Activity of the Working Group 6E FIG in the Years 1988-1998

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Abstract

It was decided at the XVIIth FIG Congress in Sofia to create an International Working Group 6E „Laser Technique and its Application in Engineering Surveys“ within the 6th FIG committee. The aim of activity of this group was to gather information about the laser technique in surveying and to coordinate the methods of application of techniques in engineering surveying, civil engineering, machinery and mining engineering and in other related branches. Results of these activities are supposed to be presented in the publication „Laser in Engineering Surveys“ with international author's team from the members of the 6E Group. 35 colleagues and university employees from 17 European countries, Australia, Japan and Canada participated in this activity (their names will be stated on the poster). Prof. Ing. L. Cheschankov from Sofia (died in 2003) was nominated a chairman and Doc. Ing. M. Kašpar, CSc. from Prague was nominated a secretary. Working sessions took place in several towns within eight international symposiums in 1989 to 1998 and 36 papers published in anthologies dealing in the examined issue were presented. The poster will document a summary of these papers. Activity of this group was terminated within the First International INGEO 98 Conference held in Bratislava from 21.10.1998 to 23.10. 1998.

Key words: working group, laser technique, engineering surveys

1 INTRODUCTION

It was decided to create an International Working Group 6E **„Laser Technique and its Application in Engineering Surveys“**within the 6th FIG committee at the XVIIth FIG Congress in Sofia. The goal of this group’s activity was to gather information about the laser technique in surveying and to coordinate the methods of application of techniques in engineering surveying, civil engineering, machinery and mining engineering and in other related branches. Results of these activities are supposed to be presented in the publication „Laser in Engineering Surveys“with international authors‘ team from the members of the 6E Group. We organized a statewide symposium „Using the laser scanning technology in the engineering geodesy“ [1] within ČsVTS (Československá vědecko-technická společnost – Czechoslovak Science and Technology company) in 1985, where we stated significant savings achieved by using the new laser scanning technology in civil engineering, when riding pushing sets and digging shields in the underground of Prague, in mining (OKR – Ostravsko-Karvínský Revír – district of Ostrava-Karviná) and in other workplaces in metallurgy and machinery. The demand was an accelerated introduction of this progressive technology into practice and coordination of development and production of the relevant laser devices. This was also the task of the newly created international WG 6E FIG.

2 THE FIRST WG 6E MEETING

The first WG 6E meeting took place 2.-5.11.1992 in Prague, Czechoslovakia. The participants were L. Tcheschankov (Bulgaria), Chairman, M. Kašpar, Secretary (Czechoslovakia). The founding members were: J. Abelovič (Czechoslovakia), J. M. Becker (Sweden), B. J. Gorham (England), J. Pospíšil (Czechoslovakia), V. Staněk (Czechoslovakia), F. Vodopivec (Slovenia). M. Klimeš (FIG Honory Member) participated in the meeting as well.Analysis of the members countries' activities in the WG and Information about planned activities during the time period from 1992 to 1995 were discussed at the meeting. An analysis was performed on the basis of the materials sent to the WG 6E members. It results from the analysis that laser measurements are efficiently introduced in several FIG member states, but there is no sufficiently extensive material at disposal, so that these conclusions could be definitely spread for use all over the world [2]. A list of the WG 6E members was added with more precise titles and names of workplaces [3]. Czechoslovak State Gestion of Laser Technique and Mine Surveying constituted by Faculty of Civil Engineering of the Technical University – ČVUT in Prague participated in this activity in Czechoslovakia.

