FACULTY OF CIVIL ENGINEERING AND ARCHITECTURE

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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" and EUREKA "SEFIE" are underway.

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

- ***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. Structural systems investigated include moment-resisting frames and eccentrically brace frames. Both analytical (non-linear dynamic analyses) investigations on different structural typologies, as well as experimental (on beam-column joints and bolted links) were performed. Dual structural systems were analysed and showed to present benefits in terms of control of damage distribution and improved performance over homogeneous systems. Shear wall panels fabricated from cold-formed steel framing and timber framing, with different cladding materials, subjected to seismic type actions have been investigated both experimentally and numerically in order to characterize their behaviour and to provide design criteria. Strengthening of historical buildings in seismic areas using reversible mixed building technologies, mainly based on metal devices is a new research area addressed by the CEMSIG team.

ACTIVITIES

- Processing of experimental data on removable bolted links for eccentrically braced frames
- Analytical investigations on seismic performance of homogeneous and dual structural systems under different types of ground motions
- Analytical investigations of performance criteria of moment-resisting frames in seismic areas
- Seismic performance of shear panels: development of design and criteria and procedures
- Contribution to drafting of the new Romanian Design Code for seismic resistant structures: P100-2004.
- Strenghening of existing buildings with reversible mixed technologies: study cases.

RESEARCH TEAM

- Prof. Dan Dubina, PhD (Steel and composite steel-concrete structures and characterisation of their response under exceptional actions)
- Prof. Daniel Grecea, PhD (PBD, Beam-column joints in moment-resisting frames)
- 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)
- Sen. lect. Aurel Stratan, PhD (Dual structures, eccentrically braced frames)
- Sen. lect. Adrian Ciutina, PhD (Steel and composite structures)
- Sen. lect. Raul Zaharia, PhD (Fire design)
- Sen. lect. Ludovic Fulop (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)

RESEARCH OFFERS

- Monotonic and cyclic testing of materials and structural subassemblies
- Advanced static and dynamic analysis of structural systems
- Consulting and design

RESULTS

RESEARCH PROJECTS

1. FP6 INCO-CT-2004-509119/2004, *Earthquake protection of historical buildings by reversible mixed technologies*, Financing authority / Beneficiary: European Commission, Value: 186,500 EUR
2. EUREKA E!3034 - SEFIE-RO, 30.07.2004, *Steelbiz as an E-forum for the implementation of the eurocodes for steel construction*, Financing authority / Beneficiary: European Commission, Value: 60,000,000 ROL (total value: Eureka + private funds 4,435,000,000 ROL)
3. COST C12, *Improvement of buildings' structural quality by new technologies*, Financing authority / Beneficiary: European Commission, Value: 10,000 EUR
4. Contract no. 32940/2004 E, theme 3, CNCSIS code 31, *Testing rig for cyclic loading*, Financing authority / Beneficiary: CNCSIS, Value: 1,000,000,000 ROL
5. Contract no. 32940/2004 AT, theme 7, CNCSIS code 218, *Seismic response of dual steel frames with removable short link*, Financing authority / Beneficiary: CNCSIS, Value: 73,000,000 ROL
6. Contract no. 1n/2004 AT, theme 22, *Alternative solutions for shear wall panels for buildings in seismic areas*, Financing authority / Beneficiary: CNCSIS, Value: 50,000,000 ROL
7. Contract no. 32940/2004 A, theme 10, CNCSIS code 167, *Steel-based structural solutions for strengthening and rehabilitation of buildings loated in seismic areas*, Financing authority / Beneficiary: CNCSIS, Value: 195,000,000 ROL
8. Contract no. 0512/2004, *Examination of plane steel gate of the Portile de Fier I hydro station ship lock*, Financing authority / Beneficiary: S.C. Hidrolectrica S.A., Value: 129,136,000 ROL
9. Contract no. 25/26.02.2004, *Examination and design of strengthening solution of the Korohghy Palace in Caransebes*, Financing authority / Beneficiary: Caransebes City Hall, Value: 340,000,000 ROL
10. Contract no. 33047/22.06.2004 AT, CNCSIS code 219, *Behaviour factors for steel structures in seismic areas for performance-based design*, Financing authority / Beneficiary: CNCSIS, Value: 70,000,000 ROL

BOOKS PUBLISHED

1. V. Ungureanu, D. Dubina (editors), 2004, *Advances in steel structures and welding* (in Romanian), Orizonturi Universitare Publishing House, ISBN 973-638-140-4, 202 pages
2. D. Dubina, D. Grecea (editors), 2004, *Recent advances and new trends in structural design*, Orizonturi Universitare Publishing House, ISBN 973-638-119-6, 430 pages

PUBLISHED PAPERS

1. Ciutina, A., Aribert, J.M., Dubina, D., *Etude expérimentale sur la résistance de panneau d'âme d'assemblages de type poutre-poteau sous sollicitations cycliques de type sismique*, Revue Construction Métallique, n°3, 2004, pp. 15-28
2. Dubina, D., *Ductility and seismic performance of thin-walled cold-formed steel structures*, Steel Structures, no. 4, 2004, pp. 209-222
3. Grecea, D., Dinu, F., Dubina, D., *Performance criteria for MR steel frames in seismic zones*, Journal of Constructional Steel Research, Vol. 60, Issues 3-5, March-May 2004, Elsevier Ltd, pp. 739-749
4. Achim, M., *Composite steel and concrete beams with web openings. Design principles*, Scientific Bulletin of the "Politehnica" University of Timisoara, Civil Engineering and Architecture series, 2004, pp. 54-64
5. Ciutina, A., Aribert, J.M., Lachal, A., *Expérimentation et modélisation numérique du comportement d'assemblages boulonnés métalliques et mixtes acier-béton sous sollicitations cycliques de type sismique*, Revue Construction Métallique, n° 1, 2004, pp. 3-34
6. Dinu, F., Stratan, A., Ciutina, A., Grecea, D., Dubina, D,, *Performance based design criteria for steel MR frames*, International Colloquium „Recent advances and new trends in structural design", Timisoara, 07-08 May, 2004, pp. 331-342
7. Stratan, A., Dubina, D, *Bolted links for eccentrically braced steel frames*, ECCS/AISC workshop: Connections in steel structures V: Innovative Steel Connections, June 3-5, 2004, Radison SAS Hotel, Amsterdam, Netherlands. http://www.bouwenmetstaal.nl/congres/congres_eccs_04/Stratan_ebf.pdf
8. Dubina, D., Stratan, A., Ciutina, A., Fulop, L., Nagy, Zs., *Strength, stiffness and ductility of cold-formed steel bolted connections*, ECCS/AISC workshop: Connections in steel structures V: innovative steel connections, June 3-5, 2004, Radison SAS Hotel, Amsterdam, Netherlands, http://www.bouwenmetstaal.nl/congres/congres_eccs_04/Dubina_cold_formed.pdf
9. Stratan, A., Dubina, D., *Eccentrically braced dual steel frames with removable* link, Improvement of building's structural quality by new technologies, outcome of the cooperative action, final scientific report, September 2004, ISBN 04 1536 610 0, pp. 111-116
10. Dubina, D., Dinu, F., Stratan, A., *Welded joints: effect of detailing and strain rate*, Improvement of building's structural quality by new technologies, outcome of the cooperative action, final scientific report, September 2004, ISBN 04 1536 610 0, pp. 313-318
11. Achim, M., Mercea, Gh., *Aspects regarding the rehabilitation and the consolidation of the steel structure of a hall for a warehouse*, CIB 2004, Brasov, Romania., pp. 409-414
12. Grecea, D., Stratan, A., Ciutina, A., Dubina, D., *Rotation capacity of MR beam-to-column joints under cyclic loading*, ECCS/AISC workshop: Connections in steel structures V: innovative steel connections, 2004, Amsterdam, Netherlands, http://www.bouwenmetstaal.nl/congres/congres_eccs_04/Grecea.pdf
13. Grecea, D., Dubina, D., *Cyclic rotation capacity of beam-to-column joints*, COST C12 action: Improvement of buildings structural quality by new technologies, A. A. Balkema publ, Netherlands, ISBN 0415366100, 2004, pp. 303-312
14. Dinu, F., Dubina, D., Grecea, D., *Partial q-factor values for performance based design of MR frames*, COST C12 action: Improvement of buildings structural quality by new technologies, A. A.Balkema publ, Netherlands, ISBN 0415366100, 2004, pp. 105-110

PhD THESIS

Florea Dinu, *Contributions to the study of moment-resisting steel frames with semirigid joints*, 30 January 2004, coordinator: Prof. Dan Dubina

