



**Webinar Talk: Tunnelling in Japan under Challenging Geological Conditions**

by Ir. Assoc. Prof. Ir. Dr. Rini Asnida binti Abdullah and Mr. Karthigeyan a/l AL. Ramanathan



Ir. Assoc. Prof. Ir. Dr. Rini Asnida binti Abdullah is currently a committee Member of Tunnelling and Underground Space Engineering Technical Division (TUSTD).

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The webinar on “Tunneling in Japan under Challenging Geological Conditions” was organized by the Tunneling & Underground Space Technical Division (TUSTD) of The Institution of Engineers, Malaysia (IEM). The webinar was held digitally via the ZOOM application on 31<sup>st</sup> of July 2021 from 0900 am to 1100 am. The two hours long webinar talk was delivered by Mr. Kensuke Date and Dr. Yasuhiro Yokota for one hour each with Assoc. Prof. Ir. Dr. Rini Asnida binti Abdullah as the moderator. A total of 154 participants registered for this webinar talk while 126 participants logged into the ZOOM application to attend the stated webinar talk (Figure 1).



Figure 1: Group photo session for the webinar talk via ZOOM application.

The webinar talks commenced with the brief introduction of the first speaker Mr. Kensuke Date. He fully utilized his one-hour slot entitled “Watertight Tunnel Construction with Peripheral Grouting”. He introduced the location and geological background where the Kitanomine Tunnel was constructed. The subsurface profile comprising mudstone, welded tuff, and alluvial fan deposits challenge the tunnel construction process.

The speaker also added that there was a great water influx during the tunneling process, which needs to be addressed to avoid negative impacts on the ground surface. However, special care needs to be taken to ensure the mitigation of water influx is then recovered once the tunnel excavation is completed. This was explained in the latter part of Mr. Kensuke Date’s presentation. He then presented the pre-grouting design used before the tunnel excavation and complex grout implementation due to the challenging geological profile.

The speaker has highlighted that the quality of pre-grouting was done during and after the tunnel excavation process via the in-situ permeability test (as shown in Figure 2). He concluded that the ground settlements and other negative impacts were in control as the mitigations implemented were sufficient and effective.

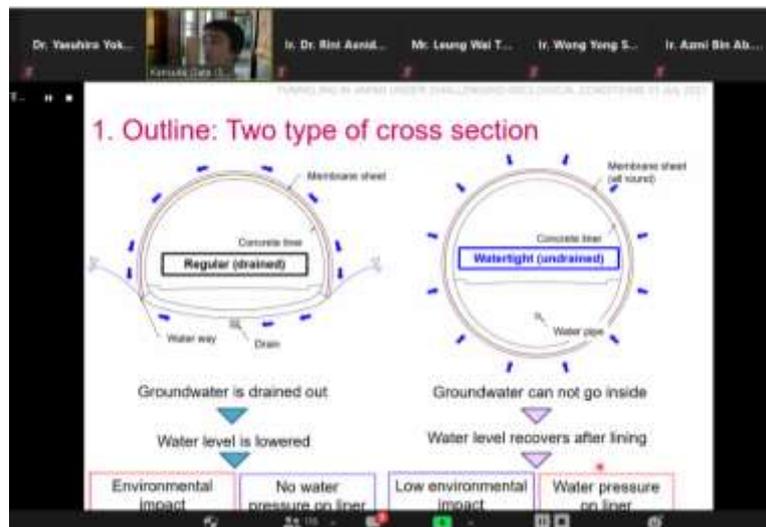


Figure 2: Presented slide that shown comparison of cross section between regular and watertight tunnel.

The slot for Mr. Kensuke Date ended sharply at 1000am and giving way to the next speaker, namely Dr. Yasuhiro Yokota. He presented on the topic entitled “Deformation Controlled Tunnel Support for High Overburden Tunnels”.

Firstly, he addressed the points to be highlighted in his talk, as shown in Figure 3. A brief introduction was done on overburden tunnels and the negative impacts that may occur if mitigations were not taken into consideration. One of the primary mitigation explained by the speaker was the rock bolt. He also mentioned the setbacks of using a grouted rock bolt as it may fail due to tension from the large deformation.

The solution that Dr. Yasuhiro Yokota proposed was using a new energy-absorbing rock bolt, also known as deformation-controlled rock bolt (DC-bolt). The speaker then verified further the performance of this DC-bolt using the numerical simulation of Discontinuous Deformation Analysis and also laboratory test. He then concluded that the DC-bolt helps to reduce rock surface settlement when it reached certain displacement, especially for tunnel excavation under squeezing ground conditions.

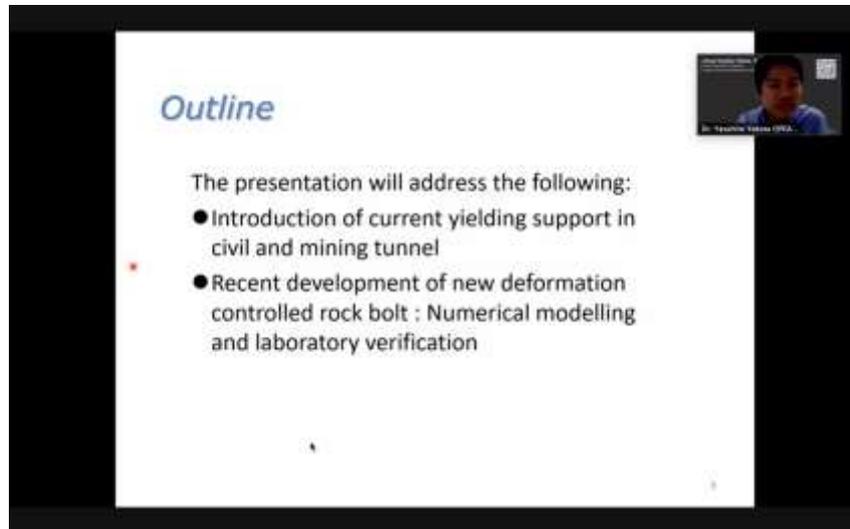


Figure 3: The outline of Dr. Yasuhiro Yokota's presentation.

The webinar ended at 11:00 am with a fruitful Question & Answer (Q&A) session. The moderator thanked Mr. Kensuke Date and Dr. Yasuhiro Yokota for their time to deliver the webinar talk to the participants and members of IEM TUSTD who have attended this webinar talk.