Honeywell

TARS-IMU Sensors for Smart Leveling Hitches

An Application Note

Background

In the past, implements attached to the hydraulic three-point hitch of the tractor were susceptible to uneven surfaces. For example, in the illustration in Figure 2, consider a blade attached to the hitch of the tractor. As the tractor moves across uneven surfaces, the hitch acts as a fulcrum and would drive the implement higher or lower based on the movement of the tractor relative to the ground terrain. As a result of the tractor moving over the uneven terrain, more uneven terrain may be created which is undesirable. Reference the non-TARS-IMU example in the left views of Figure 2 (blue tractor).

Solution

As agriculture and construction equipment integrate more electronic controls for smart sensing, Honeywell offers enhanced performance with the TARS-IMU (Transportation Attitude Reference System- Inertial Measurement Unit) sensor. The sensor mounted on the equipment would detect movement with respect to the tractor and blade in this example and provide real-time feedback. Reference the TARS-IMU example in the right views of Figure 2 (green tractor). In this example, the tractor's Equipment Control Unit processes this information and provides feedback to the tractor's position with respect to the terrain. This information allows the hitch position of the tractor to generate real-time adjustments to maintain the grade/blade height as the tractor is in motion.

The Honeywell TARS-IMU has grade measurement capability engineered into its design. Internal machine systems provide real-time grade data to the operator who can adjust the terrain as needed. This feature enables the end user (as the operator) to prepare a work site more quickly – saving time and money with no need for additional expensive ground surveying equipment.

This operator-assist feature helps reduces the skills gap between an inexperienced operator and an expert operator, by providing the information and control required to grade more efficiently and accurately.

This assistance will be found more often as the industry moves toward some fully autonomous systems. TARS-IMU can be a key piece in providing and reporting key vehicle and implement data. With six degrees of freedom (See Figure 1), TARS-IMU reports the key movement data such as angular rate, acceleration, and inclination. Furthermore, TARS-IMU is equipped with customizable data filters; it can be tuned to reduce extraneous noise and vibration that would otherwise distort the valuable data.

Features and Benefits

- Enhanced performance from IMU offers reporting of vehicle angular rate, acceleration and inclination (6 degrees of freedom)
- Ruggedized PBT thermoplastic housing design enables it to be used in many demanding applications and environments (IP67- and IP69K-certified)
- Advanced filtering of raw sensor data to minimize unwanted noise and vibrations, improving positioning accuracy
- Optional metal guard for added protection
- Supports 5 V and 9 V to 36 V vehicle power systems
- Operating temperature of -40°C to 85°C [-40°F to 185°F]
- Reduced power consumption
- Small form factor

Figure 1. TARS Six Degrees of Freedom

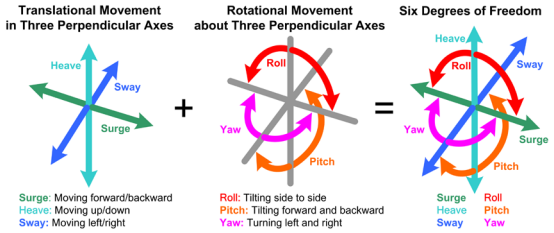
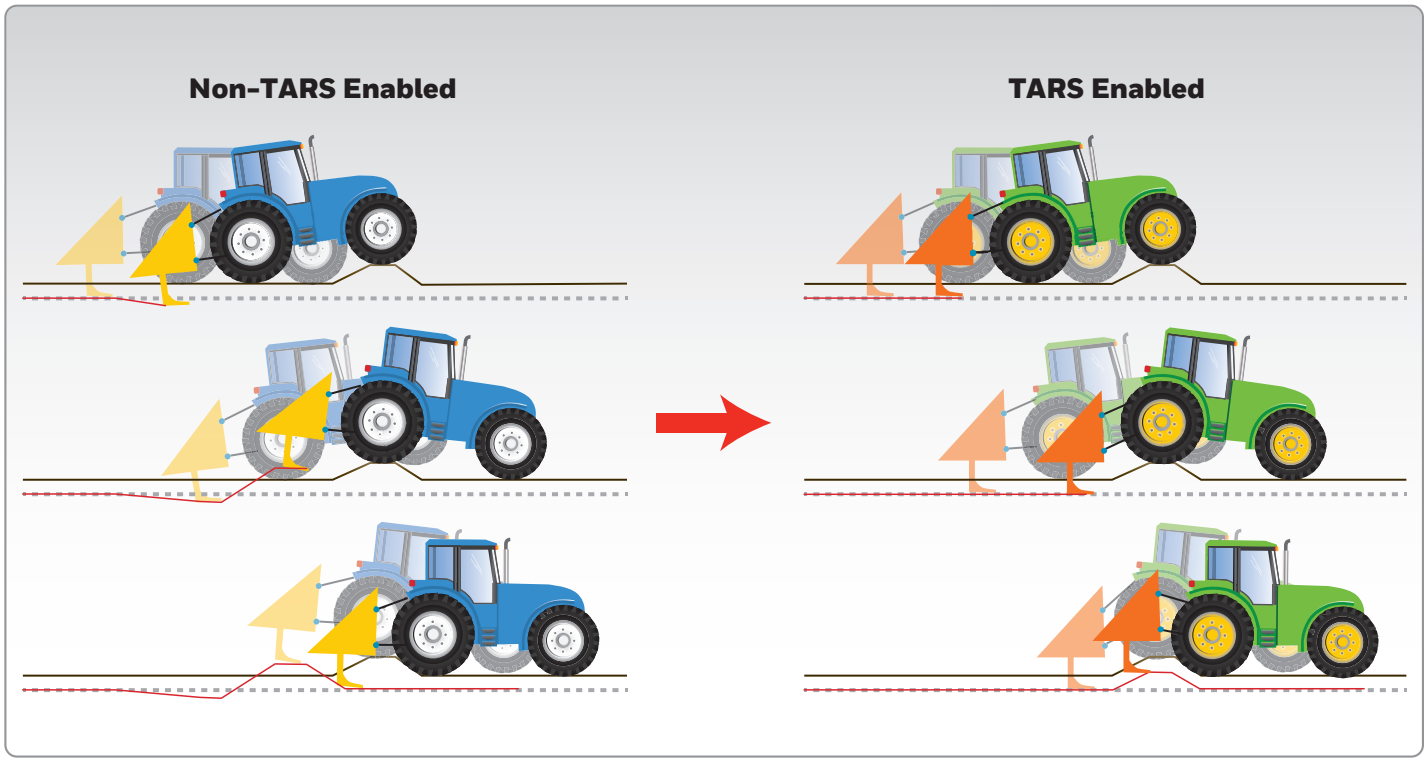


Figure 2. Honeywell TARS-IMU in a Smart Leveling Hitch Application



⚠WARNING
IMPROPER INSTALLATION

- Consult with local safety agencies and their requirements when designing a machine control link, interface and all control elements that affect safety.
- Strictly adhere to all installation instructions.

Failure to comply with these instructions could result in death or serious injury.

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items that Honeywell, in its sole discretion, finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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