NEWS RELEASE

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Joint research between Japan and Finland
~ Smart Bridge Health Monitoring ~

KOZO KEIKAKU ENGINEERING INC. (Head Office: Nakano-ku, Tokyo, JAPAN, President: Shota Hattori, "KKE" hereafter) and VTT Technical Research Centre of Finland (FINLAND, President & CEO: Antti Vasara, "VTT" hereafter) conducted joint research project "Smart Bridge Health Monitoring" in collaboration with Professor Emeritus Ayaho Miyamoto of Yamaguchi University. The main purpose of this project was to collect data regarding maintenance and management of bridges in Finland by implementing a new system of vehicle-mounted sensors.

Aging infrastructure, such as roads and bridges, is becoming a major concern not only in Japan but also around the world. New ways of monitoring bridges such as performing daily inspection inexpensively and regular safety monitoring without difficulty are needed to tackle this challenge. KKE not only explores innovative methods but also has a long-standing experience in monitoring and inspection of bridges using vehicle-mounted sensor systems on local route buses in Japan. This joint research project created an opportunity to implement our solutions overseas. The results also proved that this technology can be applied with great success, regardless of different structures, climate and types of buses.

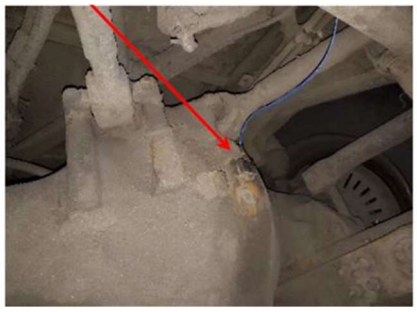
KKE and VTT will continue to deepen collaboration and promote research on the safety management of bridges.

■ Research Outline

Helsinki, the capital city of Finland, has established a "Smart City Initiative" and is engaged in building infrastructure that provides accessible information for everyone in the city.

As part of this effort, the "e-Bus Project" (http://livinglabbus.fi/use-cases/) aims to improve the convenience of citizens' lives by utilizing information obtained from city buses. This research was conducted to obtain data on the changes in road surfaces and bridges from vibrations of the buses.

HSL Bus


Acceleration sensor installed on the axle


Monitoring on the Bridge

【Outline for bridge monitoring system】

By using an acceleration sensor mounted on the axle of the bus, the vibration of the bridge is monitored. The collected data is used to identify "Characteristic deflection value" that can be further analyzed with supporting information to determine the status of the bridge. In addition, data can also be used to examine the condition of the road surface and detect road anomalies, such as bumps.

【Results of a study in Espoo】

Date of Monitoring：Sep.8, 2018
Date of Results：May 17, 2019
Bus：HSL Bus
Bridge：Matinsilta, Olarin risteyssilta in Espoo

【Result】

Synchronization has been detected between the vibration pattern of the bridge and the bus, which is a prerequisite for the extraction of the characteristic deflection value.
The characteristic deflections were calculated from the vibration data of the axle when the bus passes through the bridge. Furthermore, the condition of the road surface could be evaluated from noting changes in the vibration data.
In the next step, we will strive to ensure the proposed technology is applicable in different environments.

■ Company Information

Kozo Keikaku Engineering Inc.

KKE pursues its Thought "Innovating for a Wise Future", a future vision and direction to be sought together with society. As a Professional Design & Engineering Firm that acts as a bridge between the academic and business worlds, KKE strives to solve various issues and challenges that society faces, utilizing its engineering expertise acquired through knowledge exchanges in diverse fields. KKE will thus contribute to creating a wiser and better society.
Learn more at www.kke.co.jp/en

VTT Technical Research Centre of Finland Ltd.

VTT is a visionary research, development and innovation partner, which drives for sustainable growth and tackles the biggest global challenges of our time and turn them into growth opportunities. The company goes beyond the obvious to help society and businesses to grow through technological innovations. VTT has over 75 years of experience in top-level research and science-based results. The turnover and other operating income are 268 M€.
Learn more at www.vttresearch.com/

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