Continuous Torque Increment Using Mass Inertia Drive

Saket Burkul[1],Ankit Sapariya[2], Arun Basude[3]
Department of Mechanical Engineering
[1]Assistant Professor,D Y Patil Technical Campus, Pune
[2, 3]UG Student,D Y Patil Technical Campus, Pune

Abstract-*The transmission system used is infinitely variable transmission system (IVT) which makes use of mass assembly and one way clutch to transmit torque and speed .The purpose of this system is to increase the torque transmitting capacity of the system at given speed at a given time. A unique infinitely variable transmission utilizing oscillating torque to transmit mechanical power will be presented. At the ends of the arms are eccentric masses, rotatable coupled. An input shaft rotates the masses about the ends of the arms. The rotating masses produce an oscillating torque .The arms are attached to an output assembly. The output assembly utilizes one way clutches, with one clutch reversed relative to the other clutch. The one way clutches convert the sinusoidal motion into pulses for the load and the increasing torque is utilized from the output shaft .The advantage of this system is that it will give a smooth working which will reduce the stresses acting on the system.*

Keywords*-*Mass Inertia Drive, Infinitely Variable Transmission, Automatic Transmission IVT.

I. INTRODUCTION

The Mass-Inertia Drive provides continuously variable speed and torque ratios, depending on the input and output speeds. Mass Inertia Drive is basically system to be designed for improving the torque transmitting capacity of continuously variable transmission system at higher speed and. The primary advantage of an MID over a conventional transmission system is a much higher efficiency. A conventional transmission system generally has an efficiency of between 60% - 80%, while an MID can deliver Efficiencies approaching 90%. The input to the mass-inertia drive, the motor, produces a power and torque output that 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.0 The IVT in turn 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 average power is dependent on the amplitude and frequency of these pulses. Higher amplitude and frequency will result in a higher average power output. The amplitude of the power pulses depends on the magnitude of the input received from the engine, while the frequency of the pulses is dependent on the speed of the arm assembly shaft.

II. OBJECTIVES

- Eliminate friction clutch from the system.
- Increase transmission efficiency
- Make transmission automatic by automatically selecting gear ratios
- Reduce system weight and space occupied

III. WORKING PRINCIPLE

The mass-inertia drive can be considered to consist of four main parts. These are the input assembly, arm assembly, clutch assembly and the 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.

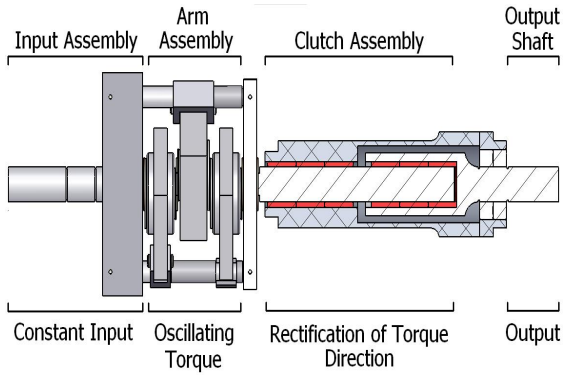


Figure – 1

The heart of the mass-inertia drive is the method in which the masses interact with the arm assembly. This arm assembly allows for the masses to generate torque through their rotation and transmits it to the output shaft.

Figure 2. represents four stages of rotation of the masses. This figure generalizes the mass-inertia drive setup, with two masses representing the offset masses, and the arm assembly represented by a bar.

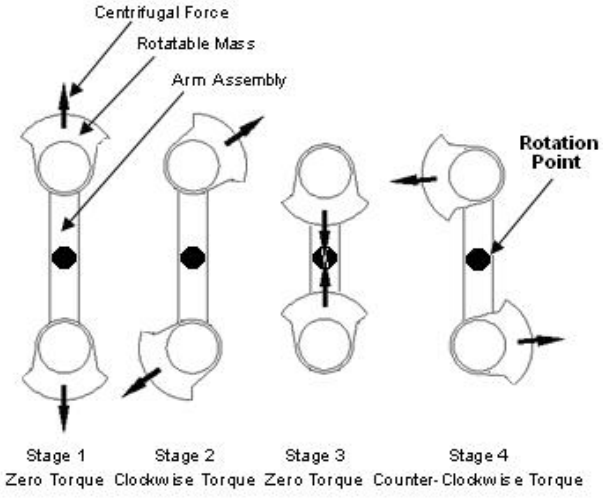


Figure- 1.1

In stage 1, the centrifugal forces generated by the rotating masses pass through the point of rotation and therefore do not generate any moment. At stage 2, the masses have continued to rotate and now the centrifugal forces generate a clockwise torque. Stage 3 shows the masses having continued to rotate to the point where their centrifugal forces once again pass through the point of rotation and cause no moment. Finally, in stage 4 the masses have rotated so that their forces now generate a counterclockwise torque. The maximum torque is given by the formula:

