

Gyrostabilizer Encyclopedia Article

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Gyrostabilizer

A gyroscope is a weighted, balanced wheel mounted in bearings and spinning at high velocity. It holds its position, no matter at what angle it is held. This has made the gyroscope valuable for several purposes.

One obvious application is to stabilize ships and aircraft. In 1868 the English inventor Matthew Watt-Boulton proposed using a gyroscope to help keep a ship steady at sea. In 1903 Otto Schlick devised the first gyrostabilizer for a ship, a huge device bolted to the ship's framework. A self-contained motor drove the rotor of the gyrostabilizer, which then resisted the rolling effect of waves beating against the ship. In 1913 Elmer Sperry began installing these gyrostabilizers aboard American warships and merchant vessels.

He also applied the same principle to airplanes, inventing an automatic pilot that used gyroscopes to stabilize an airplane's controls. In 1914 this device won an award of 50,000 francs from the French when Sperry's son, Lawrence, flew over Paris while he took his hands off the controls and a mechanic walked out on the plane's wing.

Newer versions of the gyrostabilizer have become standard equipment on many vessels. Smaller gyroscopes are mounted to the ship's hull and connected to stabilizer fins and water tanks with gyroscopically controlled air valves. In the 1940s Charles Stark Draper developed a highly effective gyrostabilizer while working on his inertial navigation and guidance system for the United States Air Force. His gyrostabilizer could register and correct any outside interferences that might affect the flight of aircraft and rockets. Today's sophisticated gyrostabilizers, thanks to their help in guiding and steadying various machines, free people to carry on with their duties.

Optical gyroscopes called ring laser gyros were invented in the 1960s, while fiber optic gyros were developed in the 1970s. Both operate on the principle that they are able to sense phase shifts between counterpropagating beams of light. By the 1980s, ring laser gyros began to replace mechanical or spinning gyros mainly because they are almost impervious to acceleration. By the late 1980s, ring laser gyros were used on European launch vehicles as well as on aircraft and helicopters. By the end of the 1990s, research on fiber optic gyroscopes had progressed to the point where it is considered to be the best technology available for inertial guidance and control.