Blade rotation number, which is a function of the number of blades per meter depth, rotational speed of mixing tool and jackshaft/turbine rate. An adequate mixing would require a blade rotation number of approximately more than 400. It was found that the unit weight effect is proportionally more significant than the blade rotation number effect.

The second speaker, Ir. Dr. Toh, presented various case histories of deep excavations in his first lecture entitled “Deep Excavations with Finite Elements.” The case histories presented included circular cantilever diaphragm walls, cantilever contiguous bored piles (CBP) walls, cantilever secant pile wall, top-down construction, preloaded struts, wall with permanent soil nails, etc. Ir. Dr. Toh informed that the measured wall deflections range between 0.2% and 0.6% of the excavation depth for cantilever walls (low support stiffness), compared to 0.3% to 0.8% observed by Clough and O'Rourke (1990). For walls associated with the top-down construction method (high support stiffness), the measured wall deflections range between 0.12% and 0.36% of the excavation depth compared to 0.3% obtained by Clough and O'Rourke (1990). In Ir. Dr. Toh concluded that the comprehension of soil behaviours, mechanics of excavation and soil-structure interaction coupled with the practical knowledge of construction methods and excavation logistics would enable an economical and safe design.

In his second lecture entitled “Soil Mixing and Jet Grouting as Excavation Support,” Ir. Dr. Toh shared his experience in grouting using three case histories.

The case histories presented were:
1. The use of jet grout behind a strutted CBP wall to reduce ground movement (caused by excavation) to a negligible level.
2. Soil-cement mix to form an embedded wall for a relatively low height excavation in very soft marine clay.
3. Jet grout slab with diaphragm wall and top-down construction for a deep excavation in soft clay.

The last lecture entitled “Applications of Deep Soil Mixing (DSM)” was presented by Dr. Leong. He concluded that to ensure reliable and successful applications of the DSM technique, the following aspects of design and operation must be properly considered:

Design considerations:
1. Suitability of soil
2. Design and analysis of DSM
3. DSM pattern and treatment depth

Operation considerations:
1. QA/QC in mixing process
2. Degree and uniformity of mixing
3. Sequence of mixing
4. Coring and testing

At the end of each of the lectures, the relevant speaker answered questions from the audience. Lastly, a token of appreciation was presented to each of the speakers. The seminar ended with loud applause from the floor.
The Three Gorges Project in China

MY wife and I, together with some friends, travelled to Zhangjiajie to tour the UNESCO World Heritage Forest Park of unique towering mountain peak formations. The Zhangjiajie Mountains were also popularised by the movie "Avatar". We then travelled seven hours eastward by road, running almost parallel to the Yangtze River to Yichang, the World Energy City.

The Three Gorges Project (TGP) was built across the Yangtze at Yichang in Hubei Province, some 1,850km upstream of Shanghai. The TGP is the world’s largest hydroelectric power plant (22,500MW capacity). The annual generated capacity in 2009 was 79.4TWh. However, the Itaipu Dam (by Brazil and Paraguay with a smaller output is set to rise when the dam is fully impounded at a maximum of 175m from the current level of about 162m. The power supply coverage radius exceeds 1,000km, hence covering over 50% of the Chinese territory.

Nevertheless, with 32 turbines, the TGP production is China’s pride and touted as an engineering and economic feat. Besides power generation, it also serves the functions of flood control and irrigation, and enables a multiple-fold increase in shipping operations, allowing 10,000 tonnage vessels to navigate directly from Shanghai to Chongqing.

Another transit facility in the form of a 11,800 tonne capacity, 153m vertical slipway 89m has been under construction since 2007. The 18,300 tonnes vessel is scheduled for completion in 2014, cutting the transit time to only 45 minutes.

Unfortunately, due to the heavy river vessel congestion, regular container ships were no longer able to transit the shiplocks at all. We, therefore, had to be contented with only viewing the dam, the shiplocks and other facilities in the accessible areas of the TGP.

From Yichang, we boarded the President Prime luxury cruise ship, intending to have a leisurely 4-day cruise 660km upstream to Chongqing City, including an initial 4-hour transit through the two-way five-step shiplocks (200m x 35m each) designed for 10,000-tonne vessels. The shiplocks would now each transiting vessel from 62m downstream to a maximum level of 175m upstream.

We also passed by the entirely new booming Badong township where up to 100,000 of the resettled population now live in two- or three-storey high western style buildings with modern facilities. Surely, the TGP and the Yangtze will become increasingly popular as tourist attractions.