

Co-funded by the Erasmus+ Programme of the European Union MODERNIZING GEODESY EDUCATION IN WESTERN BALKAN WITH FOCUS ON COMPETENCES AND LEARNING OUTCOMES - GEOWEB

INSTITUTIONAL FRAMEWORK FOR OPERATION OF ENGINEERING GEODESY IN THE REPUBLIC OF SERBIA – PROBLEMS, CHALLENGES AND PERSPECTIVES

Institucioni okvir delovanja Inženjerske geodezije u Republici Srbiji savremeni problemi, izazovi i perspektive

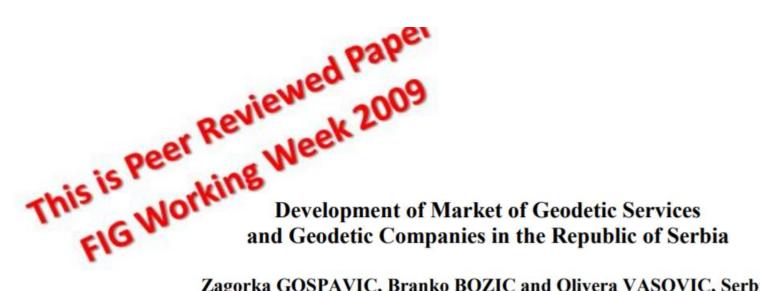
> Branko Bozic, Zagorka Gospavic, Marko Pejic, Milutin Pejovic Mostar, 17.10. – 21.10.2017

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- About Engineering Geodesy as a discipline meaning, history,...
- Chamber of Engineers organization, membership, type of licenses
- RGA Geodetic company and Personal Licensing
- The future of EG

TS 3E – Needs of Changing Society – New Skills, Competences in Surveying

https://www.fig.net/resources/proceedings/fig_proceedings/fig2009/papers/ts03e/ts0 3e gospavic bozic vasovic 3195.pdf



Zagorka GOSPAVIC, Branko BOZIC and Olivera VASOVIC, Serbia

TS 3E – Needs of Changing Society – New Skills, Competences in Surveying Zagorka Gospavic, Branko Bozic and Olivera Vasovic Development of Market of Geodetic Services and Geodetic Companies in the Republic of Serbia FIG Working Week 2009 Surveyors Key Role in Accelerated Development Eilat, Israel, 3-8 May 2009

Vermessung & Geoinformation 1/2009, p. 144 – 149

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Scope of Competences of Future Serbian Surveyors Educated under the New Master Study Program in Land Law and Economy

Branko Bozic, Zagorka Gospavic, Serbia

Keywords: Faculty of Civil Engineering, surveying education, master programme

https://geo.tuwien.ac.at/fileadmin/editors/VGI/VGI_200923_Bozic.pdf

TS 3 – Engineering Geodesy for Construction Works, Industry and Research

TS 3 - Engineering Geodesy for Construction Works, Industry and Research

Institutional Framework for Operation of Engineering Geodesy in the Republic of Serbia – Problems, Challenges and Perspectives

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http://www.geof.unizg.hr/pluginfile.php/7437/mod_book/chapter/173/TS3_1.pdf

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Geodetic Education and Practice in the Republic of Serbia – Past and Present

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http://geonauka.sgs.org.rs/articles/201506.pdf

Employment opportunities for geodetic professional

Public sector entities

• Private sector entities

RGA, Government institution, State owned companies with various engineering departments, municipal urbanism departments

Private surveying companies, Distributors of surveying equipment and companies where surveying is a secondary activity. In 2002 there were 92 private geodetic enterprises with 500 employees. In 2008 this number increased to 631, and the number of employees to 2000.

According to some estimations, the number of geodetic professionals is about 4500.

