected to the output shaft through a mechanism which is able to convert torque to axial force, such as a ball screw. Between the input and output discs there are placed a convenient number (typically three-five) of spherical

elements, which do not have a materialized axis of rotation. The arrangement of these parts is shown in figure.

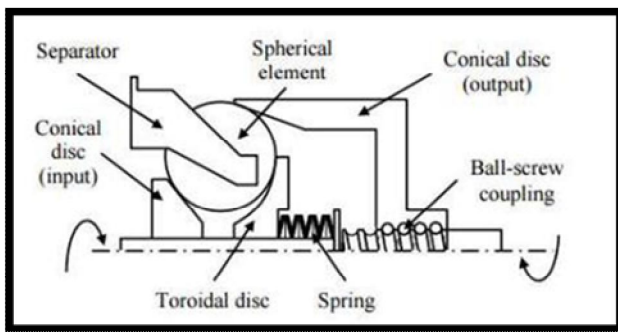


Fig.Design solution for constant power CVT

The validity of the optimized design is demonstrated through the use of a “ground-up” simulation that attempts to model the behavior of the CVT in a real automotive application using multiple fundamental theories and models including tire friction and traction behavior. Additional complementary research looks at the accuracy of the tire friction models through the use of a specially design tire friction test rig. Furthermore, a monitoring system is proposed for this particular CVT design (and similar) that is capable of continuously checking the contact film thickness between adjacent elements to ensure that there is sufficient lubrication to avoid metal-on-metal contact. The system, which is based around electrical capacitance, requires the knowledge of the behavior of the electrical permittivity at increased pressure. This behavior is studied through the use of an experimental test rig.

Stuart H. Loewenthal (1978) –

It has done research on multiroller traction drive. Before each test the test drives were completely disassembled and the components were cleaned in an ultrasonic vapor degreaser to insure maximum cleanliness. Also, the lubricant in the test drives lubrication systems was circulated for several hours. After the transmissions were reassembled and the minimum preload adjusted, the high-speed shafts of the two test drives were contained in a mounting fixture and coupled by a lightweight, high-speed gear-coupling.

III. DISCUSSION

D. S. Welkar, (2014)It has completed research and analysis on single ball traction drive. In the era of development of continuously variable transmission system the development of simple and proficient system would always be considered on priority.position.Eventuallythe chances of risk

will reduces.Cost is also low as compare to other mechanism or machine.[1]

The free ball traction drive unit consists of an input disc or cone, a single adjustable free ball, and an output friction disc or cone. There are many machines and mechanical units that under varying circumstances make it desirable to be able to drive at a barely perceptible speed, an intermediate speed or a high speed. The primary motions of machine tools are power driven. Thus an infinitely variable (step less) speed variation in which it is possible to get any desirable speed. Some mechanical hydraulic, drives serve as such step less drives. Traction drive system has been used for various purposes and in various environments. Mainly Traction drive is used for CVT (continuously variable transmission) applications. Traction drive systems can be alternative to the gearing system. The advantage of Traction drive is the smooth traction surfaces that provide more variability ratio and capability for higher and lower speeds than gears. The current paper reviews the state-of-the-art research review on control of friction-limited continuously variable transmissions by using free ball traction drive. The aim of this project is to manufacture & Experimental Analysis of STEPLESS FRICTION DRIVE for the purpose of Power Transmission. We mount a Rope Type Brake Dynamometer to calculate the speed variations and thus various operating characteristics and we can thus able to show experimentally the efficiency of the Drive is good for low speed application.

Stuart H. Loewenthal (1978) –It has done research on multiroller traction drive. Before each test the test drives were completely disassembled and the components were cleaned in an ultrasonic vapor degreaser to insure maximum cleanliness.power source.In this project we done that Properly balanced power transmission. Easy to maintain proper pressure between the contact surfaces thereby resulting in trouble free operation. Multiple speeds can be obtained; where as regular clutches are of ON-OFF type where only one speed is available.Infinitely variable speed available over a given range. Ease of operation; the speed changes are gradual, without any shock. Singular control:-Entire range of speeds is covered by a single knob control.Low cost. Compact size

IV. FUTURE SCOPE

There is scope for developing this machine having following characteristics.

- Research in this area has shown ball to have advantages in accuracy of rotation and stiffness, even at high speeds. A related area of interest is the use of free ball in pure rolling contact self-actuating traction drive.

- b. For the development of drive simple manufacturing methods have been used. Drive could be made more precise and accurate by using modern methods of manufacturing. Precise and accurate drive might reduce the slip so as to have output speeds as intended.
 - c. Drive could be converted for transmission of higher values of torques with more efficient prime mover at the Input.
 - d. Instead of Knob, a spur gear can be used to transmit the power and motion to another system. E.g. For modern machines like CNC Lathe, interconnection of motion between lead screw and chuck can be done with the help of single ball traction drive.
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