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Design and Fabrication of Magnetic Contactless Transmission System to Reduce Friction Wear and to High Torque Power Transmission

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▪ **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. That is the gears are meshed together with the help of magnetic force of attraction without making into contact. By using such kind of gearing systems we can reduce the wear and tear that are commonly seen in mechanical spur gear systems and the magnetic gears works smoothly without any sound and the main advantage of magnetic gearing is it will not get heated as long as it works. Magnetic gearing systems can be used in vehicle transmissions that reduce the friction and improve the efficiency without using any type of additional lubricants. We are using high power rare earth neodymium magnets for the purpose of making gears.

Key Words: Neodymium magnets, magnetic gears, permanent-magnet, direct-drive, friction, noise, heat, vibration, transmissions, efficiency, earth neodymium magnets.

1. 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 conservation, 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 attention 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.

2. PROBLEM STATMENT:

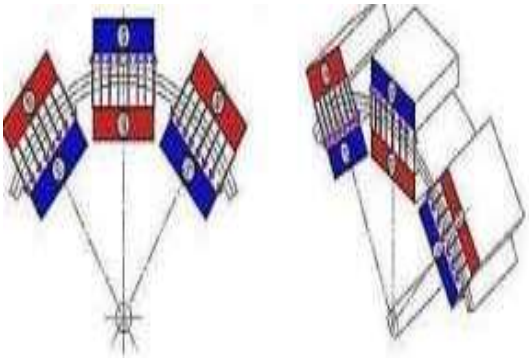
Power Transmission is major part in industry and automobile and other sector. When Power transmission comes mechanical gears also comes but life of mechanical gear reduce due to friction and wear. Failure due to Overload and improper periodic lubrication and maintenance.

3. 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.

5. PRINCIPLE OF OPERATION:

- The magnetic coupling works by using the power generated by permanent magnets. No external power supply is needed. These are permanent magnets not electro magnets.
- The magnets are installed alternating between poles in a side by side and opposing position as seen in the diagram. The main body of each coupling half is of ferromagnetic material to aid the channeling of the magnetic field correctly and therefore maximizing transmittable torque.



4. CONCLUSIONS

Magnetic Gears 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.
Contactless Transmission done with no Noise, no wear and tear of gear, no periodic lubrication and maintenance required.
Here our project give more than 95% transmission efficiency.

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REFERENCES

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