

“STUDY OF POWER TRANSMISSION AND THEIR TYPES”

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ABSTRACT: *Now a days Power is transmitted from one shaft to another shaft by means of belts, ropes, chains and gears in mechanical system. Power is transmitted through gears from an engine to a drive axle or propeller in an automotive machine. For large distance between the shaft belts, ropes and chains are used for transmission of power. For small distances gears are used. Power transmission systems and drives are extremely important units for many machines and other mechanical devices. In this paper going to presenting the study of power transmission methods and also discuss the types of power transmission in mechanical engineering. We are also present the comparative analysis of different methods for transmission of power.*

Keywords: gear, power transmission, shaft, belt, ropes, chain

1. INTRODUCTION

From the last two decades, there has been lot of research done for improving the transmission for better fuel economy, drivability and other quality of vehicle operations. In a road vehicle, the functions of transmission are to match the running state of engine to the motion states of the vehicle. Among these studies, many were focused on modifying the transmission designs to keep the vehicle safe and controllable, and to make passengers more comfort introducing Mechatronic Systems [10] in Automobile Transmissions.

Mechatronic is the engineering discipline concerned with the construction of systems incorporating mechanical, electrical and information technology components. Today, mechatronic is an area combining a large number of advanced techniques from engineering, in particular sensor and actuator technology, with computer science methods [1].

2. RELATED WORK

P. Sarath Babu [1] Present the current and future trends in the how to develop new Mechatronic systems or Smart Systems in Automobile Transmission. Author discusses the challenges involved in the construction of future advanced Smart systems. The challenges arising from the collaboration of several different disciplines (which is already an issue today), and those due to the aspect of self-coordination which seems to be a main characteristic distinguishing current from future Smart Systems.

Douzi Imran Khan et. al. [2] discusses the transmission system help to improve the economy and efficiency of the work transfer Automatic gear transmission system which is consists of mechanical systems, hydraulic systems, electrical systems and computer controls which work together. All the cars in india are changing to automatic transmission. They are better than manual transmission both in performance and pick up on

normal roads. Some automatic transmission systems are specified. Optical speed sensors are essential for automatic transmission.

Allwin Glover et. al. [3] proposed the chain power transmission from engine to rear wheel hub, through a new power transmission mechanism called as shaft driven mechanism. Basically in two wheelers, the energy transmitted by using chain sprocket and gear teeth mechanism. But in chain & sprocket case of transmission only 81% of power is transmitted to the wheel, where remaining 19% of the energy is lost in form of energy loses (traction in gears and less tension in chain). And here, regular lubrication is required in chain transmission because of reducing noise & for good performance Dynamic two wheelers claims that drive shaft two-wheelers can deliver 94% efficiency and it has more consistent performance.

Jovan Vradić et. al. [4] proposed the procedure of establishing the appropriate dynamic model and corresponding equations. It enables the analysis of the relevant influences, such as variation of the rope free length, slipping of the elastic rope over the drum or pulley and damping due to the rope internal friction.

Gurumurthy Veerapathiran et. al. [5] The effect of noise and friction on performance of the chain drives system for motor bikes. the performance of transmission in chain drive system leads to poor overall, due to its noise and chain gets loose due to aging and sprockets wear due to chain friction etc., the proposed system consists of drive and driven pulley with timing belt transmission. Compared to conventional method, proposed method give improved tension in pulleys and belt by the additional arrangement called belt tensioner. This gives

good overall performance of the system, and reduces noise, vibration and gives high transmission speed.

Ergin Kilic et. al. [6] presenting the important aspects of the timing belt mechanisms that are frequently used in motion control systems. Key points of the research are: Dynamic model of the timing belt drive mechanisms, which could be used in the design of motion control systems, is derived. Simulation results, which are based on the developed model, are in a good agreement with the experimental results. An experimental study is conducted to investigate the attributes of such mechanisms. During the experiments, extensive data is collected under different operating conditions. The collected

data are shown to be both spatially and temporally repeatable in character. High repeatability suggests the development (and deployment) of different position estimation / observer techniques. A huge error reduction (from 365 micron levels to 30 micron levels) is attained utilizing advanced interpolation methods. The presented techniques, which rely on indirect measurement, bring no additional hardware) cost to the overall system. Author shows the advanced estimation schemes are quite effective when the drive system is not subjected to external loads as well as widely changing operating conditions such as ambient temperature and belt tension.

