

Closing the Gap in High-Rise Surveying Engineering

Joel van Cranenbroeck (Belgium), Ali Afsahi (Sweden), Dan Zvinca and Hermann Stift (Austria)

Key words: Deformation measurement; Engineering survey; GNSS/GPS; Implementation of plans; Positioning

SUMMARY

Closing the Gap in High Rise Surveying Engineering

Dan Zvinca , Hermann Stift, Ali Afsahi, Joël van Cranenbroeck

Since the construction of the world's tallest building, the Burj Khalifa in Dubai, the so-called Core Wall Control Survey procedure has been deployed successfully on many other vertical engineering structures such as towers, bridge towers and pylons.

The innovation at that time was the combination of a small network of GNSS receivers and antennas collocated with 360° prisms (namely Active GNSS Control Points) to support the setup of total stations on platform top and a chain of high precision dual axis inclinometers to provide precise and reliable 3D coordinates to eventually put the formwork panels in position the first time right.

The weakness of that complex process lies at that last stage where the workers plumbing the formwork were using setout data provided by the surveyor and or handled vertical laser plummets to shut formwork panels right;

Because of lift manufacturers accuracy specifications for the lift shafts verticality and the precast façade elements, surveyors have been regularly challenged to provide ultimate precise coordinates in a dynamic environment due the various loads (wind load, sun insolation, cranes movement and placing booms) applied on such structure.

Doka, one of the world leading providers of self-climbing formworks for High Rise construction is

Closing the Gap in High-Rise Surveying Engineering (10571)

Joel van Cranenbroeck (Belgium), Ali Afsahi (Sweden), Dan Zvinca and Hermann Stift (Austria)

FIG Working Week 2020

Smart surveyors for land and water management

Amsterdam, the Netherlands, 10–14 May 2020

bridging the gap by introducing its revolutionary DokaXact solution that consists of using high precision inclinometers fixed on the formwork panels and connected in real time via a Wifi mesh network to deliver on an Android and iOS Smartphone or Tablet instructions for the site operators.

The construction of the tallest building in Scandinavia, the Karlatornet of Gotheborg, Sweden, will benefit from this invention. The merit of DokaXact is clearly to extend accurately down to the formwork elements, all the efforts delivered by the surveyors to match the challenging accuracy performances.

The other merits of DokaXact are obviously on speeding up the whole process of shutting the formworks, traceability of manual operations all along the construction and monitoring the elements as well as increasing surveying performances with the net results of reducing intervention often handled from unstable places.

With DokaXact, delivered “as a service”, Doka is leading the High Rise construction segment one step closer towards Industry 4.0. All the data can be shared eventually through a BIM system to all parties involved. The authors will introduce the solution and will share first practical results and benefits.

Closing the Gap in High-Rise Surveying Engineering (10571)

Joel van Cranenbroeck (Belgium), Ali Afsahi (Sweden), Dan Zvinca and Hermann Stift (Austria)

FIG Working Week 2020

Smart surveyors for land and water management

Amsterdam, the Netherlands, 10–14 May 2020