

4.1 Hybrid Gear

Statement: A gear that incorporates lightweight, high-strength composites into drive systems.

Problem addressed: Existing large-scale gears are machined from forgings, which results in substantial weight of components. Also, metallic gears do little to dampen the noise induced by the gear meshing process.

Solution and technology description: The hybrid gear has a metallic shaft and outer gear rim, with composite layup between the shaft interface and the gear tooth rim. The composite layup serves to lighten the gear without reducing its torque-carrying capability, and to reduce the noise and vibration typical of gear systems. The hybrid gear transfers the same level of torque found in all-metallic gearing, while the composite materials reduce weight and lower noise and vibration.

Benefits of the product: The gear is:

- Lighter: 20% lighter than all-metallic gears.
- Quieter: Optimized designs can lower gear noise and vibration.
- Cheaper: Less machining of forgings required.
- Robust: Composite materials can accommodate complex geometry.

Areas of application: The hybrid gear can be used where weight and noise reduction is required, and manufacturing cost should be lowered. The technology could be used for:

- Drive systems in land vehicles.
- Construction machinery.
- Wind turbines.