

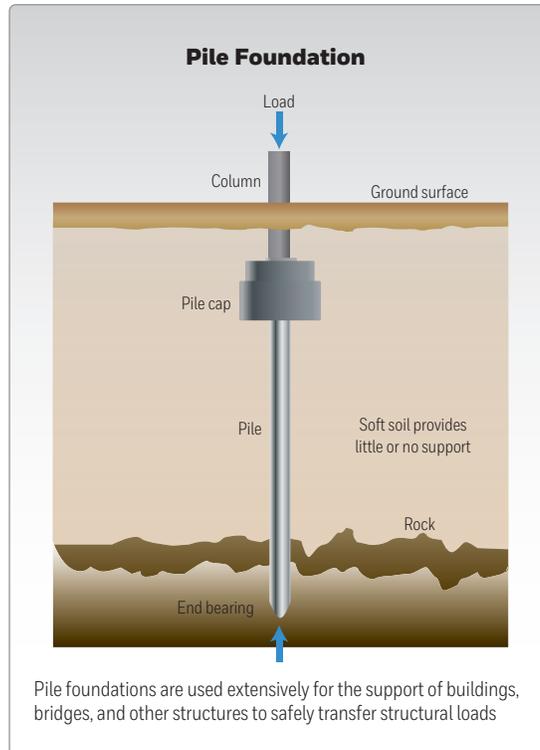
## TARS-IMU Sensors for Pile Drivers

### An Application Note

#### Background

Most construction and development projects should begin on a solid foundation. In some situations, steps must be taken to help ensure this foundation is strong enough to support the structures being developed. When the soil is not conducive to good footing, a technique called Pile Driving can be implemented. This is a situation in where large piles are driven into the ground, sometimes down to the bedrock. These piles help to transfer the load of the structure down to more solid ground thus ensuring a solid and reliable foundation.

**Figure 1. Pile Foundations Add Strength and Stabilization**



#### 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.

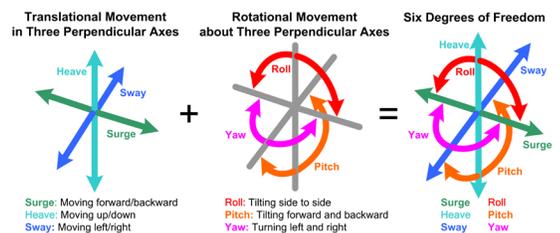
TARS-IMU enables autonomous vehicle characteristics and enhances efficiency and productivity by reporting key data required to automate and monitor movements of vehicle systems and components. The sensor



#### 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 2. TARS Six Degrees of Freedom**



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.

To maximize the effectiveness of these piles, it is critical that they be driven at the proper angle. A Honeywell TARS-IMU sensor mounted to the mast of the pile driver monitors the condition of the machine as a tilt sensor. Real-time readings from TARS-IMU allows the machine to properly position the pile to ensure the pile is driven as close to the desired angle as possible. Due to the real-time readings from the TARS sensor, small changes in the angle of the pile insertion can be made to adjust the direction of the pile.

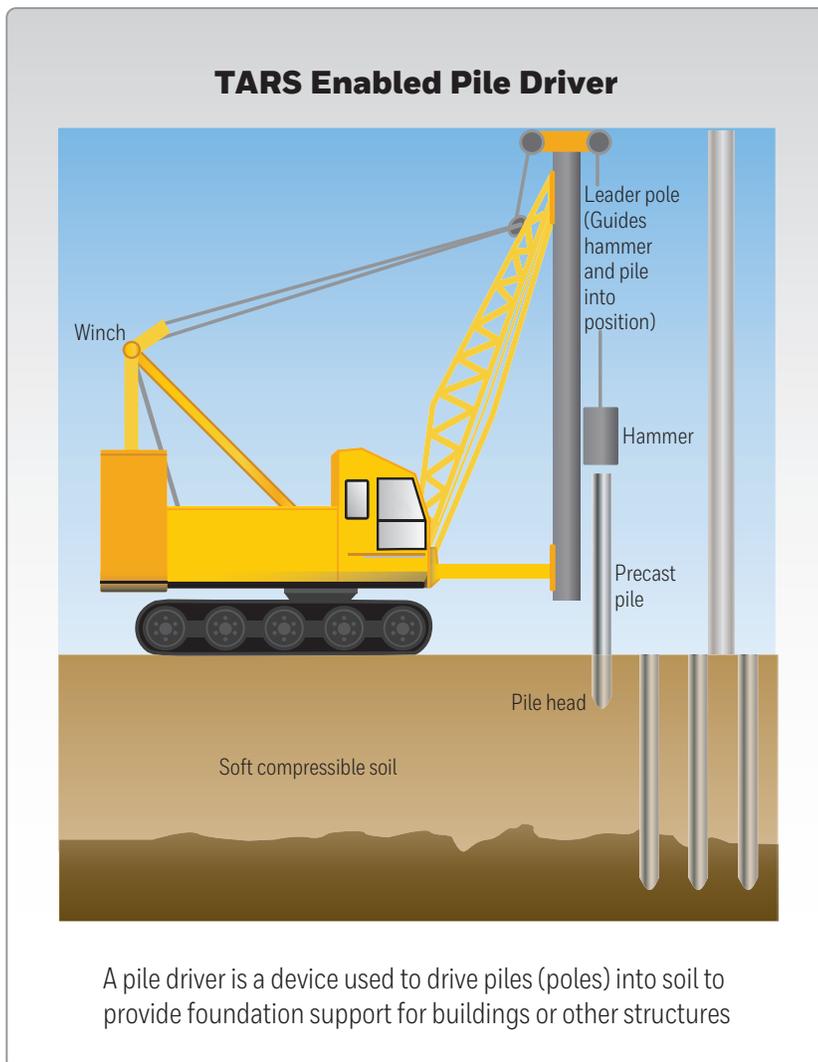
In this instance, TARS-IMU sensors are utilized to help operators properly position the piles, and help them confirm if they are driven to the proper depth and in the proper orientation as outlined in the engineering plans. This operator-assist feature endeavors to reduce the skills gap between an inexperienced operator and an expert operator, by providing the information and control required to drive the piles more efficiently and accurately.

This assistance will be found more often as the industry moves toward some fully autonomous systems.

The Honeywell TARS-IMU can be a key component as it provides and reports key vehicle and implement data. With six degrees of freedom (See Figure 2), the TARS-IMU reports 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.

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 [-40 ° F to 185 °F] makes it ready for use in many demanding tool and implement applications.

**Figure 3. Honeywell TARS-IMU in a Pile Driving 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**

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