
FACULTY OF CIVIL ENGINEERING



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GENERAL PRESENTATION

CEMSIG research centre was founded in 1999, and was accredited in 2001 by National University Research Council (CNCSIS) as Centre of Excellence. In 2006 it was reaccredited as Centre of Excellence, being the only such centre at the Politehnica University of Timisoara and one of the two excellence centres accredited in the field of engineering in Romania. Significant achievements in past years included participation to the IC15-CT96-0201/1997 European project COPERNICUS (FP4) "RECOs" - "Reliability of Moment Resistant Connections of Steel Building Frames in Seismic Areas", and the World Banc/CNCSIS project C16 "Reliability of Buildings Located in Strong Seismic Areas in Romania". Currently, the FP6 project "Earthquake protection of historical buildings by reversible mixed technologies", CEEX MATNANTECH "Structural systems and advanced technologies for structures from high-performance steels for buildings located in high-seismicity areas - STOPRISC" and RFCS "Steel solutions for seismic retrofit and upgrade of existing constructions - STEELRETRO" projects are underway. The master course "New technologies and structures for construction" is closely connected to the CEMSIG research centre. Members of the research centre are actively involved in teaching and tutoring of master student research.

OBJECTIVES

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

Developing and diversifying of consulting activity and industry oriented research in partnership with national and international private companies.

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, fire, impact, explosions, performance-based design, moment-resisting frames, eccentrically braced frames, connections, ductile materials, high-performance steel

- *Light gauge steel structures*

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

- *Sustainable building design and technology*

Keywords: sustainability, environment, energy consumption, technological solutions, life-cycle

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

FIELD DESCRIPTION

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

ACTIVITIES

- Use of high-performance steel for earthquake-resistant multistorey steel structures.
- Strengthening of existing masonry and reinforced concrete buildings with steel-based reversible mixed technologies.

- Fire resistance of steel and composite steel-concrete structures.
- Experimental investigation of buckling-restrained braces.
- Drafting of the National Annex to EN 1993-1-4 (Eurocode 3: Design of steel structures - Part 1-4: General rules - Supplementary rules for stainless steels)
- Drafting of the National Annex to EN 1994-1-1 (Eurocode 4: Design of composite steel and concrete structures – Part 1-1: General rules and rules for buildings) and EN 1994-1-2 (Eurocode 4: Design of composite steel and concrete structures – Part 1-2: General rules - Structural fire design)
- Drafting of the National Annex to EN 1999-1-2 (Design of aluminium structures - Part 1-2: Structural fire design)

RESEARCH TEAM

- Prof. Dan Dubina, PhD., Dr.HC., FIStructE (Steel and composite steel-concrete structures and characterisation of their response under exceptional actions)
- Prof. Daniel Grecea, PhD (Performance-Based Design, beam-column joints in moment-resisting frames, rehabilitation of existing buildings)
- Assoc.Prof. Raul Zaharia, PhD (Fire design, High-Performance Steel)
- Assoc.Prof. Florea Dinu, PhD (Performance-Based Design, High-Performance Steel)
- Sen.lect. Aurel Stratan, PhD (Earthquake-resistant steel structures, dual structures, eccentrically braced frames)
- Sen.Lect. Adrian Ciutina, PhD (Steel and composite structures)
- PhD student Adrian Dogariu (Strengthening of masonry and reinforced concrete structures with steel materials)
- PhD student Sorin Bordea (Strengthening of masonry and reinforced concrete structures with steel materials)
- PhD. student Nicolae Muntean (Welded and bolted connections realised using high-strength steel)
- PhD. student Calin Neagu (Seismic performance of structures with steel plate shear walls)
- PhD. student Gelu Danku (Plastic rotation capacity of composite steel-concrete members and connections)

- PhD. student Norin Filip-Vacarescu (Seismic performance of steel concentrically braced frames equipped with friction dampers)

RESEARCH OFFERS

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

RESULTS

RESEARCH PROJECTS

1. FP6 INCO-CT-2004-509119 / 2004-2008 *Earthquake protection of historical buildings by reversible mixed technologies*, Financing authority / Beneficiary: European Union, Value: 30,432 EUR (Total value: 182,854 EUR)
2. RFCS-CT-2007-00050 STEELRETRO / 01.07.2007-31.06.2010 *Steel solutions for seismic retrofit and upgrade of existing constructions*, Financing authority / Beneficiary: European Commission - Research Fund for Coal and Steel, Value: 19,490 EUR (Total value: 87,600 EUR)
3. DIFISEK RFCS-CT-2007-00030, 01.07.2007. *Dissemination of structural fire safety engineering knowledge throughout Europe*. Financing authority / Beneficiary: European Union, Value: 722,941 EUR (Total value: 722,941 EUR)
4. 29/10.10.2005, 2005-2008. CEEEX MATNANTECH: *Structural systems and advanced technologies for structures from high- performance steels for buildings located in high-seismicity areas - STOPRISC*, Financing authority: Ministry of Research and Education, Value: 116,200RON (Total value: 1,369,400 RON)
5. 1434/27.04.2006: 2006-2008 CEEEX-ET, *Dual steel structures with removable dissipative elements for buildings located in seismic areas*, Financing authority: Ministry of Research and Education, Value:10,715 RON (Total value: 139,500 RON)
6. 04/15.09.2006., 2006-2008 *Advanced training and research interdisciplinary platform "Centre for advanced studies and research in material and structural engineering"*. Financing authority / Beneficiary: Ministry of

Education and Research. Value: 693,500 RON
(Total value: 2,250,000 RON)

7. TD-407. *Solutions for consolidation and rehabilitation of masonry and reinforced concrete buildings placed in seismic areas using metallic materials.* Beneficiary: UEFISCSU, Value: 12,925 RON (Total Value: 15,670 RON)
8. 300/2007. *Drafting of the National Annex to EN 1993-1-4,* Financing authority / Beneficiary: MDLPL (Ministry of Regional Development and Housing). Value: 85,000 RON
9. 301/2007. *Drafting of the National Annex to EN 1994-1-1 and EN 1994-1-2,* Financing authority / Beneficiary: MDLPL (Ministry of Regional Development and Housing). Value: 90,000 RON
10. 303/2007. *Drafting of the National Annex to EN 1999-1-2,* Financing authority / Beneficiary: MDLPL (Ministry of Regional Development and Housing). Value: 65,000 RON
11. 90CP/I/14.09.2007. *Structural assessment laboratory for large scale tests,* Financing authority: ANCS, Value: 1,422,000 RON (Total value: 1,998,000 RON)
12. TD-55. *The study of dual frames with buckling restrained bracings.* Beneficiary: UEFISCSU, Value: 24,870 RON (Total Value: 42,440 RON)
13. 798/2007. *Evaluation of the rail and steel structure of the coal extracting machines M2, M3, M4a, M4b.* Beneficiary: SC Complex Energetic Rovinari SA, Value: 690,200 RON

BOOKS PUBLISHED

1. Frannsen, J.M., Zaharia, R.: *Calculul constructiilor metalice la actiunea focului.* Orizonturi Universitare, Timisoara, 2008, ISBN 978-973-638-360-1, 144 p. (in Romanian).
2. Mazzolani, F., Mistakidis, E., Borg, R.P., Byfield, M., De Matteis, G., Dubina, D., Indirli, M., Mandara, M., Muzeau, J.P., Wald, F., Wang, Y. (Editors): *Urban Habitat under Catastrophic Events,* Proceedings of the International Symposium "Urban Habitat Constructions under Catastrophic Events", University of Malta, 22-23 October 2008, ISBN 978-99909-44-42-6, 518 p.
3. Dubina, D., Ungureanu, V. (Eds.) *Structuri metalice amplasate în zone seismice - Preocupări actuale.* Zilele Academice Timisene, Timisoara, 25 mai 2007. Editura

Orizonturi Universitare, Timișoara, 2008. ISBN 978-973-638-377-9, 235 p.

