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Honeywell Introduces 6 Degrees of Freedom Inertial Measurement Unit, 6-D Motion Variant

6-Dimensional Motion Sensor Enables Precise Control and Increases Accuracy, Stability, Safety, and Operator Productivity

MINNEAPOLIS, Jan. 14, 2013 – [Honeywell](#) (NYSE:HON) announced today it has introduced its Inertial Measurement Unit (IMU), 6-D Motion Variant, 6DF Series, designed to provide motion, position, and navigational sensing from a durable single device over six degrees of freedom.

The six degrees of freedom is achieved by using MEMS (microelectromechanical system) technology to sense translational movement in three perpendicular axes (surge, heave, sway) and rotational movement about three perpendicular axes (roll, pitch, yaw). Because the movement and rotation along the three axes are independent of each other, such motion is said to have “six degrees of freedom”.

The 6DF Series IMU measures the motion of the equipment onto which it is attached and delivers the data to the equipment’s control module using an industry-standard CAN SAE J1939 communications protocol. This capability allows the equipment operator to focus on other functions, enabling more precise control than can be achieved by using only the human eye, thus increasing safety, stability, and productivity.

“Honeywell’s 6DF Series’ aluminum packaging, sealing, corrosion-resistance, and chemical compatibility provide industry-leading durability from harsh environments,” said Ted Tomita, senior global product marketing manager for Honeywell Sensing and Control. “Additionally, Honeywell has integrated the IMU with the algorithms, calibration, and environmental testing required for effective operation, easing integration and reducing total cost for the end customer.”

Honeywell's IMU 6DF Series provides three key benefits:

- 1) **Highly accurate 6-D rotation and acceleration outputs:** Provides industry-leading accuracy due to durable packaging, industry-leading stability, temperature compensation, software filtering and design, and automotive-grade industry-leading Six Sigma testing requirements.
- 2) **Industry-leading durability:** Aluminum housing protects the device from damage due to harsh environments; corrosion-resistance minimizes susceptibility to deterioration often experienced in salt water environments; compatibility with diesel fuel, hydraulic oil, gas/ethylene glycol, brake fluids, urea, liquid lime, NPK fertilizer, ammonia hydroxide, and alkaline degreasers enhances durability; IP67 and 69k ratings provide resistance to weather; wide operating temperature range withstands most thermal extremes, preventing package breakage; EMI (Electromagnetic Interference) and EMC (Electromagnetic Compatibility) ratings protect the device from environmental radio frequencies.
- 3) **Ease of integration:** SAEJ1939 CAN 29 bit identifier communication output—the standard for the transportation industry—allows more data to be transmitted than an RS-485 output; IP67 and IP69k ratings minimize the customer having to design weather resistant packaging around the IMU, allowing for a wide range of use in the application; wide voltage range (7 V to 32 V) minimizes the need for a voltage converter; Deutsch connector, common for the transportation industry, simplifies the customer's supply chain and reduces design complexity; chemical compatibility minimizes the OEM having to expose the device to the substances.

The 6DF Series may potentially be used in the following applications:

- Transportation
 - Applications: tractors, harvesters, loaders, graders, bulldozers
 - Motion type: stability, rollover prevention/detection, grading/harvesting
- Industrial
 - Applications: mining conveyors, robotics, shaker tables
 - Motion type: stability, rollover prevention/detection
- Non-ITAR aerospace/military
 - Applications: ground vehicles, unmanned aerial vehicles
 - Motion type: stability, rollover prevention/detection

Motion Types: Use and Benefits

Stability:

- **Use:** Stability is a critical feature for all types of vehicles, both in motion and those able to move large loads. Honeywell's IMU can be used to help provide traction on uneven surfaces, or vehicle stability when a load or boom arm is extended on the job. This is also beneficial for automatic steering control because it provides tipping information to the vehicle.
- **Benefits:** Provides vehicle traction and safe equipment operation, extends vehicle product life due to reduction in vibration and other mechanical stresses, prevents mechanical arm overextension and reduces operator error.

Rollover Prevention/Detection:

- **Use:** Preventing vehicle rollover is critically important for both safe operation and equipment longevity. Honeywell's IMU can be used to prevent vehicle rollover. Whether it's a vehicle traveling over rugged terrain, or a front loader with a fully extended load, the IMU can be used to warn the operator when the vehicle is approaching an angle of tilt or inclination that could lead to a vehicle rollover, preventing potential catastrophic damage to the vehicle or operator.
- **Benefits:** Prevents equipment damage, enhances operator safety, extends vehicle product life due to reduction in vibration and other mechanical stresses, reduces operator error, and withstands harsh outdoor conditions.

Grading/Harvesting:

- **Use:** Accurate grading and harvesting are important to construct quality roadways and to maximize crop yields. Honeywell's IMU helps ensure a flat, smooth roadway or field for road grading or planting purposes. It may also be used to optimize harvester blade levels to maximize crop yield in uneven fields.
- **Benefits:** Helps save time by reducing the number of steps in processes, maximizes crop yields, and withstands harsh outdoor conditions.

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