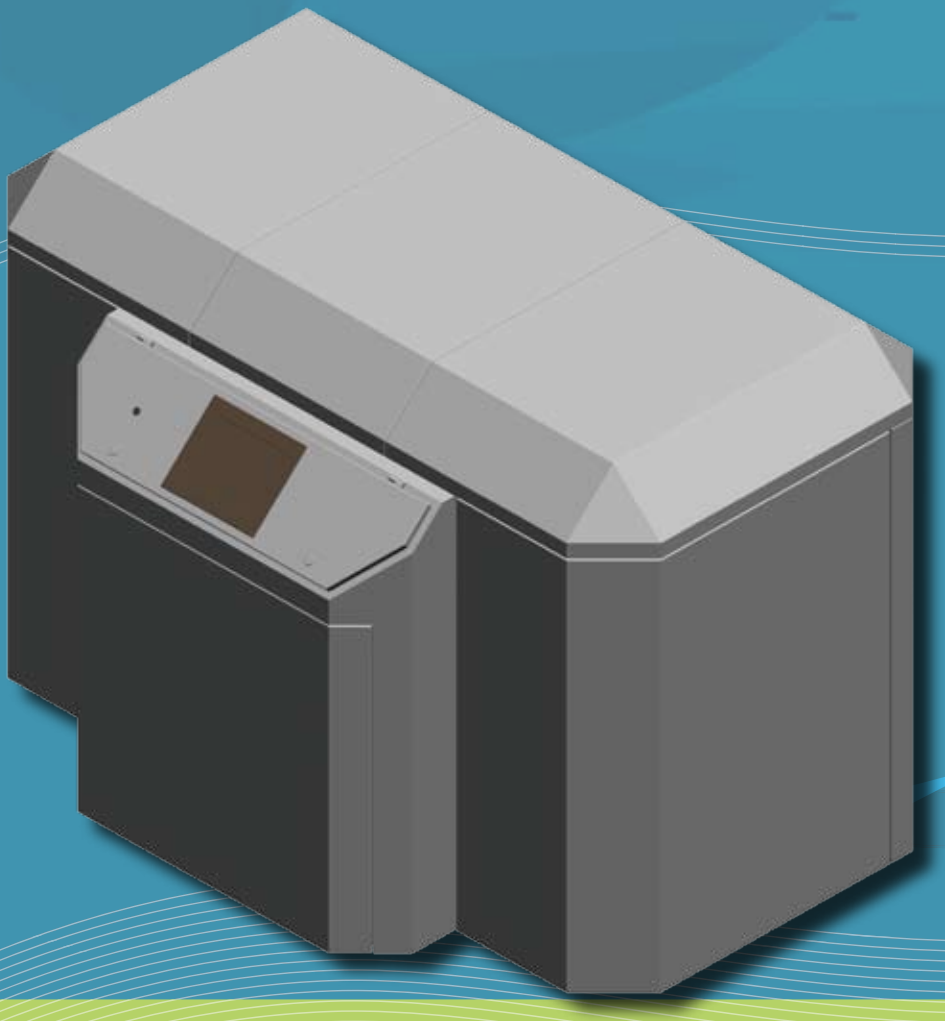
ACTIVE GYROSCOPIC ROLL-STABILISER

Roll stabilisation

....at any speed



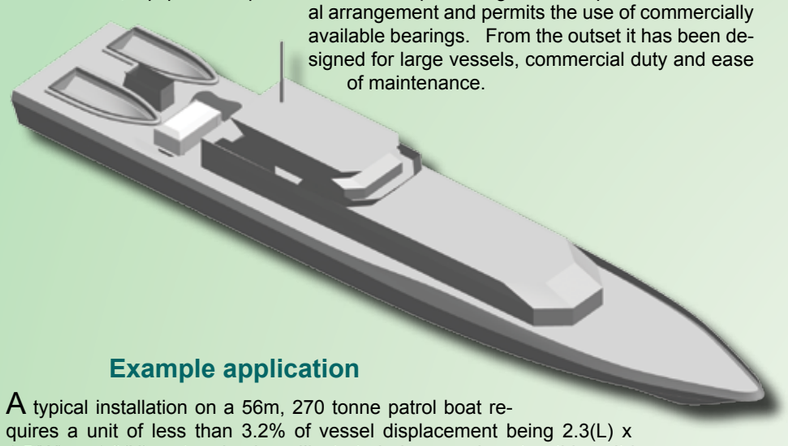
ShipDynamics

Zero-Speed, Loiter-Speed, High-Speed

Roll stabilisation at any speed

Active Gyroscopic Roll-Stabiliser

The Ship Dynamics active gyroscopic roll stabiliser (patent pending) is a self contained roll absorbing device that can be accommodated entirely within the ship hull. Unlike some stabilisation systems the Ship Dynamics active gyroscope continues to stabilise irrespective of vessel forward speed. Whether at anchor, at loiter speed or at full speed, the unit has been specifically designed to maximise its stabilisation effectiveness throughout in a single mode of operation. With all equipment fully contained within the hull there is no marine fouling, no breach of the hull and no appendages to endanger other vessels, equipment or personnel. The unique arrangement simplifies the structural arrangement and permits the use of commercially available bearings. From the outset it has been designed for large vessels, commercial duty and ease of maintenance.