PUBLISHED PAPERS

1. Dubina, D., Stratan, A., Dinu, F.: *Dual high-strength steel eccentrically braced frames with removable links.* Earthquake Engineering & Structural Dynamics, 2008, Vol. 37, issue 15, ISSN 0098-8847, pp. 1703-1720.
2. Ciutina, A., Dubina, D.: *Column web stiffening of steel beam-to-column joints subjected to seismic actions.* Journal of Structural Engineering, 2008, vol 134, n 3, 2008, ISSN 0733 – 9445, pp. 505-511.
3. Zaharia, R., Taucer, F.: *Equivalent period and damping for EC8 spectral response of SDOF ring-spring hysteretic models.* JRC Scientific and Technical Reports, 2008, EUR 23365EN-2008, ISSN 1018-5593, 66 p.
4. Ciutina, A., Dogariu, A.: *Performanțele conectorilor la încărcări ciclice.* Acta Technica Napocensis. Section: Civil Engineering – Architecture, 2008, Nr. 51, vol. 1, 2008, ISSN 1221-5848, pp. 335-345.
5. Dubina, D., Bordea, S., Stratan, A.: *Seismic upgrading of reinforced concrete moment-resisting frame with dissipative buckling restrained steel braces.* Acta Technica Napocensis. Section: Civil Engineering – Architecture, 2008, Nr. 51, vol. 1, 2008, ISSN 1221-5848, pp. 353-360.
6. Dubina, D., Dinu, F., Stratan, A.: *Performance based analysis of high strength steel building frames under seismic actions.* Acta Technica Napocensis. Section: Civil Engineering – Architecture, 2008, Nr. 51, vol. 1, 2008, ISSN 1221-5848, pp. 361-372.
7. Dubina, D., Muntean, N., Stratan, A., Grecea, D., Zaharia, R.: *Performance of moment-resisting joints of high-strength steel components.* Acta Technica Napocensis. Section: Civil Engineering – Architecture, 2008, Nr. 51, vol. 1, 2008, ISSN 1221-5848, pp. 373-384.
8. Dubina, D., Dinu, F., Stratan, A.: *Proiectarea bazată pe criterii de performanță a structurilor metalice pentru clădiri înalte amplasate în zone seismice: metodologie și studiu de caz.* AICPS Review, 2008, nr. 1-2/2008, ISSN 1454-928X, pp. 124-130
9. Dubina, D., Stratan, A., Dinu, F., Grecea, D., Muntean, N., Zaharia, R.: *Structuri în cadre multietajate realizate în sistem dual-steel: cerințe de performanță și program experimental.* AICPS Review, 2008, nr. 1-2/2008, ISSN 1454-928X, pp. 39-52.

10. Pinte D., Zaharia, R., Stratan, A., Dubina, D.: *Scenariul „foc după cutremur” pentru clădiri multietajate cu structură metalică*. AICPS Review, 2008, nr. 1-2/2008, ISSN 1454-928X, pp. 53-60.
11. Dogariu, A.: *Masonry walls strengthened with metal sheathing: FEM modelling*. Scientific Bulletin of the "Politehnica" University of Timisoara, Transactions on Civil Engineering and Architecture, 2008, Tomul 53 (67), Fascicola I, 2008, ISSN 1224-6026, pp. 5.
12. Ciutina A.: *Cyclic Performances of Shear Connectors*. Scientific Bulletin of the "Politehnica" University of Timisoara, Transactions on Civil Engineering and Architecture, 2008, Vol. 53 (67) No. 1, 2008, ISSN 1224-6026, pp. 57-67.
13. Muntean, N., Stratan, A., Dubina, D.: *Experimental evaluation of strength and ductility performance of weld details and T-stub bolted connections between high-strength and mild carbon steel*. Scientific Bulletin of the "Politehnica" University of Timisoara, Transactions on Civil Engineering and Architecture, 2008, Vol. 53 (67) No. 1, 2008, ISSN 1224-6026, pp. 45-55.
14. Zaharia R, Pinte D, Dubina D: *Fire after earthquake - study considering natural fire*. Scientific Bulletin of the "Politehnica" University of Timisoara, Transactions on Civil Engineering and Architecture, 2008, Vol. 53 (67) No. 2, 2008, ISSN 1224-6026, p. 10.
15. Dinu, F., Bordea, S. Dubina, D.: *High strength steel dual frames with buckling restrained V braces*. Scientific Bulletin of the "Politehnica" University of Timisoara, Transactions on Civil Engineering and Architecture, 2008, Vol. 53 (67) No. 1, 2008, ISSN 1224-6026, pp. 67-72.
16. Bordea, S., Stratan, A., Dubina, D.: *Performance based evaluation of a non-seismic RC frame strengthened with buckling restrained braces*. COST C26 Urban Habitat Constructions under Catastrophic Events, 2008, Proceedings of the International Symposium "Urban Habitat Constructions under Catastrophic Events", Malta, 22-23 October 2008, COST Action C26, Editors: Mazzolani, Mistakidis, Borg, Byfield, De Matteis, Dubina, Indirli, Mandara, Muzeau, Wald, Wang, ISBN 978-99909-44-40-2, pp. 241-246
17. Dinu, F., Dubina, D.: *Response of high rise steel buildings as a result of column loss*. COST C26 Urban Habitat Constructions under Catastrophic Events, 2008, Proceedings of the International Symposium "Urban Habitat Constructions under Catastrophic Events", Malta, 22-23 October 2008, COST Action C26, Editors: Mazzolani, Mistakidis, Borg, Byfield, De Matteis, Dubina, Indirli, Mandara, Muzeau, Wald, Wang, ISBN 978-99909-44-42-6, pp. 277-282
18. Dogariu, A., Dubina, D.: *Performance of masonry shear walls strengthened with steel and aluminium sheeting*. COST C26 Urban Habitat Constructions under Catastrophic Events, 2008, Proceedings of the International Symposium "Urban Habitat Constructions under Catastrophic Events", Malta, 22-23 October 2008, COST Action C26, Editors: Mazzolani, Mistakidis, Borg, Byfield, De Matteis, Dubina, Indirli, Mandara, Muzeau, Wald, Wang, ISBN 978-99909-44-40-2 , pp. 229
19. Dogariu, A., Dubina D. & Campitiello, F., De Matteis, G.: *FEM Modeling Masonry Shear Walls strengthened with metal sheating* . COST C26 Urban Habitat Constructions under Catastrophic Events, 2008, Proceedings of the International Symposium "Urban Habitat Constructions under Catastrophic Events", Malta, 22-23 October 2008, COST Action C26, Editors: Mazzolani, Mistakidis, Borg, Byfield, De Matteis, Dubina, Indirli, Mandara, Muzeau, Wald, Wang, ISBN 978-99909-44-40-2 , pp. 235
20. Dubina, D., Dinu, F. Stratan, A.: *Seismic resistant dual steel / dual frames: Performance based analysis of structural effectiveness*. COST C26 Urban Habitat Constructions under Catastrophic Events, 2008, Proceedings of the International Symposium "Urban Habitat Constructions under Catastrophic Events", Malta, 22-23 October 2008, COST Action C26, Editors: Mazzolani, Mistakidis, Borg, Byfield, De Matteis, Dubina, Indirli, Mandara, Muzeau, Wald, Wang, ISBN 978-99909-44-42-6, pp. 187-192
21. Faggiano, B, Esposto, M, Zaharia, R, Pinte D: *Risk management in case of fire after earthquake*. COST C26 Urban Habitat Constructions under Catastrophic Events, 2008, Proceedings of the International Symposium "Urban Habitat Constructions under Catastrophic Events", Malta, 22-23 October 2008, COST Action C26, Editors: Mazzolani, Mistakidis, Borg, Byfield, De Matteis, Dubina, Indirli, Mandara, Muzeau, Wald, Wang, ISBN 978-99909-44-40-2, pp. 75
22. Faggiano, B, Esposto, M, Zaharia, R, Pinte D: *Structural analysis and design in case of fire after earthquake*. COST C26 Urban Habitat Constructions under Catastrophic Events, 2008, Proceedings of the International Symposium "Urban Habitat Constructions