3 THE SECOND WG 6E MEETING

The second WG 6E meeting took place during the International symposium on" New Surveing Instruments and Technologies", which was held 22.-23.9. 1993 in Sofia, Bulgaria. The following WG members participated: L. Cheschankov, Chairman (Bulgaria), M. Kašpar, Secretary (Czech Republic). Members: B. J. Gorham (England), Gy. Graczka (Ungarn), M. Kasser (France), F. Vodopivec (Slovenia). Specialization and other activities of the working group (WG) in period from 1993 to 1995 were discussed. Attention was concentrated on expert activity in the area of the laser scanning technology in the individual member states of the FIG and on preparation of 20th FIG Congress v Melbourne, Australia,

5. - 15. 3. 1994. Gy. Graczka and L. Cheschankov joined the collective of authors within preparation of the book manuscript. B.J. Gorham [4] was elected a responsible editor. The following members presented papers at the symposium taking place at the same time: L. Cheschankov [5], B. J. Gorham [6], Gy Graczka [7], M. Kašpar, J. Pospíšil [8].

4 THE THIRD WG 6E MEETING

The third WG 6E meeting was organized as a Member Meeting and took place 29.-30.9 1994 in Miskolc, Hungary. The participants were: M. Kašpar, Secretary of the WG GE (Czech Republic) and members were J. Pospíšil (Czech Republic), Gy Graczka (Hungary), I. Havasi (Hungary), M. Kasser (France), B. Witte (Germany), A. Kopáčik (Slovakia), B. J. Gorham (England). New members of the WG 6E FIG became A. Kopáčik, I. Havasi and M. Shortis (Australia). It was decided that the chapter about the Laser Guidance of Construction Machine will be compiled by Gy. Graczka. The chapter about the Laser EDM will be prepared after consultation with the LEICA Company that agreed to publish the final version of the book [9].

Discussion about the manuscript of the planned book „Lasers in Engineering Surveys" in September 1994 in Miskolc prepared this proposal of the book:

Chapter 1: Introduction	Barry Gorham
Chapter 2: Laser Beams and their propagation through the Atmosphere	Barry Gorham
Chapter 3: Setting Out with Laser	John Uren

Chapter 4: Laser Levelling	Bertold Witte
Chapter 5: Monitoring Movement and Deformations	Milan Kašpar
Chapter 6: 3-Dimensional Position Measurement with Lasers	Jiří Pospíšil
Chapter 7: Laser Distance Meter	LEICA
Chapter 8: Laser Control of Building Machines	Gyula Graczka
Chapter 9: Hight Accuracy Techniques with Lasers	Michel Kasser
Chapter 10: Safety Aspects of working with Lasers	Barry Gorham
Chapter 11: Future Developments in Laser Applications	Michel Kasser

The following reports were presented at this international conference on Engineering Surveying: B. J. Gorham [10], M. Kasser [11], Gy Graczka [12], M. Kašpar, J. Pospíšil [13], I. Havasi [14].

5 THE FOURTH WG 6E MEETING

The fourth WG 6E meeting took place 14.-15.9.1995 in Ljubjana, **Slovenia within the 1st International Symposium on Application of Laser Technique in Geodesy and Mine Surveying**. Participation: L. Cheschankov, Chairman (Bulgaria), M. Kašpar, Secretary (Czech Republic). Members: M. Kasser (France), B. Witte (Germany), B. J. Gorham (England), F. Vodopivec (Slovenia), Gy. Graczka (Hungary), I. Havasi (Hungary) and new members: C. Marchesini (Italy), K. Schnädelbach (Germany), R.T. Todorovič (Slovenia), A. Dzierzega (Switzerland). New members were accepted at the WG 6E meeting: K. Vach (Czech Republic), G. Milev (Bulgaria) a A. Chrzanovski (Canada) [15]. Updating the plan activity of the WG 6E for period 1994-1998. Information about 62 PC Meeting FIG in Berlin 22.-26.5. 1995. Discussion concerning the progress in production of the „Lasers in Engineering Surveys“ book. The Working Group Members participated on this Symposium and presented the following papers there: M. Maurer, K. Schnädelbach [16], B. J. Gorham [17], B. Witte, W. Schauerte [18], N. Solarič et al. [19], J. Abelovič, J. Ježko [20], M. Jozwik [21], M. Kašpar [22], R. T. Todorovič et al. [23], M. Jozwik [24].

