

TARS-IMU Sensors for Depth Control

An Application Note

Background

As technology advances, processes are transitioning from operator control to computer-programmed or computer-assisted programmed equipment/machine control. As an example a machine, such as a backhoe, is operating in an application for above-grade or below-grade job site, it can be critical to remove a pre-determined amount of material to accurately and efficiently meet the design specifications at the job site. Removing too little material may require a second pass requiring additional time and cost. Removing too much material could result in interference with buried utilities or a secondary operation of adding material, both adding cost and time. Another potential issue that could occur is raising the boom too high, that would cause interference with overhead power lines resulting in costly downtime.

Solution

The Honeywell Transportation Attitude Reference System, or TARS-IMU, is a packaged sensor array designed to report vehicle angular rate, acceleration, and attitude data for demanding applications in industries such as heavy-duty, off-highway transportation.

TARS-IMU enables autonomous vehicle characteristics and enhances efficiency and productivity by reporting key data required to automate and monitor movements of vehicle systems and components. The sensor fusion algorithm can be customized for specific vehicle applications through on-board firmware, allowing movement data to be filtered for extraneous environment and vehicle movements.

The Honeywell TARS-IMU sensor array can be programmed to communicate with the operator and/or the control system for a pre-determined set of values.

In the above example, a backhoe equipped with multiple TARS sensors can be programmed to interact with the operator or the control unit so that a predetermined depth of a trench can be maintained. The sensor array provides feedback with enhanced precision regarding the position of the working parameters on the equipment.

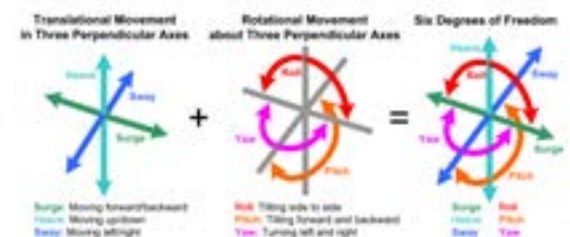
TARS-IMU sensors can help provide the position of linkage or components for off-road wheeled, track construction, or agriculture machinery components such as booms, buckets, augers, tillage equipment, and trenchers allowing the operator to ensure the machinery can achieve the desired results with precision and safety. Honeywell TARS can also increase efficiency by reducing the need for manual measurement and positioning.



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

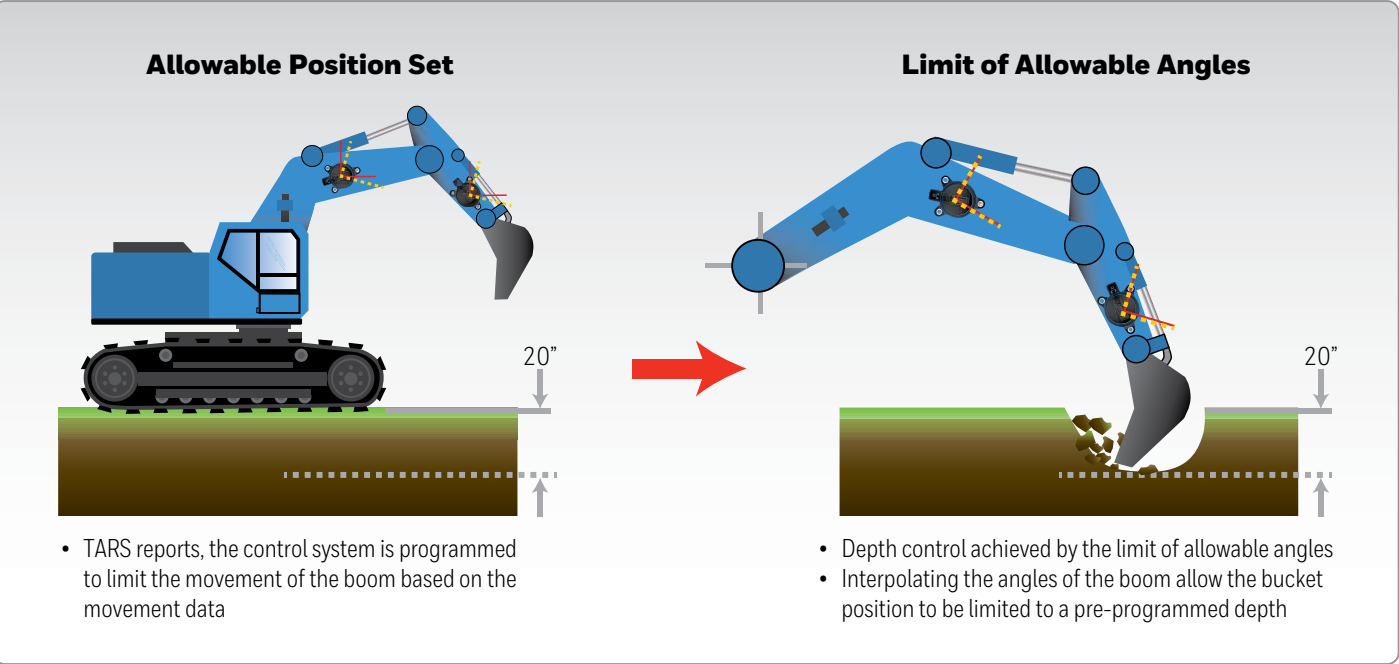
Figure 1. TARS Six Degrees of Freedom



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

This assistance will be found more often as the industry moves toward select fully autonomous systems. TARS-IMU is a key piece as it provides and reports key machinery 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, the 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.

Figure 2. Honeywell TARS-IMU in a Depth Control Application



The TARS-IMU utilizes a robust packaging design (IP67/IP69K) that makes it more resilient to the rigors of the construction industry. In addition, a wide operating temperature range of -40 °C to 85 °C makes it ready for use in many demanding tool and implement applications.

**⚠ 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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