Example application

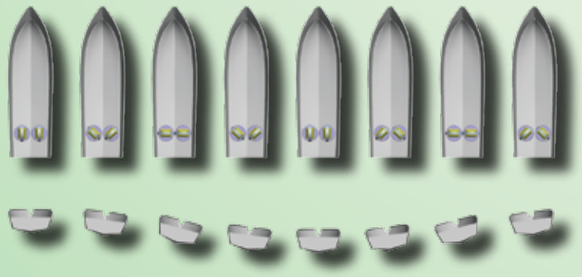
A typical installation on a 56m, 270 tonne patrol boat requires a unit of less than 3.2% of vessel displacement being 2.3(L) x 1.5(W) x 1.6(H) metres in size. Illustrated above and centre, this unit is hydraulically operated and powered.

Operation

Ship Dynamics' active gyroscopic stabiliser works on the same principal as a gyrocompass, only on a much larger scale. A pair of continually rotating high-speed precision rotors, each mounted on their own slewing base are allowed to oscillate in phase with the vessel's roll. As the vessel rolls each rotor assembly tends to want to precess so as to follow the vessel's roll motion and thereby conserve the rotor's spinning angular momentum. A computer controlled system monitors this tendency to precess and actuates the hydraulics to maintain synchronism with the roll disturbance. The roll disturbance is opposed by the gyroscopic force, thus reducing the roll motion. Peak stabilisation capacity is reached when the rotor assembly is working within its maximum oscillatory travel limits.

The computer control system provides for complete autonomous operation where the rotor's movement is continually managed. This differs to passivelly operated gyroscopes, which are primarily uncontrolled and can become erratic and ineffective in certain conditions.

A fundamental aspect of the gyroscopic stabiliser is that it cannot counteract a steady heel or list. However, this situation can be ameliorated by including additional devices such as heel tanks, transom tabs or transom interceptors to supplement the unique attributes of the gyroscopic stabiliser.



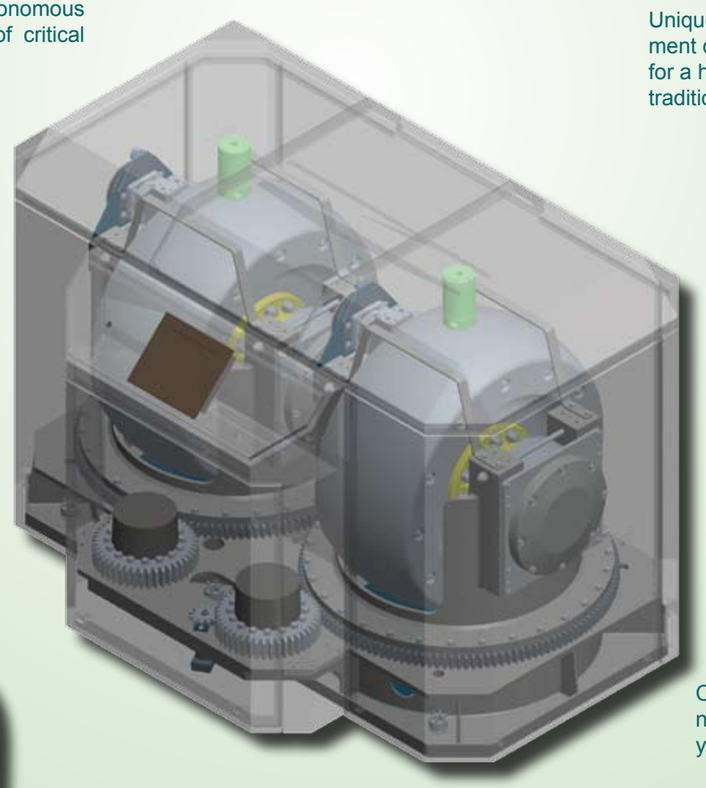
Counter rotating rotors for compact unit size;

Industrial controller for autonomous operation and monitoring of critical safety parameters;

Simple self managed operation with remote display capability;

Safe operating speeds commensurate with engine RPM;

Commercially available rolling element bearings designed for continuous commercial operation;



Unique and distinctive spherical appearance that profiles the rotor precession. The protective cover can be modified to suit the access constraints around the installation;

Unique slewing arrangement obviates the need for a heavy gimbal cage of traditional gyroscopes;

Minimal part count and an arrangement designed to be maintained within the confines of a ship;

Designed to be sized to suit virtually any vessel;

Integrated hydraulic brake/drive unit ensures that the gyro is always working to maximum capability;

Cross coupled rotors eliminates influence of pitch and yaw;