6 THE FIFTH WG 6E MEETING

The 5th WG 6E member meeting 13.11.1996 in Bulgaria during **International Symposium on Applications of Laser, GPS and GIS Technologies in Surveying.**
Participation: L. Cheschankov (Bulgaria), Chairman of the WG 6E
Others: G. Milev (Bulgaria), N. Solarič (Croatia), F. Vodopivec (Slovenia).

Information about preparation of the „Lasers in the Engineering Surveys“ book. Updating the plan of the WG 6E during the period up to 1998.Information presented at the meeting in application of laser techniques in his own countries. On this Symposium were presented these papers: B. Witte [25], F. Vodopivec [26], M. Jozwik [27], [31], N. Solaric et al [29], L. Cheschankov [29], M. Kašpar [30].

7 THE SIXTH WG 6E MEETING

The 6th WG 6E member meeting on 1 October 1997 in Zurich during the Fourth Conference on „Optical 3D Measurement Technique“ [32]. Partipication: M. Kašpar, (Czech Republic), Secretary of the WG 6E, Gy. Graczka (Hungary), F. Vodopivec (Slovenia), B. Witte (Germany), V. Slaboch (Czech Republic) as observer.

The meeting discussed the situation after the resignation of prof. B. J. Gorham as editor and compiler of the publication „Lasers in the Engineering Surveys“. The publication should be printed before the XXI FIG Congress in Brigton July 1998.

The paper of P. Hánek, M. Kašpar and V. Slaboch [33] was added within the panel discussion at the Conference in Zurich.

8 THE SEVENTH WG 6E MEETING

The 7th Member Meeting of WG 6E 22 October 1998 held in Bratislava within 1st International Conference of Engineering Surveying INGEO '98 [34]

The following members participated in the meeting: M. Kašpar (Czech Republic), Secretary of the WG 6E FIG, J. Uren (England), T. Wunderlich (Austria), J. Hardoš (Slovakia), F. Vodopivec (Slovenia), J. Santala (Finland), A. Kopáčik (Slovakia), Gy. Graczka (Hungary), V. Staněk (Slovakia), I. Havasi (Hungary). National reports of experience and problems of engineering surveying, new methods and technologies, laser measuring systems and deformation measurement were presented during INGEO '98 Conference with papers being given by A. Kopáčik [35], J. Santala [36], G. Mentes [37], J. Uren [38], J. Pospíšil [39], M. Kašpar [40], F. Vodopivec [41], N. Solarič et al [42], A. Kopáčik, V. Staněk [43], K. Vach [44].

The FIG publication „Lasers in Engineering Surveying“ failed to be released and activity of WG 6E FIG was terminated. 35 employees of colleges and universities [3] from 17 European countries, Australia, Japan and Canada participated in activities of the WG 6E FIG from 1988 to 1998.

It was recommended to create a new Task Force under the leadership of J. Uren (England) and secretary would be Gy. Graczka (Hungary). A proposal plan of activities from 1998 to 2002 was prepared.

The collective of authors M. Kašpar, J. Pospíšil, M. Štroner, T. Křemen and M. Tejkal published Czech version [45] of the Laser Scanning in Civil Engineering and Land Surveying“ book in 2003 and an English version [46] of the Laser Scanning in Civil Engineering and Land Surveying“ book in 2004 within the Czech Republic in the Vega s.r.o. Hradec Králové Publishing house. The English version of the book was extended and more concentrated on the results of the laser scanners (Fig.1).

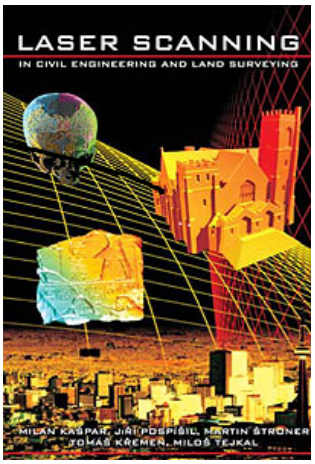

Figure 1 Front cover of „Laser Scanning in Civil Engineering and Land Surveying“ [46]

Figure 2 Univ. Prof. Dr. Ing. Bertold Witte, founding member of WG 6E FIG

REFERENCES

[1] KAŠPAR, M., POSPÍŠIL, J.: Celostátní symposium „Využití laserové techniky v inženýrské geodezii“. Jemná mechanika a optika 1986/1, s. 26-28.

