FACULTY OF CIVIL ENGINEERING

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RESEARCH CENTRE FOR MECHANICS OF MATERIALS AND STRUCTURES SAFETY – *CEMSIG*

GENERAL PRESENTATION

CEMSIG research centre was founded in 1999, and was accredited in 2001 by National University Research Council (CNCSIS) as Centre of Excellence. Significant achievements in pas years included participation to the IC15-CT96-0201/1997 European project COPERNICUS "RECOS" - "Reliability of Moment Resistant Connections of Steel Building Frames in Seismic Areas", and the World Banc/CNCSIS project C16 "Reliability of Buildings Located in Strong Seismic Areas in Romania". Currently, the FP6 project "Earthquake protection of historical buildings by reversible mixed technologies", CEEX MATNANTECH "Structural systems and advanced technologies for structures from high-performance steels for buildings located in high-seismicity areas - STOPRISC" and EUREKA "SEFIE" projects are underway. The master course "New technologies and structures for construction" is closely connected to the CEMSIG research centre. Members of the research centre are actively involved in teaching and tutoring of master student research.

OBJECTIVES

CEMSIG research centre pursues development of the structure, competence and acting capability necessary to promote new technologies, research services, expertise, technical assistance and training of qualified specialists in the field of materials used in engineering structures, especially from the point of view of their mechanical characteristics that affect structural response and safety under static and dynamic loading. Research competence and capabilities are to be strengthened through national and international partnership, especially through cooperation with universities in the frame of European Union Programmes. CEMSIG offers research services and technology transfer for industry partners, and aims to support doctoral and master activities by integrating them into research activities and providing the necessary financial and material support.

MAIN RESEARCH FIELDS

- ***Performance of steel, timber and composite steel-concrete structures and characterisation of their response under exceptional actions***

Keywords: steel, composite, structural systems, seismic, performance-based design, moment-resisting frames, eccentrically braced frames, connections, ductile materials, high-performance steel

- ***Light gauge steel structures***

keywords: thin-walled cold-formed elements, stability, shear walls, numerical simulations, connections, lightweight pitched roof portal frames

Researches in *PERFORMANCE OF STEEL, TIMBER AND COMPOSITE STEEL-CONCRETE STRUCTURES AND CHARACTERISATION OF THEIR RESPONSE UNDER EXCEPTIONAL ACTIONS*

FIELD DESCRIPTION

Performance of steel and composite steel-concrete structures is regarded in terms of strength, stiffness, and ductility at global and local levels, including material behaviour. Exceptional actions refer to earthquakes and fire. Earthquake resistant design of structures improves continuously as a result of experimental and analytical research, as well as experience and observations gained after new earthquakes. One of the latest trends in seismic design of structures is the Performance-Based Design, which requires assurance of a set of controlled performance levels under a corresponding set of earthquake intensities. Performance-Based Design aims at reducing both structural and non-structural damage under multiple performance objectives. Strengthening of historical buildings in seismic areas using reversible mixed technologies, mainly based on metal devices is a new research area addressed by the CEMSIG team. Analytical and experimental investigations on high-performance steel for use in earthquake-resistant structures are underway.

ACTIVITIES

- Use of high-performance steel for earthquake-resistant multistorey steel structures.
- Strengthening of existing masonry and reinforced concrete buildings with steel-based reversible mixed technologies.
- Fire resistance of steel and composite steel-concrete structures.
- Drafting of Romanian versions of structural Eurocodes for Steel Structures: EN1993-1.8 (Design of joints), EN1993-1.2 (Fire design). Collaboration to drafting of EN1993-1.1, EN1993-1.9, EN1993-1.10.

- Influence of local site conditions in the city of Timisoara on the seismic response of building structures.
- Numerical and experimental study on the connecting systems between steel and concrete for buildings with composite structure in seismic areas

RESEARCH TEAM

- prof. Dan Dubina, PhD (Steel and composite steel-concrete structures and characterisation of their response under exceptional actions)
- prof. Daniel Grecea, PhD (Performance-Based Design, beam-column joints in moment-resisting frames, rehabilitation of existing buildings)
- prof. Alexandru Botici, PhD (Structural analysis, strengthening techniques for existing buildings)
- sen.lect. Mirela Achim, PhD (Structural analysis, timber and composite structures)
- sen.lect. Florea Dinu, PhD (Performance-Based Design, High-Performance Steel)
- sen.lect. Aurel Stratan, PhD (Earthquake-resistant steel structures, dual structures, eccentrically braced frames)
- sen.lect. Adrian Ciutina, PhD (Steel and composite structures)
- sen.lect. Raul Zaharia, PhD (Fire design, High-Performance Steel)
- sen.lect. Ludovic Fulop, PhD (Steel and timber shear walls)
- PhD student Adrian Dogariu (Strengthening of masonry and reinforced concrete structures with steel materials)
- PhD student Radu Heput (Rotation capacity of beam-column joints)
- PhD student Sorin Bordea (Strengthening of masonry and reinforced concrete structures with steel materials)

RESEARCH OFFERS

- Monotonic and cyclic testing of materials and structural subassemblies
- Advanced static and dynamic analysis of structural systems
- Consulting and design
- Technical expertise for seismic strengthening of existing building structures

RESULTS

RESEARCH PROJECTS

1. FP6 INCO-CT-2004-509119 / 2004-2006 *Earthquake protection of historical buildings by reversible mixed technologies*, Financing authority / Beneficiary: European Union, Value: 186,500 EUR
2. 29/10.10.2005, CEEX MATNANTECH *Structural systems and advanced technologies for structures from high- performance steels for buildings located in high-seismicity areas - STOPRISC*, Financing authority: Ministry of Research and Education, Value: 1,369,400 RON
3. 3153 / 13.10.2005 CEEX-ET, *Numerical and experimental study on the connecting systems between steel and concrete for buildings with composite structure in seismic areas*, Financing authority: Ministry of Research and Education, Value: 120,000 RON
4. EUREKA E3034 - SEFIE-RO, 30.07.2004 *Steelbiz as an E-forum for the implementation of the eurocodes for steel construction*, Financing authority / Beneficiary: European Union, Value: 6,000 RON (total value: Eureka + private funds 443,500 RON)
5. 0514/12.10.2004-2005, Collaboration to the *Documentation Regarding the Local Seismic Hazard Zoning in Timisoara City and its Metropolitan Area – Special Drillings and Specific Interpretation Data*, Beneficiary: INCERC Timisoara, Value: 6,700 RON
6. 25 / 2004-2005 *Technical expertise, consolidation and rehabilitation project for the Korogny Palace in Caransebes*, Financing authority/Beneficiary: Caransebes City Hall. Value: 8,500 EUR
7. 245 / 2005 *Structural analysis of existing buildings in view of their rehabilitation: I. Buteanu school*, Value: 15,240 RON
8. 246 / 2005 *Structural analysis of existing buildings in view of their rehabilitation: Minis school*, Value: 12,240 RON
9. 290 / 30.06.2005 *Collaboration to rehabilitation of the steel frame mechanical-welding shop and TS annex. Technical expertise*, Beneficiary: INCERC Timisoara, Value: 32,400 RON
10. 1080 / 01.06.2005 *Elaboration of national standards 2005*, Beneficiary: Romanian Standards Association - ASRO, Value: 11,340 RON
11. 3853 / 12.04.2005, Theme 12, code 167, *Strengthening and rehabilitation of buildings in seismic zones by structural solutions based on steel use*, Financing authority: Ministry of Research and Education, Value: 31,200 RON

BOOKS PUBLISHED

1. J.M. Franssen, R. Zaharia, 2005 *Design of Steel Structures subjected to fire - Background and Design Guide to Eurocode 3 Part 1.2*, Les Editions de l'Universite de Liege, ISBN 2-930322-99-3, 184 pages

PUBLISHED PAPERS

1. Ciutina, A., Stratan, A., Dubina, D., *Strength, stiffness and ductility of column web panel under monotonic and cyclic loading*, Proceedings of the 4th European Conference on Steel and Composite Structures - Eurosteel 2005, Maastricht, the Netherlands, June 8-10, 2005, Volume C, Part. 5.2, ISBN 3-86130-812-6, pp. 155-163
2. Botici, A., Botici, A.A., Let, T., *Consolidation of handcrafted metallic constructions*, National technical-scientific conference "Modern technologies for the 3rd millennium" Baile-Felix, Oradea, October 21-22, 2005, Volume VIII, ISSN 1454-4067, pp. 285-294
3. Dinu, F., Dubina, D., Grecea, D., *Partial q-factor values for performance based design of MR frames*, Final Scientific Report, Cost C12 Action "Improvement of Buildings Structural Quality by New Technologies", A.A.Balkema Publishers, Leiden, the Netherlands, ISBN 04-1536-6100-0, 2005, pp. 105-110
4. Dinu, F., Dubina, D., Grecea, D., Stratan, A., *Performance based design of steel frames*, Cost C12 Final Conference Proceedings, A.A.Balkema Publishers, Leiden, the Netherlands, ISBN 04-1536-609-7, Ed. C. Schaur et al, 20-22 January 2005, Innsbruck, Austria, pp. 291-301
5. Dinu, F., Dubina, D., Stratan, A., *Welded joints: effect of detailing and strain rate*, Final Scientific Report, Cost C12 Action "Improvement of Buildings Structural Quality by New Technologies", A.A.Balkema Publishers, Leiden, the Netherlands, ISBN 04-1536-6100-0, 2005, pp. 313-318
6. Dinu, F., Dubina, D., Stratan, A., *Performance Criteria for Seimic Design of Steel Frames with Eccentric Bracings*, Proceedings of the 4th European Conference on Steel and Composite Structures - Eurosteel 2005, Maastricht, the Netherlands, June 8-10, 2005, Volume C, Part. 5.2, pp. 65-73
7. Dubina, D., *Factors influencing the cyclic capacity of steel moment-resisting frames*, Proceedings of the 4th International Conference on Advances in Steel Structures – ICASS'05. Shanghai, China, 13-15 June 2005, Volume 1, Elsevier, London, 2005, Eds. Z.Y Shen, G.Q. Li, S.L. Chan, pp. 755-766
8. Dubina, D., Dinu, D., Dima, Ghe., Olaru, V., *Commercial complex Bricostore - Orhidea Bucharest* (in Romanian), AICPS Bulletin, Nr. 1/2005-2/2005, pp. 31-39
9. Dubina, D., Grecea, D., Dinu, F., Stratan, A., Ciutina, A., Dogariu, A., *Performance based design of steel frames*, Sesiunea Ştiinţifică Festivă prilejuită de împlinirea a 60 ani de către Dl. Prof. Dr. Ing. Radu Băncilă, pp. 137-154
10. Dubina, D., Marin, M., Ungureanu, V., Dogariu, A., *Masts of the light equipment of the „Dan Păltinişanu" stadium in Timisoara*, (in Romanian), AICPS Bulletin, Nr. 1/2005-2/2005, pp. 62-73
11. Dubina, D., Stratan, A., Ciutina, A., *Components and macrocomponents of rotation capacity of moment conections*, Proceedings of XX Congresso C.T.A. "Advances in Steel Constructions", 26-28 September 2005, Ischia, Italy, Ed. ACS ACAI Servizi, Milano, 2005, pp. 409-418
12. Grecea, D., Dubina, D., *Ductility of steel joints* (in Romanian), Aniversare INCERC Filiala Timişoara - 50 de ani de activitate, 28 October 2005, Ed. Marineasa, Timisoara, pp. 109-124
13. Let, T., Botici, A., Bejenaru, V., *Strength and stability analysis of an U.H.F. antennae mast*, National technical-scientific conference "Modern technologies for the 3rd millennium" Baile-Felix, Oradea, October 21-22, 2005, Volume VIII, pp. 278-284
14. Mateescu, D., Dubina, D., Dogariu A., *The influence of design procedure and structural details on structural safety of a multistorey steel eccentrically braced frame building located in high seismic risk area*, "Preocupari actuale in constructii metalice si sudura", Orizonturi Universitare Publishing House, Timisoara, 2005, pp. 11-19
15. Fajfar, P., Dolšek, M., Marušić, D., Stratan, A., *Pre- and post-test mathematical modelling of the SPEAR building*, In: Fardis, M.N. (ed.), Negro, P. (ed.). SPEAR (Sesmic Performance Assessment and Rehabilitation of Existing Buildings) International Workshop: an event to honour the memory of Prof. Jean Donea, Ispra, 4-5 April 2005, Proceedings, (Report EUR, 21768 EN), Ispra, Italy: Joint Research Centre, 2005, pp. 173-188
16. Stratan, A., Dubina, D., *Eccentrically braced dual steel frames with removable link*, Final Scientific Report, Cost C12 Action "Improvement of Buildings Structural Quality by New Technologies", A.A.Balkema Publishers, Leiden, the Netherlands, ISBN 04-1536-6100-0, 2005, pp. 111-116

ONGOING PhD THESES

- Adrian Dogariu: *Solutions for consolidation and rehabilitation of masonry and reinforced concrete buildings placed in seismic areas using metallic materials*, PhD supervisor Prof. Dan Dubina

- Radu Hepuț: *Plastic rotation capacity of MRF connections, loaded monotonically and cyclically, located in seismic areas*, PhD supervisor Prof. Dan Dubina
- Sorin Bordea: *Dual frame systems with buckling-restrained braces*, PhD supervisor Prof. Dan Dubina
- Mihai Muțiu: *Structural configurations, functional and technical-economical parameters of steel-framed buildings*, PhD supervisor Prof. Dan Dubina
- Anca Baciu: *Imperfections in steel structures, their measurement, codification and modelling for structural analysis*, PhD supervisor Prof. Dan Dubina

OTHER RESULTS

- Organisation of the second international workshop "L'acier dans la construction moderne", Timisoara, October 13-15, 2005
- Organisation of the colloquium "Timisoara Academic Days", IX edition, May 26-27, 2005

FURTHER DEVELOPMENTS

- Performance-based design of braced frames
- Dissipative systems for strengthening of masonry and reinforced concrete buildings with metallic systems
- Development of analytical procedures for prediction of rotation capacity beam-column joints in moment-resisting frames
- Earthquake performance of steel structures realised from high-performance steel

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EXEMPLES

1. Fire design of an administrative building using reinforced concrete filled CHS columns

For the administrative building MEDIPLUS, Bucharest, the fire resistance of the composite circular columns was analysed by means of both simplified and advanced methods provided in Eurocode 4 part 1.2.

