RemScan®

Particle Size Distribution Measurement with RemScan

The measurement of particle size distribution of soil is important in many industrial applications including agriculture management, groundwater modelling, geotechnics, bioremediation and risk assessment. Ziltek has developed an infield method for measuring particle size distribution (%sand and %clay) within 30 seconds with similar accuracy to laboratory, using the hand-held infrared instrument, RemScan.

The particle size distribution measurements are made simultaneously with other RemScan measurements, e.g. Total Petroleum Hydrocarbons (TPH), using the same infrared spectrum. The particle size distribution measurements are displayed and stored in the same manner as for TPH.

The calibration method is based on measurements of more than one thousand soil samples. RemScan is calibrated versus laboratory method ASTM 152H - USDA method but uses the Australian classification for silt as shown in Table 1. Results can be provided according to USA definitions (see Table 1) if required. Texture Classes can also be provided if required.

Table 1: Definitions of Clay, Silt and Sand according to Australian and USA Methods

Class	Particle Size Range (microns)	
	Australian Definition	USA Definition
Clay	0 - 2	0 - 2
Silt	2 - 20	2 - 53
Sand	> 20	> 53

The method has been validated using 28 samples which were measured by RemScan and compared to the laboratory method. Figure 1 below shows the accuracy of RemScan in comparison with the laboratory for measurement of sand and Figure 2 shows the same for clay. The Root Mean Square Errors (RMSE) of 8.0 for %sand and 6.4 for %clay are considered very good in comparison with the uncertainties of the laboratory method.

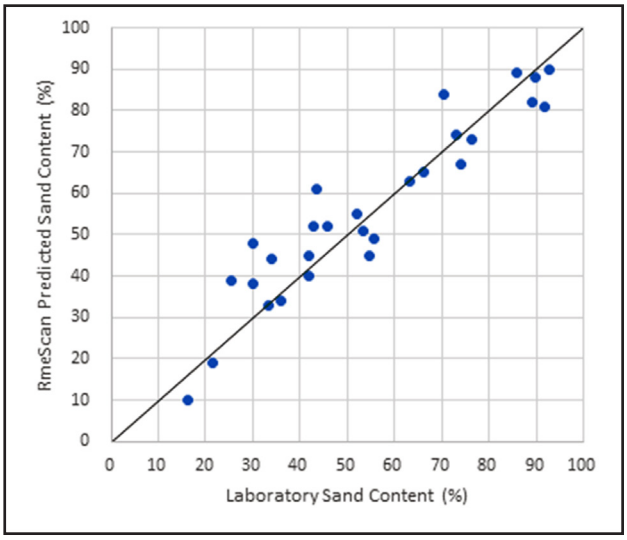

Figure 1: Comparison between RemScan and laboratory measurements of %sand in 28 samples

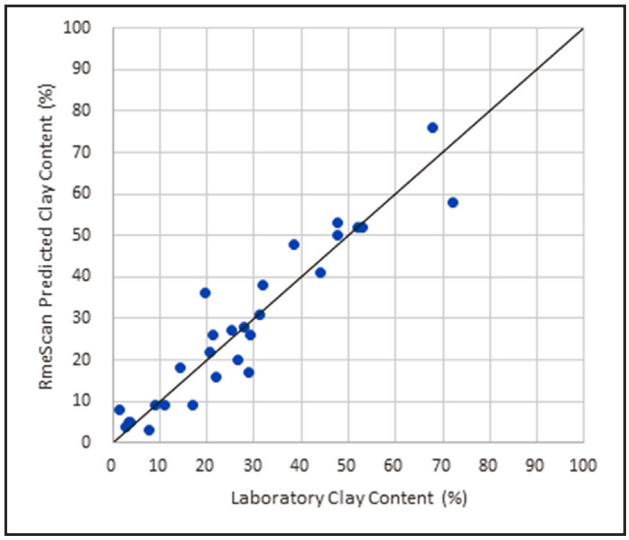

Figure 2: Comparison between RemScan and laboratory measurements of %clay in 28 samples

The current calibration models do not yet cover <20 %sand,>80 %clay and high carbonate soils. Ziltek is in the process of extending the models to cover these conditions as soon as possible.

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