- under Catastrophic Events", Malta, 22-23 October 2008, COST Action C26, Editors: Mazzolani, Mistakidis, Borg, Byfield, De Matteis, Dubina, Indirli, Mandara, Muzeau, Wald, Wang, ISBN 978-99909-44-40-2, pp. 81
23. Pinteau, D, Zaharia, R, Kaliske, M, Kaklauskas, G, Bacinkas, D, Gribniak, V, Torok, A, Hajpal, M: *Mechanical properties of materials*. COST C26 Urban Habitat Constructions under Catastrophic Events, 2008, Proceedings of the International Symposium "Urban Habitat Constructions under Catastrophic Events", Malta, 22-23 October 2008, COST Action C26, Editors: Mazzolani, Mistakidis, Borg, Byfield, De Matteis, Dubina, Indirli, Mandara, Muzeau, Wald, Wang, ISBN 978-99909-44-40-2, pp. 28
 24. Pinteau, D, Zaharia, R, Kaliske, M, Kaklauskas, G, Bacinkas, D, Gribniak, V, Torok, A, Hajpal, M: *Thermal properties of materials*. COST C26 Urban Habitat Constructions under Catastrophic Events, 2008, Proceedings of the International Symposium "Urban Habitat Constructions under Catastrophic Events", Malta, 22-23 October 2008, COST Action C26, Editors: Mazzolani, Mistakidis, Borg, Byfield, De Matteis, Dubina, Indirli, Mandara, Muzeau, Wald, Wang, ISBN 978-99909-44-40-2, pp. 34
 25. Stratan, A., Dubina, D.: *Removable bolted links for eccentrically braced frames*. COST C26 Urban Habitat Constructions under Catastrophic Events, 2008, Proceedings of the International Symposium "Urban Habitat Constructions under Catastrophic Events", Malta, 22-23 October 2008, COST Action C26, Editors: Mazzolani, Mistakidis, Borg, Byfield, De Matteis, Dubina, Indirli, Mandara, Muzeau, Wald, Wang, ISBN 978-99909-44-40-2, pp. 181-186
 26. Stratan, A., Dubina, D.: *Selection of time-history records for dynamic analysis of structures*. COST C26 Urban Habitat Constructions under Catastrophic Events, 2008, Proceedings of the International Symposium "Urban Habitat Constructions under Catastrophic Events", Malta, 22-23 October 2008, COST Action C26, Editors: Mazzolani, Mistakidis, Borg, Byfield, De Matteis, Dubina, Indirli, Mandara, Muzeau, Wald, Wang, ISBN 978-99909-44-40-2, pp. 123-128
 27. Ciutina, A., and Stratan, A.: *Monotonic and cyclic behaviour of shear connectors*. EUROSTEEL 2008, 5th European Conference on Steel and Composite Structures - Graz, Austria, 2008, Proc. of the 5th European Conference on Steel and Composite Structures EUROSTEEL 2008, 3-5 September, Graz, Austria. R. Ofner, D. Beg, J. Fink, R. Greiner, H. Unterweger (Eds)., ISBN 92-0147-000-90, pp. 261-266
 28. Dinu, F., Bordea, S. Dubina, D.: *High strength steel dual frames of dissipative buckling restrained inverted V braces*. EUROSTEEL 2008, 5th European Conference on Steel and Composite Structures - Graz, Austria, 2008, Proc. of the 5th European Conference on Steel and Composite Structures EUROSTEEL 2008, 3-5 September, Graz, Austria. R. Ofner, D. Beg, J. Fink, R. Greiner, H. Unterweger (Eds)., ISBN 92-0147-000-90, pp. 1413-1418
 29. Dubina, D., Dinu, F. and Stratan A.: *Performance based evaluation seismic response of Bucharest Tower Center International*. EUROSTEEL 2008, 5th European Conference on Steel and Composite Structures - Graz, Austria, 2008, Proc. of the 5th European Conference on Steel and Composite Structures EUROSTEEL 2008, 3-5 September, Graz, Austria. R. Ofner, D. Beg, J. Fink, R. Greiner, H. Unterweger (Eds)., ISBN 92-0147-000-90, pp. 1317-1322
 30. Dubina, D., Muntean, N., Stratan A., Grecea, D. and Zaharia R.: *Testing program to evaluate behaviour of dual steel connections under monotonic and cyclic loading*. EUROSTEEL 2008, 5th European Conference on Steel and Composite Structures - Graz, Austria, 2008, Proc. of the 5th European Conference on Steel and Composite Structures EUROSTEEL 2008, 3-5 September, Graz, Austria. R. Ofner, D. Beg, J. Fink, R. Greiner, H. Unterweger (Eds)., ISBN 92-0147-000-90, pp. 609-614
 31. Zaharia, R, Pinteau D., Dubina, D.: *Fire after earthquake, a natural fire approach*. EUROSTEEL 2008, 5th European Conference on Steel and Composite Structures - Graz, Austria, 2008, Proc. of the 5th European Conference on Steel and Composite Structures EUROSTEEL 2008, 3-5 September, Graz, Austria. R. Ofner, D. Beg, J. Fink, R. Greiner, H. Unterweger (Eds)., ISBN 92-0147-000-90, pp. 1065
 32. Arsene, V., Negoescu, C. Dubina, D. Dinu, F. Stratan, A. Ciutina, A.: *Conception des bâtiments à étages associant l'acier à d'autres matériaux: Projet "Bucharest Tower Center"*. L'acier dans la construction moderne, Timisoara, 13-15 oct. 2005, Colloque International, 2eme edition, 2008, A. Ciutina and A. Lachal (Eds), Editura Politehnica, Timisoara. , ISBN 978-973-625-682-0, p. 27-39.
 33. Ciutina, A., Stratan, A., Lachal, A.: *Moyens d'essai et de calcul antisismique en laboratoire*. Colloque international – 2eme