The simplified method was able to demonstrate a fire resistance of only 1 hour. Thus, the advanced method using SAFIR computer program was considered, in order to determine the fire resistance limit of the columns. In the first step, the temperature distribution inside the composite column was determined (Figure 1).

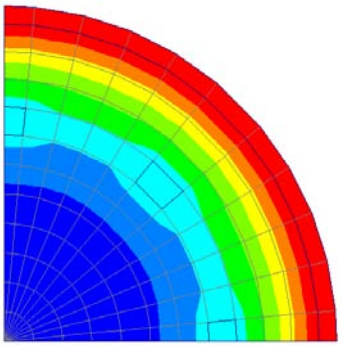

Fig. 1 Temperature distribution on cross-section (120 min)

In the second step, the column is loaded with the axial force and bending moment corresponding to the fire situation. The response of the column (time - displacement at mid-height of the column), under static and thermal loading is shown in Figure 2. The column demonstrated a maximum fire resistance of 122 minutes.

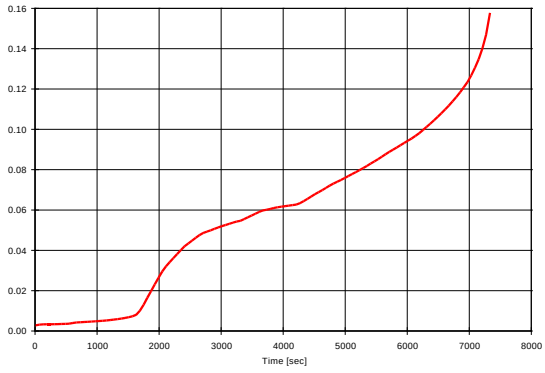

Fig. 2 Time - displacement characteristic

Researches in *LIGHT GAUGE STEEL STRUCTURES*

FIELD DESCRIPTION

Light-gauge steel profiles are class 3 and 4 welded sections and cold-formed members and sheeting. Beside the classical structural problems characterising hot-rolled profiles, light-gauge steel sections are prone to local instability phenomena, involving reduction in section strength, poor post-elastic capacity and ductility, and high sensivity to geometrical imperfections. However, these materials have important technical and economical advantages, and the sector of light-gauge steel structures is one of the most dynamic in the field. In order to promote these light-gauge steel structures, instability problems and connecting technology and performance have to be carefully managed. These problems are even more important in case of structures located in seismic areas, as Romania.

The research activity on light-gauge profiles is focused in three main directions: (1) buckling of members under compression and/or bending; (2) performances of structures made of light-gauge profiles under earthquake loading and (3) the promotion of new structural solutions where the advantages of light-gauge profiles can be fully exploited.

ACTIVITIES

- Seismic performance of pitched-roof portal frames with elements of class 3 and 4 cross-sections.
- Full-scale tests on pitched-roof portal frames with cold-formed built-up members
- In-situ experimental modal analysis of steel framed residential buildings (in collaboration with Technical University of Civil Engineering of Bucharest)
- FE modelling of the buckling phenomenon for compression and bending members
- FE investigations on the seismic performance of light-gauge steel houses
- Evaluation of post-elastic strength and ductility of cold-formed steel members and joints.

RESEARCH TEAM

- prof. Dan Dubina, PhD (Light gauge steel structures)
- assoc.prof. Mircea Georgescu, PhD (Stability of cold-formed steel members)
- sen.lect. Ludovic Fülöp, PhD (Steel framed houses)
- sen.lect. Daniel-Viorel Ungureanu, PhD (Buckling of thin-walled cold-formed members)
- sen.lect. Raul Zaharia, PhD (Connections in cold-formed steel structures)
- assist. Ionel-Mircea Cristutiu (Lightweight steel portal frames)
- PhD. student. Daniel Ticle (Post-elastic capacity of Z purlins with overlapped joints)
- PhD. student. Bogdan Neagoie (Built-up cold-formed steel beams with corrugated web)
- PhD. student. Agnes Ruff (Behaviour of thin walled overlapped purlins, Shear walls from cold-formed steel cassettes)
- resc. Nicolae Muntean (Post-elastic capacity of Z purlins with overlapped joints)

RESEARCH OFFERS

- Advanced stability and nonlinear static and dynamic analysis of thin-walled steel members and structures
- Buckling and material testing
- Testing of structural subassemblies and connections

RESULTS

RESEARCH PROJECTS

1. Contract no. 3853/12.04.2005 type A, theme 11, CNCSIS code 164, *Experimental study of light-gauge steel portal frames for civil and industrial buildings located in seismic areas*, Financing authority / Beneficiary: CNCSIS. Value: 39,000 RON
2. Contract no. 27688/14.03.2005 Td, theme 1, CNCSIS code 155, *Component method for determination of beam-to-column structural characteristics for pitched-roof portal frames with variable cross section of class 3 and 4*, Financing authority / Beneficiary: CNCSIS. Value 12,000 RON
3. EUREKA E3034 - SEFIE-RO, 30.07.2004 *Steelbiz as an E-forum for the implementation of the Eurocodes for steel construction*, Financing authority / Beneficiary: European Union, Value: 6,000 RON (total value: Eureka + private funds 443,500 RON)
4. 3853/12.04.2005, type At, theme 1, code 22, *Alternative structural solutions of shear-wall panels for seismic resistant buildings*, Financing authority: Ministry of Research and Education, Value: 16,900 RON

BOOKS PUBLISHED

Light gauge metal structures. Recent advances, Ed. Rondal, J., Dubina D. CISM - Courses and lectures no. 455, Springer, Wien, New York, 2005, 253 pages

PUBLISHED PAPERS

1. Dubina, D., Ungureanu, V., Rondal, J., *Numerical modelling and codification of imperfections for cold-formed steel members analysis*, Steel & Composite Structures, An International Journal, Volume 5, Number 6, December 2005, ISSN 1229-9367, pp. 315-332

2. Dubina, D., Cristutiu, M., *Buckling Strength of Pitch-roof Portal Frames of Class 3 and 4 Tapered Sections*, Proceedings of the 4th European Conference on Steel and Composite Structures - Eurosteel 2005, Maastricht, the Netherlands, June 8-10, 2005, Volume A, Part. 1.4, pp. 121-128

3. Dubina, D., Fulop, L., *Steel structured residential buildings* (in Romanian), Casa Noastră journal, January 2005, pp. 22-25

4. Dubina, D., Rondal, J., *Peculiar problems in cold-formed steel design*, in Light gauge metal structures. Recent advances. (Ed. Rondal, J., Dubina, D.), CISM - Courses and lectures no. 455, Springer, Wien, New York, 2005, pp. 5-22

5. Dubina, D., Ungureanu, V., Fülöp, L., Zaharia, R., *Research Advances in Cold-formed Steel Design. Contributions of "Timisoara School"*, Sesiunea Ştiinţifică Festivă prilejuită de împlinirea a 60 ani de către Dl. Prof. Dr. Ing. Radu Băncilă, 2005, pp. 118-135

6. Dubina, D., *Industrial and non-residential buildings*, in: Light gauge metal structures. Recent advances. (Ed. Rondal, J., Dubina, D.), CISM - Courses and lectures no. 455, Springer Wien, New York, 2005, pp. 189-232

7. Fulop, L., Dubina, D, *Light-gauge steel-framed structures for residential buildings, a safe and high-quality solution* (in Romanian), AGIR Bulletin, Year X, no. 1-2, January-June 2005, pp. 94-103

8. Fulop, L., Dubina, D, *Design criteria for seam and sheeting to framing connections of cold-formed shear panels*, ST/2004/024463, Journal of Structural Engineering, ISSN 0733-9445, (in print)

9. Ruff, A., Ungureanu, V., Dubina, D., *Flow Charts and Case Study for a New Series of Cold Formed Cassette Sections*, First International PhD Symposium in Engineering, Pecs, Hungary, October 20-21, 2005, (in print)

10. Ungureanu, V., Dubina, D., *Erosion effect of geometrical and material imperfections on the buckling strength of thin-walled cold-formed steel members*, Proceedings of the 4th International Conference on Advances in Steel Structures – ICASS'05. Shanghai, China, 13-15 June 2005, Volume 1, pp. 497-504

11. Ungureanu, V., Dubina, D., *Post-critical behaviour and ductility of cold-formed steel sections*, Proceedings of the 4th European Conference on Steel and Composite Structures - Eurosteel 2005, Maastricht, the Netherlands, June 8-10, 2005, Volume A, Part. 1.2, pp. 35-44

12. Zaharia, R., Dubina, D., *Stiffness of joints in bolted connected cold-formed steel trusses*, Journal of Constructional Steel Research, paper 2005/009, (in print)

ONGOING PhD THESES

- Agnes Ruff: *Influence of connections on the behaviour of thin walled purlins overlapped on supports*, PhD supervisor Prof. Dan Dubina
- Daniel Ţicle: *Behaviour of cold-formed steel structural elements in post-elastic domain*, PhD supervisor Prof. Dan Dubina
- Bogdan Neagoie: *Structural detailing of steel girders with flanges made of cold-formed sections and corrugated sheet web*, PhD supervisor Prof. Dan Dubina
- Zsolt Nagy: *Structural configuration and performance of steel industrial halls from light-gauge cold-formed profiles*, PhD supervisor Prof. Dan Dubina
- Ionel - Mircea Cristutiu: *Stability and ductility of lightweight industrial halls made of pitched-roof portal frames with class 3 and 4 variable cross section*, PhD supervisor Prof. Dan Dubina

OTHER RESULTS

- Organisation of the colloquium "Timisoara Academic Days", IX edition, May 26-27, 2005
- Dan Dubina - external examinator in the PhD jury at the Polytechnic University of Hong Kong for the PhD thesis *Structural behaviour of flapped cold-formed steel Z sections* by Mr. Ho-Ho-Cheung, on February 21, 2005
- Dan Dubina, *Particular features of cold-formed steel structural building systems in seismic and heavy snow areas*, Invited lecture at the Polytechnic University of Hong Kong, February 22, 2005

FURTHER DEVELOPMENTS

- Influence of residual stresses on the ultimate capacity of cold-formed steel members
- Strength and ductility of thin-walled steel sections and structural systems under monotonic and cyclic loading
- Built-up cold-formed steel beams with corrugated web
- Post-elastic capacity of Z purlins with overlapped joints
- Shear walls from cold-formed steel cassettes

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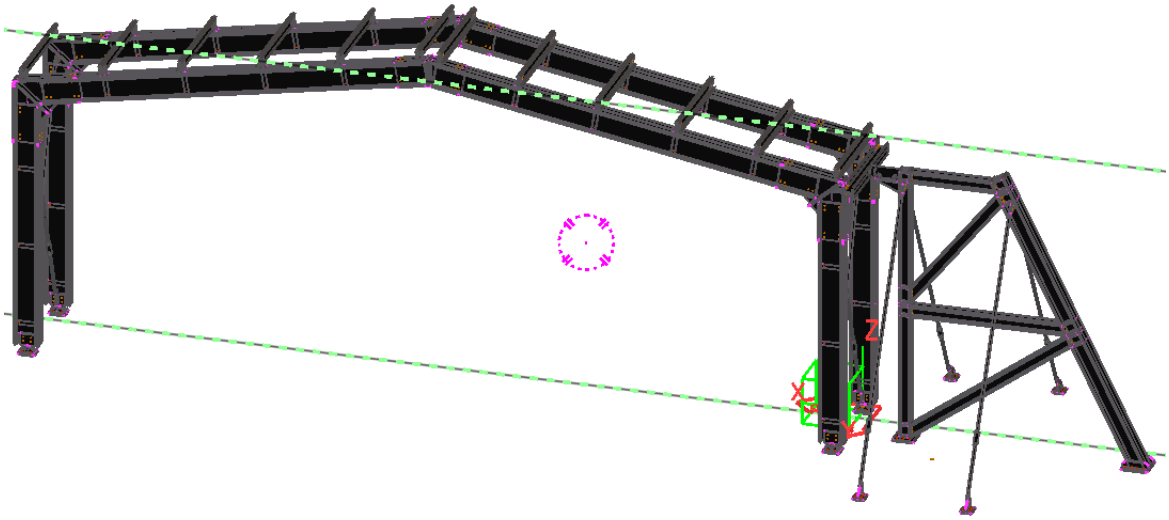
EXEMPLES

1. Full-scale tests on pitched-roof portal frames with cold-formed built-up members

Experimental program was aimed at extending previous research on behaviour of light-gauge cold-formed frames. Behaviour of bolted knee and apex joints was studied experimentally in the past. This research was extended with full-scale tests on light-gauge cold-formed portal frames with bolted knee and apex connections. Two full-scale tests were performed: one with monotonically increasing horizontal load, and a second one with gravity load and monotonically increasing horizontal load.



(a) numerical model

(b) experimental test

Numerical model and experimental failure mechanism of the frame

RESEARCH CENTRE FOR MATERIALS AND STRUCTURES *CES-MAST*

GENERAL PRESENTATION

The research centre for materials and structures was founded in 2000. Significant achievements of the centre researches are obtained in the field of new materials, structural design and rehabilitation of different constructions types: reinforced and prestressed concrete, masonry, wooden, composite steel-concrete.

Researches are in close relation with practice and the present and future needs of construction industry.

MAIN RESEARCH FIELDS

- New construction materials

Keywords: high performance concrete, additives, fly-ash, phosphogypsum, experimental tests

- Rehabilitation of reinforced concrete and masonry structures by using CFRP

Keywords: reinforced concrete, masonry, modern rehabilitation solutions, CFRP, tests

- Behaviour and rehabilitation of masonry shear walls at seismic actions

Keywords: masonry shear walls, reinforced masonry, experimental tests, rehabilitation solutions

- New alternative methods for design of reinforced concrete structural elements

Keywords: reinforced concrete, shear walls, strut-and-tie method design, experimental tests

- Optimisation of composite steel-concrete building structures in seismic area

Keywords: composite steel concrete elements, structural design, rehabilitation, experimental test

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Researches in *NEW CONSTRUCTION MATERIALS*

FIELD DESCRIPTION

New construction materials are tested for finding out the physical and mechanical characteristics in order to be used according to their quality.

ACTIVITIES AND RESULTS

The laboratory tests provide: mechanical strengths, shrinkage, creep, permeability, freezing resistance, abrasion resistance, etc., for materials including fly-ash, lime, phosphogypsum and mircosilica. The results are used for the confirmation of the products as: materials with high mechanical performances as well as with insulating properties.

RESEARCH TEAM

- Prof. dr. eng. Iosif BUCHMAN
- Prof. dr. eng. Corneliu BOB
- Assoc. prof. dr. eng. Eugen JEBELEANU
- Assist. dr. eng. Cătălin BADEA
- Assist. eng. Liana IUREŞ

RESEARCH OFFERS

New construction materials, physical and mechanical tests for different materials

Researches in *REHABILITATION OF REINFORCED CONCRETE AND MASONRY STRUCTURES BY USING CFRP*

FIELD DESCRIPTION

Reinforced concrete structures and masonry structures damaged by different actions, or subjected to functional modifications, must be examined and rehabilitated. Efficient structural rehabilitation are studied and experimentally tested for reinforced concrete structures and masonry structures. The main aspects are related with the use of CFRP - carbon fibre reinforced polymers at rehabilitation of reinforced concrete frames and shear walls and masonry structures.

ACTIVITIES

Activities provided: technical examination of existing constructions, inspection by non-destructive and destructive methods, theoretical studies and experimental tests on the behaviour of different structure types - masonry shear walls, reinforced concrete frames and shear walls, strengthening by using CFRP different types, rehabilitation projects.

RESEARCH TEAM

- Prof. dr. eng. Valeriu STOIAN
- Prof. dr. eng. Corneliu BOB
- Assist. dr. eng. Tamas NAGY-GYORGY
- Lect. dr. eng. Sorin DAN
- Lect. dr. eng. Daniel DAN
- Eng. Cosmin DĂESCU

RESEARCH OFFERS

Efficient structural rehabilitation solutions, design tools, experimental tests.

Researches in *BEHAVIOUR AND REHABILITATION OF MASONRY SHEAR WALLS AT SEISMIC ACTIONS*

FIELD DESCRIPTION

Studies on the behaviour of reinforced masonry shear walls at seismic actions are performed in order to provide new technical structural solutions. Existing masonry structures damaged by different actions, or subjected to functional modifications, must be examined and repairing solutions have to be indicated.

ACTIVITIES

Activities provided: studies related to the behavior of masonry shear walls, technical examination of existing constructions, inspection by non-destructive and destructive methods, rehabilitation solutions according to the norms.

RESEARCH TEAM

- Prof. dr. eng. Dan TUDOR
- Prof. dr. eng. Sevastean IANCA
- Prof. dr. eng. Valeriu STOIAN
- Lect. dr. eng. Daniel DAN
- Eng. Dan DIACONU

RESEARCH OFFERS

Experimental tests, design, technical examinations of existing masonry structure.

Researches in *NEW ALTERNATIVE METHODS FOR DESIGN OF REINFORCED CONCRETE STRUCTURAL ELEMENTS*

FIELD DESCRIPTION

Efficient structures realised using reinforced concrete are the main purpose of theoretical and experimental studies. The main aspects are related with the use of the optimal design of reinforced concrete elements for civil buildings and bridges, non-linear analysis of reinforced concrete shear walls.

ACTIVITIES

Activities provided: studies related to behavior of different reinforced concrete structural types like shear walls, short cantilever, coupling beams, design procedure by the strut-and-tie method for the reinforced concrete elements.

RESEARCH TEAM

- Prof. dr. eng. Tudor CLIPII
- Prof. dr. eng. Alexandru TOMA
- Prof. dr. eng. Valeriu STOIAN
- Prof. dr. eng. Sevastean IANCA
- Lect. dr. eng. Sorin DAN
- Lect. dr. eng. Daniel DAN
- Assist. eng. Marina LUTE
- Assist dr. eng. Tamas NAGY-GYORGY

RESEARCH OFFERS

Efficient structural solutions, design tools, experimental tests.

Researches in *OPTIMISATION OF COMPOSITE STEEL-CONCRETE BUILDING STRUCTURES IN SEISMIC AREA*

FIELD DESCRIPTION

Building construction industry is in development in the last decade. The specific developments consists of new construction materials, new structural solutions with high performance parameters, new technologies. These tendencies characterises the recent successful construction works. In this respect the studies concerning the structural solutions realised with steel concrete elements becomes a necessity, being highly motivated for the structures placed in seismic areas.

ACTIVITIES

- research activity in the field of the steel concrete structures, mainly for those placed in seismic area
- technical instructions for the design of the steel concrete elements
- refurbishment methodology using steel concrete elements
- dedicated software for structural non-linear analysis of the steel concrete elements

RESEARCH TEAM

- Prof. dr. eng. Valeriu STOIAN
- Lect. dr. eng. Daniel DAN
- Assist. eng. Marina LUTE

RESEARCH OFFERS

Mechanical tests for composite elements

RESEARCH PROJECTS

1. CNCSIS National Grant: *Ultra High Performance Concretes*, Director: Prof. dr. eng. Iosif BUCHMAN, Value: 7,000 RON
2. CNCSIS National Grant: *Modern and Efficient Solutions for Strengthening of Reinforced Concrete and Masonry Structures*, Director: Lecturer dr. eng. Sorin DAN, Value: 25,000 RON
3. CNCSIS National Grant: *Evaluation of Beams Stiffness from Composite Steel – Concrete Frames in Seismic Regions*, Director: Assoc. prof. dr. eng. Agneta TUDOR, Value: 12,000 RON
4. CNCSIS National Grant: *Prestressed Concrete Elements Associated with Fibres*, Director: Assoc. prof dr. eng. Aurora FLOREA, Value: 7,500 RON
5. CNCSIS National Grant: *Evaluation of Masonry Walls Stiffness Rehabilitated Using Different Procedures*, Director: Prof dr. eng. Sevastean IANCA, Value: 15,500 RON
6. CNCSIS National Grant: *Theoretical and Experimental Study Upon the Ductility of RC Columns Rehabilitated Using Composite*

Materials, Director: PhD student eng. Cosmin DĂESCU, Value: 12,320 RON

7. CNCSIS National Grant: *Theoretical and Experimental Study of Prefabricated Beam Ends Consolidated Using Composite Materials*, Director: Prof dr. eng. Valeriu STOIAN, Value: 25,000 RON

PUBLICATIONS

BOOKS

1. Gheorghe FĂGĂDAR-COSMA, Cătălin BADEA, Chemistry – Laboratory Works. Ed. TEMPUS, Timişoara, 55 pages
2. Cătălin BADEA, Eugen JEBELEAN, Building Materials and Technolgy, Orizonturi Universitare Publishing House, Timişoara, ISBN 973-638-221-4, 92 pages
3. Ioan CADAR, Tudor CLIPII, Agneta TUDOR, Reinforced Concrete, Orizonturi Universitare Publishing House, Timişoara, ISBN 973-638-176-5, 535 pages
4. Traian ONEŢ, Tudor CLIPII, Aurel CIUCUREANU, Structural Concrete, Ed. Academic Society Tein Boter, Cluj, ISBN 9737962-20-6, 180 pages
5. Traian BERAR, Dan TUDOR, Dorel MIHAI, Elements of Civil, Agricultural and Forest Constructions, Orizonturi Universitare Publishing House, Timişoara, ISBN 973-638-188-9, 331 pages
6. Sevastean IANCA, Railway Stations and Complexes, Politehnica Publishing House, Timişoara, ISBN 973-625-228-0, 231 pages
7. Alexandru TOMA, Technology and Mechanization of Civil and Industrial Construction Work, Politehnica Publishing House, Timişoara, ISBN 973-625-215-9, 331 pages

PUBLISHED PAPERS

1. Badea, C., Bob, C., Experimental Research on Some New Building Materials Realised with Fly Ash, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 21-26, (published in Romanian)
2. Buchman, I., Industrial Special Concrete Made in Laboratory, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 33-38, (published in Romanian)
3. Buchman, I., Făgădar, G., *The Behaviour of High Performance Concretes at Aggressive Action of High Content Ammonium Nitrate Waters*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 39-44, (published in Romanian)
4. Iureş, L., Bob, C., *Comparative Study Over Some Concretes Shrinkage Reducing Admixtures*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 53-58
5. Bota, A., *Filler Beam Deck Bridges*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 97-102, (published in Romanian)
6. Clipii, T., *EC2 New Provisions Concerning Second Order Effects in Compression*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 103-108, (published in Romanian)
7. Dăescu, C., Stoian, V., Nagy-Gyorgy, T., *Theoretical Study of Prefabricated Beam Ends*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 109-114, (published in Romanian)
8. Iosip Moţ, Şt. N., *Some Aspects about the Durability of Prestressed Concrete*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 121-126, (published in Romanian)
9. Tudor, A., *New Approach of Shear Design According to EC2*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 173-176, (published in Romanian)
10. Dan, D., Stoian, V., Nagy-Gyorgy, T., *Experimental Studies Concerning the Load*

Bearing Capacity of Composite Joints, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 211-218, (published in Romanian)

11. Mihai, D., Bob, C., *Shearwalls with Gypsum Wallboard Sheathing*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 241-246, (published in Romanian)
12. Mihai, D., Bob, C., *Shearwalls with OSB Sheathing*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 247-252, (published in Romanian)
13. Mihai, D., Furdui, C., *Wood Structures with Vertical and Horizontal Diaphragms*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 253-258, (published in Romanian)
14. Diaconu, D., Ianca, S., Tudor, D., Secula, S., Berar, T., Nagy-Gyorgy, T., *Behaviour of the Brick Masonry Walls – Results and Perspectives*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 309-314, (published in Romanian)
15. Tudor, D., Berar, T., *Solutions for the Consolidation of Masonry Damaged by* Earthquakes, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 337-342, (published in Romanian)
16. Tudor, D., Berar, T., *Recovery of the Bearing Potential of a Damaged Masonry Diaphragm: a Comparative Study*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 343-348, (published in Romanian)
17. Tudor, D., Berar, T., Secula, S., *A Theoretical Calculus of Bearing Potential of a Consolidated Masonry Diaphragm*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 349-354, (published in Romanian)
18. Bob, C., Dan, S., Badea, C., Gruin, A., *Rehabilitation of an Architectural Monumental Building at Timisoreana Brewery*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 361-366, (published in Romanian)
19. Dan, S., Bob, C., Badea, C., Gruin, A., *RC Framed Structures Strengthened by CFRP*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 381-386
20. Dan, S., Bob, C., Badea, C., Gruin, A., Iureş, L., *Strengthening Solutions for Palace Building in Tmisoara*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 387-392, (published in Romanian)
21. Jebelean, E., Jiva, C., Badea, C., Gruin, A., *Determinations on Structural Concretes of a Bridge in Timisoara*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 411-416, (published in Romanian)
22. Jiva, C., Jebelean, E., *Technical Expertise of a Concrete Bridge at Pischia Village*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 417-422, (published in Romanian)
23. Nagy-György, T., Stoian, V., Moşoarcă, M., Gergely, J., Dan, D., *Design of RC Walls Retrofitted with Composites*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 427-432, (published in Romanian)
24. Dan, D., *Quality Control of Building Erection at the Iulius Mall Center Timisoara*, Timiş Academic Days, International Symposium

"Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 459-464, (published in Romanian)

25. Pătcaş, A., Pătcaş, I., Andriş, C., *Monolith Concrete Borders Performed without Forms*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 481-484, (published in Romanian)

26. Tudur, V., Lute, M., *New Solutions for Columns' Formworks*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 497-500, (published in Romanian)

27. Lannert, A., *Anti-Graffiti Systems*, Timiş Academic Days, International Symposium "Composite Materials, Elements and Structures for Constructions", Timişoara, May 2005, Mirton Publishing House, ISBN 973-661-652-5, pp. 545-550, (published in Romanian)

28. Făgădar-Cosma, E., Făgădar-Cosma, G., Laichici, M., Vlascici, D., *Chlorophylls A and B Content Development in Wheat Treated with a Phosphonium Compound*, Agrochimica, vol IL - N. 1-2, Gennaro, 2005, ISSN 0002-1857, pp. 51-59

29. Făgădar-Cosma, E., Făgădar-Cosma, G., Laichici, M., *Synthesis and Auxinic Behavior of 2-Ethyl-2-Isopropy-3, 5-Dimethyl-1, 4, 2-Diazaphosphorine 2-Oxide*, Acta Chimica Slovenica, 52(1), 2005, ISSN 1318-0207, pp. 93-97

30. Făgădar-Cosma, E., Maranescu, B., Făgădar-Cosma, G., Cozmiuc, C., *Iodotriphenylphosphonium Triiodide. Ir, ^{1}H-NMR, ^{31}P-NMR, UV-VIS Spectroscopy and HPLC Investigations*, Rev. Chimie, Bucharest, 56(9), 2005, ISSN 0034-7752, pp. 947-950

31. Făgădar-Cosma, G., Făgădar-Cosma, E., Ţăranu, I., *Studies about the Electrochemical Oxidation of Triphenylphosphine in the Presence of $Agno_3$*, Revue Roumaine de Chemie, 50(4), 2005, ISSN 0035-3930, pp. 291-296

32. Făgădar-Cosma, G., Făgădar-Cosma, E., Ţăranu I., *Oxidation Reaction of the Malachite Green Leuco Base*, Rev. Chimie - Bucuresti, 56(11), 2005, ISSN 0034-7752, pp. 1178-1181

33. Făgădar-Cosma, E., Făgădar-Cosma, G., Vlascici, D., *Synthesis, Characterization and Comparative Study of Bilogical Activity of some Phosphorus(V) Heterocyclic Compounds Obtained from p-Substituted Arildichlorophosphines*, 8th International Conference of Chemistry and Its Role in Development, Fac. of Science, Mansoura University, Egypt, 2005-OC-13, 1 page