OTHER RESULTS

- AICPS prize II 2004, for the design project of the BANC POST building
- Diploma of the Romanian Association of Engineers (AGIR) for the book *Structures located in high-seismicity areas*, Coordinators: Dan Dubina & Dan Lungu, Orizonturi Universitare Publishing House, Timisoara
- Excelence diploma in scientific research awarded to CEMSIG in 2004 by "Politehnica" University of Timisoara

- Participation to the activity of Technical Committee No. 10 (Structural connections) of the European Convention of Constructional Steelwork - ECCS (prof. Dan Dubina and prof. Daniel Grecea)
- Participation to the activity of Romanian Association for Standardisation (ASRO) Technical Committee 3.4.3 (prof. Dan Dubina)
- Participation to the activity of the Technical Committee S5 (Structures) of Ministry of Transportation, Construction and Tourism (prof. Dan Dubina)
- Member in Editorial Board of the International Journal "Steel and Composite Structures" (prof. Dan Dubina)

FURTHER DEVELOPMENTS

- Performance-based design of braced frames
- Dissipative bracing 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

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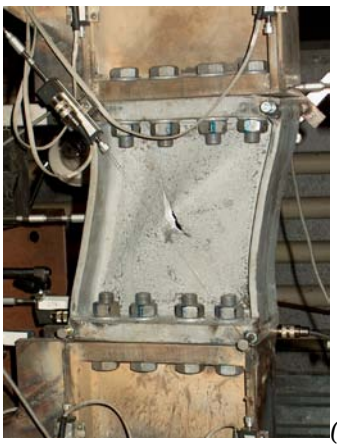
EXAMPLES

1. Removable links for eccentrically braced steel frames

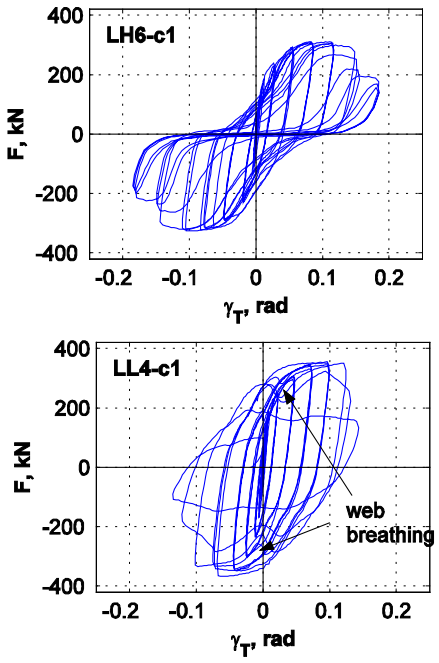
An experimental program was carried out to determine cyclic performance of bolted links and to check the feasibility of the solution. The following parameters were investigated: link length, stiffener spacing, and bolt preloading.

(a)



(b)

Failure modes of specimens LH6-c2 (a) and LL4-c1 (b).

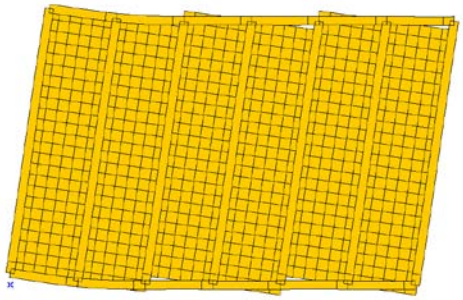


Force-displacement relationship for the specimens LH6-c1 and LL4-c1.

2. Experimental investigation of lateral load bearing characteristics of different wood-framed OSB-sheeted wall panels.

The investigation comprises: (1) experimental investigation of components judged to have a crucial role in determining the overall behaviour of wall-panels; (2) based on the experiments on components attempt to build a possibly simple Finite Element (FE) model to predict the response of the entire wall-panel; (3) monotonic and cyclic experiments on wall-panels; (4) comparison of the predicted FEM results with the experimentally obtained ones and (5) integration of the experimental results on wall-panels in the design of a house under earthquake loading.

Failure of corner specimen due to eccentricity



Deformation pattern of the wall panel by FEM

Full scale testing of wall-panel

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 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

- Experimental results on thin-walled compression members
- Experimental results on connections with self-drilling screws in thin steel sheets
- Experimental and numerical results on knee and ridge connections for light-gauge portal frames
- 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)
- 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)
- Resc. Muntean (Post-elastic capacity of Z purlins with overlapped joints)
- Post-graduate student Ruff Agnes (Shear walls from cold-formed steel cassettes)

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. 32940/2004 A, theme 9, 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: 390,000,000 ROL
2. Contract no. 32940/2004 TD, *Stability and ductility of light steel portal frames with class 3 and 4 cross-sections*, Financing authority / Beneficiary: CNCSIS, Value: 52,000,000 ROL
3. Bilateral Romanian-Greek cooperation contract 2003-2005, *Conservation and rehabilitation of historical buildings using light gage steel structures*, Financing authority / Beneficiary: Ministry of Education and Research, Value: 20,000 EUR
4. EUREKA E!3034 - SEFIE-RO, 30.07.2004 *Steelbiz as an E-forum for the implementation of the Eurocodes for steel construction*, Financing authority / Beneficiary: European Commission, Value: 60,000,000 ROL (total value: Eureka + private funds 4,435,000,000 ROL)
5. Contract no. 33047/22.06.2004, Theme 4, CNCSIS code 222. *Ductility of light-gauge steel structures*, Financing authority / Beneficiary: CNCSIS, Value: 70,000,000 ROL

BOOKS PUBLISHED

1. I. Vayas, D. Dubina, *Cold-formed steel design*, Kleidarithmos Publ. House, Athens, Greece, 2004, 640 pages, ISBN 960-209-730-2
2. D. Dubina (invited editor), *Cold-formed steel research advances in Central –Eastern Europe*, Thin–Walled Structures, Volume 42, Issue 2, Elsevier Applied Science, London, 2004, 149-349, 200 pages, ISSN 0263-9231
3. D. Dubină, V. Ungureanu, R. Zaharia, Zs. Nagy: *Design of light-gauge steel structures* (in Romanian), Vol. I., Ed. AMM, Lindab Collection, Bucharest, 2004, 256 pages, ISBN 973-86509-4-1

PUBLISHED PAPERS

1. Ungureanu, V., Dubina, D., *Recent research advances on ECBL approach. Part I: plastic–elastic interactive buckling of cold-formed steel sections*, Thin Walled Structures, 42(1), 2004, pp. 177-194
2. Szabo, I.F., Dubina D., *Recent research advances on the ECBL approach. Part II: interactive buckling of perforated sections*, Thin Walled Structures, 42(1), 2004, pp. 195-210
3. Fülöp, L.A., Dubina D., *Performance of wall-stud cold-formed shear panels under monotonic and cyclic loading: part I: experimental research*, Thin Walled Structures, 42(1), 2004, pp. 321-338
4. Fülöp, L.A., Dubina D., *Performance of wall-stud cold-formed shear panels under monotonic and cyclic loading: part II: numerical modelling and performance analysis*, Thin Walled Structures, 42(1), 2004, pp. 339-349
5. Ungureanu, V., Dubina, D., *Interaction between localised plastic modes and lateral-torsional buckling of thin-walled cold-formed steel beams*, 4th Int. Conf. on Coupled Instabilities in Metal Structures - CIMS'04, Rome, Italy, 27-29 Sept. 2004, pp. 237-246
6. Dubina, D., Cristutiu, I.M., *Buckling strength of pitched-roof portal frames of class 3 and class 4 tapered sections*, 4th Int. Conf. on Coupled Instabilities in Metal Structures - CIMS'04, Rome, Italy, 27-29 Sept, 2004, pp. 327-336
7. Dubina, D., Ungureanu, V., Rondal, J., *Numerical modelling and codification of imperfections for cold-formed steel members analysis*, Proc. of the Second Int. Conference on Steel & Composite Structures, Seoul, Korea, 2-4 Sept. 2004, pp. 206-223
8. Dubina, D., *Can be considered the thin-walled structures suitable to be used in seismic regions?*, Proc. of the Second Int. Conference on Steel & Composite Structures, Seoul, Korea, 2-4 Sept. 2004, pp. 83-101
9. Dubina, D., Stratan, A., Ciutina, A., Nagy, Z., *Experimental research on monotonic and*

cyclic performance of joints of cold formed pitched roof portal frames, Proc. of the Second Int. Conference on Steel & Composite Structures, Seoul, Korea, 2-4 Sept. 2004, pp. 130-132