- edition "L'acier dans la construction moderne. L'acier dans la construction moderne, Timisoara, 13-15 oct. 2005, Colloque International, 2eme edition, 2008, A. Ciutina and A. Lachal (Eds), Editura Politehnica, Timisoara. , ISBN 978-973-625-682-0, pp. 161-179
34. Dinu, F., Gh. Dima: *Presentation de la structure Bricostore Orchideea Bucharest. L'acier dans la construction moderne*, Timisoara, 13-15 oct. 2005, Colloque International, 2eme edition, 2008, A. Ciutina and A. Lachal (Eds), Editura Politehnica, Timisoara. , ISBN 978-973-625-682-0, 2008, pp. 181-189
 35. Dubina, D., Ciutina, A.: *Evolutions normatives dans le contexte européen. L'acier dans la construction moderne*, Timisoara, 13-15 oct. 2005, Colloque International, 2eme edition, 2008, A. Ciutina and A. Lachal (Eds), Editura Politehnica, Timisoara. , ISBN 978-973-625-682-0, p. 13-26
 36. Gioncu, V., Grecea, D.: *Calcul et conception des ossatures en acier en zone sismique. L'acier dans la construction moderne*, Timisoara, 13-15 oct. 2005, Colloque International, 2eme edition, 2008, A. Ciutina and A. Lachal (Eds), Editura Politehnica, Timisoara. , ISBN 978-973-625-682-0, pp. 115-130
 37. Pintea, D., Zaharia, R., Stratan, A., Dubina, D.: *Fire after earthquake. STRUCTURES IN FIRE 2008*, 2008, Proceedings of the Fifth International Conference, 28-30 May, Singapore, ISBN 978-981-08-0767-2, pp. 324
 38. Zaharia, R., Dubina, D., Pintea, D.: *Application of advanced calculation models for fire design in Romania. STRUCTURES IN FIRE 2008*, 2008, Proceedings of the Fifth International Conference, 28-30 May, Singapore, ISBN 978-981-08-0767-2, pp. 606
 39. Dubina, D., Stratan, A., Muntean, N., Dinu, F.: *Experimental program for evaluation of moment beam-to-column joints of high strength steel components*. Proceedings of the Sixth International Workshop "Connections in Steel Structures VI", June 22–25, 2008, Chicago, USA. Ed. R. Bjorhovde, F.S.K. Bijlaard, L.F. Geschwindner, ISBN, pp. 355-366
 40. Dubina, D., Stratan, A., Muntean, N., Grecea, D.: *Dual steel T-Stub behaviour under monotonic and cyclic loading*. Proceedings of the Sixth International Workshop "Connections in Steel Structures VI", June 22–25, 2008, Chicago, USA. Ed. R. Bjorhovde, F.S.K. Bijlaard, L.F. Geschwindner, ISBN, pp. 185-196
 41. Bordea, S.: *Seismic Upgrade of RC MR Frames with dissipative BR Steel Braces*. 7th international PhD Symposium in Civil Engineering, 2008, CD, ISBN CD Conference Proceedings, Cap. 13, pp.3
 42. Ciutina A.: *Comportamentul diverselor tipuri de conectori sub încărcări monotone și ciclice alternante*. Zilele Academice Timisene, Timisoara, 25 mai 2007, Structuri metalice amplasate în zone seismice - preocupări actuale. Ed. D. Dubina, V. Ungureanu. Editura Orizonturi Universitare, Timișoara., ISBN 978-973-638-377-9, 2008, pp. 171-183
 43. Dinu, F., Stratan, A., Dubina, D.: *Analiza avansată a structurii Tower Center International din București*. Zilele Academice Timisene, Timisoara, 25 mai 2007, Structuri metalice amplasate în zone seismice - preocupări actuale. Ed. D. Dubina, V. Ungureanu. Editura Orizonturi Universitare, Timișoara., ISBN 978-973-638-377-9, 2008, pp. 21-28
 44. Dubina, D., Dinu, F., Stratan, A., Muntean, N., Zaharia, R., Ungureanu, V., Grecea, D.: *Utilizarea oțelurilor de înaltă performanță în structura de rezistență a clădirilor multietajate amplasate în zone cu risc seismic ridicat: studii de eficiență și program experimental*. Zilele Academice Timisene, Timisoara, 25 mai 2007, Structuri metalice amplasate în zone seismice - preocupări actuale. Ed. D. Dubina, V. Ungureanu. Editura Orizonturi Universitare, Timișoara., ISBN 978-973-638-377-9, 2008, pp. 89-106
 45. Grecea, D., Bordea, S., Stratan, A., Dogariu, A., Dubina, D.: *Soluții moderne pentru consolidarea și reabilitarea clădirilor amplasate în zone seismice*. Zilele Academice Timisene, Timisoara, 25 mai 2007, Structuri metalice amplasate în zone seismice - preocupări actuale. Ed. D. Dubina, V. Ungureanu. Editura Orizonturi Universitare, Timișoara., ISBN 978-973-638-377-9, 2008, pp. 141-156
 46. Cristuțiu, I.M., Dubina, D.: *Factori de comportare la acțiunea seismică a cadrelor parter cu secțiuni variabile de clasă 3 și 4*. Zilele Academice Timisene, Timisoara, 25 mai 2007, Structuri metalice amplasate în zone seismice - preocupări actuale. Ed. D. Dubina, V. Ungureanu. Editura Orizonturi Universitare, Timișoara., ISBN 978-973-638-377-9, 2008, pp. 107-116

ONGOING PhD THESES

- Calin Neagu: *Seismic performance of steel building frames of dissipative shear walls*, PhD supervisor Prof. Dan Dubina
- Gelu Danku: *Development of plastic zones and evaluation of rotation capacity in composite steel-concrete members and connections*, PhD supervisor Prof. Dan Dubina
- Mihai Muțiu: *Structural configurations, functional and technical-economical parameters of steel-framed buildings*, PhD supervisor Prof. Dan Dubina
- Nicolae Muntean: *Behaviour of connections of realised from high-strength steel subjected to seismic loading*, PhD supervisor Prof. Dan Dubina
- Norin Filip-Vacarescu: *Seismic performance of steel centrally braced frames equipped with friction dampers*, PhD supervisor Prof. Dan Dubina
- Sorin Bordea: *Dual frame systems with buckling-restrained braces*, PhD supervisor Prof. Dan Dubina