34. Făgădar-Cosma, E., Fuliaş, A., Făgădar-Cosma, G., Tudose, R., Costişor, O., Fărcaş, S., *Synthesis and Characterization of p-Hydroxy and p-Methoxy-phenyl Substituted Porphyrins as Altenative to Inorganic Photovoltaics*, Proceedings CSE – International Conference on Sustainable Energy, P2.7, ISBN 973-635 539-X, 8 pages

35. Făgădar-Cosma, E., Vlascici, D., Făgădar-Cosma, G., *Monomer and Sandwich Type Complexes of Zr(IV) with Meso-tetraphenylporphyrin*, Proceedings of the 12th Symposium on Analytical and Environmental Problems, Szeged, Hungary, September 2005, Ed. Hungarian Academy of Sciences-SZAB, ISBN 963 217 147 0

36. Berar, T., Berar, C., Tudor, D., Secula, S., *Construction Fire Risk a Decisive Factor in Destroying the Environment*, Timiş Academic Days, Symposium "60 Years of High Education in Agronomy in Banat", USAMVB Timisoara, May 2005, 8 pages

37. Berar, T., Berar, C., Tudor, D., Secula, S., *Methods of Calculating Fire Response of Constructions*, Timiş Academic Days, Symposium "60 Years of High Education in Agronomy in Banat", USAMVB Timisoara, May 2005, 8 pages

38. Berar, T., Tudor, D., *Experimental Research Concerning the Consolidation of Damaged Masonry*, Timiş Academic Days Symposium, USAMVB Timisoara, May 2005, 8 pages

39. Berar, T., Tudor, D., *A Theoretical and Experimental Study on the Bearing Potential of a Consolidated Masonry*, Timiş Academic Days Symposium, USAMVB Timisoara, May 2005, 6 pages

40. Berar, T., Tudor, D., *A Study on Structural Rehabilitation of Masonry Damaged by Earthquakes*, Timiş Academic Days Symposium, USAMVB Timisoara, May 2005, 8 pages

41. Badea, C., Bob, C., *Building Materials with Fly-Ash and Phospho-Gypsum*, International Symposium "Universitaria SIMPRO2005", Ed Universitas, Petroşani, Romania, 2005, ISBN 973-8260-91-4, 5 pages

42. Bob, C., Badea, C., *Gas Explosion Effects on Buildings,* COST C12 Conference on Improvement of Building's Structural Quality by New Technologies, Innsbruck, Austria, 2005, 7 pages

43. Jiva, C., *Decreasing of Joint Numbers at Concrete Bridges by Continuing on Supports,* Timiş Academic Days Symposium, Timişoara, May 2005, Ed. Solnes, ISBN 973-792-037-2, 8 pages, (published in Romanian)

44. Jiva, C., *Bridge Rehabilitation on DN68 at Zeicani,* Timiş Academic Days Symposium, Timişoara, May 2005, Ed. Solnes, ISBN 973-792-037-2, 8 pages, (published in Romanian)

45. Jiva, C., *Avoiding of Degradation at Two Existing Bridges Infrastructure in Service,* Scientific Bulletin of the "Politehnica" University of Timişoara, 49(63), 2005, ISBN 1224-6042, 6 pages

46. Stoian, V., Nagy – György, T., Diaconu, D., Dăescu, C., *Technical-economical Study and the Rehabilitation of the RC Beams using Composite Materials,* Symposium AICPS, Bucharest, March 2005, 11 pages

47. Nagy-György, T., Moşoarcă, M., Stoian V., Dan D., *Strengthening Reinforced Concrete Walls With Composite Materials,* Symposium AICPS, Bucharest, March 2005, 10 pages

48. Diaconu, D., Dăescu, C., *Shear Strengthening of RC Beams Using Composite Materials – Economical Study,* Communication Session, Cluj Napoca, March, 2005, 12 pages

49. Nagy-György, T., *Composites – From Research To Application,* International Conference in Civil Engineering and Architecture - EPKO 2005, Miercurea Ciuc, 2005, 7 pages

50. Dan, D., Stoian, V., Nagy-György, T., *Theoretical and Experimental Studies Concerning the Load Bearing Capacity of Composite Joints,* EUROSTEEL 2005, Maastricht, The Netherlands, 2005, 8 pages

51. Nagy-György, T., Moşoarcă, M., Stoian, V., Gergely, J., Dan D., *Retrofit of Reinforced Concrete Shear Walls with CFRP Composites, fib* Symposium - Keep Concrete Attractive, Budapest, Hungary, 2005, 6 pages

52. Stoian, V., Dan, D., Nagy-György, T., Dăescu, C., *Efficient Composite Materials Used for Strengthening the RC Structures,* Festive Scientific Session, Timisoara, 2005, 11 pages

53. Nagy-György, T., Stoian, V., Dan, D., Sas, G., *Studies Concerning Strengthening Structural Elements with Composite Materials,* National Scientific Conference – Modern Technologies for the III. Millennium, Oradea, 2005, 10 pages

54. Stoian, V., Dan, D., Nagy – György, T., Dăescu, C., Diaconu, D., Sas, G., *Study on the Performance of an Hollow Core Precast Slab Consolidated with Carbon Fiber Sheet,* Symposium – Concrete Prefab Structures, Cluj Napoca, Novemver, 2005, 6 pages

55. Stoian, V., Clipii, T., Fekete-Nagy, L., Sas, G., *Design Method for Discontinues Zones of Precast Concrete,* Symposium – Concrete Prefab Structures, Cluj Napoca, Novemver, 2005, 8 pages

56. Bob, C., Dan, S., Gruin, A., Dan, Z., *Rehabilitation of Reinforced Concrete Structures in Seismic Zones by Using CFRP, fib* Symposium - Keep Concrete Attractive, Budapest, Hungary, May 2005, ISBN 963 420 839 8, 8 pages

57. Bob, C., Dan, S., Badea, C., Iureş, L., *Classic and Modern Rehabilitation Techniques in Seismic Zones,* IABSE Symposium - Structures and Extreme Events, Lisbon, Sept. 2005, 2 pages

58. Bob, C., Bob, L., Florea, V., Gruin, A., *New Techniques For Rehabilitation Of Masonry Structures,* IABSE Symposium - Structures and Extreme Events, Lisbon, Sept. 2005, 2 pages

59. Dan, S., *Rehabilitation of RC structures by Using Carbon Fibre Based composites,* Revista de Politica Ştiinţei şi Scientometrie, ISSN- 1582-1218, 7 pages

CERTIFIED LABORATORIES

REINFORCED CONCRETE LABORATORY

- Tests concerning behaviour of the reinforced concrete and prestressed elements and structures under service loads
- Tests concerning durability of concrete and/or prestressed elements.

MATERIALS LABORATORY

- Tests concerning mechanical, physical and chemical characteristics of building materials (building stone, sand and aggregates, mineral binders, mortars and concretes, bricks and tiles, building timber)
- Non-destructive tests concerning concrete resistances.

BUILDINGS LABORATORY

- Tests concerning the thermal conductivity of building materials and thermal insulation materials.

INVENTIONS

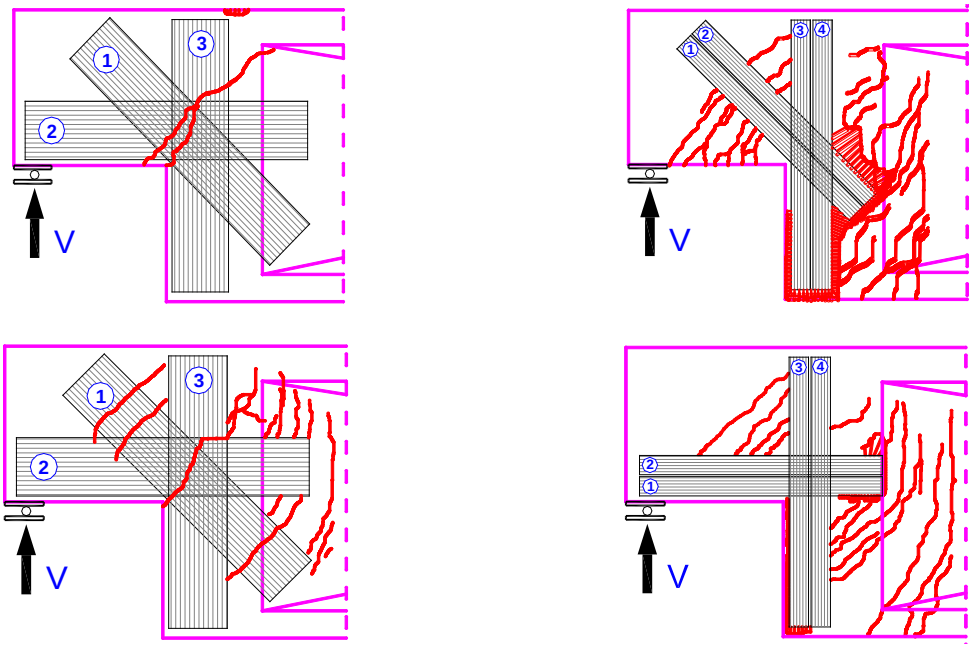
1. Rădoi, I., Goanţă, I., Ţăranu, I., Făgădar, G., *Procedeu de obţinere a soluţiilor concentrate de clorură de zinc,* Brevet nr. 120191 B1 din 28.10.2005

FURTHER DEVELOPMENTS

- In the field of construction materials will be developed new materials like high performance concrete or using additives, fly-ash, phosphogypsum, etc.
- In the field of structural rehabilitation of reinforced concrete and masonry structures new modern and efficient solutions are studied, tested and used in practice
- Behaviour and rehabilitation of masonry shear walls at seismic actions will be developed and new solutions will be studied
- New alternative methods for design of reinforced concrete structural elements are developed and proposed for different reinforced concrete structural elements
- Futher optimisation of composite steel-concrete building structures in seismic area will be performed.

REMARKABLE ACHIEVEMENTS

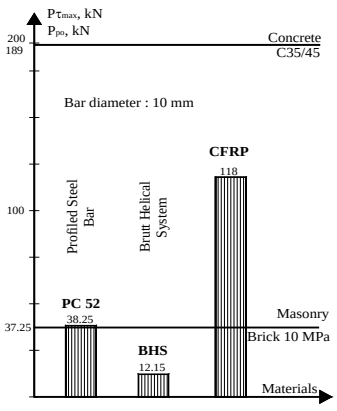
1. **Dapped-end beams strengthened with FRP composites** exhibit a delay in cracking, the failure occurred by fibre rupture through principal diagonal crack in case of the fabric used, and by peeling-off the horizontal or inclined plates. The elements strengthened with fabrics failed more ductile compared with those retrofitted with plates.



Failure modes of the dapped-end beams strengthened with different systems of FRP

2. **Strengthening of masonry walls** by using of near-surface technology by: Profiled Steel Bars, Brutt Helical Systems.

Brutt Helical Bars failure



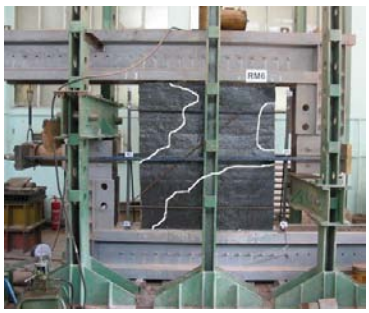
Technical efficiency of different types of bars

3. **Evaluation of Beams Stiffness from Composite Steel–Concrete Frames in Seismic Regions.**
Experimental program purpose consists in evaluation of reinforced concrete slab contribution to the stiffness of the composite steel-concrete beam.

Experimental composite steel-concrete frames

Experimental frames tested at horizontal loads

4. **Masonry walls retrofitted with horizontally applied FRP composites** debonded in large areas, in the middle part and even in the whole width of the wall. This means that the use of anchorages could increase substantially the final capacity of the retrofitted wall. The most advantageous strengthening system proved to be the composite with glass fibers, because it uses up to 50 % of the load bearing capacity of the fibers. The simplest and the fastest strengthening method was the system with the dry application process.



CFRP retrofitted masonry wall after the test

NATIONAL RESEARCH CENTRE IN CIVIL ENGINEERING AND FATIGUE – *CNCCO*

GENERAL PRESENTATION

CNCCO - This research centre has been created in 2002, as a consequence of a grant co-financed by the Romanian Government and the World Bank. It is a multi-user research centre. We are in relations of partnership with the Technical University of Civil Engineering Bucharest, Technical University of Iaşi, Technical University of Cluj-Napoca, "Eftimie Murgu" University of Reşiţa, "Lucian Blaga" University of Sibiu, University of Petroşani.

OBJECTIVES

CNCCO - The main objective of the centre is the developing of highly qualified human resources for higher education and scientific research.
Special attention is given to youth training, by attracting students to major research programs performed by our experienced team, in which they are making use of our high-performance research infrastructure,
CNCCO - offers research, expertise, consulting design and testing services for structures and materials used in civil and mechanical engineering.

MAIN RESEARCH FIELDS

- ***Nonlinear analysis of structures***

Keywords: nonlinear, static, dynamics, stability, rigid, semi-rigid connections

- ***Computational Methods, Computer Aided Design, Computer Aided Engineering***

Keywords: finite elements, boundary elements, design, CAD, CAE, training center

- ***Earthquake Engineering***

Keywords: multistory steel frames, earthquake, global performance, ductility, beam-to-column connections, reliability, bearing capacity, safety, damaged elements, seismic events, maintenance

- ***Fatigue and fracture of materials***

Keywords: fatigue, fracture

Researches in *NONLINEAR ANALYSIS OF STRUCTURES*

FIELD DESCRIPTION

Nonlinear elastic and elastic-plastic analysis of structures under static and dynamic loads is treated.

The influence of beam-to-column joint flexibility on the structural behaviour is evaluated. Post critical analysis is performed. Several connection types are taken in consideration. An optimum response of the entire structure is the final goal.

