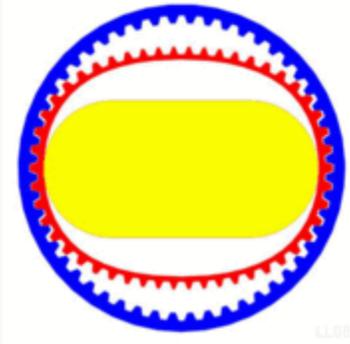
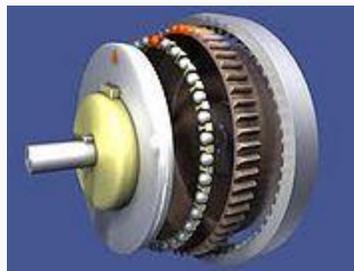


HARMONIC DRIVES



Harmonic Drive Animation



Harmonic Drive

Harmonic Drives also known as strain wave gearing because harmonic drive gears are strain wave gears produced by the harmonic drive companies is a special type of mechanical gear system that can improve certain characteristics compared to traditional gearing systems such as helical gears or planetary gears. They are typically used in industrial motion control, machine tool, printing machine, robotics and aerospace, for gear reduction but may also be used to increase rotational speed, or for differential gearing.

Harmonic drives have an elliptically deformable inner gear that is meshed into a ridged outer gear using an elliptical horn that attaches to a motor. As the wave generator moves it deforms the flex spline and changes its contact points with the circular spline. Every full rotation of the wave generator moves the flex spline by only by the difference in the number of teeth in the flex spline and the circular spline.

A unique and useful characteristic of the harmonic drive is its ability to transmit motion through sealed walls. The flexspline teeth can be placed near the centre of a long, hermetically sealed, flexible, cylindrical tube. The wave generator can be inside the tube and by its rotation deflect the flexspline and produce a slow rotation of the encircling circular spline. A rotary-to-linear version of the harmonic drive uses a screw and moves the control rod in a nuclear reactor head without mechanical contact through a sealed tube. Harmonic drives have been employed in a variety of applications that range from such low-cost consumer applications as vending machines and rotating home-television antennas to sophisticated systems for military and aerospace use.

Advantages

- no backlash
- compactness and light weight
- high gear ratios
- reconfigurable ratios within a standard housing
- good resolution and excellent repeatability when repositioning inertial loads
- high torque capability
- coaxial input and output shafts
- High gear reduction ratios are possible in a small volume

Disadvantages

- tendency for wind-up
- potential degradation over time from mechanical shocks and environment

Source: http://solidswiki.com/index.php?title=Harmonic_Drives