



Applications of Magnetic Gears in Renewable Energy Technology

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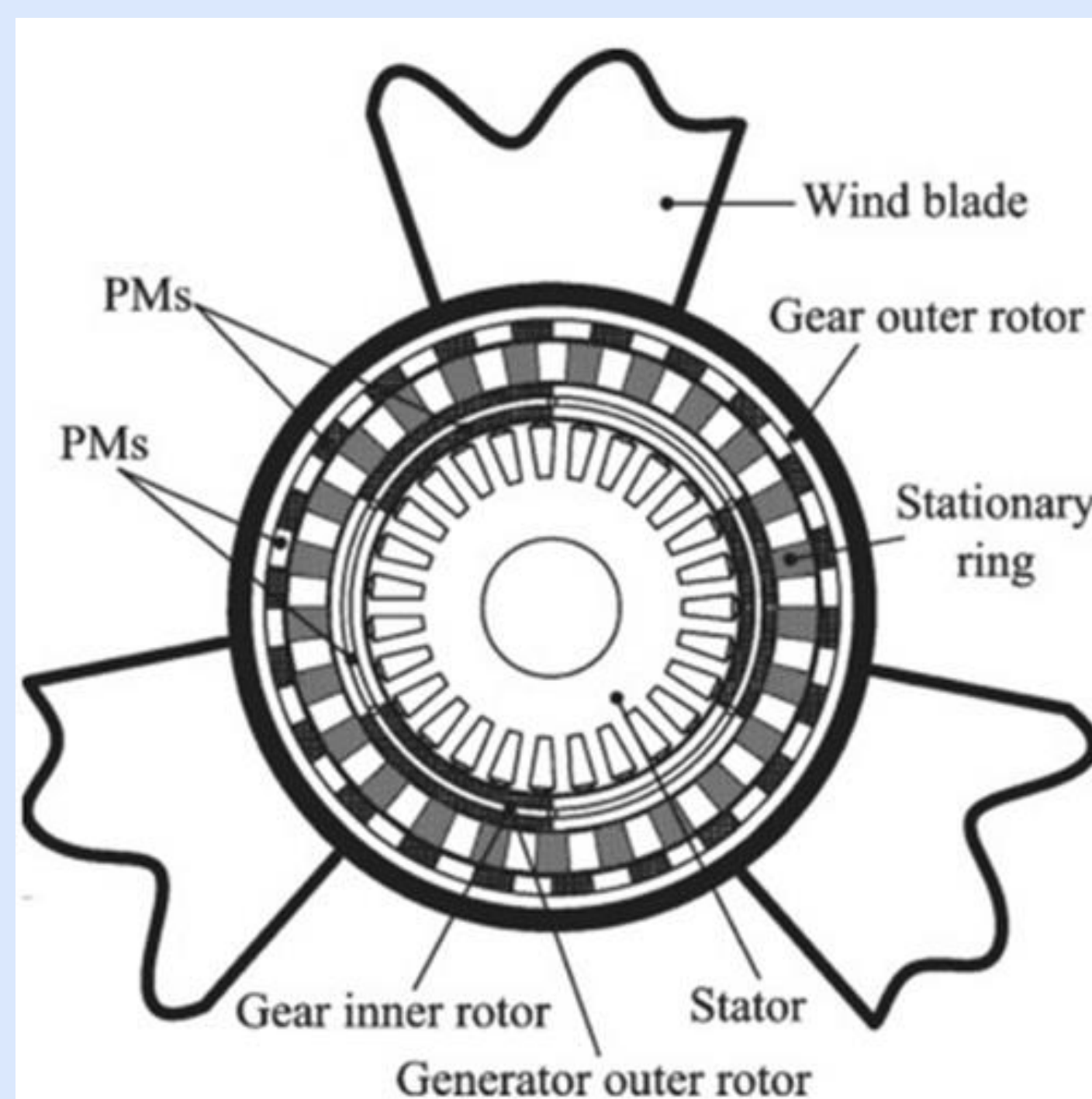


Introduction & Research Question

As a part of CPSP359S, I developed my own research question on a topic of my choice while working with my peers to refine my work and guide my research. For this course, my research question was: How magnetic gears systems improve the energy efficiency and cost of renewable energy in comparison to mechanical gear systems?

