



Watson Industries Application Notes

Warehouse Navigation

For higher efficiency, reliability and lower costs, robotic material handling equipment are used to move shipments in large warehouses. A navigation system is needed for the vehicle to negotiate its way through the building.

The gyros in this navigation system must be extremely stable because the warehouse environment does not support the use of a magnetic or GPS heading reference.



For this application, Watson Industries produces the Dynamic Measurement System (DMS). The DMS provides the full array of sensors necessary in a navigation system along with a relative heading output. Our VSG-E Series of gyros are also available for integration into larger navigation systems.

Technical Challenges:

Navigation inside of a warehouse is a very challenging environment. Dead reckoning with occasional absolute fixes is used. The heading of the vehicle is needed so that its position in the warehouse can be calculated. Directly integrating a heading gyro will provide information on relative heading. Gyro drift and the Earth's rotation will slowly cause errors in the heading reading. To overcome this difficulty, navigation systems typically employ a heading update system.

The two most common and cost-effective types of heading reference systems are a magnetic compass and GPS. Inside of a warehouse, the sensor cannot properly detect the Earth's magnetic field and it is shielded from the signal from GPS satellites. These challenges create the need for a relative heading system based on the direct integration of a rate gyro. To minimize heading errors during navigation, the gyro signal must be extremely stable. To remove residual errors, the warehouse should use a network of detectable fixed waypoints to periodically correct the relative heading.

Watson Industries has gyros that are ideally suited for this job. Our VSG series of gyros has the low drift and stability specifications that are needed to provide an accurate relative heading signal.



Watson Industries, Inc.

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Watson Experience:

Watson Industries been involved in the development and production of products for this application since 1988.

Requirements:

- Low drift / noise
- High reliability
- Low life cycle cost

Applicable Products:

- DMS-E604
- VSG-E Series Gyros

Typical Options:

We are able to accommodate your custom needs. Shown below is a listing of our most common custom modifications.

- Custom specifications – For certain applications, customers require specifications that are different from our standard units. Watson Industries engineering is willing and able to accommodate these needs.
- Input Voltage – Many different input voltages can be accommodated.
- Output Format – Communications Protocols RS-232, RS-485, RS-422, USB.
- Data Format – We have made many products with custom formatted data outputs.
- Sensor Ranges – The ranges for most of our sensors can be expanded or reduced to meet your requirements. Some of our gyros can have ranges of up to $\pm 3000^\circ/\text{sec}$.



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