

**Report to the 35th General Assembly
FIG Working Week 2012 in Rome, Italy**

FIG Commission 6 – Engineering Surveys

Report of Activities 2011-2012

1. General

Commission 6's work plan for 2011-2014 consists of 4 main mission statements, namely:

- promote the knowledge, skills and abilities of surveyors in civil and industrial works within the various professional fields of engineering
- support all development and multidisciplinary expertise leading to integrated survey methods, using various instruments (geodetic, geotechnic, fast motion) and sensors and combining geometry with all other data relevant to each engineering problem
- provide a forum for exchange of knowledge related to engineering analysis of survey data for the study of structures
- in addition to the links with related WGs of IAG, ISM and ISPRS, look for possible cooperation within these organisations and support the co-operation of civil, structural and mechanical engineers with our profession

During 2011, commission 6 was active within the FIG Working Week in Marrakech, participating in 11 technical sessions, Working Group 6.1's organised Deformation Monitoring Conference in Hong Kong, and involvement, participation and support of a further 5 international meetings in Novosibirsk, Ulaanbaatar, Melbourne, Croatia and Kazakhstan. Commission 6 is sub-divided into three working groups and a fourth jointly with commission 5. Their activities have been as follows:

2. Working Groups

Working Group 6.1 – Deformation Measurements and Analysis

Chair: Prof Wolfgang Niemeier.

Policy Issues

Deformation studies in Engineering Surveying are based on a broad knowledge of suitable sensors and their potential, modern data storage and communication solutions and advanced processing and analysis methods. Additionally a thorough understanding of the behaviour of monitoring objects (large scale structure or landslide effected area), is essential to set-up and operate an optimum monitoring system. Nowadays deformation tasks are more and more oriented towards real-time systems, which require automation of data capture and new concepts in data processing, analysis and interpretation.

Activities

The main activity carried out by Working Group 6.1 was the Deformation Monitoring Conference held in Hong Kong in November 2011. This was jointly organised by the IAG

and the Hong Kong Polytechnic University. This was the third such joint meeting, although the FIG's conferences go back to the early 1970s. Over 128 people from 27 countries attended, and presented 114 oral papers, in 26 technical sessions. Papers were presented on various practical and theoretical aspects of deformation monitoring.

In addition to this, WG6.1 was involved with three technical sessions at the FIG's Working Week in Marrakech, namely:

- TS01E - Deformation Monitoring
- TS02E - Land Deformation
- TS03E - Land Deformation and SAR

Working Group 6.2 – Engineering Surveys for Construction Works and Structural Engineering

Chair: Joel van Cranenbroeck

Policy Issues

- Promoting the use of adapted survey techniques in industry & engineering;
- Promoting a multidisciplinary collaboration between survey engineers, civil engineers, structural & mechanical engineers;
- Promoting the use of adapted survey techniques in the rail and railway building and operating sector;
- Promoting the understanding of fibre optic sensors, e.g. interferometric sensors, Brillouin and Raman scattering and Bragg gratings;
- Study the use of embedded sensor arrays and the role of advanced surveying techniques for structural monitoring;
- Creating an awareness of surveyors through a task force "Fibre optic sensors" of the rapidly emerging technology of fibre optic sensors as "non-geodetic" sensors to measure deformations (strain) and temperatures in civil engineering structures
- Promoting the use of Terrestrial based RF positioning system in engineering surveying;
- Creating an awareness of surveyors through a task force "Geotechnical sensors" as the trend today is going for an integration of those sensors in the geodetic deformation analysis.
- Creating an awareness of surveyors through a task force "Railways Trolley monitoring system.

Activities

A Working Group 6.2's main activity focussed on the Working Week in Marrakech, and was involved with 5 technical sessions, namely:

- TS04E - Laser Scanners
- TS06E - Laser Scanning and Photogrammetry
- TS07E - Engineering Surveying
- TS08E - Engineering Surveying – Equipment
- TS09E - Engineering Surveying – Software

Working Group 6.3 – Machine Control and Guidance (MCG)

Chair: Prof. Dr.-Ing. Werner Stempfhuber

Policy Issues

The importance of real-time 3D-position sensors for navigation of machinery on construction sites of roads, tunnels, railways, and airports has increased over the last years and the market is still growing. Also in the field of agriculture GPS-based applications such as crop mapping and automatic steering are well introduced. The new FIG Working Group 6.5 will intensively deal with following topics:

- Kinematic Measurement and Sensor Technology (focus on L1 RTK Cost systems, adjustments of total station MCG requirements, additional Sensor like Slope Sensors, INS, Orientations Sensors, etc.),
- 3D-Applications (Agriculture, Construction, Special Applications e.g. UAVs),
- Multi-Sensor Systems and -platforms
- MCG Data Processing and Data Flow
- Control Process and Control Algorithm
- Standardization of Major Construction Projects
- The main goal of Working Group 6.3 is the interaction of research and industry activities.

3. Cooperation with other commissions and organisations

Cooperation with commissions

Various co-organised events occurred in Marrakech, and in particular there is strong collaboration with commission 5. The following sessions at the FIG Working Week in Marrakech were held:

- TS04J - Geodetic Applications in Various Situations
- TS07F - Mobile and Asset Mapping Systems
- TS09A - Alternatives and Backups to GNSS

The joint Working Group 5.5 on Ubiquitous Positioning has had a number of activities, which are highlighted in Commission 5's report. Both Commission 5 and 6 were involved in supporting the following:

- Geo-Siberia (Novosibirsk, Siberia)
- Innovative Technologies for an Efficient Geospatial Management on Earth (Ulaanbaatar, Outer Mongolia)
- Workshop on Innovative Technologies for an Efficient Geospatial Management of Earth Resources, Kazakhstan

Cooperation with sister organisations

- INGENEO 2011, organised jointly with the Faculty of Civil Engineering, Slovak University of Technology
- UAV-g, ISPRS (Zurich, Switzerland)

4. Events

2012

Three main events will be the focus of Commission 6's activities in 2012:

- 3rd International Conference on Machine Control and Guidance, Organised by the University of Stuttgart and the University of Hohenheim, Germany, and co-sponsored by the FIG, 27-29 March 2012.
- Interexpo Geo-Siberia-2012. Organised by the Siberian State Academy of Geodesy, and co-sponsored by the FIG, 17-19 April 2012.
- FIG Working Week, Rome Italy, 6-10 May 2012.

Further to this, the opportunities for Commission 6 activities in China will be investigated, taking advantage of Prof Roberts' current presence at the University of Nottingham Ningbo China.

Further information on Commission 6's activities and contacts can be found on the Commission 6 web page, and most of the conference proceedings can also be found on the FIG's web page. www.fig.net/commission6

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Chair, FIG Commission 6

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