10. Dubina, D., *Light gauge steel structures in seismic zones: recent advances and trends*, Thin-walled structures recent research advances and future trends in technology, Canopus Publish. Limited, ed. J. Loughlan, 2004, pp. 63-81
11. Dubina, D., Stratan, A., Ciutina, A., Fulop, L., Nagy, Z., *Monotonic and cyclic performance of joints of cold-formed steel portal frames*, Proc. of the 4th Int. Conf. on thin-walled structures, Loughborough, UK, 22-24 June 2004, pp. 381-389
12. Ungureanu, V., Dubina, D., *Post-elastic strength and ductility of cold-formed steel sections*, 4th Int. Conf. on thin-walled structures, Loughborough, UK, 22-24 June 2004, pp. 283-290
13. Dubina, D., Stratan, A., Ciutina, A., Fulop, L., Nagy, Z., *Performance of ridge and eaves joints in cold-formed steel portal frames*, Proc. of the 17th Int. Specialty Conf.: Recent advances and developments in cold-formed steel design and construction, Orlando, Florida, USA, 04-05 Nov. 2004, pp. 727-743
14. Dubina, D., Ungureanu, V., Fulop, L., Cristutiu, M., *Seismic performance of thin-walled building structures*, International Colloquium „Recent advances and new trends in structural design", 7-8 May 2004, Timisoara, Romania, pp. 343-356
15. Rondal, J., Dubina, D., Ungureanu, V., *Imperfections and computational modelling of cold-formed steel members*, International Colloquium „Recent advances and new trends in structural design", 7-8 May 2004, Timisoara, Romania, pp. 209-220
16. Fulop, L., Dubina, D., *Design criteria for seam and sheeting-to-framing connections of cold-formed steel shear panels*, Proc. of the 17th Int. Specialty Conference: Recent advances and developments in cold-formed steel design and construction, Orlando, Florida, USA, 04-05 Nov. 2004, pp. 743-760
17. Fulop, L., *Earthquake design of light framed houses using experimental results* (in Hungarian), EPKO 2004, June 5, Csíksomlyó, pp.113-123, EMT, ISBN 973-86852-1-4
18. Fulop, L., *Seismic behaviour of framed houses* (in Hungarian), Magyarország földrengésbiztonsága, Modellezés, méretezés. Széchenyi istván egyetem, 2004, November 4-5, pp. 91-101
19. Fulop, L.A., Dubina, D., *Load bearing capacity of light-gauge steel shear walls*, Improvement of building's structural quality by new technologies, outcome of the cooperative action, final scientific report, September 2004, ISBN 0415366100, pp. 491-496
20. Fulop, L.A., Dubina D., *Performance of screwed connections in light-gauge steel shear walls*, Improvement of building's structural quality by new technologies, outcome of the cooperative action, final scientific report, September 2004, ISBN 0415366100, pp. 497-502
21. Dubina, D., Stratan, A., Ciutina, A., Fulop, L., Nagy, Zs., *Monotonic and cyclic tests on cold-formed steel joints*, COST C12 Improving buildings structural quality by new technologies, April 23-24, 2004, Rzeszow, Poland, http://members.telering.at/geraldhuber/c12/
22. Georgescu, M, *Distortional instability of thin-walled cold-formed Z purlins in case of sandwich panel roofs*, CIMS 2004 - Rome, Italy, pp. 173-182

PhD THESIS

Iosif Szabo, *Study of Constructional Systems and Structural Performances of Steel Frames for Pallet Racks*, 13 February 2004, coordinator: Prof. Dan Dubina.

OTHER RESULTS

- Best Conference Paper for: *Monotonic and cyclic performance of joints of cold-formed steel portal frames*", by D. Dubina, A. Stratan, A. Ciutina, L. Fulop, Zs. Nagy, 4th Int. Conf. on Thin-Walled Strucutres, Loughborough, UK, 22-24 June 2004
- Award for the "Best 2003 PhD Thesis", awarded in 2004 to Ludovic Fulop by the Academy of Technical Studies, Timisoara Branch
- Distinction "Eminent Researcher" awarded to Ludovic Fulop by the "Orizonturi Universitare" Association
- Participation to the activity of Technical Committees No. 7 (Light Gauge Steel Structures) and 8 (Structural Stability) of the European Convention of Constructional Steelwork - ECCS (prof. Dan Dubina)

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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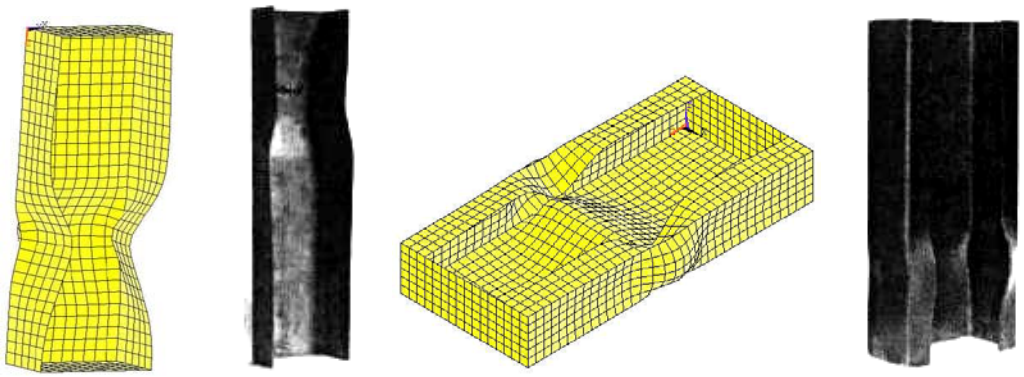
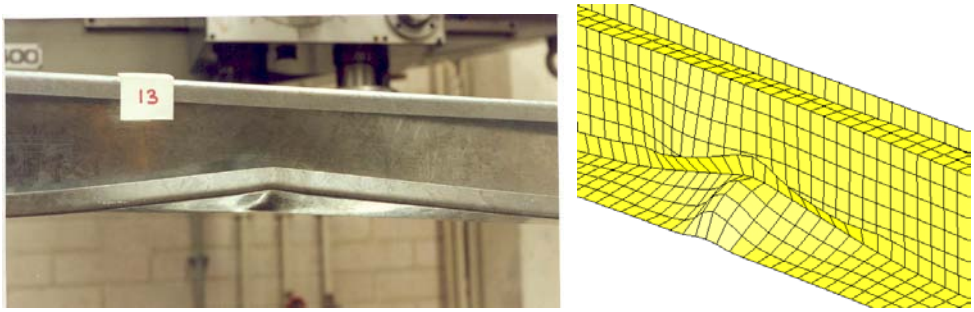
EXEMPLES

1. Post-elastic strength and ductility of cold-formed steel sections

Cold-formed steel sections are traditionally considered with no plastic capacity, and consequently non-ductile, mainly due to wall slenderness involving local instability phenomena. However, even they do not have sufficient plastic rotation capacity to form plastic hinges, they can form local plastic mechanisms. Figure 1 provides numerical and experimental evidences of plastic mechanism failure of cold-formed steel sections, both for members in compression and bending.



(a) members in compression



(b) members in bending

Numerical and experimental evidences of plastic mechanism failure

2. Component method for rafter-to-column connections of pitched roof-portal frames made of elements with variable section

The major scope of the research program is to study the behaviour of rafter-to-column connection for steel pitched-roof portal frames used for lightweight industrial steel buildings, having elements with variable cross section, and to find a proper way to design and check themExperimental tests on connections in thin-walled portal frames. Experimental program for determination of shear strength of screw connections in thin-walled plates.