T = m*ω2*RCG*Dlobe offset

IV.TEST RIG SET UP

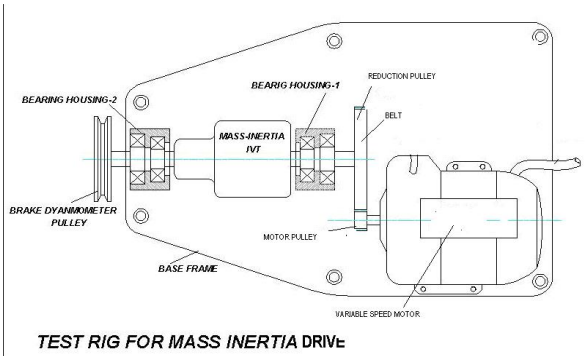


Figure – 2

The Mass-Inertia Drive test rig consists of the following parts:

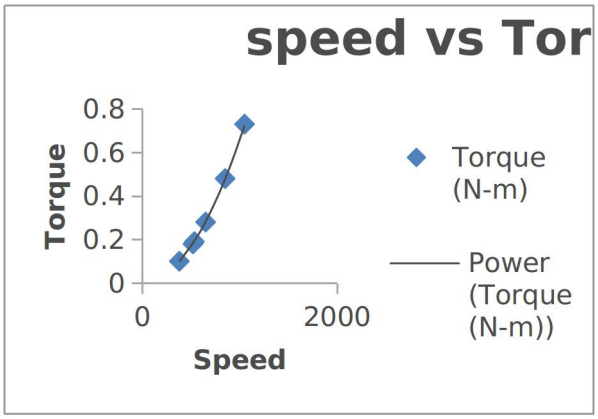
1. Motor
2. Speed Regulator
3. Reduction Pulley
4. Belt
5. Bearing Housing-1
6. Bearing Housing-2
7. Mass-Inertia IVT
8. Brake Dynamometer pulley
9. Base frame.

V. RESULTS

EXPERIMENTAL RESULTS –

The following test results will be derived from the test and trial on MID.

Sr. No	Weight Kg	Speed Rpm	Angular speed ω	Torque N-m
1	4.9	1050	109.953	0.73
2		850	89.820	0.48
3		650	68.065	0.28
4		535	56.023	0.19
5		520	54.452	0.18
6		380	39.792	0.10



VI. CONCLUSION

The Mass Inertia Drive provides continuously variable speed and Torque ratios depending on the input and output speeds. The primary advantage of an MID over conventional drive is much higher efficiency. A CVT has an efficiency between 60%-80% while an MID equipped CVT has higher efficiency between 80%-90%. And having large torque transmitting capacity at higher speed.

Here we conclude that our project "MASS INERTIA DRIVE" transmits higher torque to CVT in high speed. This transmission system provides variable speed ratio and torque. This transmission system replaces conventional gearbox

mechanism with help of CVT system with higher torque capacity. Which can be used efficiently in today's automobile.

ACKNOWLEDGMENT

Every effort, small or big involves the effort of several people who have worked behind the scenes to make this project a success. Behind this effort lies the Co-operation and invaluable help of several people. We take this opportunity to express our profound gratitude to all those who have directly or indirectly help us. We express our sincere regards to all those who have been helpful to us in completing our project on "CONTINOUS TORQUE INCREMENT BY USING MASS INERTIA DRIVE" . We sincerely express our gratitude to Prof. Saket Burkul for guiding us thoroughly and providing us with proper material and full fledge knowledge about the subject.

We also extend our respects to H.O.D (Dr. ARUNKUMAR) and PRINCIPAL (Dr. ABHAY A. PAWAR) as well as teaching staff for their extreme support.

REFERENCES

[1] Automatic Transmission Vehicle Using Infinitely Variable Transmission. Deore R. B.1 , Sonawane J. C.2 , Thakare D. M.3 International Journal of Emerging Technology (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 5, Issue 3, March 2015).

[2] Application of Linear Infinitely Variable Transmission in Automobile. Arun M. Meshram1, IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN: 2278-1684,p-ISSN: 2320-334X, Volume 11, Issue 6 Ver. IV (Nov- Dec. 2014.

[3] Analysis of Torque Convertor Using Two Masses for Medium Duty Vehicles .Rajesh K. Narhire, L. B. Raut American Journal of Engineering Research (AJER) e-ISSN : 2320-0847 p-ISSN : 2320-0936 Volume-4, Issue-2

[4] INFINITELY VARIABLE TRANSMISSION USING FOUR BAR MECHANISM .Dr.N. ARUNKUMAR, R. SANTHOSH. International Journal of Engineering Science and Technology (IJEST) ISSN : 0975-5462 Vol. 6 No.4 Apr 2014