

FIG Congress in Washington, 19-26 April 2002

**COMMISSION 6  
ENGINEERING SURVEYS  
WORK PLAN 2002 – 2006**

**1. Title**

Engineering Surveys.

**2. Terms of reference**

- Acquisition, processing and management of topometric data and of all related information throughout the life cycle of a project;
- Development and implementation of adequate survey methods in Engineering projects;
- Metrology, quality control and validation for civil construction and manufacturing of large objects;
- Deformation monitoring, analysis and interpretation;
- Prediction of deformation and movements in Engineering projects, mines and areas of geological hazard;

**3. Mission statement**

- 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 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 Working Groups of IAG, ISUM and ISPRS, look for possible connections within organisations of civil, structural and mechanical engineers and within those dealing with metrology and quality control - at the national and international level.

**4. General**

This Working Plan covers a wide scale of survey disciplines related to plants, installations and constructions of any kind. Through the Working Plan Commission 6 want to extend the Council strategy by encouraging:

- development of international standards and qualifications,
- closer links and co-operation with other FIG Commissions,
- development of best practice guides in Engineering Surveys,
- actively support and participate in FIG regional events.

## 5. Working Groups

### WG6.1 – Deformation Measurement and Analysis

#### Policy issues

- Automation of monitoring surveys.
- Enhancement of geometrical modelling of deformations from integrated deformation surveys
- Physical interpretation of deformations including numerical modelling and prediction of deformations and back analysis.

#### Chair

- Adam Chrzanowski (Canada); Vice-chair Cecilia Whitaker (USA)

#### Specific project(s)

- Regular symposia and exchanges between researchers and concerned professionals.

#### Workshop(s)

- 11th International Symposium on Deformation Measurements, Santorini, Greece, 25-28 May 2003;
- Workshop on Vibration and Cyclic Deformations, Nottingham, UK, 2004;
- 12th International Symposium on Deformation Measurements, China or France, 2005;
- Contributions to various joint meetings and FIG working weeks;

#### Publication(s)

- Proceedings of the meetings (by the host).

#### Beneficiaries

- Geodetic engineers dealing with comparative measurements of deformed or unstable objects, geologists, geophysicists, and civil and structural engineers concerned on this issue.

### WG6.2 – Engineering Surveys for Industry and Research

#### Policy issues

Engineering surveys in industry and research demand ultimate quality to be realised in ever-shorter time slots and under spatially most limited conditions. WG2's main goal is to provide the specialists involved in that kind of missions with the latest state of the art concerning:

- the use of adapted survey techniques in industry & Engineering;

- a multidisciplinary collaboration between survey engineers, civil engineers, structural & mechanical engineers, R&D scientists - for a better approach of complex Engineering survey problems;
- specific algorithms, instrumentation, equipment and techniques in Engineering Surveys;
- high precision measurements and special techniques for the large scale metrology of big equipment or structures;
- Integration of survey & alignment sensors with actuators and/or tools for on-line monitoring and control of a given process (dynamic systems);
- Relevant modules for the 'Optical 3d Measurement Techniques' series.

### Chair

Thomas Wunderlich (Germany); Vice-chair: Alojz Kopacik (Slovak).

### Specific project(s)

1. Engineering surveying procedures for power plants
2. Engineering surveying procedures for linear and circular accelerators
3. Engineering surveying procedures for nuclear research facilities
4. New techniques for as-built documentation and facility inventory
5. Industrial metrology in production, assembling and finishing processes
6. In-situ calibration of industrial robots

Within topic 4 of the list above special emphasis will be addressed on terrestrial laser scanning to stimulate quick acceptance and diversified application by surveyors. Object scanning represents a growing and promising new market, which evidently also attracts non-geodetic competitors. Urgent actions to be managed by a group of WG6.2 members cover:

- Advising optimal instrument for each special application of a mission catalogue;
- Development of suitable planning tools for extensive scanning tasks;
- Optimisation of necessary georeferencing procedures;
- Software improvements to increase variety of best-fitting objects;
- Monitoring of CAD-SW behaviour under heavy scanning data load;
- Dialogue with manufacturers to realise competent consumer wishes;
- Expansion of application fields.

### Workshop(s)

- Co-sponsoring INGEO 2002, November 11 - 13, Bratislava
- Special workshop towards the end of 2003;
- Tutorials as part of the "International Course for Engineering Surveying", March 15-19, 2004, Zürich
- Contributions to the FIG Working Weeks and to FIG Congress;
- Specific seminars or workshops on dedicated topics.

### Publication(s)

- Proceedings of the meetings (by the host).

## Beneficiaries

- Surveyors wanting to acquire more expertise in these special applications;
- Designers and manufacturers in various industrial or Engineering activities;
- Engineers dealing with quality control of large objects or structures;
- Scientific laboratories dealing with particle accelerators and detectors, fusion rings, gravitational antennas, power lasers, etc.;
- All scientists and engineers dealing with large scale metrology and accurate positioning in R&D sectors or in Industry;
- Universities and manufacturers involved in the development of special instruments.

