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Design and Fabrication of Magnetic Transmission System

Onkarnath Dnyanraj Thorat, Prof. Pankaj karande, Santosh ashruba sapte., Ashvin yadorao gilorkar. Adesh vijay nimbalkar.

Student

Keystone school of engineering

1. ABSTRACT

Neodymium magnets are powerful magnets which are about 12 times stronger than normal magnets used in speakers. With the advent of magnetic gears, researchers have developed a new breed of permanent-magnet machines. These magnetic geared permanent-magnet machines artfully incorporate the concept of magnetic gearing into the permanent-magnet machines, leading to achieve low-speed high-torque direct-drive operation. Gears and gearboxes are extensively used for speed change and torque transmission in various industrial applications. It is well known that the mechanical gear has a high torque density, but suffers from some inherent problems such as contact friction, noise, heat, vibration and reliability are of great concern. In order to avoid these types of problems we are using magnetic meshing gears.

2. Introduction

The power transmission is mechanical in most machines, and it is commonly achieved in the use of gear transmissions. Mechanical gear transmissions have a high torque density, but the friction occurs in them, which is often the cause of the gear failure. Also, the noise, heat and vibration are present, so the reliability of these gears is reduced.

Nowadays, it is more and more taken care of the energy conse rvation, and therefore the environment as well, when designing new products. The goal is to reduce the noise, vibration, to simplify maintenance more, reduce heat and reduce dimensions. The magnetic gears are the new type of gears, which attract the attent ion of the constructors because of the possibility to

overcome some of these problems. These are non-contact gears, where the power and torque transmission is achieved with the help of magnetic forces. Friction, wear and fatigue are not present in magnetic gears, they do not require lubrication, and they can be applied as a protective mechanism against overloading. They can operate in a wide temperature range, from -270°C to 350°C. Also, the operation is reversible, so the same device, in which they are installed, can be used as a reducer and as a multiplier.

3. PROBLEM STATEMENT

Power Transmission is major part in industry and automobile and other sector. When Power transmission comes mechanical gears also comes but life of mechanical gear reduce due to friction and wear. Failure due
to Overload and improper periodic lubrication and maintenance.

4. OBJECTIVES

- Reduce Friction and wear and increase life cycle of gear by implementing magnetic gear.
- Avoid Failure during overload and overheated condition.
- Reduce Noise, Vibration by contact-less power transmission.
- Avoid Periodic lubrication and maintenance.

5. LITERATURE REVIEW

[1] Magnetic Gear Technologies: Theoretical and experimental approach (September 2014)

Gear and geared machines are widely used in a broad spectrum of industry, where the rotational speed of an input source must be matched to the required rotational speed of an output load. Mechanical gears are often employed for this purpose but they are subject to wear, can overheat, are often damaged in an over-torque situation and require periodic lubrication and maintenance. So contactless transmission reduce this problems.

[2} The development of magnetic gears for transportation application

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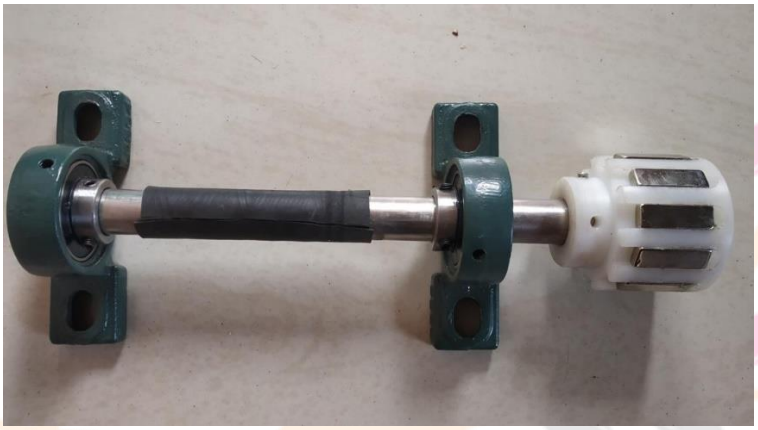
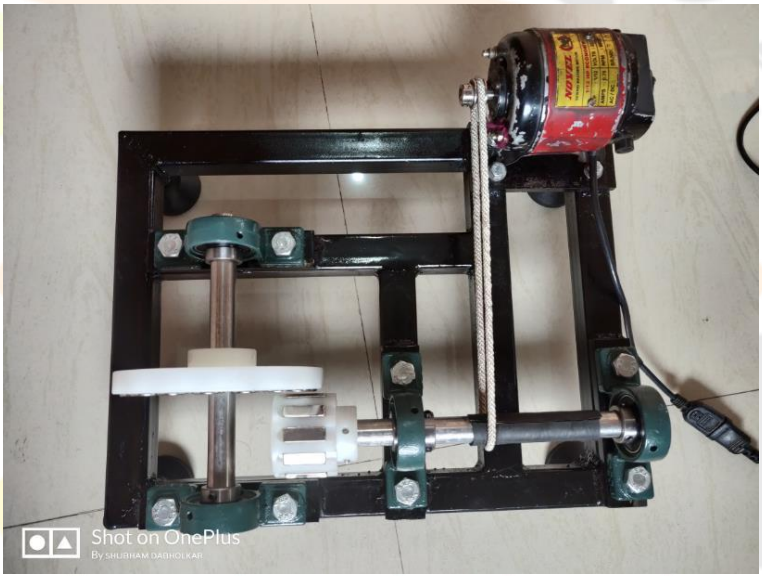
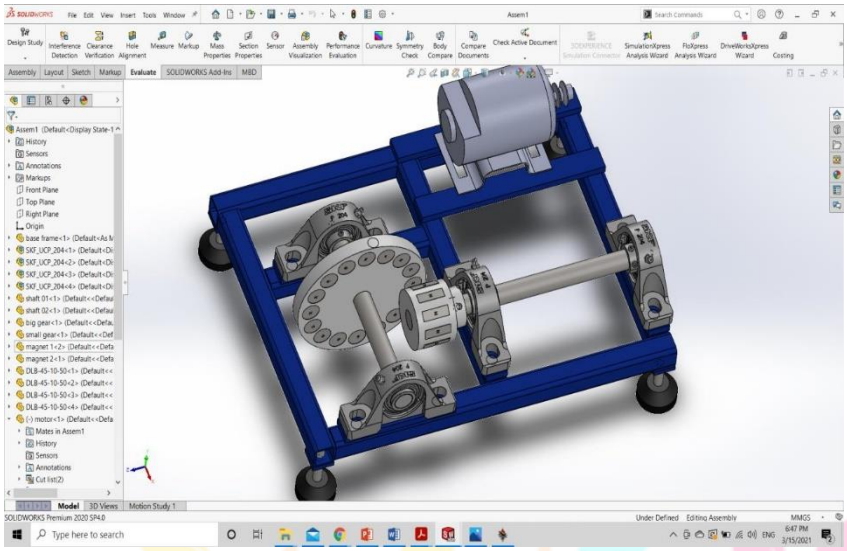
6. PHOTOS







