Rate effects on shear strength measurements of Australian tailings using a rotation-controlled field vane shear

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ABSTRACT
This paper explores the relationship between the vane rotation rate and the measured shear strength from a large set of vane data collected using the Geomil GVT-100 Vane System. When soil is sheared at low rotation rates, soil resistance may increase due to partial drainage effects. At very high penetration rates, the resistance may increase because of viscous effects. The degree of drainage that occurs during vane shear is a crucial factor in the derivation of soil properties, and its impact is rarely assessed. Standards developed for traditional soils have set the vane rate for undrained behaviour at 6 deg/min. The data from the Geomil system is unique in that it provides data collected at two separate rates (6 deg/min and 1,200 deg/min) for every vane test completed. We present a comparison of the data at these two rates and assess whether the soil is behaving drained or undrained during the standard rate vane test and whether the peak and residual shear strengths are being overestimated.