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## **Bosch Implements Demonstration Experiment using the IoT Solution “TRACI” with Shimizu Corporation** Supporting Improved Productivity at Construction and Civil Engineering Worksites

- ▶ Bosch IoT solution to be proposed for construction and civil engineering worksites
- ▶ Implement a demonstration experiment for acquiring the location and operating status of construction vehicle and monitoring land slope conditions in Japan
- ▶ The “TRACI” IoT Solution features durability in harsh environments

Tokyo — Bosch Corporation (President and Representative Director: Klaus Meder, hereinafter Bosch) has implemented a demonstration experiment with Shimizu Corporation (President and CEO: Kazuyuki Inoue, hereinafter "Shimizu Corporation") for acquiring the location and operating status of construction vehicles and monitoring land slope conditions at construction and civil engineering worksites in Japan using the IoT Solution “TRACI.” The demonstration experiment was implemented to verify whether “TRACI,” which has achieved results in demonstration experiments in Europe, could contribute to productivity improvements even under the conditions at construction and civil engineering worksites in Japan.

### **Bosch IoT solution to be proposed for construction and civil engineering worksites**

Since 2016, the Ministry of Land, Infrastructure, Transport and Tourism has been promoting “i-Construction,” which uses ICT, etc. in all construction and production processes from investigation and measurement surveys to design, construction, inspections, maintenance, and updates. It is predicted that, in conjunction with this, the management of construction at construction sites will change dramatically through the future full-scale utilization of ICT technology.

At construction and civil engineering worksites, site managers must clearly grasp various types of information, such as the location and operating status of construction vehicles of many types and from many manufacturers, the amount

of fuel consumed and the volume of soil moved on site, and their relevance to the progress of construction, and then connect that information to enhancing productivity. Bosch's "TRACI" (Bosch Asset Tracking Solution) can be easily retrofitted to target objects, such as construction vehicles and materials, to enable the continuous monitoring and tracking of those target objects. This allows the status of these objects to be confirmed from a remote location, which leads to better management efficiency and improved productivity.

### **Effectiveness at civil engineering worksites in Japan confirmed through demonstration experiment**

Location and operating status visualization solutions using Bosch's "TRACI" consist of "TRACI" tags, a gateway, cloud computing, and applications. "TRACI" tags, which acquire data on vehicle location and operating status, are mounted on target vehicles using magnets. After acquired data is transmitted to Bosch's IoT cloud through a LoRaWAN (an open wireless network standard formulated by the LoRa alliance), which is one type of a Low Power Wide Area (LPWA) network, it is processed so that it can be browsed directly from smartphone apps and browsers. Furthermore, users can integrate acquired data and processed results into their own company management systems.

The demonstration experiment for acquiring the location and operating condition of construction vehicles follows demonstration experiments in Europe, and was implemented at a Shimizu Corporation civil engineering worksite in Kanagawa Prefecture to confirm its effectiveness in Japan. Through demonstration experiments of construction vehicle location and operating status acquisition, Bosch has been able to learn the status of construction vehicles based on GNSS location and acceleration information, and confirm its effectiveness. Note that, based on consultations with Shimizu Corporation, the companies are examining and validating new ways of using "TRACI."

Bosch also implemented a land slope condition monitoring demonstration experiment at a Shimizu Corporation civil engineering worksite in Shizuoka Prefecture. The frequency and scale of landslides in Japan have been increasing in recent years due to natural disasters, such as typhoons, earthquakes, and heavy rains, and so it is important to maintain a continuous grasp on land slope conditions resulting from mounding during construction at civil engineering worksites. During this demonstration experiment, "TRACI" tags were placed on land slopes at the civil engineering worksite and reaction thresholds for detecting topsoil slippage due to land slope collapse were verified. As a result, the use of "TRACI" tags reduced the frequency of patrols for monitoring land slope

conditions during bad weather, confirming that the concept could lead to labor savings at civil engineering work sites.

### **“TRACI” demonstrates durability in harsh environments**

From the “TRACI” tag development stage, in addition to data security and ease of data integration, Bosch emphasized durability suitable to the environmental conditions at construction and civil engineering worksites. Therefore, “TRACI” has been developed to withstand the harsh environment of construction and civil engineering worksites, not only shocks, rain, and dust, but also in situations such as high-pressure washing of vehicles. The service life of “TRACI” tags equipped with primary batteries is expected to be 5 years depending on communication frequency settings.

Bosch is promoting the exchange of information on the latest technology with Shimizu Corporation. Going forward, it will promote digital transformation with an eye on areas such as long-distant transport systems, AI, and construction vehicle automation to support better productivity at construction and civil engineering worksites.

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