Background

Magnetic gears are gears which utilize the repulsive and attractive force of permanent magnets for the purpose of mechanical power transmission. Compared to mechanical gears utilizing the physical contact between sets of gear teeth to transmit mechanical power, magnetic gears require no physical contact



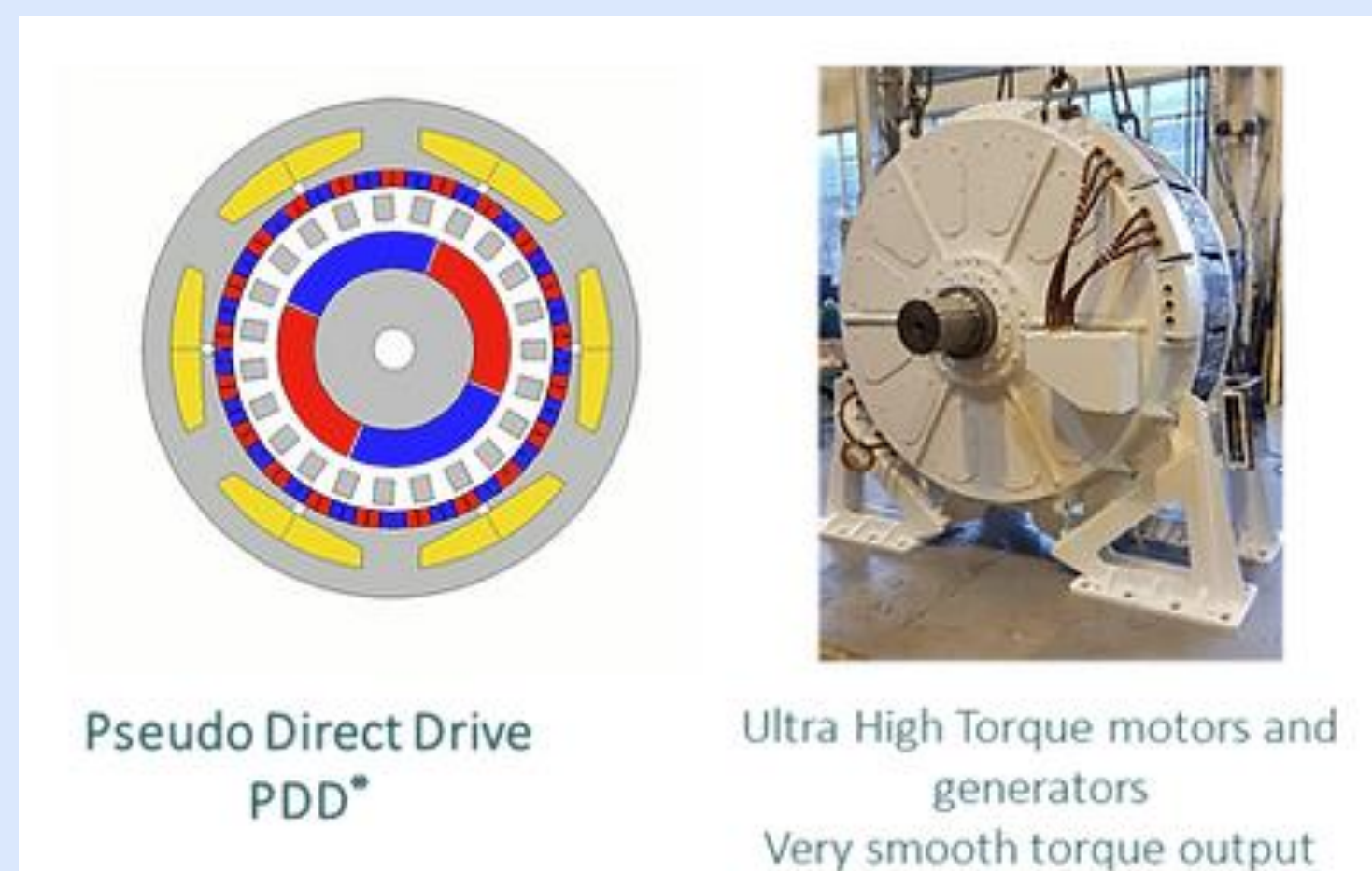
<https://doi.org/10.1049/cp>

Research Methods

Through my research, I gathered both primary and secondary sources including information on magnetic gear technologies from within the most recent decade. My primary sources included studies on the performance of magnetic gears, including both simulated and actual performances. My secondary sources included reviews on magnetic gear technologies, either in general or applied to renewable energy such as wind or marine energy.