Figure 1. Experimental setup

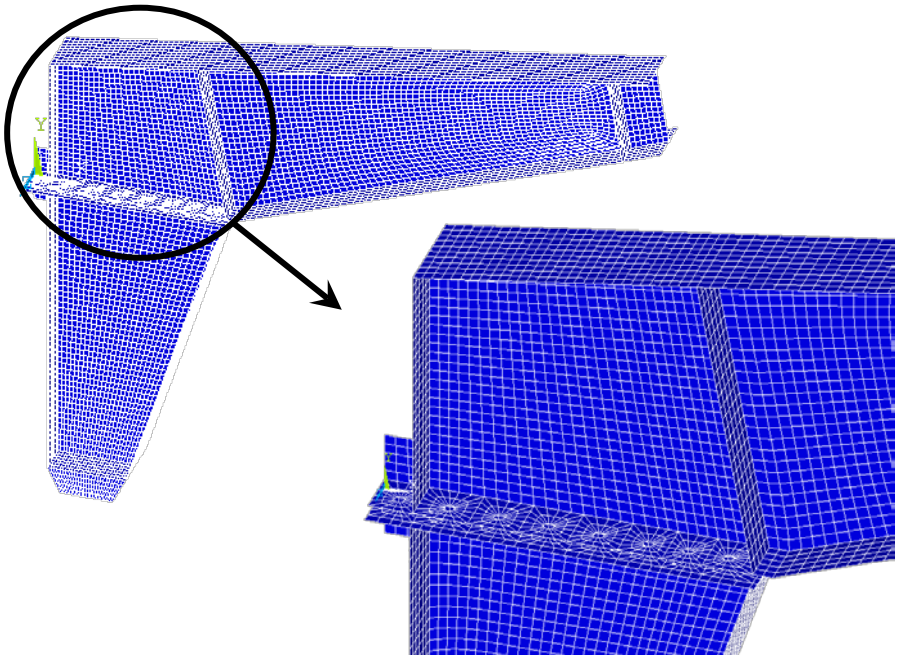
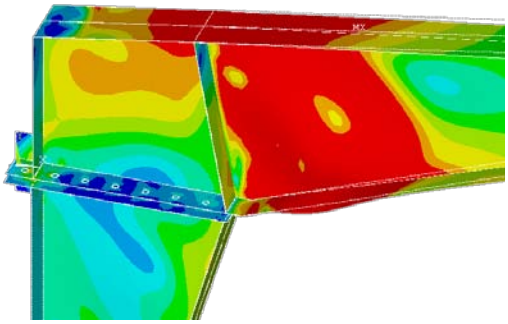
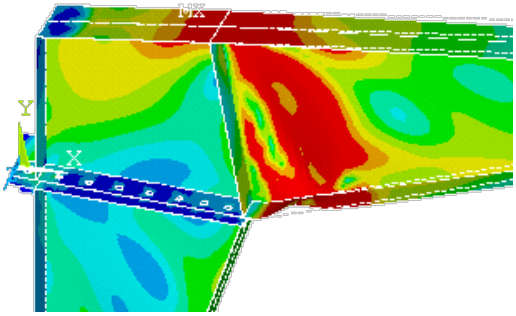


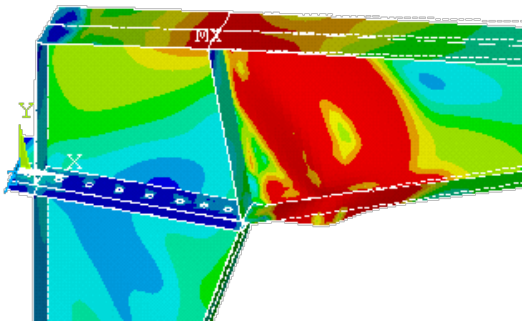
Figure 2. Finite element modelling



joint J2-3



joint J2-4



joint J3-4

Figure 3. Failure modes

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

CONTACT

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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 IUREȘ

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: *Alternative Methods for the Design of Reinforced Concrete Elements*, Director: Prof. dr. eng. Tudor CLIPII, Value: 135,000,000 ROL
2. CNCSIS National Grant: *High Performance Concretes*, Director: Prof. dr. eng. Iosif BUCHMAN, Value: 50,000,000 ROL
3. CNCSIS National Grant: *Rehabilitation of Reinforced Concrete Structures by using CFRP*, Director: Lecturer dr. eng. Sorin DAN, Value: 120,000,000 ROL
4. CNCSIS National Grant: *Evaluation of Beams Stiffness from Composite Steel – Concrete Frames in Seismic Regions*, Director: Assoc. prof. dr. eng. Agneta TUDOR, Value: 120,000,000 ROL
5. CNCSIS National Grant: *Experimental Tests on Reinforced Concrete Shear Walls Strengthened by Using CFRP*, Director: Assist. dr. eng. Tamas NAGY-GYORGY, Value: 96,000,000 ROL
6. CNCSIS National Grant: *Optimisation of Modern Composite Steel – Concrete Solutions for Structural Elements*, Director: Lecturer dr. eng. Daniel DAN, Value: 130,000,000 ROL
7. CNCSIS National Grant: *Low Shrinkage Concrete with Special Additives*, Director: Assist. eng. Liana IUREŞ, Value: 80,000,000 ROL

PUBLICATIONS

BOOKS

1. Gheorghe FĂGĂDAR-COSMA, *Chemistry – Laboratory Works. Second Edition*, Ed. EUROSTAMPA, Timişoara
2. Gheorghe FĂGĂDAR-COSMA, *Allgemeine Chemie*, Ed. EUROSTAMPA, Timişoara
3. Valeriu STOIAN, Tamas NAGY-GYORGY, Daniel DAN, Janos GERGELY, Cosmin DĂESCU, *Composites Materials for Constructions*, Ed. Politehnica, Timişoara
4. Eugen JEBELEAN, Corneliu BOB, *Superplasticizers in Concrete*, Ed. Orizonturi Universitare, Timişoara
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4. Făgădar-Cosma, E., Făgădar-Cosma, Ghe., *Studiul proprietăţilor chimice ale alchil şi arildiclorofosfinelor III nou compus heterociclic al fosforului obţinut din P-tolildiclorofosfină. Sinteză, caracterizare şi activitate biologică,* Revista de Chimie
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8. Făgădar-Cosma, E., Făgădar-Cosma, Ghe., Laichici, M., *Studies on the Synthesis, Characterization and Auxinic Behavior of 2-I-Propyl-3-Ethyl-3-Methyl-5-Methyl-1, 4, 2-Diazaphosphorine-2-Oxide,* Acta Chim. Slovenica
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15. Secula, S., Ianca, S., *Behaviour Diagram of Masonry Shear Walls,* Buletinul Ştiinţific al Universităţii "Politehnica" din Timişoara - seria Construcţii – Arhitectură
16. Nagy-Gyorgy, T., Stoian, V., Dan, D., *Polymers Reinforced Composite System for Strengthening of Structural Elements,* Buletinul Ştiinţific al Universităţii "Politehnica" din Timişoara - seria Construcţii – Arhitectură
17. Secula, S., *Remarks Regarding Behaviour Diagrams for Masonry Shear Walls,* Buletinul Ştiinţific al Universităţii "Politehnica" din Timişoara - seria Construcţii – Arhitectură
18. Dan, S., *Behaviour of Reinforced Concrete Structures Subjected to Seismic Impact,* Buletinul Ştiinţific al Universităţii "Politehnica" din Timişoara - seria Construcţii – Arhitectură
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23. Stăncuţa, S., Bob, C., *Time Behaviour of Finishing Slabs,* Ed. Universitară Transilvania, Lucrări Ştiinţifice, Noiembrie, 2004 – in Romanian
24. Iosip-Moţ, Ş., Brun, L., *New Methods and Technologies for Precast Constructions, Succesfull Experience in Timişoara,* Revista "Lumea Construcţiilor", Nr. 5, Decembrie 2004, Anul III, Nr. 1 – in Romanian
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Membrane Electrode Based On (5, 10, 15, 20-Tetraphenylporphyrinato) CO (III) Chloride, Proceedings of the 11th Symposium on Analytical and Environmental Problems" Szeged, Hungary, September 2004, Ed. Hungarian Academy of Sciences-Szab, Szeged, ISBN 963 217 147 0

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36. Bota, A., Ionesi, A., Terţiu, M., *Rehabilitation of Bridges for the Modern Tramway in Timisoara,* Simpozion Tehnologie şi Siguranţă, Cluj-Napoca - in Romanian

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38. Bota, A., *A New Structure with Embedded Girders,* Int. Symp. Reliability and Performance on Bridge & Transportation Infrastructure Engineering, Iasi

39. Luminiţa Fekete-Nagy, Sevastean Ianca, *The "Strut-And-Tie" Design Procedure for Reinforced Concrete Deep Beams Having an Opening,* "Modern Building Materials, Structures and Techniques" 8th Intrenational Conference, Vilnius, Lituania

40. Stoian, V., Dan, D., Moşoarcă, M., Nagy-Gyorgy, T., *Experimental Studies on Structural Elements,* Recent Advances and New Trends in Structural Design, Victor Gioncu Anniversary Colloquium, Timisoara

41. Nagy-Gyorgy T., Gergely, J., Dan, D., *Reinforced Concrete Structural Walls Retroffited with Composites,* International Conference in Civil Engineering and Architecture - Epko 2004, Miercurea Ciuc

42. Nagy-Gyorgy, T., Stoian, V., Gergely, J., *Structural Walls Retrofitting with Composites,* Conference in Earthquake Engineering - Design and Modelling, Gyor, Hungary

43. Jiva, C., Jebelean, E., Badea, C., *Time Behaviour and Tests on Concrete and Reinforcement from Existing Bridges,* Volum Sesiune Ştiinţifică CIB 30.10 - Braşov ISBN973-635-410-5 - in Romanian

44. Jiva, C., Niţă, D., *Strengthening of Bridges Structures by Over Casting of a Concrete Slab,* Volum Sesiune Ştiinţifică CIB 30.10 - Braşov ISBN973-635-410-5 - in Romanian

45. Jiva, C., *Observations Regarding Bridge Rehabilitation by Over Casting of a Concrete Slab,* Simpozion Tehnologie şi Siguranţă, Cluj-Napoca - in Romanian

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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.

