The Institution of Engineers, Malaysia

CIVIL AND STRUCTURAL ENGINEERING TECHNICAL DIVISION (CSETD)

SERIES 1 - WEBINAR ON "VALIDATING THE STRUCTURAL BEHAVIOR AND RESPONSE OF BURJ KHALIFA: THE CREATION OF REAL TIME FULL SCALE STRUCTURAL HEALTH MONITORING PROGRAMS: A REAL TIME STRUCTURAL DIGITAL TWIN"

Wednesday I 09 June 2021 I 3.00 p.m. – 5.00 p.m.

SYNOPSIS

The Burj Khalifa Project is 828 meters tall and comprises of 162 floors above grade and 3 basement levels. Early integration of aerodynamic shaping and wind engineering played a major role in the architectural massing and design of this multi-use tower, where mitigating and taming the dynamic wind effects was one of the most important design criteria established at the onset of the project design.

The involvement of the author in the development of the structural and foundation design concepts, construction planning/construction of Burj Khalifa during his tenure at both SOM and Samsung C&T since the project inception prompted the author to develop an extensive survey and real-time structural health monitoring program [creating Structural Digital Twin] to validate all the fundamental assumptions made for the design and construction planning of the tower.

The focus of this presentation is to describe the structural and foundation system development, wind engineering studies, seismic engineering studies, and the development and execution of state-of-the-art Real-time Structural Health Monitoring Programs (RSHMP) [Structural Digital Twin] to validate the structural behavioral and response of the tower during construction stage and during its service life. This RSHMP provided extensive insight into the structural and foundation behavior of the tower (static/dynamic), control of the construction process and sequence of work, and evaluation of the structural response by correlating the actual measured response to the predicted behavior. This will include, but not limited to 1) monitoring the tower's foundation system and settlement, 2) tower vertical elements (core/fin walls) strain measurement, 3) measuring total vertical shortening in walls/columns due to elastic, shrinkage and creep effects, 4) measuring the lateral displacement/sway of the tower under its own gravity loads (due to asymmetrical effects) resulting from immediate elastic and long term creep effects and its impact of the tower verticality, 5) measuring the building lateral movements due to wind/seismic events/dynamic characteristics during construction, 6) measuring the building displacements, accelerations, dynamic characteristics, and structural behavior in real time under building permanent conditions, and 7) monitoring the Pinnacle dynamic behavior and fatigue characteristics.

SPEAKER

Mr Ahmad Abdelrazaq'
SE, MASCE, FCtbuh
Executive Vice President, 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 Inchon Tower; 360 Tower, Mumbai; UIC and Tanjong Pagar in Singapore.

During his tenure at Samsung C&T, Mr. Abdelrazaq' held several positions including the Head of High-rise & Complex Building, and Head of Building Business Development (Marketing & Sales)/Technical Proposal Division, several operational positions as Executive Project Director of the Merdeka PNB118 Project, and the "Lakhta Center".

While during his tenure at SOM as an Associate Partner, his responsibilities included the design of several complex developments, long span structures, and ultra highrise towers, that included, but not limited the structural design of Burj Khalifa, Tower Palace III (Korea), Jin Mao Tower (Shanghai), Hotel De Artes, Spain, and Millennium Park Project, Chicago.

Ahmad Abdelrazaq' earned his B.S. (1984) and M.S. (1986) in Civil Engineering from the University of Texas.

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