

Half-Day Seminar: Inclinometer Measurements and Errors & Ground Anchors-From Design to Construction

TUNNELLING AND UNDERGROUND SPACE TECHNICAL DIVISION



By Ir. Syed
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Ir. Syed Rajah Hussain graduated from Bolton University, United Kingdom. He joined a British Civil Engineering and Tunnelling Contractor JF Davalan and worked on various tunnelling project throughout UK. He then joined the Kelana Jaya LRT Line with a Project Management Company and was involved in the underground works. He later joined various Consultants and Developers and involved in local and overseas developments notably in Indonesia, Kazakhstan and Pakistan.



Participants during Q&A Session

On 9th August 2014, Dr V. Ganeshan of AECOM Singapore Pte Ltd gave a half-day seminar to 63 participants on two important subject related to Tunnelling And Underground Works.

The seminar was held in Wisma IEM, Petaling Jaya.

The lecture was delivered in two sessions. The first session was on Inclinometer Measurements And Errors and the second session was on Ground Anchors – From Design To Construction. Dr Ganesh, who has over 35 years of experience in all aspect of geotechnical works, gave a detailed and comprehensive lecture on both topics.

INCLINOMETER MEASUREMENT AND ERRORS

Dr Ganesh said geotechnical instrumentation are used in almost all deep excavation works but the inclinometer is one of the most crucial instrument that ensures safety at site.

The inclinometer, as the name implies, measures the inclination of a particular structure that it is intended to measure. It measures the lateral displacement of the structure, for example a retaining wall trough out the wall full depth and beyond, when installed below the wall toe.

He explained how inclinometer measurements are installed, the data read and the associated errors. It is crucial to study and explain in-depth the associated errors as, on numerous occasions, the anticipated wall lateral movement is not as expected, according to the results of the inclinometer readings.

Errors in installation and measurements as well as method of correcting measurements with systematic errors were presented. Dr Ganesh covered in-depth the types of errors inherent to the inclinometer as follows:

Systematic Error	Random Errors
Zero Offset / Bias Error	Depth Positioning Error
Bias-Shift Error	Casing Irregularities
Sensitivity Error	
Orientation / Spiral Error	
Rotational Error	
Gravity Error	

GROUND ANCHORS - FROM DESIGN TO CONSTRUCTION

In the second session, Dr Ganesh presented the standard terms for the design of ground anchors and stressed on the importance of gaining compression in the grouting and introducing the Single Bore Multiple Anchor® system.

He continued his lecture on special features and considerations that need to be taken while designing and installing ground anchors.

The lecture concluded with the 3 criteria for testing of anchors that includes Proving Test, Onsite Suitability Test and On Site Acceptance Test.

The lecture ended at 1.30 p.m. with an question and answer session. There was active discussion from the floor and participants gave Dr V. Ganeshan a round of applause for his well-presented seminar.

On behalf of TUSD, its chairman Ir. Andrew Yeow Pow Kwei presented a memento to Dr Ganeshan. ■