PhD THESIS

1. Tamas NAGY-GYORGY, *Using of Polymer Composite Materials for Strengthening of Masonry and Reinforced Concrete Elements*
2. Cătălin BADEA, *Aspects Regarding the Using of Recyclable Waste for Producing New Construction Materials*

INVENTIONS

1. Gheorghe FĂGĂDAR, *Electrolizor pentru oxidarea etixantatului de sodium*
2. Gheorghe FĂGĂDAR, *Reactor pentru oxidarea electrochimica mediata a dextranului 2000-5000*

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.

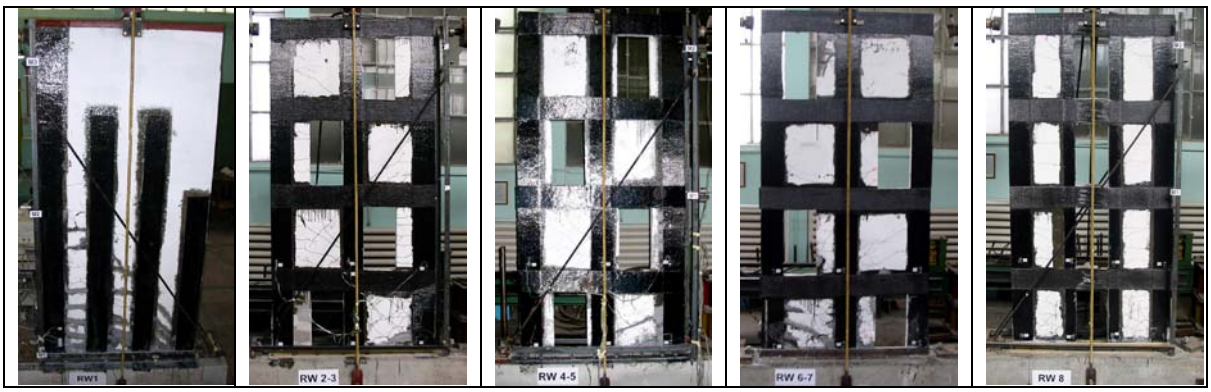
REMARKABLE ACHIEVEMENTS

1. New Construction Materials

Pavements elements made with fly ash

Masonry elements made with fly ash

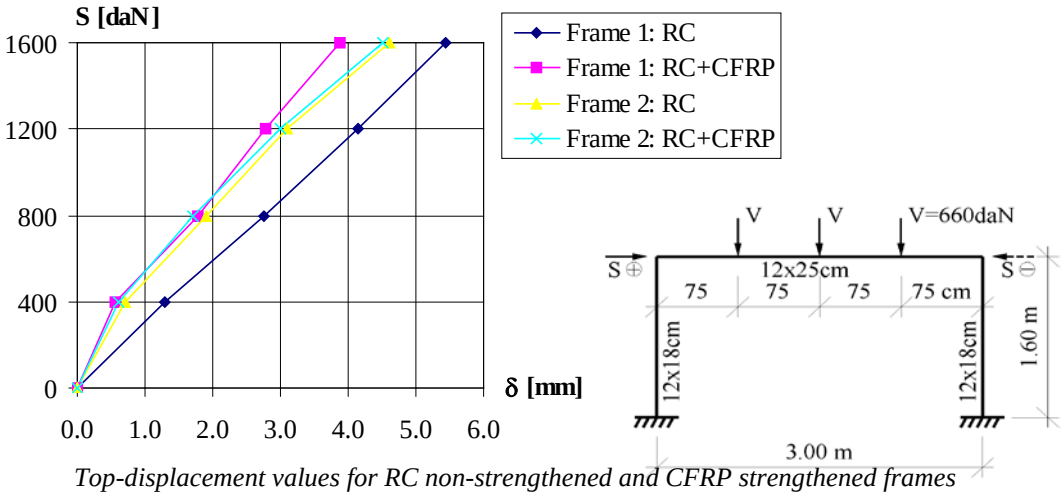
2. Rehabilitation of Reinforced Concrete Shear Walls by using CFRP



3. Rehabilitation of Reinforced Concrete Framed Structures with CFRP

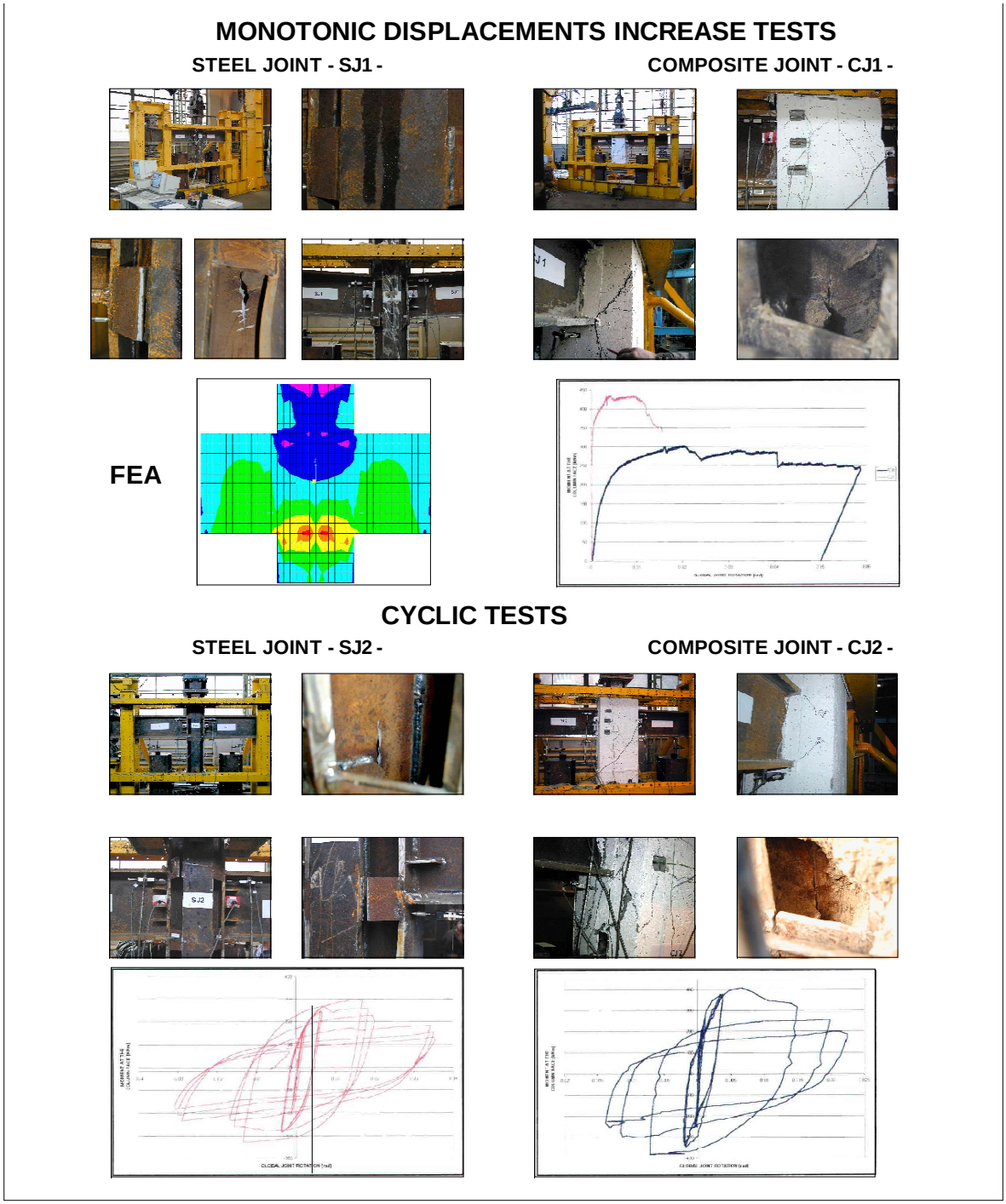
Damage of un-strengthened frame

RC frame + CFRP strengthening



Top-displacement values for RC non-strengthened and CFRP strengthened frames

4. Optimisation of Composite Steel-Concrete Building Structures in Seismic Areas



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

- ***Bridges and Large Span Structures***

Keywords: bridges, reticulated structures, large span, connections

- ***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 LEȚ
- Eng. Mihail STANCIU

