

NASA Glenn Technology Fact Sheet

Lightweight Offset Compound Gear Drive Transfers High Power at High Speed

Scientists at NASA's Glenn Research Center have developed a lightweight yet robust two-speed driveline transmission that is capable of transferring high power at high speed for next-generation rotary wing aircraft. The innovation offers a high-range 100 percent ratio as well as a 50 percent low-range reduction ratio in two stages, utilizing only three gears. The configuration is based on a novel approach of offsetting and embedding a gear mesh. The unique geometry and offset axis permit the compound gear to mesh with the smaller diameter input gear and the larger diameter output gear, both of which are on the same centerline. This configuration results in a compact in-line reduction gear set consisting of fewer gears and bearings than a conventional planetary gear train.

Benefits

- **High performance:** Achieves a 50 percent reduction ratio with two stages utilizing three gears, while maintaining optimal engine speed
- **Customizable:** Permits other configurations to meet specific design requirements, such as a low-range reduction ratio other than 50 percent or operation as a quasi-variable drive
- **Novel:** Features a unique offset compound gear that uses identical pitch diameter in both an internal configuration on the input end and an external configuration on the output end
- **Lightweight:** Offers a simple design and minimum number of gears

Applications

- Next-generation rotary wing aircraft

Patent

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