

Quantifying the Effect of Rolling Dynamic Compaction

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Abstract

Rolling dynamic compaction (RDC) is a ground improvement technique that involves towing, typically with the aid of a tractor, a 3-, 4- or 5-sided, non-circular module. Due to the mechanics of its operation, as well as the increased travel speed of 10 – 12 km/hr when compared with the 4 km/hr speed of conventional vibrating and drum rollers, RDC has demonstrated improved earthworks efficiency and greater effectiveness at depth below the ground surface. Despite the significant benefits derived from RDC, much research is needed to facilitate the development of models to predict the extent of ground improvement, as a function of soil type, ground conditions, travel speed, module type and weight, and the number of passes. This paper presents the results of an extensive research program undertaken to quantify the behaviour of RDC and its consequent effect of the ground. The research involves field studies incorporating in situ measurement, laboratory testing of small-scale physical models involving novel instrumentation, numerical modelling using dynamic finite element analyses, and the implementation of artificial intelligence. Each of these aspects is treated in detail in the paper.