## **WG6.3 – Engineering Survey Data Bases and Facility Management**

### Policy issues

- Focus on the role of the surveying engineer as the responsible manager of spatially referenced information;
- Support for the co-ordination of the activities of other disciplines.

### Chair

- Lothar Gründig (Germany); Vice-chair Hande Demirel (Turkey)

### Specific project(s)

- Concepts of data models for the Mapping of relevant 4D or 5D project data, covering 3D geometry, time, and descriptive attributes;
- Exchange, provision and presentation of facility management data in computer networks;
- Data integration for this subject, taking into accounts the presence of redundant data and different sources of information;
- The automation and combination of feasible data acquisition techniques.

### Workshop(s)

- Workshop on Engineering Survey Data Bases and Facility Management, Berlin, Germany, 2004 or 2005;
- Sessions and contributions to joint seminars, workshops and symposia.

### Publication(s)

- Proceedings of the meetings (by the host).

### Beneficiaries

- Surveying engineers, engineers and managers involved in facility management tasks.

## **WG6.4 – Engineering Surveys for Construction Works and Structural Engineering**

### 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 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

### Chair

- Gethin Wyn Roberts (UK); Vice-chair Jin Fengxiang (China); chair of task force: Fritz K. Brunner (Austria)

### Specific Projects

- Precise methods and equipment for staking out during construction and structural works;
- QC and documentation for as build compared to as designed;
- Precise methods and equipment for Engineering surveys for visualisation and photo match;
- Precise methods and equipment for remote surveys. (Terrestrial laser scanners etc.)
- Dynamic Monitoring of Buildings and Structures;
- Offshore construction surveys.

### Task force 'Fibre optic sensors':

- Monitoring using fibre optic sensors;
- Health monitoring of structures, including real-time and "non-geodetic" sensors in Engineering;

### Workshops

- Regular symposia and exchanges between researchers and concerned professionals;
- Possibly integrating the workshop at Nottingham under commission 6.1 with this group in 2004.
- Contributions to various joint meetings and FIG working weeks
- Contribution FIG World Congress in 2006.

### Publications

- Proceedings of the meetings (by the host).
- Web page

## Beneficiaries

- Surveying profession becoming involved in this developing technology which will partly replace current geodetic techniques;
- Surveyors wanting to acquire information about fibre optic sensors as used in "smart civil Engineering structures";
- Engineers who has to decide about the best techniques to monitor civil Engineering structures;
- Universities teaching advanced sensor technology.
- Engineering Surveyors and Engineers involved with construction and setting out will benefit, as well as structural engineers, current buildings and future building designs.

## **6. Co-operation with sister associations**

Commission 6 intends to continue co-operation with Sister Associations, especially FIG Commission 5 whose interests are quite similar to Commission 6. Further more The International Society for Mine Surveying (ISM), The International Association of Geodesy (IAG), International and the International Society for Photogrammetry and Remote Sensing (ISPRS) is of interest.

## **7. Co-operation with United Nations agencies**

Commission 6 intends to locate and establish co-operation with UN agencies of relevance.

## **8. Other Activities**

### **Communications**

Commission 6 will develop and maintain a web page with linkages to other relevant web pages to keep commission delegates, other FIG members and the public informed. The secretariat will provide the webmaster.

Commission 6 will provide an annual newsletter with input from the working groups. This will be distributed by e-mail.

### **New partnerships**

Commission 6 will try to establish a partnership with ISM and IAG Special Commission 4.

## **9. Calendar of events**

### **2002**

- FIG Congress Washington 19 - 26 April 2002.
- Co-sponsoring INGEO 2002, November 11 - 13, Bratislava

### **2003**

- 11th International Symposium on Deformation Measurements, Santorini, Greece, 25 - 28 May 2003;
- FIG Working Week 19 – 23 May 2003, Eilat, Israel.

## **2004**

- Workshop on Vibration and Cyclic Deformations, Nottingham, UK, 2004;
- FIG Working Week 23 - 28 May 2004, Athens Greece;
- Tutorials as part of the "International Course for Engineering Surveying", March 15-19, 2004, Zürich
- Workshop on Engineering Survey Data Bases and Facility Management, Berlin, Germany, 2004 or 2005.

## **2005**

- 12th International Symposium on Deformation Measurements, China or France, 2005;
- FIG Working Week 7 - 12 May 2005, Cairo, Egypt.

## **2006**

- FIG Congress Munich.

### **10. Commission officers**

Commission Chair: Svend Kold Johansen (Denmark)

WG1 Chair: Adam Chrzanowski (Canada); Vice-chair: Cecilia Whitaker (USA)

WG2 Chair: Thomas Wunderlich (Germany); Vice-chair: Alojz Kopacik (Slovak)

WG3 Chair: Lothar Gründig (Germany); Vice-chair Hande Demirel (Turkey)

WG4 Chair: Gethin Wyn Roberts (UK); Vice-chair Jin Fengxiang (China);  
Chair task force: Fritz K. Brunner (Austria)

Commission secretary: Henrik Vad Jensen (Denmark)

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Svend Kold Johansen

Vice chair of Commission 6

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