



WEBINAR INVITATION



Speaker

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Design and Construction of Merdeka118 Tower: Pushing the Boundaries of Concrete Technology for Megatall Tower

Standing Tall and rising above the historic site of Malaysia's independence, the Merdeka 118 Tower is an iconic landmark address and its futuristic and symbolic design will not only embody the culture and legacy of Malaysia independence, but to harmonize with the adjacent heritage building, including Stadium Merdeka and Stadium Negara, and serve as a catalyst for the revitalization of a historic district into the future while redefining and weaving into the fabric of Kuala Lumpur Skyline.



The purpose of this presentation is to address the structural engineering, construction innovations and panning, and the key challenges in the design and construction of Malaysia's new landmark.

Design and Construction of Merdeka118 Tower: Pushing the Boundaries of Concrete Technology for Megatall Tower



Ahmad Abdelrazaq, SE, MASCE, FCtbuh

Executive Vice President at Samsung C & T Corporation.

Since joining Samsung, he was involved in the design and construction planning of several local and international projects including Burj Khalifa; Samsung HQ office; 151-story Incheon Tower; 360 Tower, Mumbai; UIC and Tanjong Pagar in Singapore. He also held several operational positions as Executive Project Director of the Merdeka PNB118 Project, and the “Lakhta Center”. During his tenure at SOM as an Associate Partner, his responsibilities included, but not limited the structural design of Burj Khalifa, Tower Palace III, Jin Mao Tower, Hotel De Artes, and Millennium Park Project, Chicago.

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The Merdeka 118 Tower is a Mega-tall building with 118 floors and five basements. Within 292,000 m² of GFA, the tower consists of 83 floors of office space, 17 floors of luxury hotel by the Hyatt Group, retail, observation deck floors, and a spire rising to more than 160 m to bring Merdeka 118 to more than 640m tall, thus becoming the tallest building in Malaysia, and the second tallest building in the world. The purpose of this presentation is to address the structural engineering, construction innovations and panning, and the key challenges in the design and construction of Malaysia’s new landmark including:

- ❖ **Structural System Optimization:** The primary structural system components of the tower comprised of 8 Mega Columns, central core walls, intermediate steel columns, 6 sets of belt trusses and 3 sets of outriggers. The central core wall is connected to the exterior mega columns through the outriggers at 3 levels to form the lateral load resisting system and stability mega frame structure. High Performance Concrete up to C105 has been applied to the mega column and core walls to optimize the size of the elements and improve the gravity and lateral load resisting capability of the elements.
- ❖ **Application and Delivery of High Performance Concrete:** The effective use and application of High Performance Concrete, up to C105, resulted in optimizing the size of structural elements and improve the economics of the building by maximizing premium floor space. To ensure delivery of HPC to the highest standard, extensive testing program and QA/QC program has been developed. The successful development and application of HPC in Merdeka 118 Tower has push the boundary of HPC utilization in Malaysia since the Petronas Twin Tower and will serve as a

reference to the efficient utilization of HPC for future tall buildings. Concrete planning works included the application of elastic, creep and shrinkage testing program for all concrete grades, concrete pumping test, mockup to verify concrete temperature for the massive concrete elements, etc.

- ❖ **Construction Planning & Construction Sequence of the Tower:** Due to the complexity of the structural system, consisting of centralized concrete core wall, 3-mega steel outriggers trusses that are connected to 8 mega concrete columns, and 6 belt/transfer trusses that transfer intermediate structural steel column to 8 mega-concrete columns at the perimeter of the tower, careful planning and construction sequence analysis was required to confirm the behavior of the interconnectivity and behavior between the major building elements, including compensation program, floor levelness, and the timing of connecting the outriggers to the center concrete core wall, etc.. Application of modular construction to mega columns to improve constructability will be also addressed.
- ❖ **Application of Real-time Structural Health Monitoring and Survey Programs:** An extensive Structural Health Monitoring Program, with IoT and other smart devices, was implemented to feedback of the structural behavior response and behavior of the tower.
- ❖ **Wind Engineering:** While variation in the building shape in general is beneficial in taming the building wind effects, however, the sharp edges of the Tower presented wind engineering challenges.
- ❖ **Impact of Merdeka 118 on future generation of Mega-Tall and Slender Towers.**

