
Development of real-time measuring system of tip position with deep mixing methods

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The accuracy control during the construction in the soil improvement work was mainly the empirical control of the construction manager such as attitude of the construction machine and experience of the operator. There is a growing need for technology that capable of measuring and controlling the trajectory of the mixing tool tip in real time and with high accuracy in deep construction or construction in close proximity to existing structures. The authors developed a deep depth measurement system capable of measuring the tip position of a mixing tool in real time during construction for the Deep Cement Mixing method and applied it to actual construction work for the first time. In this system, the biaxial inclinometers in-stalled inside the casing rod and the underwater and underground set of communication equipment made it possible to share the tip position information acquired by the operator and related staffs through wireless communication without affecting the rod connection as well as disassemble work. In the actual construction depth of 43.7m deep, the eccentricity of the mixing tool tip during construction relative to the design position was within 40 cm or less (approximate 1/100 of depth), which was within the range of the construction error initially assumed, and the construction was completed safely without affecting the existing underground drainage structure. This article is going to describe the detailed of system configuration and present to measurement results of the first applied construction site.