Findings

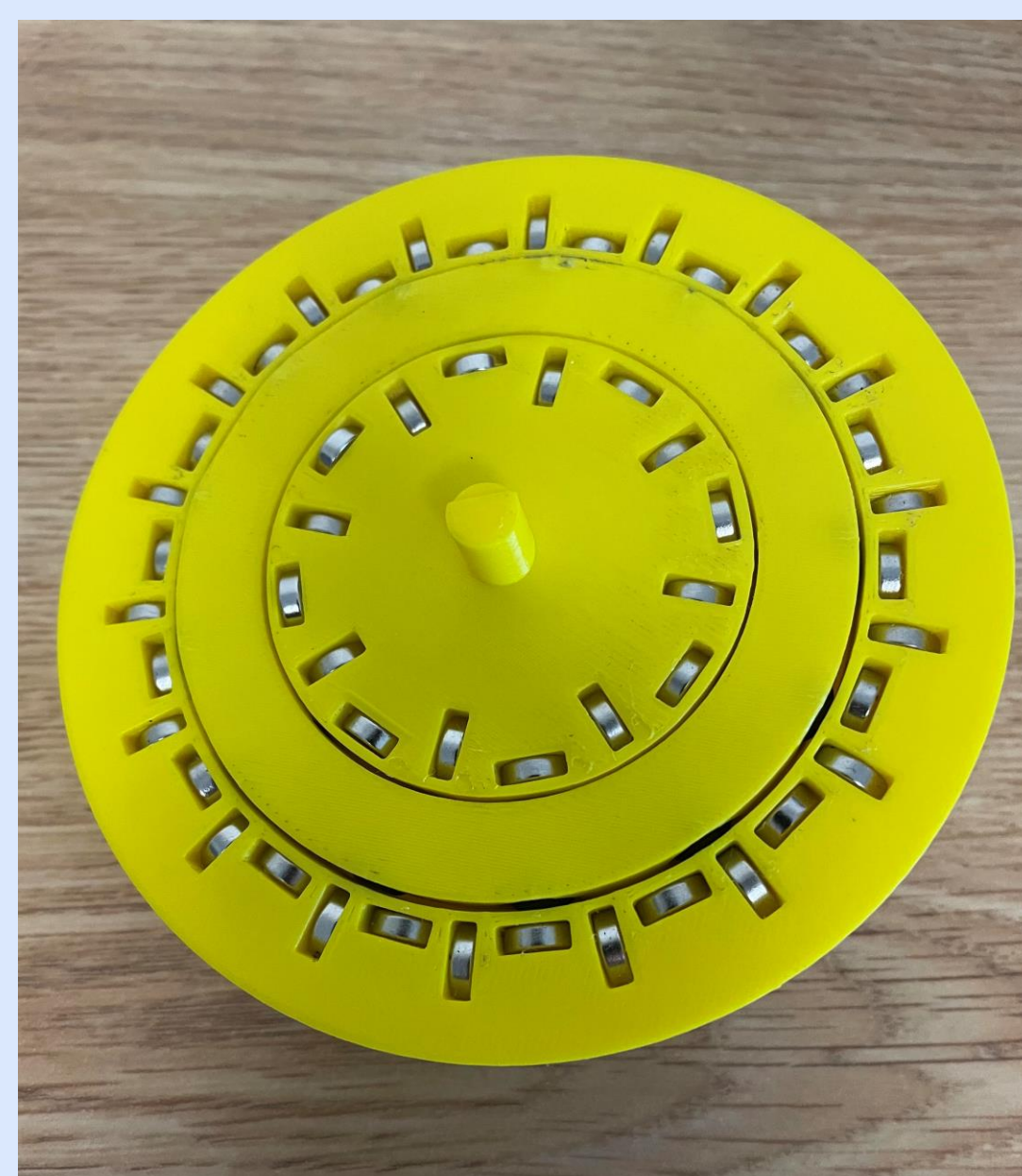
- Less maintenance due to inherent overload protection and fatigue prevention
- Reduction in noise, vibrations, and heat loss
- Can reach higher torque densities than mechanical gear counterparts
- Direct applications in wind and marine energy technologies
- Currently being developed by companies
- Greater complexity in materials and design



Pseudo Direct Drive PDD*

Ultra High Torque motors and generators
Very smooth torque output

<https://www.magnomatics.com/technology>



Discussion

Though not currently being employed on a wide scale, magnetic gears have the potential to decrease the long-term cost and increase the energy efficiency of renewable technologies. Magnetic gear systems are currently well suited to be used alongside upcoming marine energy technologies, where the environment demands the ability to function for long periods of time without the need for repair. Research on magnetic gears should continue based on our need for increasingly efficient technology in the current climate crisis.