OTHER RESULTS

- ERASMUS programmes promoting student and teaching staff mobility with INSA-Rennes, University Blaise Pascal of Clermont-Ferrand, Athens, Naples, Salerno and University of Liege
- Organisation of the seminar "Design of structures for fire resistance", Timisoara, December 12, 2008.
- Membership in the European Programme COST C26: *Urban Habitat Constructions under Catastrophic Events*. Two members of the CEMSIG research center (Dan Dubina and Florea Dinu) are members in the management committee of the COST C26 programme.
- Membership in the European Programme COST TU0601: Robustness of Structures.
- 2nd award at the contest "Technical book 2008" organised by the General Association of the Engineers in Romania (AGIR) the book "Behaviour of composite steel-concrete structures and their connections" by Adrian Ciutina.
- 1st award at the contest for young researchers organised within CEE X MATNANTECH program for the presentation of Nicolae Muntean.
- 1st award at the contest "Technical book 2008" organised by the General Association of the Engineers in Romania (AGIR) the book

"Structural dynamics and earthquake engineering" by Aurel Stratan.

- Bilateral Romanian-Greek research program (2006-2008): *Strengthening and rehabilitation of historical buildings by reversible technologies*(UPT coordinator: *sen.lect. Aurel Stratan*). Financing authority / Beneficiary: Ministry of Research and Education.

FURTHER DEVELOPMENTS

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

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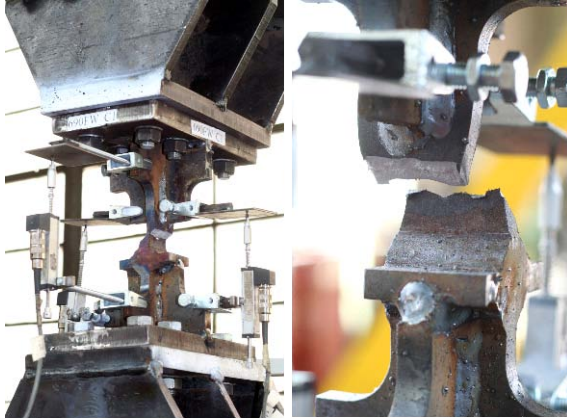
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EXAMPLES

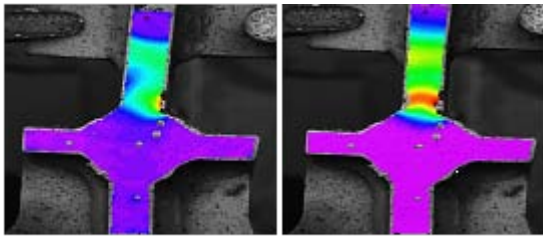
1. CEE X MATNANTECH project: *Structural systems and advanced technologies for structures from high- performance steels for buildings located in high-seismicity areas – STOPRISC.*

Seismic resistant building frames designed as dissipative structures must allow for plastic deformations in specific members, whose behaviour has to be predicted by proper design. Dual steel structural systems, optimized according to a

Performance Based Design Philosophy, in which high strength steel is used in "elastic" members and connection components, while mild carbon steel in dissipative members, can be very reliable and cost effective. Based on this idea, a targeted testing program on the purpose to evaluate the performance of moment resisting joints of high strength steel and mild carbon steel components, under monotonic and cyclic loading was carried out.



Tests on welded specimens

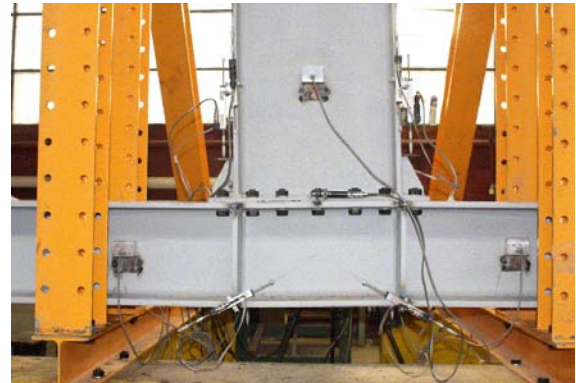


Strain measurements using image correlation algorithms



Failure mode of a T-stub specimen by end-plate bending

The objective of the experimental program was to study the performance of welded and bolted end-plate beam to column joints realized from two different steel grades. The experimental program consisted in tests on materials, welded components, T-stub components, and beam to column joints.



Experimental test of a beam-column bolted joint specimen



Close-up view of a beam-column bolted joint specimen

2. Development and experimental validation of buckling restrained braces

The research was carried out within the following projects: STEELRETRO "Steel solutions for seismic retrofit and upgrade of existing constructions", PROACTEX "Structural systems and innovative technologies for protection of buildings under extreme actions taking into account sustainable design criteria", and TD-55 "The study of dual frames with buckling restrained bracings".

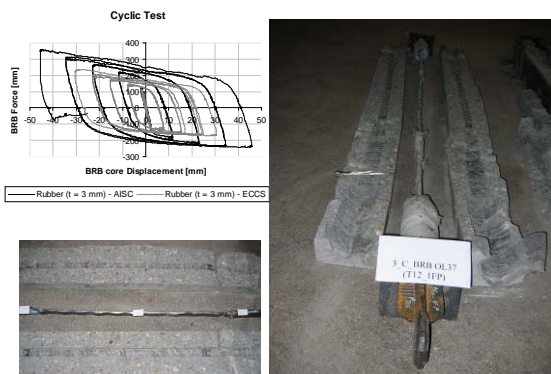
Reinforced concrete moment resisting frames in severe, or even moderate seismic zones designed for gravity loads only in the past are in need for seismic rehabilitation in order to comply with modern seismic design requirements. Seismic upgrading of this type of structures using Buckling Restrained Bracing systems (BRB) is investigated.



Principal steps of manufacturing BRB



BRB cyclic test



Results of BRB cyclic test

The main effect of the dissipative bracing system is the improvement of overall strength, stiffness and ductility.

Buckling restrained bracing systems are characterised by the ability of the elements to have the same behaviour at compression as in tension. This behaviour is obtained by restraining the buckling of the steel core by a steel tube infilled with aggregates, mortars or concrete. In this way the core absorbs the loads and by yielding it dissipates seismic energy.

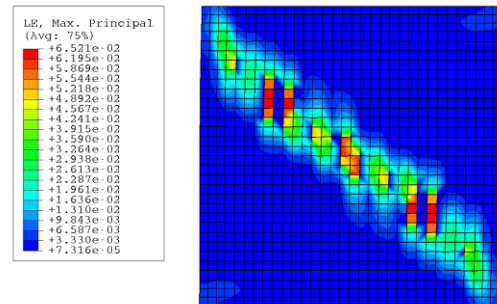
The BRB system was developed in Japan, where it was applied on over 200 buildings in the last 10 years. Since the BRB system was introduced in USA, they were applied in more than 15 projects.

In present, the strengthening of non-seismic reinforced concrete frames with dissipative bracing system is examined. For this purpose the BRB element was tested in order to prove its functionality.

