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Monitoring of a Large Extradosed Bridge in Thailand – Lessons Learned

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ABSTRACT

To the north of Bangkok (Thailand), a new motorway section has been realized in recent years to relieve the surrounding routes in Nonthaburi Province, whose main characteristic is an extradosed bridge over the Chao Phraya river with a total length of 460 m. The building consists of two pylons with golden dome and 96 stay cables carrying a box girder cross-section designed for six lanes across the river. To monitor the structural behavior of the bridge an extensive monitoring system was awarded by the client to DYWIDAG Systems International GmbH in cooperation of Schimetta Consult who have optimized, designed and realized the system. In total 45 sensors are monitoring permanently temperatures, strains and deflections of the bridge, inclinations of the pylons, movements of the expansion joints, wind velocities, accelerations and cable forces. The data are automatically stored on site, provided via a UMTS connection to an external server within a few minutes, enabling continuous display of the signals on a homepage for easy access by the client. In addition, the measurement data are being summarized on a half-year base and the results are submitted to the clients by a measurement report. The monitoring system is continuously acquiring data since opening of the structure to regular traffic, enabling a very good insight to the structural behavior.

Keywords: Extradosed Bridge, Monitoring, Sensors, Cable Force Measurements, Deflection

1 BRIDGE MONITORING

According to the existing codes in Austria monitoring is defined as non-destructive, measurement based investigation or surveillance of civil engineering structures. The data collected can be provided for stress and resistance. Sensors are installed temporarily or permanently on the civil engineering structure. Depending on the task, different physical parameters (the so-called measurement variables) can be determined statically and/or dynamically with the sensors. A distinction is made between global and local monitoring methods [1].

In addition, 3 essential principles were consistently pursued in the implementation of a monitoring system, which are of central importance for the successful application [2]: