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EVALUATION OF THE HIGHRISE BUILDING MODEL USING FUNDAMENTAL FREQUENCY MEASUREMENTS

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This paper proposes a potential method to evaluate degree of assumptions precision made during the finite element model construction. It is very important to precisely model the stiffness properties of the whole building in order to choose correct dimensions of the load bearing elements of the building. The finite element models of two 35 story high-rise buildings were verified with the real high-rise buildings structure using the experimental data. The two high-rise buildings' fundamental frequencies data was experimentally obtained during the different stages of the construction process. The data was compared with numerically calculated to evaluate the precision of the assumptions made during the FEM model creation process.

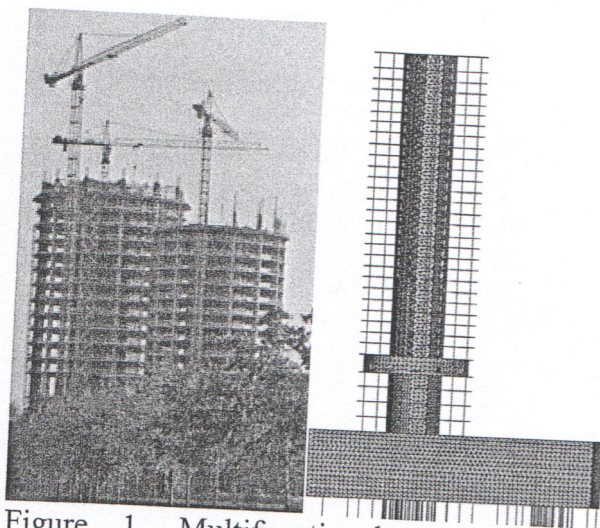


Figure 1. Multifunctional complex "Z-towers" construction process and FEM calculation model

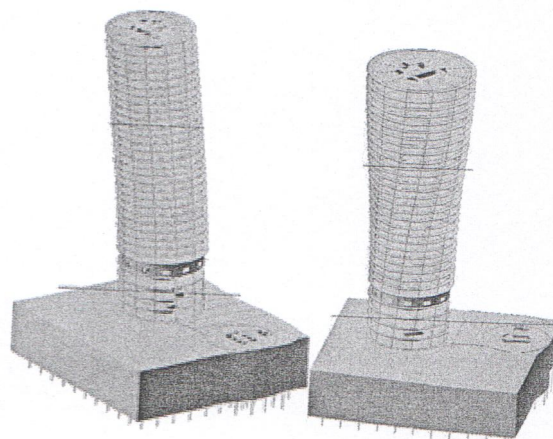


Figure 2. The FEM calculation model of the "O" tower; natural oscillations in the 1st (bending) and 3rd (torsional) modes

A simplified dynamic testing (when there is an aim to determine only the fundamental frequencies of the building) during the different stages of the load bearing structure's construction process creates the possibility to verify the existing calculation model's correspondence with the real structure's behavior. In this case if there arises a necessity the FEM model could be corrected at relatively early stage. And strengthening of the real structure can be performed before the building is finished so avoiding the extensive additional expenses. Such simplified calculation model evaluation is specifically applicable for high-rise buildings, tall towers and other similar line - like vertical structures.