3. PROHITECH project: Earthquake protection of historical buildings by reversible mixed technologies.

In the frame of FP6 PROHITECH project, innovative solutions for seismic consolidation of historical masonry buildings were proposed and developed. These solutions were developed in order to accomplish two major demands: first to be easily removable and second to use mixed technologies. Numerical investigations have been performed with

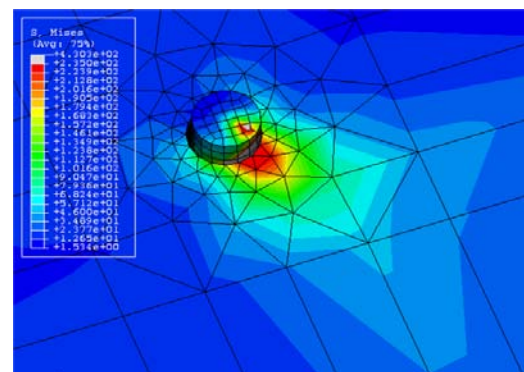
ABAQUS code in case of retrofitted panels using an innovative technique based on sheeting the walls with metallic plates.



Logarithmic strain in masonry panel at 11mm

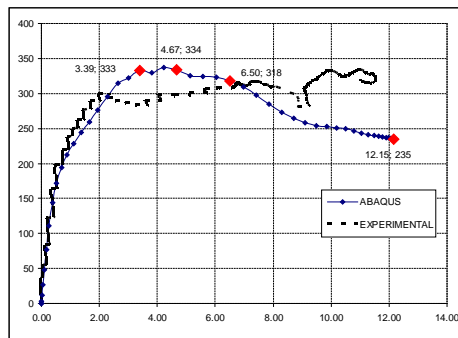


Experimental failure mode



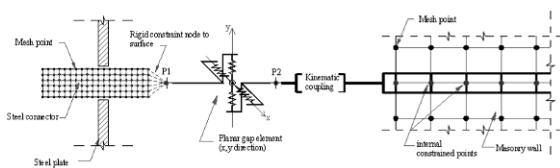
Von Mises stress in steel plate at 11 mm displacement

Assuming a Concrete Damage Plasticity material model for the retrofitted masonry panel a new and complete finite element model has been developed. This model was built referring to the real geometry of the system (1.5x1.5x0.25 m masonry wall, 2 mm thickness of the steel plate).



General shear-displacement behaviour of the system

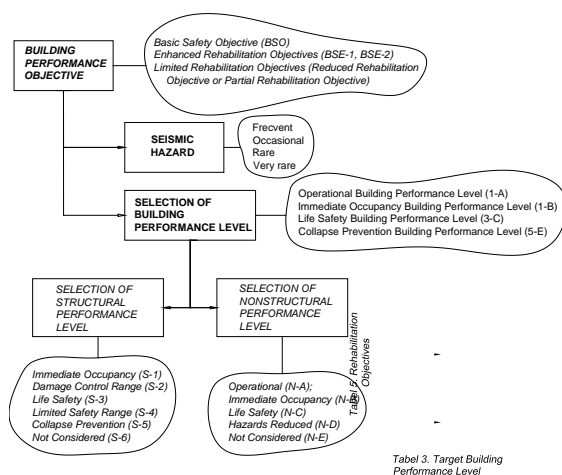
Some simplifications were used: the link between connector and masonry was introduced as a planar spring for which the constitutive law was experimentally determined.



Modelling strategy for the connector

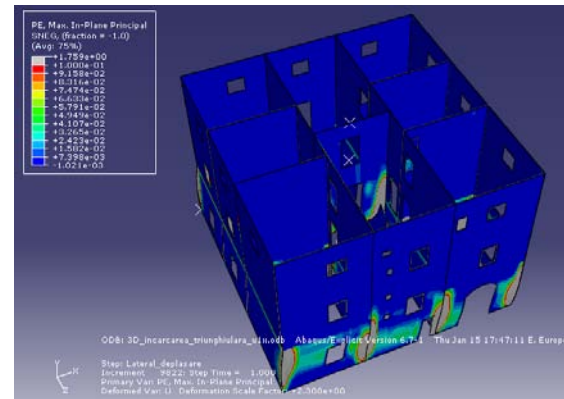
4. STEELRETRO project Steel solutions for seismic retrofit and upgrade of existing constructions:

A comprehensive report was realised in the frame of the project on "Development of a performance based methodology for existing building and its application to retrofit or upgrading systems actually used in European seismic countries".



Tabel 3. Target Building Performance Level

Also, advanced numerical simulations in order to realise performance based seismic assessment of an existing masonry building were carried out.



Plastic strain and failure mode of a masonry building

Research 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 sensitivity 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 light-gauge steel structures, instability problems and connecting technology and performance have to be carefully managed. These problems are even more important in case of structures located in seismic areas, such as Romania.

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

ACTIVITIES

- Seismic performance of pitched-roof portal frames with elements of class 3 and 4 cross-sections.
- 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., Dr.HC., FIStructE (Light gauge steel structures)
- Assoc.prof. Mircea Georgescu, PhD (Stability of cold-formed steel members)
- Assoc.prof. Raul Zaharia, PhD (Connections in cold-formed steel structures)
- Assoc.prof. Daniel-Viorel Ungureanu, PhD (Buckling of thin-walled cold-formed members)
- Lect. Ionel-Mircea Cristutiu (Lightweight steel portal frames)
- PhD. student Nicolae Muntean (Post-elastic capacity of Z purlins with overlapped joints)
- PhD. student Andrei Crisan (Cold formed structures for racks)

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. 299/2007 *Drafting of the National Annex to EN 1993-1-3*, Financing authority / Beneficiary: MDLPL (Ministry of Regional Development and Housing). Value: 85,000 RON
2. 302/2007 *Drafting of the National Annex to EN 1993-1-6*, Financing authority / Beneficiary: MDLPL (Ministry of Regional Development and Housing). Value: 130,000 RON
3. 304/2007 *Drafting of the National Annex to EN 1999-1-5*, Financing authority / Beneficiary: MDLPL (Ministry of Regional Development and Housing). Value: 90,000 RON

PUBLISHED PAPERS

1. D. Dubina: *Behavior and performance of cold-formed steel-framed houses under seismic action*. Journal of Constructional Steel Research, 2008, Volume 64, Issue 7-8, ISSN 0143-974X, pp. 896-913.
2. Dubina, D.: *Structural analysis and design assisted by testing of cold-formed steel structures*. Thin-Walled Structures, 2008, Volume: 46, Issue 7-9, ISSN 0263-8231, pp. 741-764.