7.ADVANTAGES

- Make System without physical contact hence no friction, wear or vibration.
- Achieve higher transmission efficiency.
- Make system easy to maintenance.
- Reduce maintenance effort.
- Reduce overall cost of system.

8. APPLICATIONS

Industrial Application:

-For Industrial Conveyor System

Automobile Transmission System

-Power Transmission for Car, Buses, Trucks.

Energy Storage Flywheels:

- Commercial power utility back up
- Off-grid renewably generated energy storage
- Automotive regenerative braking systems

Gearing For Drilling Motors:

- Convert high speed to high torque for drilling

- Isolation of drill bit axial / thrust loads from motor
- Magnetic Gearing System
- Hollow bore to allow drilling fluid flow

Robotics:

- Easy movement's arms for other parts
- Less constraints in motion
- Reliability

9. CONCLUSION

Magnetic Gear's potentially have high efficiency and reliability due to their contact-less operation, overload protection and little to no maintenance. Magnetically geared machines have emerged as a new class of electrical machine with high torque density. Several topologies have been proposed and further research is needed to ascertain their merits.

Contact less Transmission done with no Noise, no wear and tear of gear, no periodic lubrication and maintenance required.

10. FUTURE SCOPE

Magnetic gears are becoming competitive alternatives to conventional gears. They present no contact and no wear. They do not produce debris and they do not require lubricant, being able to be operated at abroad range of temperature ranging from -270ºC up to 350ºC.

They present intrinsic anti-jamming properties and there is a clutching effect if the applied torque exceeds a limit therefore protecting the output from overloads. This effect is completely reversible without any damage or wear. This technology is currently increasing making it available for consideration for aerospace uses. The radically different behavior against torque overloads, the isolation of vibrations, the absence of maintenance, the compatibility with sand or dust, broad temperature range and the through wall capability are some properties that make these devices attractive for aerospace and other future applications.

11. REFERENCES

1. Pushman M. Tlali (M 014) was born in Leribe, Lesotho in 1987. He received his BEng in Electrical and Electronic Engineering at Stellenbosch University, South Africa in 2012. He is currently pursuing his MScEng degree in the field of electrical machines. His research interests are in the optimal design of magnetically geared electrical machines.

2. Rong-Jie Wang (M 000-SM 008) received the PhD(Eng) degree from Stellenbosch University in 2003. He is currently an Associate Professor in the Department of Electrical and Electronic Engineering of Stellenbosch University. His research interests are computer-aided design and optimization of electric machines, computational electromagnetics and thermal modeling of electric machines. He has published more than 50 journal and conference papers and was a co- author of the monograph Axial Flux Permanent Magnet Brushless Machines (2nd ed., Springer
2008).

3. Stiaan Gerber (M 013) was born in Bellville in South Africa on February 20, 1986. He received his BEng (cum laude) in the field of Electrical and Electronic Engineering with Computer Science at Stellenbosch University in 2008 and his MScEng (cum laude) in 2011. He is currently studying towards his PhD in the field of electrical machines, with specific focus on magnetically geared electrical machines. His main interests in the engineering field are electrical machine design, numerical optimization, renewable energy power generation and finite element methods.