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Design and behavior of steel structures and members from constructability perspectives

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Nowadays the engineers still tend to optimize a structure to a minimum of weight and optimum passing stress ratios, which is only the hard criterion that is available for an engineer during the design of the structures, eventually this criterion leads to structures that are expensive and have a poor quality and complex constructability during the executions phase. For this presentation, the 20 story steel building has been taken as an example to illustrate that the selection of adequate steel members and constructible connections, which leads to have a time reduction, high quality of the structure as a whole and within the budget. ETABS 2013 software has been used to obtain the design of the systems with adequate steel section for beams, columns and bracing members from the standard set of steel sections with grade ASTM A572 Gr50 for W sections, plates and ASTM A500 Gr-50 for tubes. A three dimensional structure is taken with 5 horizontal bays of width 8 m and 20 stories with story height 4m and Atrium up to 10th floor, where the Veirenderal system has been introduced to support the floor system above 11th floor on the Atrium, further the metal deck concrete 150 mm thick with shear studs ASTM-A108 Gr 1020 dia. 19 mm @300 on floor beams are considered as a floor slab, which also acts as a diaphragm against lateral loads. Furthermore, the vertical bracings are provided only in the peripheral corner bays to limit the drift against lateral loads such as wind 100 mph and Seismic Zone-1. Limcon-V 3.63 has been used to design the connections as per AISC-360 by considering the materials ASTM-A572 Gr 50, ASTM A490 and E70XX for plates, bolts and welds respectively.

Biography

M Manikandan is the Sr. Structural Engineer at Gulf Consult, Kuwait with responsibility for designing and construction consultation of the tall buildings, colleges, shopping complexes, multi-storied car parks, hospitals, bridges and deep underground structures. Prior to joining Gulf Consult-Kuwait, he has worked as Structural Engineer at several companies, including RECAFCO-Kuwait, Saeed Hadi Al Doosary Est, Saudi Arabia, where he has completed many precast structures and treatment plants including the deep underground structures with heavy equipment. He is pursuing PhD in Risk Management in International Construction Projects as an External Part-time Researcher with Vels University Chennai, India. He received Civil Engineering Degree from Kamraj University Madurai, India in April 2000 and MBA in Project Management from Sikkim Manipal University, India in 2012.

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