[2] KAŠPAR, M.: Informace o zasedání pracovní skupiny 6E FIG v Praze v době od 2. do 5.11.1992. Geodetický a kartografický obzor 39/81, 1993, 3, s. 62-63.

[3] List of Members of the W.G. 6E FIG State of May 1996.

[4] KAŠPAR, M., POSPÍŠIL, J.: Členské zasedání pracovní skupiny 6E FIG. Geodetický a kartografický obzor 40/82, 1994, 2, s. 38-39. In: Internat. Symposium and Exhibition „New Surveying Instruments and Technologies“, Sofia, Bulgaria 21-24 September 1993.

[5] CHESCHANKOV, L.: „PALUS“ Project – New Way of Thinking. pp. 17-29.

[6] GORHAM, B. J.: Laser-Level Beam Detection. pp. 30-38.

[7] GRACZKA, Gy., HAVASI, I.: Strategy for Developing of Survey Point Systems of the Examination of Movements for Engineering Structures. pp. 68-72.

[8] KASPAR, M., POSPISIL, J.: Application of Low-Output Lasers in Industrial Surveying. pp. 77-82.

[9] KAŠPAR, M., POSPÍŠIL, J.: Členské zasedání pracovní skupiny 6E FIG. Geodetický a kartografický obzor 41/83, 1995, 1, s. 18-19.In: Internat. Working Conference on Engineering Surveying in Miskolc, Hungary on 29-30 September 1994.

[10] GORHAM, B. J.: Calibration and Testing of Laser Surveying Instruments. pp. 1-12.

[11] KASSER, M. et al: Development of an Airborne Wide Angle Laser Ranging System to Monitor Vertical Ground Deformation. pp. 13-16.

[12] GRACZKA, Gy.: Optimal Collimation of the Laser Beam. pp. 17-24.

[13] KAŠPAR, M., POSPÍŠIL, J.: Safety Work with HeNe Lasers in Surveying. pp. 25-41.

[14] HAVASI, I. Examinations of Movements in Spatial Information Environment.pp.52-59.

[15] KAŠPAR, M.: Členské zasedání pracovní skupiny 6E FIG. Geodetický a kartografický obzor 41/83, 1995, 12, s. 270-271. In: 1st International Symposium of Laser Technique in Geodesy and Mine Surveying in Ljubljana, Slovenia, on 14-15 September 1995.

[16] MAURER, W., SCHNÄDELBACH, K.: Laserinterferometry – Ten Years Experience in Calibrating Invar Leveling Staffs. pp. 1-8.

[17] GORHAM, B..: A Novel Design of Theodolite for Use with Lasers and Leds.pp.17-24.

[18] WITTE, B., SCHAUERTE, W.: Instrumental Errors of Relating Laser Levels demonstrated by the New Theis Tal S. pp. 25-36.

[19] SOLARIČ, N., et al: Semi-automatic Determination of the Cross-section in Tunnels by means of the Hand-held Laser Meter „LEICA-DISTO“. pp. 53-60.

[20] ABELOVIČ, J., JEŽKO, J.: Metrological System of the Distance in Land Surveying. pp. 68-81.

[21] JOZWIK, M.: Video Detection of Laser Beam Centre and Possibilities of its Application in Surveying. pp. 82-87.

[22] KAŠPAR, M.: Modern Laser Techniques for Aligning of Pipelines and Shield Control of Pipe-jacking Sets. pp. 88-96.

[23] TODOROVIČ, R. T., ŠKARJA, B., MAVEC, M.: Some Aspects of the Laser Beam Use for Geometrical Control in Coal Mining Technology. pp. 97-104.