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

1. Contract no. 32940/2004, theme no. 12, code 494: *Optimization of dynamic response of steel structures*, Financing authority / Beneficiary: CNCSIS. Value: 181,500,000 ROL
2. Order no. 1077/2004: *Experimental tests on steel specimens*, Financing authority/ Beneficiary: AEGEF GROUP LTD. Value: 27,350,000 ROL
3. Order no. 1312/2004: *Experimental tests on steel specimens*, Financing authority/ Beneficiary: ANDRONIC LTD. Value: 16,040,000 ROL

BOOKS PUBLISHED

1. Ivan, M., Ivan, A., *Analiza statică a structurilor*, Editura Orizonturi Universitare, Timişoara, ISBN 973-638-101-6, 2004

PUBLISHED PAPERS

1. Ivan, A., Ivan M., *Typical failure modes of some single layered reticulated shells,* International Colloquium-Recent advances and

new trends in structural design, Editura Orizonturi Universitare, Timişoara, 2004, pp. 145-154, ISBN 973 638 119 6

2. Ivan, A., Coupled Instabilities of Some Single Layered Reticulated Curved Shells, Proceedings of The Fourth International Conference on Coupled Instabilities in Metal Structures, CIMS2004, September 27-29, 2004, Rome, Italy

3. Ivan, A., *Colapsul plăcilor curbe reticulate prin instabilitate dinamică*, Preocupari actuale în construcţii metalice şi sudură, 2004, pp. 195-202, Editura Orizonturi Universitare, Timişoara, ISBN 973 638 140 4

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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

RESULTS

RESEARCH PROJECTS

Interface between LEICA Total station TCR 1100 and AUTOCAD 2002, Financing authority / Beneficiary: CNCCO. Value: (internal use) ROL

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 Constantin RĂDUICĂ
- 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

RESULTS

RESEARCH PROJECTS

Contract no. 65/2004: *Expertise and design checking for high schools in Arad county*, Financing authority/ Beneficiary: Local Council ARAD. Value: 300,000,000 ROL

BOOKS PUBLISHED

Dimoiu, I., *Earthquake Engineering*, Editura Orizonturi Universitare, Timişoara, ISBN 973-638-155-2, 2004

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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

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.

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*

STUDIES AND RESEARCHES REGARDING THE REALIZATION AND BEHAVIOR OF SOME ROAD SECTORS

FIELD DESCRIPTION

For performing modern asphaltic 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 asphaltic mixtures and of some new technologies in performing asphaltic 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 behaviour 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*

STUDIES AND 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

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.

CONTACT PERSON

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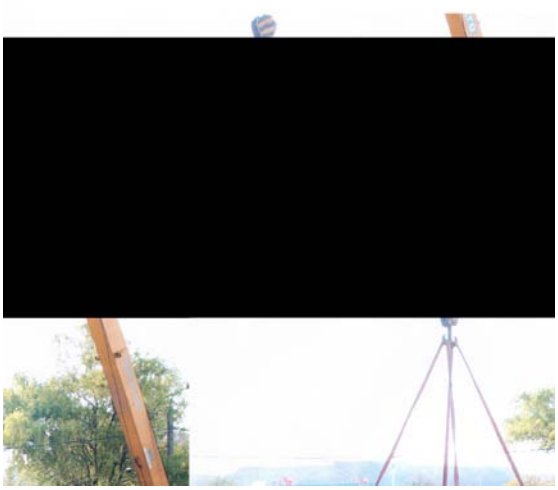
REMARKABLE ACHIEVEMENTS

Geotechnical reports and design of the foundation system for the floodlit illumination of the "Dan Păltinişan" Stadium in Timişoara

The difficult ground conditions, the high level of the underground water and the complex loading from the sustaining piers necessitates a comparative analysis, from the technical and economical point of view, for three different foundation systems: shallow foundations, caisson foundations and pile foundations. It was chosen the shallow foundation system, for which the reinforcements and casings were mounted on the asphalt platform near the foundation holes.



Reinforcements and casing

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

- 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. 0410 / 2004, *Extend study of water looses in the drinking water distribution network of Timisoara*, Beneficiary: AQUATIM Timişoara, Value: 45,000,000 ROL
2. Contract no. 140 / 2004, *Determination of coupling thermal degree between the temperatura sensors and registred temperatura for thermal heat cost alocator of different radiators*, Beneficiary: AEM Timişoara, Value: 55,000,000 ROL
3. Contract no. 109 / 2004, *Documentation in order to obtain the technical agreement for water filter typ W.F. Jumbo*, Beneficiary: INCERC Timişoara, Value: 40,920,000 ROL
4. Contract no. 135 / 2004, *Studies and documentation in order to obtain an examination certify CS for flushing cistern for toilet troys*, Beneficiary: INCERC Timişoara, Value: 19,040,000 ROL
5. Contract no. 0409 / 2004, *Determination of the functioning temperature of detectors for fire registration typ AMT*, Beneficiary: SIC KLITECHNIMA Timişoara, Value: 14,000,000 ROL
6. Contract no. 406 / 2003-2004, *Professional perfecting program of engineer for building services, in order to obtain the certification as energetically auditor in buildings*, Beneficiary: AIIR Timişoara, Value: 42,000,000 ROL
7. Contract no. 193 / 2004, *Extension of education and research spaces of Center for Documentation, Training and Technological Transfer of the "Politehnica" University of Timisoara*, Beneficiary U.P Timisoara, Value: 10,600,000 ROL

BOOKS

1. Retezan, A., Sârbu, I., Cinca, M. (ed.) Proceedings of the International Conference "*Building Equipment and Ambient Comfort*", Politehnica Publishing House, Timişoara, 2004, ISBN 973-625-140-3, 560 pages

PUBLISHED PAPERS

1. Sârbu, I., *Optimization model for water distribution systems design*, Journal of Water Engineering Research, Seoul, Korea, no. 3, 2004, pp. 191-199
2. Sârbu, I., *Nodal analysis of looped water supply networks*, Journal: Hydrotechnics, Bucharest, no. 4, 2004, pp. 16-24
3. Sârbu, I., *Calcul hydraulique géneralisé des canaux à l'écoulement permanent et uniforme*, Scientific Bulletin of the "Politehnica" University of Timişoara, 1-2/2004, pp. 119-130
4. Sârbu, I., *Utilization of heat produced by cooling installations*, J: Building Equipment Technique, Târgu Mureş, no.1, 2004, pp. 16-19
5. Kalmar,F., Sârbu, I., Halasz, E., *ACH Influence on energy balance in retrofitted buildings*, 25-th Conference of Air Infiltration and Ventilation Centre, Prague, 2004, pp. 121-129
6. Cinca, M., Bancea, O., *Calculus program for heating supply system analysis*, Scientific Bulletin of the Technical University of Debrecen, no. 2, 2004, pp. 11-23
7. Bancea, O., Cinca, M., *Study concerning thermal comfort in the transition periods depending on different heating systems*, Conference Environmental Friendly Building in Europe, Budapest, 2004, pp. 135-141

8. Popescu, D, Borza, I., *Computer simulated stability analysis for the automatic compensator*, Scientific Bulletin of Technical University of Bucharest, no. 1, 2004, pp. 8-14
9. Cinca, M., Avramovici, V. *Program for configuration heat supply systems*, Journal: Building Equipment Technique, no. 1, 2004, pp. 86-90
10. Retezan, A., Doboşi, I., Dună, Şt., Retezan, R., *Energetical aspect of building in Romania*, 35th Congres HVAC – Air refrigeration, Belgrade, vol. III, 2004, pp. 156-163
11. Chiriac, F., Retezan, A., Doboşi, I., Dună, Şt. *Energetical evolution – guarantee for functional comfort and safety in building*, SSTP 5-th International Conference High Tatra – Slovakia, 2004, pp. 263-268

CERTIFIED LABORATORY

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

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 systems
- development, 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 networks*
- 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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REMARKABLE ACHIEVEMENTS

Research room for comfort study

Research laboratory for different heating systems

RESEARCH TEAM: STEEL STRUCTURES AND BRIDGES

GENERAL PRESENTATION

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.

MAIN RESEARCH FIELDS

- ***General Concepts Regarding the Verification, Safety in Operation and Rehabilitation of Existing Steel Structures (Bridges)***

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

- ***Welded Structures Design Principles***

Keywords: choice of material, calculus, EC 3 – principles, fracture mechanics.