ACTIVITIES

- Intensive numerical and experimental investigations were performed on the behaviour of steel frames, plane plates and shells in both pre and post-buckling domains
- Experimental tests were performed in order to find the mechanical characteristics of materials

RESEARCH TEAM

- Prof. dr. eng. Marin IVAN
- Prof. dr. eng. Mircea IEREMIA
- Ass. prof. dr. eng. Adrian IVAN
- As. eng. PhD student Dumitru FLORESCU
- PhD student eng. Viorel POPA-ALBU
- PhD student eng. Teodor LEŢ
- Eng. PhD student Dănuţ CĂLUGĂR
- Eng. PhD student Vinicius PRECUPAŞ

RESEARCH OFFERS

- Advanced static and dynamic finite element analysis of civil engineering structures
- Expertise, consulting, design checking services
- Design activities for steel, concrete and timber structures
- Experimental testing services

RESULTS

RESEARCH PROJECTS

5. Contract no. 32940/2004, theme no. 15, code 494: *Optimization of dynamic response of steel structures*, Financing authority / Beneficiary: CNCSIS. Value for 2005: 27,550 RON
6. Contract no. 1278/2005: *Experimental tests on steel specimens*, Financing authority/ Beneficiary: AEGEF GROUP LTD. Value: 528 RON
7. Contract no. 1458/2005: *Experimental tests on steel specimens*, Financing authority/ Beneficiary: ANDRONIC LTD. Value: 300 RON
8. Contract no. 272/2005: *Experimental tests on steel specimens*, Financing authority/ Beneficiary: ISPE Timisoara Branch, Value: 4,000 RON

PUBLISHED PAPERS

Ivan, A., Ivan, M., *Advanced analysis of plane plates stability with finite element method*, Timis Academic Days, Orizonturi Universitare Publishing House, Timişoara, 2005, 6 pages, in print

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Researches in *COMPUTATIONAL METHODS, COMPUTER AIDED DESIGN, COMPUTER AIDED ENGINEERING*

FIELD DESCRIPTION

Finite element models together with CAD tools are highly required in order to obtain optimal structural solutions. The problem is important for both civil and mechanical engineering. The next step in this domain consists in the development of some expert systems for design and expertise.

ACTIVITIES

- Developing of small computer programs dedicated to specific civil engineering problems
- Creating interfaces between large specialized computer programs and the ones previously mentioned
- Testing of the new versions of complex computer programs for accuracy
- Developing numerical procedures to evaluate the bearing capacity of the damaged structures

RESEARCH TEAM

- Ass. prof. dr. eng. Adrian IVAN
- As. eng. PhD student Dumitru FLORESCU
- As. eng. PhD student Eugen DOGARIU
- Eng. PhD student Dănuţ CĂLUGĂR
- As. eng. PhD student Dan COSMA

RESEARCH OFFERS

- Consulting, design, training services
- CAD/CAE services
- Finite element analysis software checking

RESEARCH PROJECTS

Contract no. 339/2005, *Design projects for a footbridge and a press water conduit*, Beneficiary: Hidroconstrucţia S.A. Bucharest, Porţile de Fier Subsidiary, Value: 11,900 RON

FURTHER DEVELOPMENTS

- Testing of the new versions of complex computer programs for accuracy
- Developing numerical procedures to evaluate the bearing capacity of the damaged structures

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Researches in *EARTHQUAKE ENGINEERING*

FIELD DESCRIPTION

The main objectives of the range are: keeping the safety of the new civil engineering works through designing, cladding and maintenance, assessment of the residual bearing capacity of damaged elements of a structure, recovering the initial bearing capacity of the damaged structures to resist to the new seismic events, new resistant systems for the high-raised steel buildings.

ACTIVITIES

- Linear and non-linear dynamic response analysis of civil engineering structures subjected to seismic loads
- New seismic protection solutions for structures (base isolation, dampers)
- Evaluation of the bearing capacity of the strengthened structures

RESEARCH TEAM

- Prof. dr. eng. Marin IVAN
- Prof. dr. eng. Mircea IEREMIA
- Prof. dr. eng. Iuliu DIMOIU
- Prof. dr. eng. Zoe REGEP
- Ass. prof. dr. eng. Adrian IVAN
- Eng. PhD student Octavian MOCEAN

RESEARCH OFFERS

- Non-linear dynamic response analysis of civil engineering structures subjected to seismic loads
- Expertise, consulting, design checking services

PUBLISHED PAPERS

I. Dimoiu, *Inelastic analysis of steel structure damaging*, Timis Academic Days 2005, Orizonturi Universitare Publishing House, Timişoara, 2005, 6 pages, in print

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RESEARCH CENTRE FOR SUBSTRUCTURES FOR CONSTRUCTIONS AND TRANSPORTATION

GENERAL PRESENTATION

The ***Substructures for Constructions and Transportation*** Research Centre – ICT – belongs to the „Politehnica" University Timişoara, Faculty of Civil Engineering and Architecture, being founded in 2001. The founders are Prof. dr. eng. Virgil HAIDA and Prof. dr. eng. Marin MARIN. The centre is organized on two domains: *Soil mechanics and foundations* and *Roads and railways*.

The role of the ICT Research Centre is to conceive and develop some scientific research and design programs in soil mechanics and foundations domain, in roads and railways. An important emphasis is regarding to the practical research for implementation of some new solutions and technologies. A very important objective of the Research Centre is the seismic microzoning of Timişoara city.

MAIN RESEARCH FIELDS

- Vibration techniques in foundation problems

Keywords: under-crossing, drilling, vibration technique

- Punching holes for foundations

Keywords: punching hole

- Efficient foundation systems in seismic areas for different constructions

Keywords: foundation, seismic areas

- Conceiving efficient road structures

Keywords: road structure, local materials, technical conditions

- Checking of some technical standards and norms

Keywords: standards, norms

MAIN ACTIVITIES

- Investigation of the difficult foundation grounds
- Special foundations for different constructions in seismic areas
- Studies and researches regarding the realization and behavior of some road sectors
- Studies and researches for bringing some rehabilitated road sectors to technical characteristics

Researches in *INVESTIGATION OF THE DIFFICULT FOUNDATION GROUNDS*

FIELD DESCRIPTION

The aim of the use of the light and medium penetration test is to reduce the site investigation by drilling and soil sampling. It is also very useful to obtain the soil physical and mechanical characteristics directly by penetration avoiding the disturbance of the soil samples during the drilling and the transportation.

ACTIVITIES

Technical report regarding execution conditions and verification of the foundation soils improvement on Cora-Bucharest site, for S.C. Herve Romania S.R.L. Bucharest.

RESEARCH TEAM

- Prof. dr. eng. Marin MARIN: *Foundation systems for constructions on difficult foundation grounds in seismic areas, punched foundations*
- Prof. dr. eng. Marin PĂUNESCU: *Vibration techniques for foundations*
- Prof. dr. eng. Virgil HAIDA: *Foundations in special conditions*

RESEARCH OFFERS

Geotechnical engineering.

Researches in *SPECIAL FOUNDATIONS FOR DIFFERENT CONSTRUCTIONS IN SEISMIC AREAS*

FIELD DESCRIPTION

The buildings placed in seismic areas on difficult foundation grounds need to have pile foundations capable to transmit the loads to the resistant soil layers. To the Italia Hotel from Timişoara were used piles from reinforced concrete with a length of 11,0 m and diameter of 88 cm. The used foundation system is capable to take great horizontal and vertical loads.

ACTIVITIES

Pile foundation project for Italia Hotel in Timişoara, for S.C. Incontro Prefabbricati S.A. Timişoara.

RESEARCH TEAM

- Prof. dr. eng. Marin MARIN: *Foundation systems for constructions on difficult foundation grounds in seismic areas, punched foundations*
- Assoc. Prof. dr. eng. Petru MIHU: *Geotechnical tests for roads*

Researches in THE REALIZATION AND BEHAVIOR OF SOME ROAD SECTORS

FIELD DESCRIPTION

For performing modern asphalt sheets that will correspond to the actual and future traffic conditions, were carried out studies and researches regarding the introduction of new materials in the asphalt mixtures and of some new technologies in performing asphalt sheets. The experimental sectors were and are observed, their behavior being studied under the influence of climatic and traffic factors.

ACTIVITIES

Technical Assistance and observation of the experimental sectors behavior for the rehabilitation and modernization works on other roads (sectors from D.R.D.P. Timişoara and Craiova), researches made for CESTRIN Bucharest.

RESEARCH TEAM

- Chemist dr. Ileana STELEA: *Asphalt mixtures, road investigations, operation behavior*
- Prof. dr. eng. Florin BELC: *Road materials, road structures, operation behavior*

Researches FOR BRINGING SOME REHABILITATED ROAD SECTORS TO TECHNICAL CHARACTERISTICS

FIELD DESCRIPTION

It is known that on many modernized roads appear degradations in the first years of use. Our team carried out complex field investigation and laboratory works and studied on the base of the performed investigations the causes that led to the degradations that appeared and proposed solutions for improving the modernized roads.

RESEARCH TEAM

- Prof. dr. eng. Florin BELC: *Road materials, road structures, operation behavior*
- Chemist dr. Ileana STELEA: *Asphalt mixtures, road investigations, operation behavior*

RESEARCH TEAMS

SOIL MECHANICS AND FOUNDATIONS TEAM:

- Prof. dr. eng. Virgil HAIDA
- Prof. dr. eng. Agneta GRUIA
- Prof. dr. eng. Tadeus SCHEIN
- Prof. dr. eng. Marin MARIN
- Assoc. Prof. dr. eng. Ioan BOLDUREAN
- Assoc. Prof. dr. eng. Gheorghe BELEA
- Assoc. Prof. dr. eng. Petru PANTEA
- Assoc. Prof. dr. eng. Ion BOGDAN
- Assoc. Prof. dr. eng. Petru MIHU
- Lecturer dr. eng. Cristina VOICU
- Assist. eng. Monica MIREA
- Assist. eng. Alexandra BOLDUREAN
- Assist. eng. Luiza PIESZ

ROADS AND RAILWAYS TEAM:

- Prof. dr. eng. Gheorghe LUCACI
- Prof. dr. eng. Florin BELC
- Assoc. Prof. dr. eng. Alexandru HERMAN
- Lecturer dr. eng. Cornel BANCEA
- Assist. eng. Ciprian COSTESCU

MAIN PROJECTS

- **Load plate tests on Timisoara ring road**

Contract: 243/2005
Beneficiary: S.C. EFKLIDIS ATENA
Value: 27,375 RON
Team: Assoc. Prof. dr. eng. Petru MIHU
Assist. dr. eng. Monica MIREA

- **Embankments compaction verification on OMYACALCITA-Voislova Platform**

Contract: 352/2005
Beneficiary: S.C. DRUMCO S.A.
Value: 30,150 RON
Team: Assoc. Prof. dr. eng. Petru PANTEA

- **Technical Assistance and observation of the experimental sectors behavior for the rehabilitation and modernization works on other roads (sectors from D.R.D.P. Timişoara and Craiova)**

Contract: 912/2002– continuing in 2005 – A.A. 4/2005
Beneficiary: CESTRIN Bucureşti
Value: 12,600 RON
Team: Chemist dr. Ileana STELEA
Prof. dr. eng. Florin BELC

- **Bituminous road pavements using composite asphalts in order to increase the safety in overland transport**

Contract: 217/2005
Beneficiary: AMTRANS PROGRAM
Value: 20,000 RON
Team: Prof. dr. eng. Florin BELC

FURTHER DEVELOPMENTS

- Studies and research with regard to investigation of ground in laboratory and site
- Studies and research concerning the isolation and protection solution for buildings against vibrations transmitted by the soil
- Execution technologies of foundation works based on vibration technique, horizontal drilling
- Study and experimental works regarding new efficient technologies for road rehabilitation in relation with the foundation soil
- Studies for improving topographic technologies of cadastral determinations in Romania.

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RESEARCH CENTRE FOR BUILDING SERVICES

GENERAL PRESENTATION

In the Department of Building Services is functioning the Research Center for Building Services (CCIC), approved by CNCSIS in the year 2001 (certify with the number 57/CC-C) and the National Building Services Laboratory, abilities by MLPAT (authorization number 100.31.030/2001) to effect technical agreements for products, proceeds and equipments for building services.

The Research Center for Building Services is structured in three compartments: *Sanitary Installations and Gases* (coordinator Prof. dr. eng. Adrian Retezan), *Thermal Installations* (coordinator Prof. dr. eng. eur. eng. Ioan Sârbu), *Electrical Installations and Automation* (coordinator Prof. dr. eng. Ioan Borza).

OBJECTIVES

The objectives of CCIC are the improvement of the complex specialization activities for building services, contributing with the obtained results to their perfection/modernization, efficiencies,

renewing and to raise the qualification level of their members.