Engineering Geodesy - Definition and Core Competencies /Heiner KUHLMANN, Volker SCHWIEGER, Wolfgang NIEMEIER, Germany And Andreas WIESER, Switzerland

- "Technical measurements, which are necessary in connection with planning, execution, approval and later surveillance of buildings." [FIG, 1971]
- "... all those measurement activities belong to engineering geodesy, which have to be conducted in connection with technical planning, setting-out and monitoring of technical objects. " "...It [engineering geodesy] is the practical utilization of the entire realm of geodesy under the complicating conditions of turbulent practice when realizing technical projects."[Rinner, 1971; Rinner, 1978]
- "Surveying in connection with planning, construction, approval and monitoring of buildings and other objects [FIG, 1997]
- "Engineering geodesy is the production of geodetic information necessary for the planning of technical projects, setting out of the project design, control of the correct construction, and monitoring of deformations."[Brunner, 2007]
- "Survey in connection with the site surveying, project planning, setting out, acceptance and monitoring of structures and other objects." Note: The term "engineering survey", as a synonym for engineering geodesy, covers the spectrum of surveying tasks associated with technical projects of other trades and disciplines (e.g. building construction) [DIN 18710-1, 2012]

What is the EG and how many GP work in that field

- EG survey (site surveying or production of the geodetic information) necessary for the planning, setting out, control and deformation monitoring of engineering structures
- About 45 % of all geodetic professionals work in the field of the engineering geodesy

Three characteristic EG periods

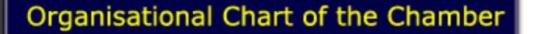
- The second half of 20th century up to the dismemberment of Yugoslavia in 1991/92
- From 1991 to the end of 2000
- The beginning of 21st century up to the present time

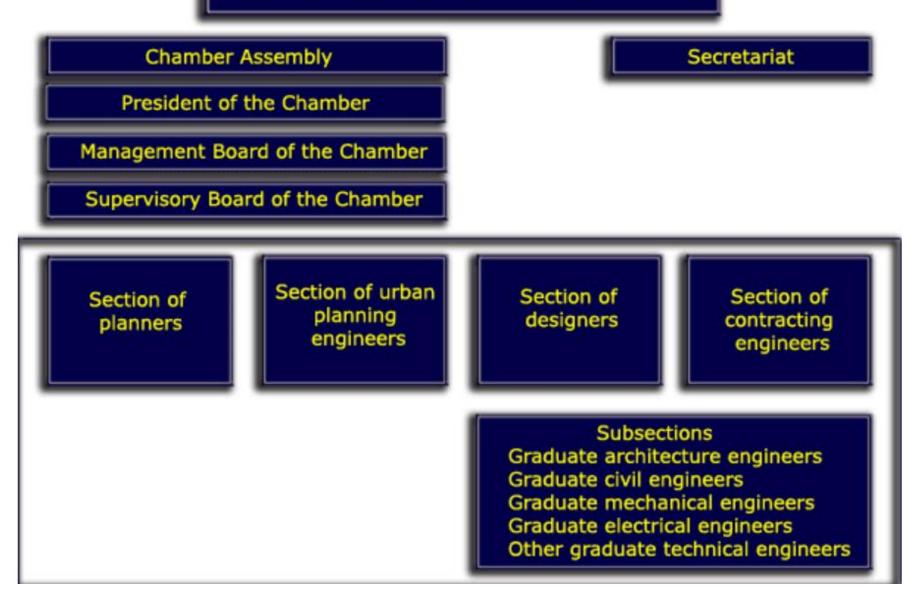
Numerus works locally and abroad, big companies, good staff

War period, UN embargo, educated and experienced staff got abroad, significant economic problems, No market

Economic transition, Small companies, Insufficient solvency, difficulties to meet bidding condition, big foreign companies, home companies sub-contractors

Chamber of Engineers





The members of the Chamber

- The university graduate engineers of architecture, civil engineering, mechanical engineering, electricals, transport and other technical engineers, as well as
- The university graduate space planners,

who hold the license issued by the Chamber

To qualify for a licence in CE

- Person must have a university or postsecondary higher degree
- Passed professional examination
- Minimum 3 years of work experience for the designers and contracting engineers, or
- Minimum 5 years for the planners, urban planning engineers and those with the postsecondary degree

The Chamber issues the licences for

- Responsible planners
- Responsible urban planning engineers
- Responsible designers
- Responsible contracting engineers

Post-secondary higher degree - only contractors, more than 1700 members

- Architecture
- Civil engineering
- Mechanical engineering
- Electrical engineering
- Other graduate technical engineers

Types licenses for geodesy in CE

- Responsible designers of geodetic projects -445 active licenses (382)
- Responsible contractors of geodetic projects -304 active licenses (471)
- Responsible contractors of geodetic projects in the field of low- and high-rise development – 2 active licenses (771 spec.study) and 20 (871)

