Mechanical Engineering Content Collection

For MAGAZINE 2026

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Society of Automotive Engineers RUET

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Session	2021-22

Topic Category Name (As mentioned in Rulebook)	Automobile parts
Topic Name	Gear and Wheel System

Gear and Wheel System: The Silent Duo behind the motion.

Introduction

Can we imagine any motion in automobiles without gears and wheels? The answer that can be given with closed eyes is “No”. The engine will generate power, but how does this power provide motion to the automobiles? The answer could not be given without the invention of gears, as well as the wheel.

These two parts have made a dynamic change worldwide with the generation of motion. The component here that transfers the power of the engine to the wheel to move the automobile is a gear, and the rotating part that helps the automobile to move forward is the wheel. They combine to create motion. No gear and wheel, no motion in automobiles, and thus, they are the core components.

Working of Gears and Wheels

Gear

In my childhood, I often played with my toy cars, and after the breakdown of the toy cars, I noticed some small, toothed parts, which were actually gears. I didn’t understand properly why they are really used. Now I can feel that the gear mainly works as a bridge between the engine and wheel to transmit the energy of the engine to the wheel to rotate the wheel, controlling speed and torque for achieving motion.

Wheel

Now think, we have an engine, gears and other accessories, but have no wheels, will the automobile move forward? Obviously not. Here, the wheel receives the rotational energy from the engine through the gear and converts it into linear motion that allows automobiles to move on the road. It also supports maintaining balance, controlling steering and ensure smooth journey.

Gear

wheel

Sustainability and Green Engineering in Gears and Wheels

If we use gears and wheels in our cars for a long time, they will deteriorate and finally be damaged due to friction. But we can overcome this problem with better design consideration. Also, using suitable lubricants and selecting alternative materials for sustainable composition.

It will reduce energy loss and provide better efficiency. This overall phenomenon can be regarded as 'Green Engineering', and it provides required sustainability to these components and improved performance.

Green gear

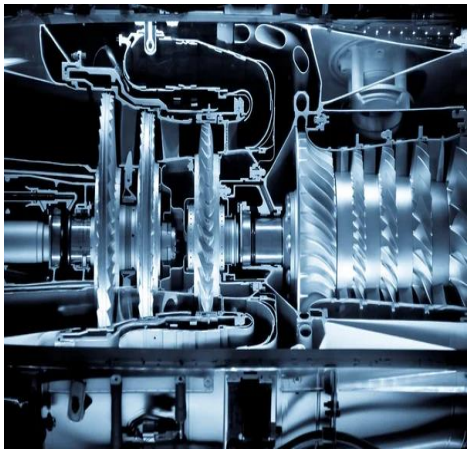
Future of Gears and Wheels

Magnetic gear

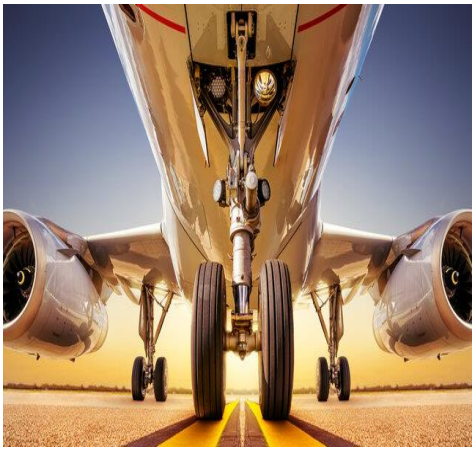
Nowadays, we wouldn't be surprised to hear that gears can make decisions to prevent their failure by themselves, or wheels can adapt to road conditions. Because our world is going to be AI-driven. AI or ML are making this happen day by day. Future automobiles will be based on smart gears or wheels, where gears will transfer energy without contact between them, ensuring no friction, and wheels will be smart enough to sense the conditions of the road and make a decision for enhanced energy efficiency.

Additionally, the integration of advanced materials, such as high-performance composites, and manufacturing techniques, including 3D printing and gearless systems will propel the gear and wheel system to an innovative stage. The future of automobiles with smart gear and wheels will be more automated and self-controlled with the implementation of embedded systems, robotics and IOT for predictive maintenance.

Gears and Wheels beyond Automobiles



Turbine Gear



Aircraft wheels

During my Industrial Internship at a glass industry, I noticed that the conveyors and roller systems are operated with gears and wheel systems to move the raw materials and float glass forward. Also in the mechanical lab, I observed machinery like lathes and milling machines, which are gear-based.

Then I recognized that the application of gears and wheel are not limited to only automobiles. They have versatile uses. From modern technology to smart industries, robotics to space exploration, medical to agricultural and electronic devices, turbines to solar systems, they have become the fundamental elements.

Medical device's gear

Robot's wheel

Industrial gear system

Conclusion

Gears and wheels are small mechanical parts, but the main drivers of automobiles. They are the enablers of motion, functioning in combination. They are updated day by day through green engineering for improved efficiency and use of AI and advanced materials. Also, the multipurpose use of these parts is making them crucial elements for the future world. Gear and wheel systems are evolving continuously becoming smarter and stronger devices as engineering advances.