MAIN RESEARCH FIELDS

- ambient comfort

Keywords: comfort, heating, ventilation, water supply, electrical energy, temperature, humidity, air velocity

- buildings energy

Keywords: energy economy, energy management, heat transfer, buildings envelop, installations systems, certification energetically audit, thermal rehabilitation

- reducing energetically consumptions and looses in the transport and distribution systems of water and thermal energy

Keywords: pipes, networks, hydraulic analysis, dimensioning, optimization, numerical modeling and simulation, recovery systems

- utilization of renewable energy resources

Keywords: unconventional energies, solar energy, thermal energy

- computational methods, computer assisted design

Keywords: numerical simulation, dimensioning programs, planning methods, energetically analysis's

- technical agreements for installations

Keywords: components, technical agreement, heating systems, cooling systems, lightening, water distribution

ACTIVITIES

- Tests and proofs for sanitary, heating, ventilation, conditioning, cooling and electrical installations, based on collaboration contracts with firms in this domain
- Tests and elaborate of documentation in order to obtain the technical agreements for products and equipments for installations
- Initialization and sustaining a program for preparing specialists to by authorized auditors in buildings energy
- Organizing the conference with international participation "Building Services and Ambiental Comfort"
- Participation to national and international scientific manifestations

RESULTS

RESEARCH PROJECTS/CONTRACTS

1. Contract no. 211 / 2005, *Studies and documentation in order to obtain an examination certify CS for PVC pipes with protection leyer*, Beneficiary: INCERC Timişoara, 1,500 RON
2. Contract no. 360 / 2005, *Thermal examination, energetically audit and thermal rehabilitation works design for the blook of flats no. 40, Vasile Alexandri street, Moldova Nouă*, Beneficiary: Town hall of Moldova Nouă, Value: 85,000 RON
3. Contract no. 361 / 2005, *Thermal examination, energetically audit and thermal rehabilitation works design for the blook of flats no. 35, Griselinii Alley, Moldova Nouă*, Beneficiary: Town hall of Moldova Nouă, Value: 30,000 RON
4. Contract no. 362 / 2005, *Thermal examination, energetically audit and thermal rehabilitation works design for the blook of flats no. 34, Griselini Alley, Moldova Nouă*, Beneficiary: Town hall of Moldova Nouă, Value: 85,000 RON
5. Contract no. 363 / 2005, *Thermal examination, energetically audit and thermal rehabilitation works design for the blook of flats no. 41, Nicolae Titulescu Highway, Moldova Nouă*, Beneficiary: Town hall of Moldova Nouă, Value: 105,000 RON
6. Contract no. 406 / 2003-2005, *Professional perfecting program of engineer for building services, in order to obtain the certification as energetically auditor in buildings*, Beneficiary: AIIR Timişoara, Value: 4,200 RON
7. Contract no. 3686 / 2005, *Covered swimming pool and exterior swimming at the sport complex no. 2 of the University Politehnica Timişoara,* Beneficiary U.P. Timisoara, Value: 410 RON
8. Contract no. 13772-351 / 2005, *General repairments at the faculties with electrical profiles AC, ETc, ET, buildings A, B, C, D. Electrical installations, security systems and structural cables networks*, Beneficiary U.P. Timisoara, Value: 1,580 RON

BOOKS

1. Retezan, A., Sârbu, I., Borza, I., Cinca, M. (ed.) Proceedings of the International Conference "*Building Equipment and Ambient Comfort*", Politehnica Publishing House, Timişoara, 2005, ISBN 973-625-223-X, 368 pages
2. Opriş, M.A., Benga, M., Popescu, G., Furdui, C. *The qualityof materials, constructions and installations – Essential demand for fire protection,* Politehnica Publishing House, Timişoara, 2005, ISBN 973-625-253-1, 134 pages

PUBLISHED PAPERS

1. Sârbu, I., *Numerical analysis of two dimensional heat conductivity in steady state regime*, Periodica Polytechnica Budapest, no. 2, 2005, ISSN 0324-6051, pp. 149-162
2. Sârbu, I., *Optimization of the discharges distribution in water supply networks*, Journal: Hydrotechnics, Bucharest, no. 6, 2005, ISSN 0439-0962, pp. 15-19
3. Sârbu, I., *Optimal design of the cooled insulation*, Journal: Building Equipment Technique, Târgu Mureş, no. 1, 2005, ISSN 1582-6244, pp. 70-72
4. Sârbu, I., *Efficient local wastewater treatment plants*, First Air Shams University International Conference on Environmental Engineering, Cairo, 2005, ISBN 973-8391-76-8, pp. 296-300
5. Sârbu, I., *Water disribution networks design optimization*, 31st IAHR Congress "Water Engineering for the Future", Seoul, 2005, ISBN 89-87898-24pp. 5001-5010
6. Sârbu, I., Ostafe, G., *Evaluation of thermal comfort level in the buildings*, Conference "Building Equipments and Ambient Comfort", Timişoara, 2005, pp. 7-16
7. Borza, I., *There exists alternatives?*, Journal "Building and office", no. 7, Bucharest, pp. 23-26
8. Cinca, M., *Mechanical smokextractioning system for industrial*, National Conference for Installations, Sinaia, 2005, pp. 105-112
9. Doboşi, I., Retezan, A., Dună, Şt., Ceauşescu, I.M., *Thermal energy storage "Cristopia" – Application in Romania*, 36th Congress on HVAC&R, Belgrade, Serbia & Montenegro, 2005, pp. 175-187
10. Dupţa, P., Retezan, A., *The dynamic programming in the optimization of the internal canalization installations*, Journal Traktors and Power Machines, no. 2/10, 2005, Novi Sad, Serbia & Montenegro, pp. 37-42
11. Iosif., A., Eleş, G., *Analytical modelling of the liqid flow that passes through the raking screen of a hydropower equipment*, Scientific Buletin of the "Politehnica" University of Timişoara, Transaction on Hidrotechics, Tom 49(63), no. 1, 2005, ISSN 1224-6042,pp. 196-199
12. Iosif, A., *Problems of dimensioning and obtaining the functioning characteristics of the air-lift pumps used for low flow rates*, Proceedings of the International Conference „Building Equipements and Ambient Comfort", Politehnica Publishing House, Timişoara, 2005, pp. 48-55
13. Brata, S., *Structure optimization and optimized drsign of gas loop networks at law pressure*, National Conference for Installation, Sinaia, 2005, pp. 56-60

CERTIFIED LABORATORY

National Building Services Laboratory, abilities by MLPTL (authorization number 100.31.030/2001)

PhD RESEARCH ACTIVITIES

1. *Prof.dr.eng.eur.eng. Ioan SÂRBU*, supervisor in the field of *Civil Engineering*

PhD students:

- Ioan Bogdan STĂNESCU: *Modelling and optimization of thermal szstems in civil buildings in order to reduce energy consumption*
- Ionuţ Mădălin CEAUŞESCU: *Contribution concerning comfort assurance and energy efficiency in buildings by using renewable sources*

2. *Prof.dr.eng. Ioan BORZA*, supervisor in the field of *Civil Engineering*

PhD student:

- Sebastian DORHOI: *Functionally optimization of central heating installations using performant automatically systems*

FURTHER DEVELOPMENTS

- to continue solving some research and designing themes, as well as with national research institutions and through collaborations with companies from our country
- realization of the research program "Annual energetically consumptions of heating, cooling and warm water supply in buildings" included in the professional – scientific collaboration program with U.T.E. Budapest
- creation of informatics system of type Internet at surrounding level and of some expert systems in the domain of installations for buildings, that will allow to promote specific information's for Romania and for countries that use already this systemsdevelopment, complete and modernizing of the research base in order to achieve increased perform ability and competitively.

RESEARCH TEAM

- Prof. dr. eng. Adrian Retezan: *Ambient comfort, Water treatment, Environment protection*
- Prof. dr. eng. eur. eng. Ioan Sârbu: *Buildings energy, Energy economy, Optimization, modeling and numerical simulations*

- Prof. dr. eng. Ioan Borza: *Electrical installations, Lightening systems, Energy economy*
- Prof. dr. eng. Dumitru Podrumar: *Thermal comfort, Energetically balances, Unconventional energies*
- Assoc. prof. dr. eng. Olga Bancea: *Thermal comfort, Modern air conditioning systems, Unconventional energies*
- Assoc. prof. dr. eng. Silviana Brata: *Thermotechnic for installations and buildings, Buildings energy, Hydraulic for thermal network*
- Assoc. prof. dr. eng. Mihai Cinca: *Thermal comfort, Heat recovering in industrial processes, Applications for informatically calculus*
- Lecturer dr. eng. Anton Iosif: *Hydraulic, Air and water pollution reducing systems, Numerically models and simulations*
- Assist. eng. Francisc Kalmar: *Energy management in buildings, Optimising the heating systems, Numerically modelling and simulations of thermal processes*
- Assist. eng. Ladislau Kardos: *Water and heat supply of buildings, Water treatment, Environment protection*
- Assist. eng. Gabriel Ostafe: *Thermotechnic for installations and buildings, Energy economy*
- Assist. eng. Domuţ Cristian: *Electrical installations, Lightening systems*

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RESEARCH TEAM: STEEL STRUCTURES AND BRIDGES

GENERAL PRESENTATION

The main function of a bridge is to carry vehicular or other traffic over a crossing, safety and economically. Rehabilitation and maintenance of existing steel bridges is one of the most important actual problems. The majority of railway existing steel bridges that have been built at the turn of the last century are riveted structures. Many of these bridges are still in operation after damages, several phases of repair and strengthening. The problem of these structures is the assessment of the present safety for modern traffic loads and the remaining service life. Replacement with new structures raises financial, technical and political problems. Along with the classical method of damage accumulation, a new approach based on the fracture mechanics principles is proposed.

In the last 10- 15 years an increased number of composite railway bridges have been built on the Romanian Railway Network. The principal advantages of these bridges are: a better functional response, reduction of maintenance costs, minimization of noise and environmental problems. These structures have been adopted on the new railway lines, or for replacing the existing old bridges. For small spans (L = 5 – 20 m) slabs with included steel (embedded) profiles are used; for spans between 6 – 32 m plate girder bridges are preferred. For large spans L = 30 – 80 m cross sections formed by two composite truss girders gives very suitable solutions in terms of economy and maintenance.

OBJECTIVES

The main objectives of the research team are the design and maintenance of steel structures, especially bridges. One of the main tasks in present is the assessment of the remaining safety of existing steel structures and bridges.

A fracture mechanics concept for the safety of existing steel structures was developed.

The team is also involved in collaboration with ISIM (National Institute for Welding and Testing of Materials) in the direction of the courses for International Welding Engineering and in the field of material choice for welded structures based on fracture mechanics criteria.

MAIN RESEARCH FIELDS

- ***Safety in Operation and Rehabilitation of Existing Steel Bridges***

Keywords: existing steel structures, verification, safety in operation, rehabilitation, fracture mechanics.

- ***Welded Structures Design Principles***

Keywords: choice of material, EC 3, fracture mechanics.

- ***Composite structures and bridges. Structures with embedded girders***

Keywords: concrete deck, steel girders, connectors, embedded girders railway and highway bridges, examples, projects.

Researches in *SAFETY IN OPERATION AND REHABILITATION OF EXISTING STEEL BRIDGES*

FIELD DESCRIPTION

Rehabilitation and maintenance of existing steel bridges is one of the most important actual problems. The infrastructure in Romania and in other East – European countries has an average age of about seventy to ninety years. Many of these structures, particularly railway bridges, have already achieved an age of ninety, hundred or even more years and are still in operation after damages, several phases of repair and strengthening. To maintain these structures is one of the most important tasks of our society. Today, the budget of the administration and the owners (i.e. the railways and highway companies) get smaller. In consequence it is necessary to invest the available money where there will be the greatest benefit. Therefore, those responsible for the decisions need information about the safety of the structure, the remaining life, the costs for maintenance etc. Nobody will take the responsibility for failure of a structure as a result of budget restrictions. During service, bridges are subject to wear. In the last decades the initial volume of traffic has increased. Therefore many bridges require an inspection. The examination should consider the age of the bridge and all repairs, the extent and location of any defects etc. A continuous maintenance, which generally must increase in time, is important in order to assure the safety in operation of the existing structures. The classical fatigue concept is based on the assumption that a constructive element has no defects or cracks. However, discontinuities and cracks in the components of structures are unavoidable, basically because of the material fabrication and the erection of structures. It is very clear that the kind of fatigue cracks, which are initiated by structural non-homogeneity (possible non-metallic inclusions or other impurities), surface defects (including corrosion) and the stress factor, are present in the old riveted structures.

The presence of cracks in structural elements modifies essentially their fracture behavior. Fracture, assimilated in this case as crack dimensions growth process under external loadings, will be strongly influenced by the deformation capacity of material. The FM approach has acceleration in damage increase; with increasing damage a smaller stress range contribute to the damage increase. Along with the classical method of damage accumulation, a new approach based on the fracture mechanics principles is proposed.

ACTIVITIES

- Processing of experimental crack growth rate for welded details.
- Analytical investigations on remaining fatigue life of existing steel bridges.
- Procedure to assess the safety in operation of existing steel bridges – riveted and welded bridges.

RESEARCH TEAM

- Prof. dr. eng. Radu Băncilă, *Steel and composite steel-concrete structures and verification of existing steel structures.*
- Lect. Dr. eng. Edward Petzek, *Steel and composite bridge structures and assessment of safety in operation of existing steel structures based on FM principles.*
- Lect. Dr. eng. Dorel Bolduş, *Verification and Rehabilitation of Steel bridge structures*
- PhD Student eng. Adrian Prahoveanu.
- PhD student eng. Anca Gido.
- PhD Student eng. Bogdan Bolduş.

RESEARCH OFFERS

- Verification of existing steel structures based on modern methods.
- Estimation of the present safety of existing steel railway and highway steel bridges based on fracture mechanics principles.
- Critical details – fracture mechanics models, remaining service life analysis.
- Consulting and rehabilitation of steel bridges.