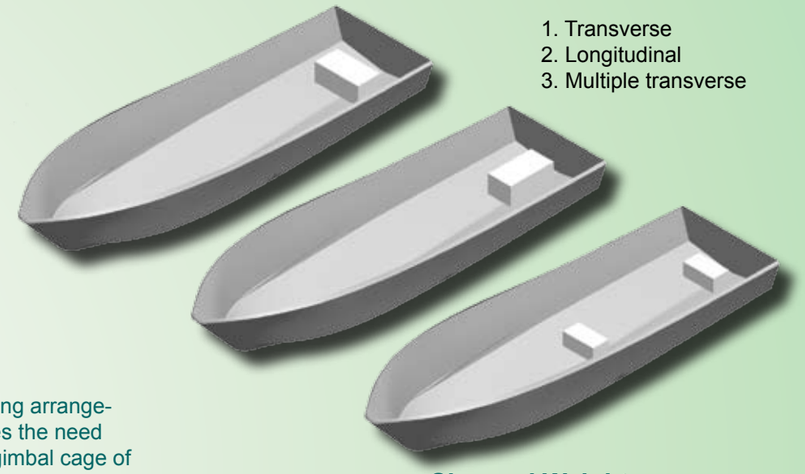
Rigid floor mounting for simplified installation;

Unique Design- Patent Pending

Mounting Flexibility

Ship Dynamics' active gyroscopic stabiliser remains effective regardless of its mounting position on the ship; whether high, low, fore or aft. Flexibility of mount location allows stabilisation equipment to be contained within machinery or auxiliary void spaces away from cabins and critical operating spaces. Mounting at locations of high accelerations, for example near the bow is not recommended. Obviously, consideration needs to be given to the unit's weight and gyroscopic reaction loads in the foundation structure. Howerver, these loads are of similar magnitude to major equipment installations or local frame loads.

The gyroscopic unit can be installed transversely or longitudinally. Alternatively, the gyroscopic unit could be mounted externally on the hull where appropriate.



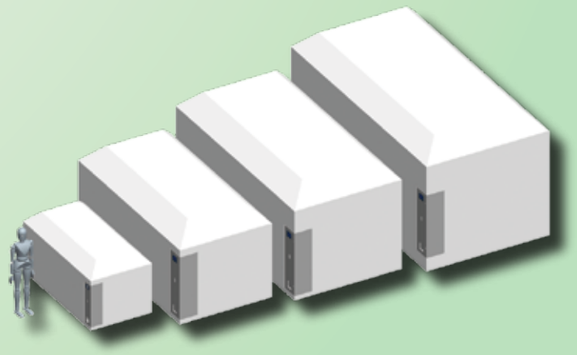
1. Transverse
2. Longitudinal
3. Multiple transverse

Size and Weight

There are many factors that influence the ultimate size of a gyroscope installation, but typical installations require 2% to 5% of vessel displacement to achieve up to 3 degrees equivalent heel force (wave slope) capacity. (Note: A constant heel force is not possible with gyroscopic stabilisers in normal operation)

The Ship Dynamics active gyroscopic stabiliser is produced in eight sizes to suit varying vessel sizes and configurations. For large vessels, multiple gyroscopic units may be required.

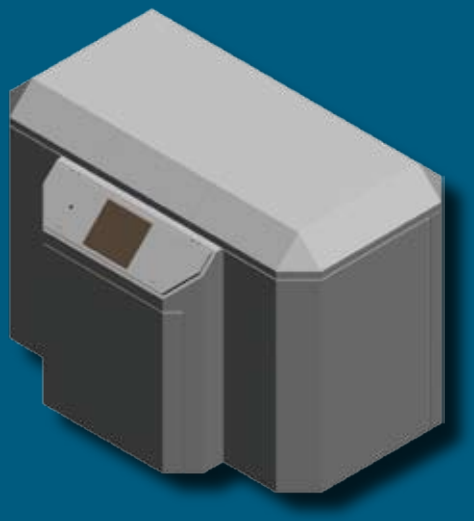
The size of the gyroscope is primarily influenced by the required roll reduction, the vessel's displacement, metacentric height (stiffness) and hull beam.



Active Gyroscopic Stabiliser

- Stabilisation at rest, loiter and high-speed*
- Single mode of operation for all speeds
- Actively controlled
- No external hull appendages
- No hull fouling
- No hull penetration
- Autonomous operation
- Maintenance friendly arrangement
- Weight of 2% to 5% of vessel displacement
- Freedom to mount anywhere on the ship
- Designed to fit within machinery space
- Performance to match fin stabilisers
- No degradation of performance with reduction of vessel speed

*May require supplementry devices in some cases



Supply Process

Each gyroscopic stabiliser is sized for each vessel application by Ship Dynamics. This process considers both the operational objectives and the constraints of installation. It also considers performance, size, weight and arrangement.

Each gyroscopic stabiliser is manufactured and tested under the supervision of Ship Dynamics ready for delivery and installation.

About Us

In addition to gyroscopic stabilisers, Ship Dynamics provides a full range of stabilising technologies that include fins and high-speed ship solutions. No matter what the seakeeping or stabilisation requirements may be, Ship Dynamics can provide impartial advice on a solution from a range of alternatives. This may include computational seakeeping prediction and other engineering tools to conduct a full performance assessment of any vessel with or without a stabilisation system. Ship Dynamics can then provide a full design and construction management service.

For further details please visit the web site at

www.shipdynamics.com

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