General conditions for getting the license in CE

- Graduated engineer of geodesy or Master for license 372 and 471
- Three or four years of undergraduate studies for licenses 771 (spec.) or 871
- Given professional experience
- List of references
- Professional exam

License description

- Geodetic Network Project
- Maps Project
- Expropriation Projects
- Setting Out Projects
- Geodetic Monitoring Projects
- Geometry Control Projects
- Projects of Special Purposes (urban, bathymetry,...)
- Projects of geodetic work in:
 - Reference networks
 - State survey and cadaster
 - Topography survey
 - Land Consolidation
 - Information systems
 - Metrology
 - Cartography



Rulebooks of particular importance for regulating the geodetic works in engineering-technical fields

- The Rulebook on content, methods, conditions, supervision and control of geodetic works performance in engineeringtechnical fields ("Official Gazette RS", number 20/2002)
- The Rulebook on technical norms, methods of work for technical documentation production and control of technical documentation for geodetic works performance in engineering-technical fields ("Official Gazette RS", number 20/2002)
- The Rulebook on terms and conditions for granting authorization for geodetic works performance and designing in engineering-technical fields ("Official Gazette RS", number 20/2002)
- The Decree on technical documentations for geodetic works performance and granting authorization for geodetic works performance ("Official Gazette RS", number 20/2002)

The Republic Geodetic Authority – The Impact on Engineering Geodesy

- Issuing and revoking the license for operation of surveying companies
- Issuing and revoking the geodetic license for the surveyor



Geodetic Company

- GC legal entity or entrepreneurs who are registered with the competent authority for execution of geodetic works and who meet legal requirements
- APR does not recognize the surveying as separate activity, but under codes for "other professional, scientific and technical activities" (code 7490) and "engineering activities and related technical consultancy '(code 7112)
- Geodetic organization may be outside or in the system of value added tax (VAT)
- In addition to income tax and possibly VAT, the GC pays the contribution for: 1) pension and disability insurance, 2) health insurance, 3 unemployment insurance and 4) income tax for each employee

RGA - The license for geodetic companies

- Organization has to be registered
- Employed prescribed number of geodetic professionals with the appropriate geodetic licenses
- Appropriate working places and the equipment
- Geodetic licenses issued to a surveyor are categorized as 1st and 2nd order licenses

RGA - The license for surveying companies

- 560 surveying companies are licensed
- The 1st order licenses have 470 geodetic surveyors,
- The 2nd order licenses have with 608 surveyors

RGA – Data about geodetic enterprises

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AR GRADNJA	БЕОГРАД	Email:			
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EVROGEOMATIKA	БЕОГРАД	Југослав	Бељин	1;2;3;4;5;6 🔯 🌄	
FALCON SURVEY DOO	БЕОГРАД			3;4;5;6 🔯 🌄	
GAUSINŽENJERING	БЕОГРАД	Panochan	Јевремовић	1;2;3;4;5;6 🔯 🌄	

The license description

- Technical documentation and supervision of geodetic work for which the main project was required
- The execution of geodetic work for which the main project was required
- The Real Estate Cadaster
- Engineering Geodesy

Engineering Geodesy trends (Heiner Kuhlmann, Volker Schwieger (Germany), Andreas Wieser (Switzerland) and Wolfgang Niemeier (Germany)

- The object to be mapped or monitored is now often not represented by a few carefully chosen individual points but by a **point-cloud created by a laser scanner** or derived from **registered images of digital cameras**. The relevant object information is not extracted during the measurement but afterwards during **data processing**
- An increasingly close link is given with photogrammetry, regarding image processing, object extraction, or orientation and positioning algorithms, e.g. laser scanning registrations. Also the newest total stations and scanners or particular add-on systems of laser trackers, like probes and hand scanners include essentially photogrammetric concepts and solutions
- Often, the measurement system is not static anymore but moves along the measured object. This also holds for setting-out, when the planned geometry is transferred to the reality directly through a guided or controlled machine without marked waypoints

We expect that "engineering geodesy – continuous in space and time" [Kuhlmann, 2004] will further develop and change in the future, providing innovative and exciting developments

Conclusion – New definition of EG

 Engineering geodesy is the discipline of reality capture, setting-out and monitoring of local and regional geometry-related phenomena paying particular attention to quality assessment, sensor systems and reference frames

http://osgl.grf.bg.ac.rs/survey/accounts/login/