3. Georgescu, M., Ungureanu, V.: *Metoda generala de calibrare si validare a curbilor de flambaj definite prin modele de tip Ayrton-Perry*. Acta Technica Napocensis. Section: Civil Engineering – Architecture, 2008, ISSN 1221-5848, pp. 397-405.
4. Dubina, D., Ungureanu, V., Stratan, A., Nagy Zs.: *Structural performance of pitched roof cold-formed steel frames of bolted joints*. Acta Technica Napocensis. Section: Civil Engineering – Architecture, 2008, Nr. 51, vol. 1, 2008, ISSN 1221-5848, pp. 385-396.
5. Cristutiu, M., Grecea, D., Dubina, D.: *Particular features on application of component method to bolted beam-to-column joints of pitched roof portal frames with class 3 and 4 sections*. EUROSTEEL 2008, 5th European Conference on Steel and Composite Structures - Graz, Austria, 2008, Proc. of the 5th European Conference on Steel and Composite Structures EUROSTEEL 2008, 3-5 September, Graz, Austria. R. Ofner, D. Beg, J. Fink, R. Greiner, H. Unterweger (Eds.), ISBN 92-0147-000-90, pp. 615-620
6. Georgescu, M., Ungureanu, V.: *Experimental procedure, modelling the distortional behaviour of Z-purlins in sandwich panel roofs*. EUROSTEEL 2008, 5th European Conference on Steel and Composite Structures - Graz, Austria, 2008, Proc. of the 5th European Conference on Steel and Composite Structures EUROSTEEL 2008, 3-5 September, Graz, Austria. R. Ofner, D. Beg, J. Fink, R. Greiner, H. Unterweger (Eds.), ISBN 92-0147-000-90, Vol. A, pp.81-86
7. Ungureanu, V., Dubina, D.: *Behaviour of continuous purlins of lapped cold-formed Z-sections and bolted on intermediate supports*. EUROSTEEL 2008, 5th European Conference on Steel and Composite Structures - Graz, Austria, 2008, Proc. of the 5th European Conference on Steel and Composite Structures EUROSTEEL 2008, 3-5 September, Graz, Austria. R. Ofner, D. Beg, J. Fink, R. Greiner, H. Unterweger (Eds.), ISBN 92-0147-000-90, Vol. A, pp.75-80
8. Dubina, D., Ungureanu, V., Stratan, A.: *Ultimate design capacity of pitch-roof portal frames made by thin-walled cold-formed members*. The 5th International Conference on Thin-Walled Structures: Recent Innovations and Developments, Gold Coast, Australia, 18-20 June 2008, 2008, ISBN 978-1-74107-239-6, Vol. 1, pp. 387-394
9. Dubina, D., Ungureanu, V.: *Behaviour of multi-span purlins of bolted lapped cold-formed Z-sections*. The Fifth Conference on

Coupled Instabilities in Metal Structures – CIMS 2008, Sydney, Australia, 23-25 June 2008, 2008, ISBN 978-0-646-49439-5, Vol. 1, pp. 507-514

10. Ungureanu, V., Kotelko, M., Mania, R.J., Dubina, D.: *Plastic mechanisms database for thin-walled cold-formed steel members in compression and bending*. The Fifth Conference on Coupled Instabilities in Metal Structures – CIMS 2008, Sydney, Australia, 23-25 June 2008, 2008, Proceedings of The Fifth Conference on Coupled Instabilities in Metal Structures – CIMS 2008, ISBN 978-0-646-49439-5, Vol. 1, pp. 189-197
11. Cristutiu M., Grecea D., Dubina D.: *Influence of connected members components on the structural performance of bolted beam-to-column joints of pitched roof portal frames*. Proceedings of the Sixth International Workshop "Connections in Steel Structures VI", June 22–25, 2008, Chicago, USA. Ed. R. Bjorhovde, F.S.K. Bijlaard, L.F. Geschwindner, ISBN, pp. 165-174
12. Georgescu M., Ungureanu V.: *Procedura experimentală pentru analiza comportamentului distorsional al panelor cu secțiune "Z" conectate la invelitori din panouri sandwich*. Zilele Academice Timisene, Timisoara, 25 mai 2007, Structuri metalice amplasate în zone seismice - Preocupări actuale. Ed. D. Dubina, V. Ungureanu. Editura Orizonturi Universitare, Timișoara., ISBN 978-973-638-377-9, 2008, pp. 213-222

OTHER RESULTS

- Membership in Technical Committee TC7 "Cold Formed Thin Walled Sheet Steel in Building" of ECCS (*European Convention for Constructional Steelwork*). Two members of the CEMSIG research center (Dan Dubina and Viorel Ungureanu) are members in Technical Committee TC7.

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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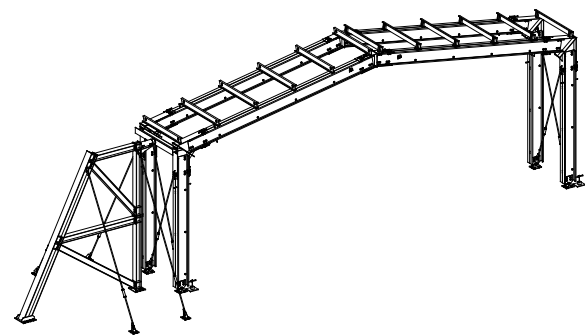
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EXAMPLES

1. Ultimate design capacity of pitched-roof portal frames made by thin-walled cold-formed members.

The research summarizes the results of the experimental and numerical simulation program carried out on full-scale pitched roof cold-formed steel portal frames of back-to-back lipped channel sections and bolted joints in order to evaluate their structural performance and to find an adequate design methodology. A procedure to evaluate the ultimate design capacity of these frames was proposed.

Following the experimental tests on cold-formed joints, two full-scale tests on pitched-roof cold-formed portal frames with moment-resisting joints has been performed to assess the performance of under lateral loading, with particular emphasis on earthquake loading.



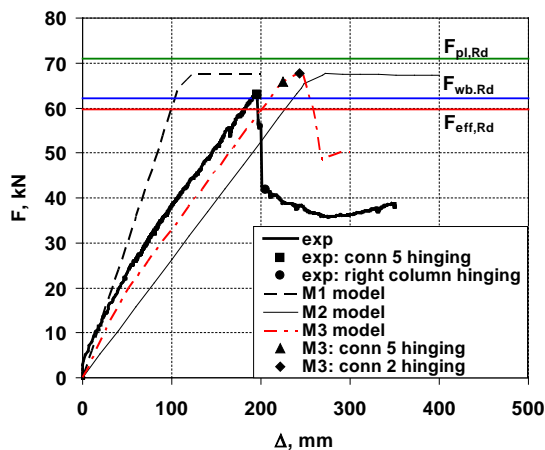
Experimental test setup for full-scale tests

From the experimental and numerical program, for practical cases, it was observed that the response to the first local buckling in members is important, which can be estimated using a more simple frame model, incorporating only the semi-rigid connection response, eventually an elastic perfectly plastic model.

Three methods are available to estimate the ultimate resistance at the edge of bracket-to-rafter

lap (e.g. the first local buckling location) of that section under design loads, i.e.:

- the "effective width" model, on the base of which the ultimate capacity of the member is evaluated considering an effective "plastic" distribution of stress; from the frame analysis the ultimate resistance, $F_{eff,Rd}$, is obtained;
- the "plastic" model, based on the local plastic model, which provide the ultimate "plastic" resistance, $F_{pl,Rd}$;
- the "interactive" model, which considers the coupling effect between web crippling, at the edge of the bracket-to-member lap, and the bearing in the bolt holes in flanges, $F_{wb,Rd}$.



