

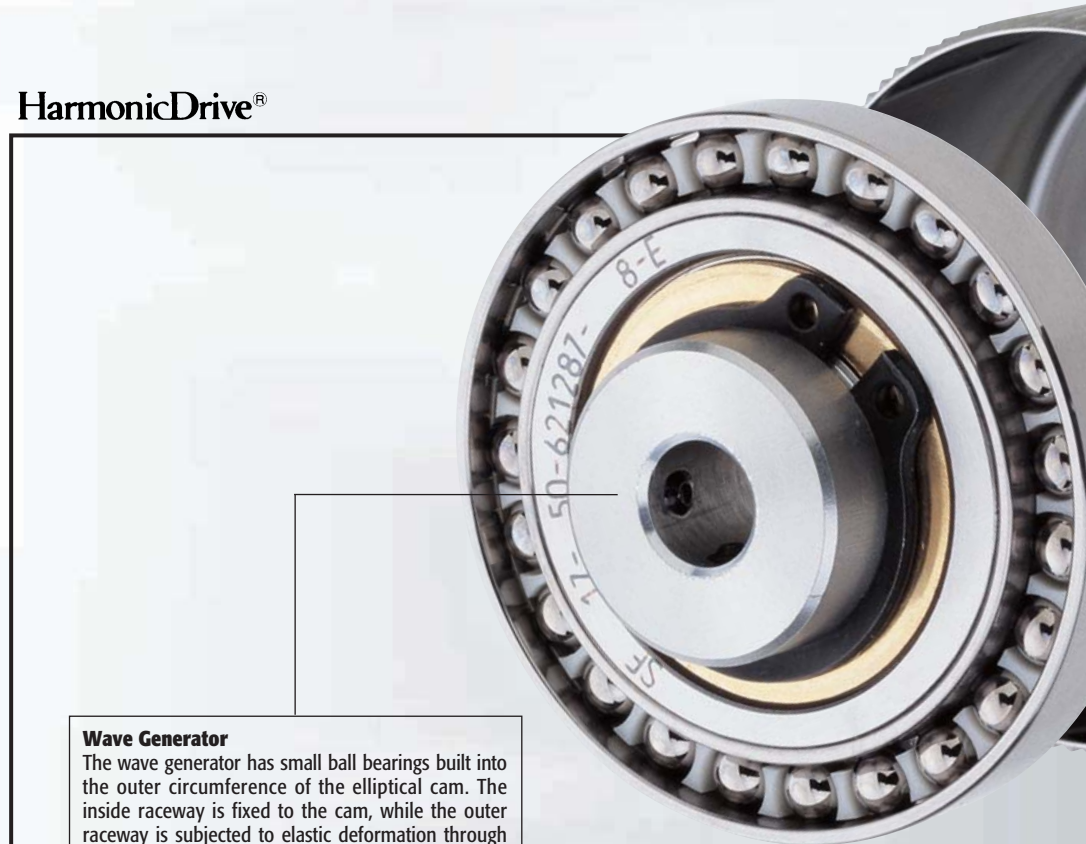
High Torque Capacity and Accurate Positioning in a Compact, Lightweight Design

Because they're comprised of just three basic components, Harmonic Drives are amenable to a compact, lightweight design. They also feature a large area of gear tooth engagement that delivers powerful torque and extremely precise positioning. We are committed to exploiting these advantages to produce the smallest, lightest drives possible through ongoing research.

Currently, we offer Harmonic Drives in 16 sizes with outer diameters ranging from 20mm to 330mm, and torque ratings ranging from 40Ncm to 15500Nm (#5 to #100). This extensive line-up can satisfy virtually any customer requirement.

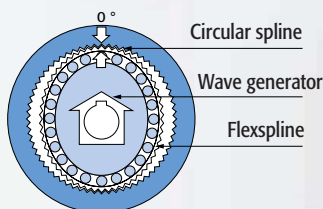
The IH tooth profile—which was developed through our unique tooth profile theory—has enabled us to significantly reduce both bending stress at the tooth base and contact stress at the tooth surface. This success, coupled with the full application of the machining technologies we have acquired over the years, has resulted in stronger products that deliver higher performance. Harmonic Drive Systems Inc. is committed to continuing this tradition of progressive advancement.

HarmonicDrive®

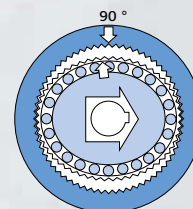


Wave Generator

The wave generator has small ball bearings built into the outer circumference of the elliptical cam. The inside raceway is fixed to the cam, while the outer raceway is subjected to elastic deformation through the ball bearings. The wave generator is usually attached to the input shaft.



The flexspline is deflected by the wave generator into an elliptical shape, which causes the flexspline teeth to engage with those of the circular spline at the major axis of the wave generator's ellipse, and to be completely disengaged across the minor axis of the ellipse.



When the wave generator is rotated clockwise with the circular spline fixed, the flexspline is subjected to elastic deformation and its tooth engagement position moves counterclockwise by turns relative to the circular spline.



AccuDrive[®]

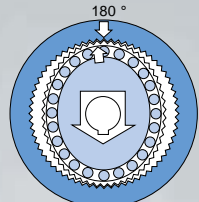
Harmonic Drive Systems Inc. has used its extensive knowledge of Harmonic Drive gearing to develop a highly precise and rigid epicyclic speed reducer called "AccuDrive." Equipped with a unique backlash prevention mechanism, AccuDrive[®] delivers a high level of rotational accuracy.

This epicyclic speed reducer was made possible by using Harmonic Drive Systems Inc.'s proprietary precision manufacturing technology.

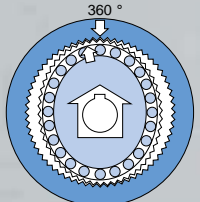


Flexspline
The flexspline is a cup-shaped metal component with external gear teeth. The bottom of the flexspline (cup bottom) is called the diaphragm; it is usually attached to the output shaft.

Circular Spline
The circular spline is a rigid steel ring with internal gear teeth. The circular spline has two teeth more than the flexspline and is usually employed as the fixed member.



When the wave generator rotates 180 degrees clockwise, the flexspline moves counterclockwise by one tooth relative to the circular spline.



When the wave generator rotates one revolution clockwise (360 degrees), the flexspline moves counterclockwise by two teeth relative to the circular spline because the flexspline has two fewer teeth than the circular spline. In general terms, this movement is treated as output power. This two-tooth shift in position provides a high single-stage gear ratio.