[24] JOZWIK, M.: Application of Lasers in Mine Surveying – Economic Aspects. pp. 105-109. **In:** Internat. Symposium „Applications of Laser, GPS and GIS Technologies in Geodesy“. 13-14 November 1996, Sofia, Bulgaria.

[25] WITTE, B.: Achieving Geodetic Accuracy using Trimble–GPS-Receivers in Real-Time-Results of Test Measurements.

[26] VODOPIVEC, F., KOGOJ, D.: GPS Measurements Scale Determination for Geodetic Needs in Engineering Survey. pp. 86-93.

[25] JOZWIK, M.: Laser Surveying Instruments-Types and Applications Classification.p. 111.

[28] SOLARIČ, N., et al: Precision of Laser Distance Meter in Electronic Precision Total Station LEICA TC 2002. pp. 112-118.

[29] CHESCHANKOV, L.: Laser Grundoscop LGR-50. pp. 119-128.

[30] KAŠPAR, M.: Some Possibilities of Laser Technique Application in Building Industry. pp. 129-133.

[31] JOZWIK, M.: Application of Laser Meter DISTO in Mining Surveying. p. 134.

[32] KAŠPAR, M.: Poznatky z mezinárodní konference v Zűrichu. Stavební informace **4**, 1997, 12, s. 15-16. **In:** Fourth Conference Optical 3D Measurement Techniques. Zűrich 29 September – 2 October 1997.

[33] HÁNEK, P., KAŠPAR, M., SLABOCH, V.: 3D Precision Crane Surveys by Total Stations. pp. 68-75.

[34] KAŠPAR, M.: První mezinárodní konference inženýrské geodezie INGEO '98 v Bratislavě 21.-23.10.1998. Stavební informace **5,** 1998, 12, s. 17-19. **In:** Proceedings of the 1st International Conference of Engineering Surveying. INGEO '98, Bratislava 21-23 October 1998.

[35] KOPÁČIK, A.: The Use of Inertial Measurment Systems in Geodesy. pp. 21-26.

[36] SANTALA, J.: On Determination of the Accuracy of the Mekometer ME 500 at the Normal Baseline Measured with the Väsiälä Interference Comparator. pp. 33-36.

[37] MENTES, G.: Calibration of CCD-Sensors Used for Deformation Measurement. pp.37-42.

[38] UREN, J.: Recent Developments in Laser Instrumentation for Engineering Surveyors. pp. 103-108.

[39] POSPÍŠIL, J.: Position Stability of the He-Ne Laser Beam. pp. 109-112.

[40] KAŠPAR, M.: Laser Instruments for Control of Building Machines. pp. 113-116.

[41] VODOPIVEC, F., KOGOJ, D.: The Use of Impulse Distancemeter for Determination of High Buildings. pp. 159-164.

[42] SOLARIC, N., SOLARIC, M., SPOLJARIC, D.: Automated Method of Determining the Deformations on Construction Objects under Test Loads. pp. 197-206.

[43] KOPÁČIK, A., Staněk, V.: Surveying Activities Connected with Construction of Highway Tunnels. pp. 213-218.

[44] VACH, K.: Multi-image Close-range Photogrammetry in Choise of Tasks in the Field of Engineering Geodesy. pp. 269-.

[45] KAŠPAR, M., POSPÍŠIL, J., ŠTRONER, M., KŘEMEN, T., TEJKAL, M.: Laserové skenovací systémy ve stavebnictví. Vyd. Vega spol. s r.o. Hradec Králové, 2003, 111 str. ISBN 80-900860-3-9.

[46] KAŠPAR, M., POSPÍŠIL, J., ŠTRONER, M., KŘEMEN, T., TEJKAL, M.: Laser Scanning in Civil Engineering and Land Surveying. Editorship Vega spol. s r.o. Hradec Králové, 2004, p. 110, ISBN 80-900860-1-7.