RESULTS

RESEARCH PROJECTS

1. BAYHOST Grant: *Fatigue life estimation of existing steel bridges*, Directors: Sen. lect. dr. eng. E. Petzek & Prof. dr. eng. R. Băncilă
2. Grant A CNCSIS, *The necessity of rehabilitation of highway steel bridges – exemplification on Traian Bridge, Arad, Romania*; Director: Prof.dr.eng.Radu Băncilă; Team: Sen.lect.dr.eng. Dorel Boldus, Sen. lect. dr. eng. Edward Petzek, PhD Stud. Adrian Prahoveanu
3. Grant AT CNCSIS, *Procedure guide for the application of fracture mechanics principles to the assessment of safety in operation and remaining fatigue life of existing steel bridges*; Director: Sen. lect. dr. eng. Edward Petzek, Team: PhD Stud. Adrian Prahoveanu, PhD Stud. Anca Gido

BOOKS

Volume: *Festtagung aus Anlass des 60 Geburtstags des Herrn Prof. Dr. Ing. Radu Băncilă*, edited by Dr.eng. Edward Petzek, Ed. Solness, Timişoara, ISBN 973-729-035-6, 265 pages

PUBLISHED PAPERS

1. Băncilă, R., Kosteas, D., Petzek, E., *General Concepts Regarding the Verification, Safety in Operation and Rehabilitation of Existing Steel Bridges*, international Symposium, Ed. Solness, ISBN 973-729-035-6, Timişoara, May 2005, pp. 183-218
2. Băncilă, R., Petzek, E., Prahoveanu, A., *Prevederi actuale privind verificarea structurilor de poduri existente*, Timis Academic Days, IXth edition, May 2005, Timişoara, Ed. Solness, pp. 194-201
3. Petzek, E., Kosteas, D. and Bancila, R. *Zur Bestimmung der Tragfähigkeit bestehender Stahlbrücken in Rumänien*, Stahlbau, nr. 8, Ed. Ernst & Sohn, ISSN 0038-9145, 2005, pp. 606-613
4. Petzek, E., Kosteas, D., Bancila, R., *Bestimmung der Restnutzungsdauer alter genieteter Stahlbrücken in Rumänien*, Stahlbau nr. 9, Ed. Ernst & Sohn, ISSN 0038-9145, 2005, pp. 691-700
5. Băncilă, R., Petzek, E., Bolduş D., *General Principles Regarding the Rehabilitation of Steel Bridges*, journal BID ISIM, 3/2005, ISSN 1453-0392, pp. 13-30
6. Băncilă, R., Petzek, E., *Rehabilitation of Steel Bridges in Romania*, Japanese–German Bridge Conference, München, 2005, conference volume, 14 pages on CD
7. Băncilă, R., Petzek, E., Bolduş, D., *Principes et méthodes de réhabilitation des ponts métalliques*, French–Romanian Colloquium, Timişoara, October 2005

PhD THESIS

- Eng. Adrian Prahoveanu: *Rehabilitation of existing steel bridges*
- Eng. Anca Gido: *Safety of existing welded steel bridges using fracture mechanics principles*
- Eng. Bogdan Bolduş: *Dynamical analysis of existing steel bridges*

FURTHER DEVELOPMENTS

- Proposal for actualization of the present Romanian Code.
- Procedure guide for the application of fracture mechanics principles on the establishment of the safety in operation and remaining service life of existing steel bridges, Grant CNCSIS 72.
- Manual project: *Safety of existing steel bridges* in collaboration with Prof.dr.eng. Dimitris Kosteas TU München.

CONTACT PERSONS

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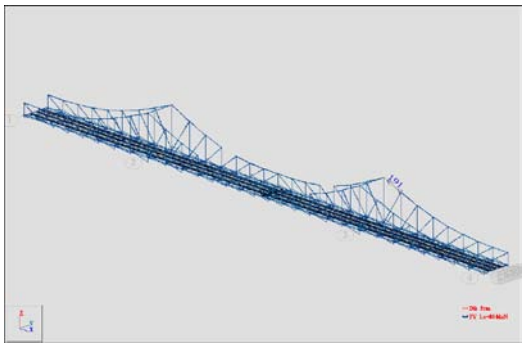
EXEMPLES

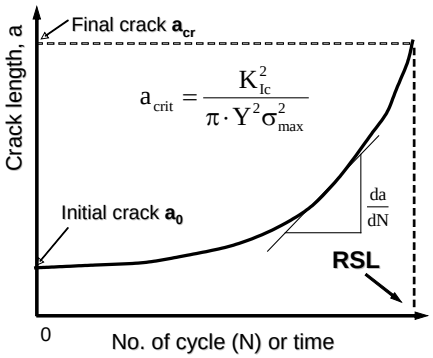
Case study – the old highway steel bridge in Arad – Traian bridge over the Mureş River.

Traian Bridge

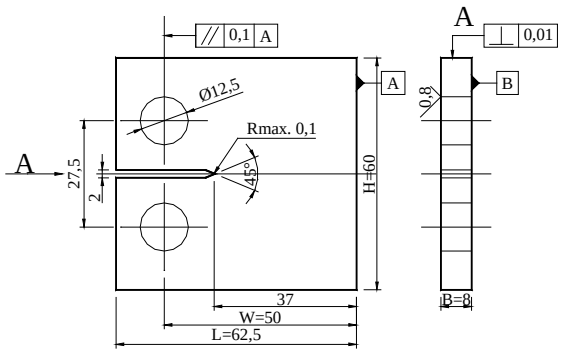


Static scheme of the structure

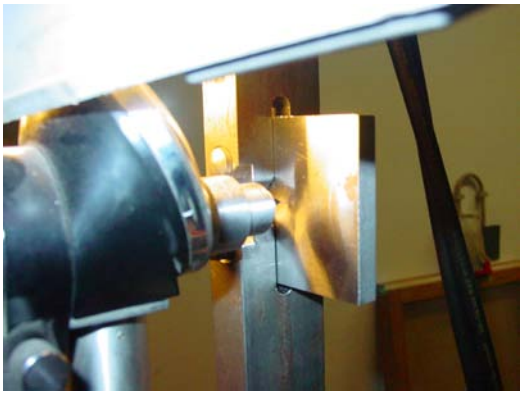
Crack growth propagation – experimental program.



Remaining service life



CT – Specimen



Experimental tests

Researches in *WELDED STRUCTURES DESIGN PRINCIPLES*

FIELD DESCRIPTION

The general principles of welded structures according to the European Codes are presented. Some typical examples for welded connection are discussed.

ACTIVITIES

- Lectures at the European Welding Engineer courses organised by the Welding Institute Timişoara.
- Master courses at the Technical University Politehnica Timişoara: International Management of the Quality for Welded Steel Structures.

RESEARCH TEAM

- Prof. dr. eng. Radu Băncilă, *steel welded structures*
- Lect. dr. eng. Dorel Bolduş, *steel welded structures*
- Lect. dr. eng. Edward Petzek, *fracture mechanics and choice of materials*

RESEARCH OFFERS

- Commentaries to the chapter welded connection - EC3
- Welds analysis.
- Choice of material for welded structures according to Eurocode and fracture mechanics principles

RESULTS

PUBLISHED PAPERS

Băncilă, R., Bolduş, D., Petzek, E., *EC 3: a new challenge for welded connection*, Intenational Conference „Structural Integrity of Welded Structures" 4-5.11.2004 ISIM Timisoara, CD-ROM, Ed. Sudura, Timisoara, ISBN 973-8359-27-9

OTHER RESULTS

- Working examples to the chapter welding joints of the EC-3
- Working examples to the chapter choice of material for welded structures

FURTHER DEVELOPMENTS

- Design examples for welded structures and bridges (especially thick plates).

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Researches in *COMPOSITE STRUCTURES AND BRIDGES. STRUCTURES WITH EMBEDDED GIRDERS*

FIELD DESCRIPTION

In the last 10- 15 years an increased number of composite railway and highway bridges have been built. The principal advantages of these bridges are: a better functional response, reduction of maintenance costs, minimization of noise and environmental problems. These structures have been adopted on the new railway lines, or for replacing the existing old bridges. For small spans (L = 5 – 20 m) slabs with included steel (embedded) profiles are used; for spans between 6 – 32 m plate girder bridges are preferred. For large spans L = 30 – 80 m cross sections formed by two composite truss girders gives very suitable solutions in terms of economy and maintenance.

ACTIVITIES

- Technical Project for a composite highway bridge in Bocşa, span L= 33 m
- Design guide for steel composite and embedded bridges.

RESEARCH TEAM

- Prof. dr. eng. Radu Băncilă, *composite structures and bridges*
- Lect. dr. eng. Edward Petzek, *composite bridges*
- Lect. dr. eng. Dorel Bolduş, *composite structures and bridges*
- PhD Stud. Ramona Gabor.

RESEARCH OFFERS

- Design guide
- Technical solution and projects.
- Consulting.
- Design examples for typical bridges.

RESULTS

PUBLISHED PAPERS

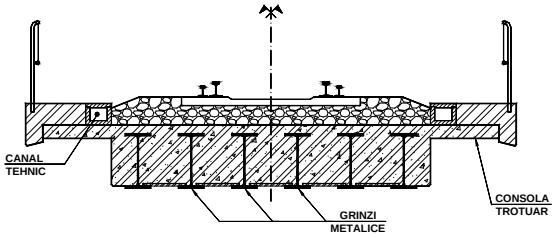
Petzek, E., Băncilă, R., *Încărcări la podurile compuse oţel – beton în conformitate cu normele europene*, Timiş Academic Days, IXth edition, May 2005, Timişoara, Ed. Solness, pp. 261-268

PhD THESIS

- Eng. Ramona Gabor: *Composite bridges for medium spans*

FURTHER DEVELOPMENTS

- Design examples for composite structures and bridges according to DIN Fachbericht 101, 102, 103 and 104.



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RESEARCH TEAM: GEOTECHNICAL ENGINEERING

GENERAL PRESENTATION

MAIN RESEARCH FIELDS

- Studies and research regarding investigation of ground in laboratory and site

Keywords: laboratory device, data processing, geotechnical investigation

- Studies and research concerning isolation and protection solutions for buildings against vibrations transmitted by the soil

Keywords: isolation, buildings, vibration, soil

- Studies regarding slipping processes of soil massifs and consolidation solutions

Keywords: instability, site investigation, consolidation methods

- Execution technologies of foundation works based on vibration technique, horizontal drilling

Keywords: under-crossing, drilling, vibration technique

MAIN ACTIVITIES

- Investigation of the foundation ground and verification of the fills compaction
- Exploitation of some industrial wastes in constructions.

Researches in *INVESTIGATION OF THE FOUNDATION GROUND AND VERIFICATION OF THE FILLS COMPACTION*

FIELD DESCRIPTION

Except studies and laboratory tests, for geotechnical investigation works, there have been applied some efficient techniques of "in situ" investigations like: dynamic penetration, cone penetration, load plate tests and so on.

ACTIVITIES

- Geotechnical investigations were carried out for establishing the foundation conditions for constructions on difficult soils
- Verification of the quality of the compaction for fills under floors
- Construction and rehabilitation of the roads

RESEARCH TEAM

- Prof. dr. eng. Virgil HAIDA: *Foundations in special conditions*
- Prof. dr. eng. Agneta GRUIA: *Laboratory and field geotechnical tests*
- Assoc. Prof. dr. eng. Petru PANTEA: *Laboratory and field geotechnical tests*
- Assoc. Prof. dr. eng. Petru MIHU: *Geotechnical tests for roads*

Researches in *EXPLOITATION OF SOME INDUSTRIAL WASTES IN CONSTRUCTIONS*

FIELD DESCRIPTION

The research theme from above pursued the study and determination of the physical and mechanical characteristics of the fly ashes for reducing the pollution of the environment and for using this kind of material in the embankment works.

ACTIVITIES

The laboratory tests carried out on fly ash samples, prepared using different formulas regarding water: fly ash ratio, respectively water; fly ash-clay ratio showed greater resistances of the tested samples. In this manner, the use of these wastes is recommended that have a special efficiency for different construction works, especially for roads.

RESEARCH TEAM

- Assoc. Prof. dr. eng. Ion BOGDAN: *Improvement of weak foundation soils*
- Assoc. Prof. dr. eng. Ioan Petru BOLDUREAN: *Foundations in special conditions*
- Assist. eng. Alexandra BOLDUREAN: *Laboratory and field geotechnical tests*

RESEARCH PROJECTS

1. *Geotechnical Study for modernizing of the DJ 664 A, Lupeni – Straja Km 1 + 000 – 9 + 300*, Beneficiary: S.C. Search Corporation S.A. Bucharest, Value: 6,614 RON, Team: Assoc. Prof. dr. eng. Petru MIHU, Prof. dr. eng. Virgil HAIDA, Assist. eng. Monica MIREA, Assoc. Prof. dr. eng. Mihu Tamara
2. *Natural disasters effects removing in the case of the national road system*, Beneficiary S.C. Search Corporation S.R.L. Bucharest, Value: 12,000 RON, Team: Assoc. Prof. dr. eng. Petru MIHU, Prof. dr. eng. Virgil HAIDA, Assist. eng. Monica MIREA, Assoc. Prof. dr. eng. Mihu Tamara
3. *Bearing capacity testing for the foundations of the roads, parking places and platforms from Mall Supermarket*, Beneficiary S.C. Iulius Group S.R.L. Value: 9,600 RON, Team: Assoc. Prof. dr. eng. Petru MIHU, Assist. eng. Monica MIREA, Assoc. Prof. dr. eng. Mihu Tamara
4. *Bearing capacity testing for the earthworks at storage department - Arad*, Beneficiary S.C. Wega N.P.K. S.R.L. Arad, Value: 12,000 RON, Team: Assoc. Prof. dr. eng. Petru MIHU, Assoc. Prof. dr. eng. Mihu Tamara
5. *Documentation study for the access ascending gradient execution at the "Politehnica" University of Timisoara Buildings*, Beneficiary "Politehnica" University of Timisoara, Value: 6,000 RON, Team: Prof. dr. eng. Marin MARIN
6. *Geotechnical investigation by plate tests at the flour foundation CONTITECH Timisoara*, Beneficiary: S.C. Gragedan S.R.L., Value: 5,000 RON, Team: Prof. dr. eng. Marin MARIN
7. *Geotechnical investigations and researches regarding the consolidation solution for earthworks on DJ 665A*, Beneficiary: S.C. Triskele S.R.L., Timisoara, Value: 5,000 RON, Team: Prof. dr. eng. Virgil HAIDA, Lecturer dr. eng. Cristina VOICU, Prep. eng. Ciprian COSTESCU
8. *Geotechnical report for rebuild and consolidation of DJ 592C road*, Beneficiary: S.C. Triskele S.R.L., Timisoara, Value: 4,500 RON, Team: Prof. dr. eng. Virgil HAIDA, Lecturer dr. eng. Cristina VOICU, Prep. eng. Ciprian COSTESCU