Researches in *GENERAL CONCEPTS REGARDING THE VERIFICATION, SAFETY IN OPERATION AND REHABILITATION OF EXISTING STEEL STRUCTURES (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 fracture toughness and crack growth rate.
- Analytical investigations on remaining fatigue life of existing steel bridges.
- Development of a procedure to assess the safety in operation of existing steel 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, *Rehabilitation of existing highway steel bridges*

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.
- Consulting and rehabilitation of steel bridges

RESULTS

RESEARCH PROJECTS

DAAD – Grant: "Die Methodik zur Bestimmung der Restsicherheit am Beispiel bestehender Stahlbrücken in Rumänien", Value: 10,000 €

BOOKS

Petzek, E., *Safety in Operation and Rehabilitation of Existing Steel Bridges*, Mirton Publishing House, Timişoara, 2004, 122 pages, ISBN 973-661-289-9 (published in Romanian)

PUBLISHED PAPERS

1. Băncilă, R., Petzek, E., *General Concepts Regarding the Safety in Operation and Rehabilitation of Steel Bridges*, 5th International Conference on Bridges across the Danube, 2004 / Bridge in Danube Basin, Novi Sad, 2004
2. Băncilă, R., Petzek, E., Prahoveanu, A., *Loading Capacity of an Old Representative Cantilever Highway Bridge (Gerber System) over the Mures River in Arad (Danube Basin)*, 5th International Conference on Bridges across the Danube, 2004 / Bridge in Danube Basin, Novi Sad, 2004
3. Bolduş, D., Bolduş, B., Băncilă, R., *Analysis of Dinamic Behaviour under Traffic Loads of a Strengthened Old Steel Bridge,* 5th International Conference on Bridges across the Danube, 2004 / Bridge in Danube Basin, Novi Sad, 2004
4. Petzek, E., Băncilă, R., *The determination of crack growth rate for existing steel bridges"*, Journal BID-ISIM, ISSN 1453-0392, 4/2004
5. Petzek, E., Băncilă, R., Kosteas, D., *The Determination of Crack Growth Rate for Old Riveted Steel Bridges*, Proceedings of the International Symposium, Computational Civil Eng., Ed. Societăţii Acad. Matei Teiu Botez, ISBN 973-7962-50-8, 2004, Iaşi

PhD THESIS

Edward Petzek, *Safety in operation and Rehabilitation of Steel Bridges*, defended February 2004, coordinator: Prof. dr. eng. Radu Băncilă &

Prof. dr. eng. Dimitris Kosteas (TU München - Germany)

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.
- The necessity of rehabilitation of highway steel bridges – exemplification on Traian Bridge , Arad, Romania, Grant CNCSIS 1579.

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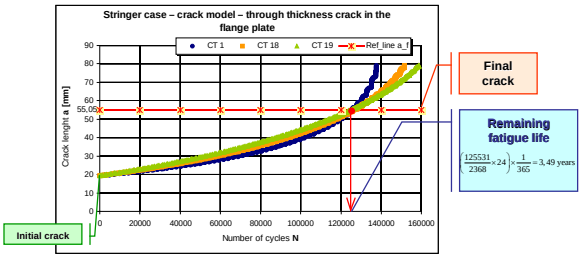
EXEMPLES

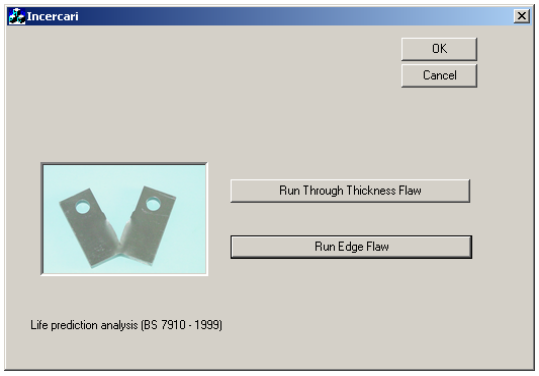
Case study – the old riveted railway steel bridge in Arad over the Mureş River (Danube basin)

Arad Bridge



Crack length vs. no. of cycles – Case Study Bridge in Arad

For an accessible appliance of the method of fatigue assessment of structural elements a programme was created in Visual C++ v.6; this programme can simulate the crack propagation rate and calculate the number of cycles needed in order that the fracture can take place.



Life prediction program – main window

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.

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*

RESEARCH OFFERS

- Commentaries to the chapter welded connection of the EC3
- Calculus of welds
- Choice of material for welded structures

RESULTS

PUBLISHED PAPERS

1. 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, Editura SUDURA Timisoara, ISBN 973-8359-27-9

OTHER RESULTS

- Working examples to the chapter welding joints of the EC-3

FURTHER DEVELOPMENTS

- Master course: International Management of the Quality for Welded Steel Structures

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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. *Load plate tests on fills*, Beneficiary: S.C. CONSTRUCTII FEROVIARE S.A. TIMISOARA, Value: 140,000,000ROL

Team: Prof. dr. eng. Virgil HAIDA
Lect dr. eng. Cristina VOICU
Assist. eng. Monica MIREA

2. *Load plate tests on fills from Vulcanization Hall for Automotive Products Timisoara*, Beneficiary S.C. CONSTRUCTII FEROVIARE S.A. TIMISOARA, Value: 150,000,000 ROL

Team: Assoc. prof. dr. eng. Petru MIHU
Prof. dr. eng. Virgil HAIDA
Assist. eng. Monica MIREA

3. *Geotechnical investigations for Highway section*, Beneficiary S.C. TERRASOND S.A., Value: 357,000,000 ROL

Team: Assoc. prof. dr. eng. Petru BOLDUREAN
Assoc. prof. dr. eng. Ion BOGDAN
Assist. eng. Alexandra CIOPEC

4. *Bearing capacity testing for the foundations of the roads, parking places and platforms from Selgros Supermarket***,** Beneficiary: SELGROS**,** Value: 40,000,000 ROL

Team: Assoc. prof. dr. eng. Petru PANTEA
Assoc. prof. dr. eng. Gheorghe BELEA
Prof. dr. eng. Marin MARIN

PUBLICATIONS

BOOKS

1. Haida, V, Marin M, Mirea Monica, *Soils Mechanic*, Orizonturi Universitare Publishing House, Timisoara, 2004, ISBN: 973-6381056, 315 pages, (published in Romanian)
2. Belea, Gh., *Descriptive Geometry*, Politehnica Publishing House, 2004; ISBN 973-6251411, 188 pages, (published in Romanian)

PUBLISHED PAPERS

1. Marin, M, *Local soil conditions influence upon seismic response of the constructions in Timişoara area*, X-th National Conference of Soil Mechanics and Foundations, 16-18 September 2004, Bucharest, 4 pages
2. Voicu, C., Haida, V., *Considerations regarding geotechnical factors influence upon the durability of roads in the Banat plain area*, X-th National Conference of Soil Mechanics and Foundations, 16-18 September 2004, Bucharest, 8 pages
3. Marin, M, *Foundation system for lighting system of "Dan Păltinişan" Stadium in Timişoara*, X-th National Conference of Soil Mechanics and Foundations, 16-18 September 2004, Bucharest, 6 pages
4. Mirea, M., Haida, V., Marin, M., *Experimental study regarding centrically loaded semispherical foundations influence area pointing out* , X-th National Conference of Soil Mechanics and Foundations, 16-18 September 2004, Bucharest, 6 pages
5. Pantea, P., Marin, M., *Foundation solutions for Timişoara Regional Business Center*, X-th National Conference of Soil Mechanics and Foundations, 16-18 September 2004, Bucharest, 4 pages
6. Belea, Gh., Marin, M., Belea, D., *Foundation system consolidation for a building placed on a fill*, X-th National Conference of Soil Mechanics and Foundations, 16-18 September 2004, Bucharest, 4 pages
7. Haida, V., Bancea, C., Costescu, C., *Roadbads consolidation on DN 65 C Craiova – Horezu*, National Conference «In situ behavior of constructions», Bucharest Sept. 2004, 6 pages
8. Haida, V, Mihu, P., Voicu, C., Costescu, C., *The consolidation for an earth sliding on DJ 665*, National Conference «In situ behavior of constructions», Bucharest, Sept. 2004, 6 pages

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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 behaviour 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 behaviour 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 behaviour*
- Chemist dr. Ileana STELEA: *asphalt mixtures, road investigations, operation behaviour*

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.

