

# Control Survey on the Hamra Tower First Worldwide Sculptural Building

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Applications in Geotechnical and Structural Engineering  
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## **ABSTRACT:**

Al Hamra tower is the world's tallest 'sculpted' tower and Kuwait's tallest skyscraper creating a impressive landmark that is visible throughout the city. Al Hamra Tower has over 70 floors of office space, a rooftop restaurant and a spa over 412m height. It's designed by architectural firm SOM(Skidmore, Owings and Merrill) and Turner is in charge of the tower's construction The skyscraper bring the state of art technologies such as the self-climbing formwork, high strength steel beams and concrete pumping system, the high speed elevator, and GPS positioning system etc, The state of art systems could help saving the time, the cost and well controlling the building position during the construction. Al Hamra tower has a unique geometry as a sculpture, the two huge concrete flare walls which are stretched out and inclined to the anti-clock direction from the center of the building rotation point and they are big enough to pull and twist the building during construction and after construction as well, so the question is, how the engineers could consider, the real movements which are driven by the unique geometry and the many factors during the construction, that must be the major consideration of succeed in the project. The bigger and the unique design give fabulous impression to the people but the construction side the more challenges and the efforts must be followed. So that it is necessary to be developed the systematic position control system during the construction and the efficient monitoring system in the long term period. The high rise building survey method could give the accurate position on the top of the formwork and needs to be understood the movements at the same duration of the survey to consider the real building position. Here we will discuss about Al Hamra tower's Active building surveying method that is applied with the totalstation, the GPS and dual axis tilt sensors to control the "Active bench mark" which is used in building construction and the monitoring. This system is focus on giving high accurate level of control point on the top of the self-climbing formwork system, And how to well consider the real position which is difficult to expect where is the building located during the GPS control points survey due to the unique geometry design, the wind, sun, tower crane etc, The bigger structure, the bigger movement here the author hope the engineers to get the idea how they could construct the big and tall structure in the moving condition as a case of Al hamra tower