9. *Laboratory and field geotechnical investigations for Metro II Timisoara site*, Beneficiary: S.C. Constructii Feroviare, Timisoara, Value: 8,000 RON, Team: Prof. dr. eng. Virgil HAIDA, Assoc. Prof. dr. eng. Petru MIHU, Lecturer dr. eng. Cristina VOICU
10. *Geotechnical investigations and study regarding causes and consolidation solution for the sliding slope on DJ 675B*, Beneficiary: S.C. Triskele S.R.L., Timisoara, Value: 4,000 RON, Team: Prof. dr. eng. Virgil HAIDA, Assoc. Prof. dr. eng. Petru MIHU, Lecturer dr. eng. Cristina VOICU
11. *Laboratory determinations on dense slurry of ash, slag and by-products from desulphurization – Geotechnical laboratory tests; CT Timisoara, CET Drobeta Turnu Severin; CET Rovinari, CET Turceni, CET Isalnita*, Beneficiary: ISPE-Bucharest, Timisoara Office, Value: 14,450 RON, Team: Assoc. Prof. dr. eng. Ion BOGDAN, Assoc. Prof. dr. eng. Ioan Petru BOLDUREAN, Assist. eng. Alexandra CIOPEC
12. *Laboratory determinations of foundation ground geotechnical characteristics on Brasov-Oradea Highway, section 3B-1*; Beneficiary: S.C. B&B Geoteh Consulting S.R.L. Timisoara, Value: 8,235 RON, Team: Assoc. Prof. dr. eng. Ion BOGDAN, Assoc. Prof. dr. eng. Ioan Petru BOLDUREAN, Assist. eng. Alexandra CIOPEC
13. *Geotechnical report and existing foundations verification from Storage Hall*; Beneficiary: S.C. RNP RomSilva, Timisoara, Value: 2,208 RON, Team: Assoc. Prof. dr. eng. Ion BOGDAN, Assoc. Prof. dr. eng. Ioan Petru BOLDUREAN, Assist. eng. Alexandra CIOPEC

PUBLICATIONS

BOOKS

Paunescu, M., Stefanica, M., Marin M., *Modern solutions and technologies of foundations industrializations for complex loaded columns*, Ed. Marineasa, Timisoara, 2005, ISBN 973-631-236-4, 552 pages

PUBLISHED PAPERS

1. Mihu, P., Haida, V., *Earthworks consolidation on DC 24 Km 5 + 500 Prigoria–Bucsana*, Timis Academic Days, 2005, pp. 315-321
2. Costescu, C., Ciopec, A., Abrudean, M., *Studies and researches regarding the usage possibilities of rocks from Baile Herculane area*, Timis Academic Days, 2005, 4 pages
3. Boldurean, I.P., Bogdan, I., Ciopec, A., *Field investigation works and stabilization solution for sliding slope on DJ 609*, Scientific Session "Festtagung aus Aulass des 60 geburstags des Hernn Prof.dr.ing. Radu Bancila", 2005, 6 pages

PhD RESEARCH ACTIVITIES

Scientific supervisor: Prof. dr. eng. Virgil HAIDA

PhD Students:

- Eng. Monica MIREA: *Contributions regarding the bearing capacity study for precast foundations in punched holes*, thesis presented in November 2005
- Eng. Liviu DROASCA: *Contributions to the study of the stability and resistance conditions for railways earthworks*
- Eng. Sorin HERBAN: *Contributions regarding the survey methods to the study and surveillance of the buildings and ground displacements*
- Eng. Carmen PEPTAN: *Contributions regarding the study of some efficient foundation systems for special constructions*
- Eng. Alexandra BOLDUREAN: *Contributions regarding the study of soil slopes stabilization*
- Eng. Marian Daniel GAINA: *Contributions regarding the study of some efficient technologies of execution for embankments of land communication ways*
- Eng. Valeria SMARANDA: *Contributions regarding the study of roads stability and resistance in Gorj county*
- Eng. Aurelian BORDOS: *Contributions regarding the study of behavior in exploitation of slopes on difficult soils*
- Eng. Ciprian COSTESCU: *Contributions regarding the study of some influence factors upon technical state of roads in Banat area*
- Eng. Mihaela Cecilia CHEZAN: *Contributions regarding the efficiency of cadastral works in construction field*
- Eng. Adrian Ciprian MAYER: *Contributions regarding the behavior in time of railway embankments*
- Eng. Valentin Sorin VLADASEL: *Contributions regarding the study of some consolidation solutions for foundations and foundation ground*
- Eng. Luiza PIESZ: *Contributions regarding the study of geo-synthetics reinforced embankments stability*
- Eng. Marius LUCACIU: *Contributions regarding the study of some realization solutions for road structures on difficult soils*
- Eng. Nicolae Ion BABAUCA: *Contributions regarding the efficiency of survey works in constructions field*

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RESEARCH TEAM: ROADS AND RAILWAYS

GENERAL PRESENTATION

MAIN RESEARCH FIELDS

- Study and research concerning the use of local materials in building and maintenance of roads

Keywords: maintenance of roads, building roads, local materials, road structures.

- Study of the operational behavior of road structures and determination of certain reinforcements or rehabilitation solutions

Keywords: road structures, road investigation, technical condition, index for the technical condition, bearing capacity, dimensioning

MAIN ACTIVITIES

- Investigation of technical condition on the rehabilitated national road sections for assessing the operational behavior and for determining the possible intervention solutions
- Laboratory tests on different road materials used in building and the maintenance of roads

Researches in *THE INVESTIGATION OF THE TECHNICAL CONDITION ON THE REHABILITATED NATIONAL ROAD SECTIONS FOR ASSESSING THE OPERATIONAL BEHAVIOUR AND FOR DETERMINING THE POSSIBLE INTERVENTION SOLUTIONS*

FIELD DESCRIPTION

The field description follows the determination of the technical condition indices on the investigated sections and of the causes which produced the possible degradations. These data are quantified to determine the efficient intervention solutions.

ACTIVITIES AND RESULTS

The activity of assessing the condition indices is realized every year and the results lead to the evaluation of time interval when the maintenance intervention should be applied.

RESEARCH TEAM

- Prof. dr. eng. Ion COSTESCU: *road materials, realization technologies*
- Prof. dr. eng. Gheorghe LUCACI: *road structures, asphalt mixtures, road maintenance*
- Prof. dr. eng. Florin BELC: *road materials, road structures, operation behavior*
- Chemist dr. Ileana STELEA: *asphalt mixtures, road investigations, operation behavior*

LABORATORY TESTS ON DIFFERENT ROAD MATERIALS USED IN BUILDING AND THE MAINTENANCE OF ROADS

FIELD DESCRIPTION

Laboratory tests are realized on different road materials (natural aggregates, binders, asphalt mixtures, cement concrete, cement stabilized aggregates) at the request of road contractors.

ACTIVITIES AND RESULTS

The results are offered to the beneficiaries through test reports and sometimes technical assistance is supplied for improving the site works.

RESEARCH TEAM

- Prof. dr. eng. Ion COSTESCU: *tests on asphalt mixtures and bituminous binders*
- Prof. dr. eng. Florin BELC: *tests on natural aggregates and stabilized materials*
- Lecturer dr. eng. Cornel BANCEA: *tests on stabilized soils and compaction on site*

RESEARCH PROJECTS

1. *Quality tests for earthworks and road pavements*, Beneficiary: S.C. Drumco S.A. Timisoara, Value: 9,000 RON, Team: Prof. dr. eng. Ion COSTESCU, Assoc. Prof. dr. eng. Petru MIHU, Prof. dr. eng. Florin BELC, Assist. eng. Ciprian COSTESCU, Tehn. Mihaela ABRUDAN
2. *Substructure modernizing on DC 108 and DC 262*, Beneficiary: S.C. Drum Proiect S.R.L. Timisoara, Value: 4,000 RON, Team: Prof. dr. eng. Ion COSTESCU, Assoc. Prof. dr. eng. Petru MIHU, Prof. dr. eng. Florin BELC, Assist. eng. Ciprian COSTESCU, Tehn. Mihaela ABRUDAN
3. *Expert opinion for communal road rehabilitation in Calacea locality*, Beneficiary:

Primaria Ortisoara, Team: Prof. dr. eng. Gheorghe LUCACI, Value: 3,500 RON

4. *Physical mechanical tests on natural aggregate, binder stabilized materials asphalt and test quality for earthworks and road layers for works realized by S.C. WEGA–N.P.K. Arad*, Beneficiary: S.C. Wega–N.P.K. Arad, Team: Prof. dr. eng. Gheorghe LUCACI
5. *Periodical field investigation works for traffic observation of the experimental sectors RO-LTPT-Timişoara*, Beneficiary: Cestrin Bucharest, Value: 32,400 RON, Team: Chem. dr. eng. Ileana STELEA, Assoc. Prof. dr. eng. Petru MIHU, Tehn. Mihaela ABRUDAN
6. *Periodical field investigation works for traffic observation of the experimental sectors RO-LTPT-DRDP CraiovaI*, Beneficiary: Cestrin Bucharest, Value: 21,600 RON, Team: Chem. dr. eng. Ileana STELEA, Prof. dr. eng. Ion COSTESCU
7. *Technical Expert Opinion for: Natural disasters effects removing on DN 7 KM 403 + 500 – 405 + 200*, Beneficiary: Search Corporation, Value: 6,000 RON, Team: Prof. dr. eng. Gheorghe LUCACI, Assoc. Prof. dr. eng. Petru MIHU
8. *Geotechnical study on Railway Station Utvinis location*, Beneficiary: S.C. Proiect CF S.A. Bucharest, Timisoara agency, Value: 4,000 RON, Team: Prof. dr. eng. Gheorghe LUCACI, Assoc. Prof. dr. eng. Petru MIHU

PUBLICATIONS

PUBLISHED PAPERS

1. Costescu, I., Malita, I., Simion, H. *Road safety – main objective in public roads administration management*, Timis Academic Days, 2005, pp. 45-51
2. Costescu, I., Botogan, C., Ionasev, M., *Consolidation and protection of the earthworks on detour variant of the Timisoara City*, Timis Academic Days, 2005, pp. 60-65
3. Cara, P., Costescu I., *Cyclical connections*, Timis Academic Days, 2005, pp. 383-389
4. Simion, H., Costescu, I., *Management of the public area from the point of view of the environment protection*, National Conference Road and environment, Baile Herculane, 2005
5. Belc, F., *Utilization condition for hot coated macadam*, "New materials and technologies for roads and bridges building and maintenance", Cluj Napoca, 2005, 15 pages
6. Belc, F., *Actual tendencies in warm coated macadam production*, Timis Academic Days, 2005, 8 pages, pp. 71-79
7. Belc, F., *Aspects regard using of the cold coated macadam in road technique*, Timis Academic Days, 2005, pp. 131-139
8. Belc, F., *Environment protection in continuous development concept*, National Conference Road and environment, Baile Herculane, 2005, 8 pages

PhD RESEARCH ACTIVITIES

Scientific supervisor: Prof. dr. eng. Ion COSTESCU

PhD Students:

- Eng. Petru CARA: *Contributions to the study for improvement of urban transportation comfort*, thesis presented in October 2005
- Eng. Stefan Luca: *Contributions to the study, research and realization of roads building and maintenance efficient technologies*
- Eng. Horatiu SIMION: *Contributions to the study and application of modern systems for road management and administration*
- Eng. Marius BANICA: *Contributions regarding the technical state improvement for the roads from Gorj County*
- Eng. Mihaela IOVANOV: *Contributions regarding usage of the efficient technologies for roads realization*
- Eng Romulus KOMOZ: *Contributions to the improvement of the urban roads management*
- Eng Liviu TUDOR: *Contributions to the study and realizations of modern technologies for roads building*
- Eng. Ionut VESA: *Research field: Civil Engineering*

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RESEARCH TEAM: SURVEYING, CADASTRE

GENERAL PRESENTATION

MAIN RESEARCH FIELDS

- Implementation of modern technologies in Surveying

Keywords: surveying, modern technologies

- Modernizing geodetic networks using Global Positioning System (GPS)

Keywords: geodetic networks, GPS

- Using Geographic and Land Information Systems (GIS, LIS) for urban development

Keywords: GIS, LIS, urban

- Informatization of Cadastral work

Keywords: cadastre, data basis.

Researches in *DEVELOPMENT OF THE ROMANIAN GEODETIC CONTROL NETWORK USING PERMANENT GPS STATIONS*

FIELD DESCRIPTION

In order to have a better accuracy and a real evaluation of the geodetic measurements, there have been established a number of permanent GPS stations on different locations on Romanian territory; the one from Timisoara is placed on the roof of the Civil Engineering Faculty, providing accurate planimetric and altimetric informations; these informations are collected and processed together with other permanent stations from the country, leading to the improvement of the national control network.

ACTIVITIES

The measurements were performed in order to create the reference network for the permanent station using control points from Timisoara.

RESEARCH TEAM

- Assoc. Prof. dr. eng. Carmen GRECEA
- Lecturer dr. eng. Mihaela STURZA
- Assist. eng.Viorica DAVID
- Assist. eng. Sorin HERBAN
- Assist. eng. Cosmin MUŞAT

PUBLISHED PAPERS

1. Musat, C., Grecea, C, *Modern concept of urban cadastre,* Timis Academic Days, Timisoara, May 2005, 6 pages
2. Musat, C., Herban, S., Sturza, M., *Aplications of final elements method deformations measurement for constructions and fields,* International Symposium GeoCad, Alba Iulia, 2005, 4 pages
3. Musat, C., Herban, S., Sturza, M., *Cyclic determinations for high structures with horizontal measurement,* International Symposium GeoCad, Alba Iulia, 2005, 4 pages
4. Musat, C., Herban, S., Sturza, M., *Information system project for geodetic datum measurements on terrestrial field,* International Symposium GeoCad, Alba Iulia, 2005, 8 pages
5. Musat, C., Herban, S., Sturza, M., *Topographical works for projecting and executions railroad terrestrial communications*, Timis Academic Days, May 2005, 6 pages
6. Musat, C., Herban, S., *Aspects regarding automization process of cadastral datum for local administration*, International Seminary, 21-22 October, 2005, 8 pages
7. Grecea, C., Musat, C., *Prediction and planning cadastral work using Gantt solution*, Terrestrial measurements and Cadastre Symposium, Bucharest, November 2005, 12 pages
8. Herban, S., Musat, C., *GIS decision in system management for national railroads in Romania*, International Seminary Surduc, Romania, 6 pages
9. Grecea, C., Baciu, A., *Topographic works in civil engineering for a horizontal control*, Timis Academic Days, Timisoara, May 2005
10. Grecea, C., *Considerations regarding control network for a permanent GPS station*, International Scientific Symposium GeoCad, Alba Iulia, 2005

BOOKS

Carmen Grecea, *Geodesy, Speciality Treaty*, Mirton Publishing House, 2005, Timisoara, ISBN 973-652-830-6, 205 pages

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