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. *Converging Solutions for the Limitation of Congestion and the Pollution Impact of the Traffic in Large Urban Areas*, Beneficiary: SC IPA S.A. Company for Research, Design and Manufacturing of Automatic Equipment and Devices, Value: 50,000,000 ROL

Team: Prof. dr. eng. Gheorghe LUCACI
Prof. dr. eng. Ion COSTESCU
Prof. dr. eng. Florin BELC
Lecturer dr. eng. Attila GONCZI
Eng. Verner STEFANESCU
Assoc. prof. dr. eng. Dumitru IANCULUI

2. *Heavy repair on DJ 571 Mocoviste-Ciuchici km40+350…42+150*, Value: 105,000,000 ROL

Team: Prof dr. eng. Victor DOANDES
Lect. dr. eng. Cornel BANCEA

3. *Periodical field investigation works for traffic observation of the experimental sectors RO-LTPT.-TIMIŞOARA*, Beneficiary: CESTRIN Bucharest, Value: 234,000,000 ROL

Team: Chem. dr. eng. Ileana STELEA

4. *Phisical mechanical terting of materials, road binders, asphalt mixtures with binders drown from the road structure*, Value: 440,000,000 ROL

Team: Prof. dr. eng. Ion COSTESCU

5. *Dosages cecking for hydrocarbon pavement mixtures and binding graded aggregates*, Beneficiary: STRABAG AG RF ILRO S.R.L. BUCHAREST, Value: 50,000,000 ROL

Team: Lect. dr. eng. Cornel BANCEA
Assist. eng. Ciprian COSTESCU

PUBLICATIONS

PUBLISHED PAPERS

1. Costescu, C., *Considerations regarding the traffic of vehicles on streets in the dweling areas*, UPT Bulletin, 2004, 6 pages
2. Herman, A., *Railway line Ramnicu Valcea - Valcele*, Building and Arhitecture Symposion Miercurea Ciuc, June 2004 , 6 pages
3. Herman, A., *Derailment mechanics of the wheel*, IIIrd Railway Symposium Bucharest, Sept. 2004, 4 pages
4. Herman, A., *Derailment mechanics of the arbor*, Railway Symposium Bucharest, Sept. 2004, 4 pages
5. Herman, A., *Derailment mechanics of the two arbor wagon*, Railway Symposium Bucharest, Sept. 2004, 4 pages

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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

RESEARCH PROJECTS

1. *Geotechnical report and topo-cadastral speicifcations for ANL buildings construction Str. Ovidiu Balea Timişoara* Beneficiary: Primaria Timisoara, Value: 798,000,000 ROL, Team: Assoc. prof. dr. eng. Carmen GRECEA, Assist. eng. Sorin HERBAN, Assist. eng. Cosmin MUŞAT

PUBLISHED PAPERS

1. Grecea C, Baciu A, *The influence of multipath error upon positioning precision for a point using the GPS system 4th Cadastral* Symposium GeoCAD , May 2004, Alba Iulia, Romania 8 pages

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RESEARCH TEAMS IN ARCHITECTURE

MAIN RESEARCH FIELDS

- History of urbanism and its applications in contemporary design.

Keywords: urban design, urbanism, urban network, settlement, city

- Forms, symbols and representation methods.

Keywords: symbol, architectural form, geometry, ecotecture, alternative form

- Integrated protection of the built patrimony in Romania.

Keywords: protection, built patrimony, historical monuments, sites and zones, rehabilitation, restoration

- Architecture and urbanism in Banat county.

Keywords: traditional architecture, vernacular, typology, integration

- Historical and critical evaluation of modern architecture.

Keywords: space, functionalism, modular, environment

Researches in *HISTORY OF URBANISM AND ITS APPLICATIONS IN CONTEMPORARY DESIGN*

FIELD DESCRIPTION

Historical researches of human settlements in order to detect the rules of urban development. Studies of urban structures.

ACTIVITIES

Solutions to increase the quality of urban projects. Collaboration in different categories of urban plans.

RESEARCH TEAM

Prof. dr. arh. Teodor Octavian Gheorghiu
Dr. arh. Radu Radoslav

PUBLICATIONS

BOOKS

Radoslav, R., *About urbanism*, Brumar Publ. House, Timisoara, 2004, ISBN: 937-602-071-1, 154 pages

PUBLISHED PAPERS

1. Gheorghiu, T.O., *The urban history as infrastructure of the contemporary villeggiatura patrimony. Case study: The West seaside of the Black Sea*, The partimony of the villeggiatura architecture in Romania, Second international workshop, Constanţa, 2004
2. Gheorghiu, T.O., *Planimetrical and archeological data, as basis for the study of Rumanian cities of Wallachia and Moldavia,* conference "Architecture – restoration – archeology", Bucharest, 2004
3. Gheorghiu, T. O., *Urban morphological and structural typologies in Wallachia and Moldavia between the 15-16th centuries. Case study for Moldavia during the reighn of Steven the Great*, Historia Urbana, 2004
4. Gheorghiu, T. O., *Morphological and structural elements concerning the medieval town of Suceava. Its genesis and evolution till the 16th century*, Historia Urbana, 2004.

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Researches in *FORMS, SYMBOLS AND REPRESENTATION METHODS*

FIELD DESCRIPTION

Study of the relationship between the architectural form and its structural and functional determination. Search to detect the expressive qualities of the architectural form.

ACTIVITIES

Theoretical contributions in the design of urban environment. Appliance in architecture, urban and interior design.

RESEARCH TEAM

Prof. dr. arh. Cristian Dumitrescu
Assoc. prof. dr. arh. Smaranda Bica
Assist. arh. Dragoş Bocan
Assist. arh. Cătălina Bocan

PUBLICATIONS

BOOKS

1. Bica, S. M., *Churches of the 20th century*, Mirton Publ. House, Timisoara, 2004, ISBN 973-661-412-3, 96 pages

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Researches in *INTEGRATED PROTECTION OF THE BUILT PATRIMONY IN ROMANIA*

FIELD DESCRIPTION

Study of the buildings and urban zones with a high architectural and historical value. Detect forms and possibilities of protection.

ACTIVITIES

Archives of information about the buildings and zones of architectural interest. Analyse of the damages produced by different causes. Proposals of rehabilitation and prevention.

RESEARCH TEAM

Prof. dr. arh. Teodor Octavian Gheorghiu
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Lecturer dr. arh. Liliana Roşiu
Arh. Doina Antoniuc

PUBLISHED PAPERS

1. Bica, S. M., Roşiu, L., *Fortified Saxon churches of the South of Transylvania*, Colloqui internazionali "Castelli e citta fortificate", Salerno, 2004
2. Roşiu, L., Bica, S. M., *The fortified citadels in Romania and the relation with the contemporary city*, Colloqui internazionali "Castelli e citta fortificate", Salerno, 2004
3. Roşiu, L, *Architecture of Lipova. Spa or villeggiatura center?*, The partimony of the villeggiatura architecture in Romania, Second international workshop, Constanţa, 2004

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Researches in *ARCHITECTURE AND URBANISM IN BANAT COUNTY*

FIELD DESCRIPTION

Researches in architectural and urban history of cities and villages in Banat. Search for historical monuments and sites in the county.

ACTIVITIES

Inventory of the valuable aechitecture in order to propose methods of their integration in the contemporary life.

RESEARCH TEAM

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Lecturer dr. arh. Liliana Roşiu
Assist. arh. Alfred Schwalie
Assist. arh. Ramona Pascu

PUBLISHED PAPERS

Roşiu, L., *Components of architectural interest from the Timişoara water supply system,* Industrial archeology – international workshop, Baia Mare, 2004

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Researches in *HISTORICAL AND CRITICAL EVALUATION OF MODERN ARCHITECTURE*

FIELD DESCRIPTION

Study of the sources of modern architecture in relationship with a critical overview of the contemporary tendencies.

ACTIVITIES

Projects and theoretical contributions to the contemporary architectural development.

RESEARCH TEAM

Assoc. prof. dr. arh. Ioan Andreescu
Assoc. prof. dr. arh. Vlad Gaivoronschi
Assist. arh. Marius Miclăuş

PUBLISHED PAPERS

1. Gaivoronschi, V., *A house in the Martirilor zone, Timişoara,* Arhitectura, nr. 30, 2004, pp. 32–35
2. Gaivoronschi, V., *The house at the limit*, Igloo, nr. 27, 2004, pp. 6–12
3. Gaivoronschi, V., *The house between landscapes*, Arhitext Design, nr. 9, 2004, pp. 34–38
4. Gaivoronschi, V., *Arrangement of the Andreescu & Gaivoronschi agency in Timişoara,* Arhitext Design, nr. 9, 2004, pp. 90–96
5. Gaivoronschi, V., *Romtelecom agency in Bucharest*, Arhitectura, nr. 10, 2004, pp.18–21

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