

Gear Bearings

New Gear Designs Reduce Cost and Increase Performance



NASA offers companies the opportunity to license, jointly develop, and commercialize its Gear Bearing technology.

NASA seeks companies to bring a new gear technology, called Gear Bearings, to the commercial marketplace. Developed by **Goddard Space Flight Center**, the technology combines gear and bearing functions to reduce weight, number of parts, size, and cost while increasing gearset capacity.

Benefits

- **Low cost** — combined gear and bearing functions reduce cost.
- **Simplified and lightweight** — fewer parts reduce weight and simplify design.
- **Proven** — based on proven gear technology with several prototypes built.
- **Stronger** — self-centering planet gears carry equalized loading, which increases overall load capacity compared to fixed planetary designs.
- **Less noise and vibration** — more even planet loading reduces cyclic loading and rough spots, which reduces noise and vibration.

Applications

Gear Bearings can enhance the performance of speed reducers, transmissions, transaxles, and linear motion devices. Examples of applications include:

- **Toys and office machines** — injection-molded plastic Gear Bearings could substantially lower speed-reducer costs
- **Power tools** — powder metal Gear Bearings could increase compactness
- **Automotive** — Gear Bearings could reduce cost and size while increasing performance of rack-and-pinion steering systems and transmissions
- **Aircraft** — machined Gear Bearings could produce lighter weight gearboxes with better performance than traditional gearboxes





The Technology

Gear Bearings function both as gears and bearings to reduce cost and increase performance by eliminating separate bearings and other parts associated with conventional gearsets. The technology also provides for tighter mesh, more even gear loading, and reduced friction and wear. Reduced cyclic loading, in turn, reduces noise and vibration.

Gear Bearings are compatible with most gear types, including spur, helical, elliptical, and bevel gears. In planetary gearsets, Gear Bearings can eliminate planet carriers or planet bearings, substantially reducing parts count and cost. The ring gear can be mated with a motor housing to eliminate the motor's front bearing and further reduce cost. In addition, Gear Bearings eliminate concerns that the center of the carrier is coincident with the center of the sun gear and equalizes the loading for the planet gears.

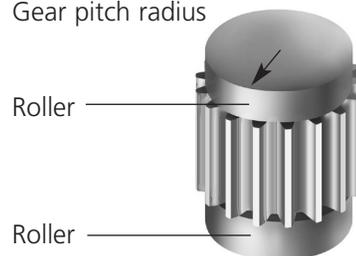
Illustrated below for spur gears, NASA's Gear Bearing technology is based on two key concepts, the Roller Gear Bearing and the Phase-Shifted Gear Bearing.

Commercial Opportunities

These technologies are part of NASA's technology transfer program. This program seeks to stimulate the use of NASA-developed technology by the commercial sector. Prototypes of these gear designs have been built, and a patent application has been filed. Commercial companies are invited to partner with Goddard to bring this innovative gear bearing technology to the commercial marketplace. Additional information on Gear Bearings is available online: <http://nasa.rti.org/gsf/gearbearings>

Roller Gear Bearing

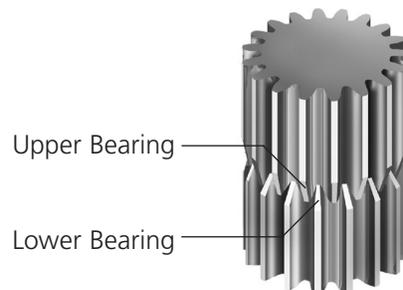
Roller bearing radius =
Gear pitch radius



Goddard's roller gear bearing can mesh with another roller gear, with the crowned ends contacting each other as with roller bearings. This design was used in the prototype shown on the front of this sheet.

Phase-Shifted Gear Bearing

Goddard's phase-shifted gear bearing can mesh with another phase-shifted gear, with the beveled tooth surfaces contacting each other as with four-way thrust bearings.



More information about working with the NASA Goddard Technology Commercialization Office is available online. _____

<http://techtransfer.gsfc.nasa.gov>

For More Information

Darryl Mitchell
Technology Commercialization Office
NASA Goddard Space Flight Center
Greenbelt, MD 20771
Phone: 301.286.5169
E-mail: Darryl.R.Mitchell.1@gsfc.nasa.gov