3. COMPARATIVE ANALYSIS

Sr. No	Title	Author	Method/Tec hnique Used	Advantages	Limitations
1	Analysis of Developing New Smart Systems in Automobile Transmissions	P. Sarath Babu,	Complex Mechanic-Electronic-Computing interaction	<ol style="list-style-type: none"> 1. It has controlling and improving the performance both in efficiency and mass reduction. 2. Safety Drives, Convenience & Forced attention to the road. 3. It increases Driver control on vehicle. 4. It will prevent the annoying slow-down on hills. 	<ol style="list-style-type: none"> 1.As we know that electronic parts are so sustainable so it may be damage in critical condition 2. Lifetime of the transmission system get change.
2	Automotive Transmission System Design Based on Reliability Parameters	Douzi Imran Khan, Seppo Virtanena, A.K Verma	Single ball continuous variable transmission	<ol style="list-style-type: none"> 1. It gives maximum performance with minimum compromise on the fuel economy. 2. It gives high torque transmission. 3. It is highly desirable. 4. it is more efficient than other transmission system. 	<ol style="list-style-type: none"> 1 .There is friction between steel ball & output cone disc. 2. There is power loss because of slipping. 3. here we have to assume that No belt elongation occurs during operation
3	Shaft Driven Transmission In Velocipede	Allwin Glover, Prabu Ram	Shaft & bevel gear mechanism	<ol style="list-style-type: none"> 1. It gives 94% efficiency. 2. It has more consistent performance. 3. It is nearly maintenance free regimen and smooth power transmission. 	<ol style="list-style-type: none"> 1. There is energy loses in chain & gear transmission. 2. regular lubrication is required which reduce the viscosity
4	Dynamic Analysis of the Load Lifting Mechanism	Jovan Vladić, Petar Malešev, Rastislav Šostakov, Nikola Brkljač	Load lifting mechanism (such as elevators)	<ol style="list-style-type: none"> 1. Rope has mechanical properties such as elasticity modulus, internal friction etc. 2 Elevator is a tool enables easy access and mobility to different levels or floors of a multi storied buildings. 	<ol style="list-style-type: none"> 1. steel wire-rope slipping over the driving pulley or drum 2. it is necessary to check the stability of the lifting process. 3. It is more complex system.
5	Power Transmission Through Timing Belt In Two Wheeler Motors	Gurumurthy Veerapathiran, Prabu Dhanapal, Ranjithkumar Koumaravel,	Belt drive transmission	<ol style="list-style-type: none"> 1. Less Noise will be created. 2. Vibration will be arrested completely. 3. High transmission speed will be occurring as compare to chain drive. 	<ol style="list-style-type: none"> 1. There is wear due to friction of machine parts. 2. There is use of flat belt so

		Padmanaban Narayanamoorthy, Vignesh Ravi, Chandran		4. It gives high performance	creep & slip will be occurs.
6	Analysis and Estimation of Motion Transmission Errors of a Timing Belt Drive	Ergin Kilic, Melik DOLEN, Ahmet Bugra KOKU	Timing belt drives	1. There is huge error reduction. 2. It is quite effective when the drive system is not subjected to external loads as well as widely changing operating conditions such as ambient temperature and belt tension.	1.timing belt is not perfect in every situation when comparing it against a chain drive

4. METHODS OF POWER TRANSMISSION

There are basic three types of power transmission,

- Belts
- Chain
- Gears

4.1 Belt

Belt drives are widely used in many industries for power transmission since they are cheap and easy to maintain. However they are often a source of vibration due to misalignments, belt resonance, and belt wear. The most common types of belt drives include:

Types of Belt Drives

Round belts: Round belts are generally made of rubber. This type of belt is generally used for light loads, such as in a sewing machine or a vacuum cleaner.

V belts: V belts are arguably the most widely used belts in industry. V belts have a V shaped cross-section, which rests against the side of V pulley under tension. The V shaped cross-section prevents belt from slipping off.

Flat belts: Flat belts are also used to transmit power from one shaft to another. They are generally classified as either small woven endless belts or higher power flat belts. The woven endless belts are especially useful where minimum vibration is required at the driven pulley due to semi-elastic material used in construction. The higher power flat belts are often useful because they eliminate the need to high belt tension used to grip pulleys, which in turn reduces the load on the shaft bearings. The material used for high power flat belts is sticky yet abrasion-resistant rubber compounds.

4.2 Chain drives

Chain drives are used to transmit power from one component to another. Specifically, they transfer speed and torque through the use of a linked chain and sprockets. Chain drives are well suited for this task because the sprocket teeth

and chain setup results in a positive speed ratio and the ability to transfer a large amount of torque within a compact space. Chain drives are used in many types of industrial applications, such as: Rigging and moving heavy materials, Hydraulic lift truck fork operation ,Increasing or decreasing a driver’s output speed by altering gear ratios between the driver and the sprocket being driven, Overhead hoists, Operating conveyer belts.

4.3 Gear Drive

Gear Drive is consisting of toothed wheels that engage and transmit rotary motion, usually transforming angular velocity and torques Gear drives are classified according to the relationship of the axes to the drives: spur gearing, with parallel axes; bevel gearing, with intersecting axes and, in rare instances, spur-bevel and flat spur gearing; and screw drives.

5. MECHATRONIC SYSTEM

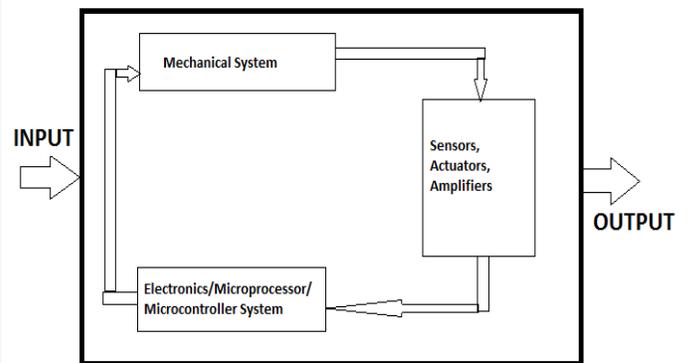


Figure 1: Simple architecture of mechatronic System

Mechatronics is an interdisciplinary area of engineering that combines mechanical and electrical engineering and computer science. A typical mechatronic system picks up signals from the environment, processes them to generate output signals, transforming them for example into forces, motions and actions.

It is the extension and the completion of mechanical systems with sensors and microcomputers which is the most important aspect. The fact that such a system picks up changes in its environment by sensors, and reacts to their signals using the appropriate information processing, makes it different from conventional machines.

Examples of mechatronic systems are robots, digitally controlled combustion engines, machine tools with self-adaptive tools, contact-free magnetic bearings, automated guided vehicles, etc. Typical for such a product is the high amount of system knowledge and software that is necessary for its design. Furthermore, and this is most essential, software has become an integral part of the product itself, necessary for its function and operation. It is fully justified to say software has become an actual "machine element".

6. REFERENCE

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