Comparison of experimental and numerical lateral force - deformation curves

In the figure from above the three horizontal lines, corresponding to the three methods, are presented comparatively with test and numerical simulations. As expected, the last one based on the "interactive" model, fit better with tests and numerical analysis.

In conclusion, the critical section for usual frames is at the edge of lap between the connecting bracket and rafter. For this section the reference design resistance has to be obtained, and for that the best estimation was provided to be the one based on the interaction between web crippling effect, at the edge of the lap, and the bearing in the outer bolt holes.

Research in SUSTAINABLE BUILDING DESIGN AND TECHNOLOGY

FIELD DESCRIPTION

The theory of sustainability is relatively new and in continuous development. The increased interest for sustainability in civil engineering had determined a series of measures and specific actions, such as the reduction and even elimination of some polluting methods, detrimental, high energy consumption, the use of regenerative resources, avoiding to use materials that cannot be reused after the demolition of structures or cannot be assimilated by the

environment, re-equilibration of the ecological balance by design, production, use, dwelling. The cost of measures of ecological order will be taken into consideration for the preliminary determination of the price of the products, in order to build just what is necessary, so that the man is stimulated to think to next generations and the preservation in good conditions of the environment.

ACTIVITIES

- Requirements on building performance and sustainability
- Methods of Performance-based and sustainable design and construction
- Social, cultural and economic aspects in sustainability evaluation
- Clean and lean construction processes
- Performance – based design approach vs. Robustness – based design approach for new and existing buildings subjected to extreme actions
- Sustainable design procedures: interactive and holistic design methods and decision-making tools

RESEARCH TEAM

- Prof. Dan Dubina, PhD., Dr.HC., FIStructE (sustainability of constructions, degradation models, life-time structural engineering)
- Prof. Daniel Grecea, PhD (sustainability of constructions, LCA databases)
- Assoc. prof. Daniel-Viorel Ungureanu, PhD (life-cycle performance, design for durability, demolition and deconstruction, life-time structural engineering)
- Assoc. prof. Adrian Ciutina, PhD (sustainability of constructions, life cycle assessment – LCA, methodologies)

RESEARCH OFFERS

- Consulting for sustainable design of buildings
- Life-cycle assessment (LCA)
- Life-cycle cost analysis (LCC)
- Study-cases

RESULTS

RESEARCH PROJECTS

1. 31042/2007 PNCDI2 – PROACTEX. *Structural systems and innovative technologies for protection of buildings under extreme actions taking into account sustainable design criteria.* Financing authority / Beneficiary: ANCS-CNMP. Value: 308,600 RON (Total value: 1,894,000)

BOOKS PUBLISHED

1. L. Braganca, H. Koukkari, R. Blok, H. Gervasio, M. Veljkovic, Z. Plewako, R. Landolfo, V. Ungureanu, L.S. Silva, P. Haller (Editors): *COST C25 Seminar: Sustainability of Construction: Integrated Approach to Life-time Structural Engineering*, 6-7 October 2008, Dresden University of Technology, Germany, ISBN: 978-3-86780-094-5, 433 p.

PUBLISHED PAPERS

1. Ungureanu, V., Muțiu, M. Dubină, D.: *Soluții constructive pentru clădiri de locuit compatibile cu conceptul de dezvoltare durabilă*. Acta Technica Napocensis. Section: Civil Engineering – Architecture, 2008, Nr. 51, vol. 1, 2008, ISSN 1221-5848, pp. 451-460.
2. Dubina, D., Ungureanu, V., Grecea, D.: *Parametri si criterii de robustețe și dezvoltare durabilă pentru clădiri multietajate (I)*. Revista Construcțiilor, 2008, an IV, nr. 43, noiembrie 2008, ISSN 1841-1290, pp. 66-68-70-72.
3. Dubina, D., Ungureanu, V., Grecea, D.: *Parametri si criterii de robustețe și dezvoltare durabilă pentru clădiri multietajate (II)*. Revista Construcțiilor, 2008, an IV, nr. 44, decembrie 2008, ISSN 1841-1290, pp. 18-20-22-24.
4. Grecea, D., Ungureanu, V.: *State-of-the Art and Survey in Members' Countries – Romania. COST C25 – WG1. Delivery 2.2 Guidelines to perform LCA*. COST C25 Seminar: Sustainability of Construction: Integrated Approach to Life-time Structural Engineering, 6-7 October 2008, Dresden, Germany, 2008, Proceedings of Seminar: Sustainability of Construction: Integrated Approach to Life-time Structural Engineering, ISBN 978-3-86780-094-5, p. 2.71-2.77.
5. Portioli, F., Ungureanu, V.: *Demolition and deconstruction of building structures*. COST C25 Seminar: Sustainability of Construction: Integrated Approach to Life-time Structural Engineering, 6-7 October 2008, Dresden, Germany, 2008, Proceedings of Seminar: Sustainability of Construction: Integrated Approach to Life-time Structural Engineering, ISBN 978-3-86780-094-5, p. 4.124-4.131.

OTHER RESULTS

- Membership in the European Programme COST C25: Sustainability of Constructions - Integrated Approach to Life-time Structural Engineering. Two members of the CEMSIG research center (Dan Dubina and Viorel Ungureanu) are members in the management committee of the COST C26 programme.

- Membership in Technical Committee TC14 "Sustainability and Eco-Efficiency of Steel Buildings" of ECCS (*European Convention for Constructional Steelwork*). Two members of the CEMSIG research center (Viorel Ungureanu and Daniel Grecea) are members in Technical Committee TC14

FURTHER DEVELOPMENTS

- Verification methods for durability of steel constructions
- Demolition and deconstruction of buildings
- Sustainable construction assessment and classification system

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EXAMPLES**1. Sustainable building solutions for housing.**

Sustainability is one of the greatest challenges of the modern world. A very well known definition of this concept was given by *World Commission on Environmental and Development* in 1987: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Sustainability includes environmental, economic and social aspects which contribute to a durable development of the society.

An example of sustainable mixed building technology application, which combine steel and timber in the framing and different materials for cladding, roofing and flooring, in order to obtain highly performance thermo-energetic properties is presented, accompanied by some innovative design solutions. The building combines modern and traditional materials and techniques, in order to obtain a typical Transylvanian village house. This example is a single family house built in Romania and located in a medium seismic region –

Timișoara. There are presented aspects related to design and detailing, as well as solutions for cladding and roofing, including structural features and thermo-energetic performance.



Carmen's family house: the main steel skeleton



Carmen's family house: General view

It is very important to underline that steel framed structures and/or steel-timber framed structure, used for house buildings enable to apply modern dry and ventilated envelopes, in order to obtain a highly thermo-energetic efficiency.

The solution is part of the "Affordable housing" project promoted within the International Network of scientific partners for steel construction

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 Iași, Technical University of Cluj-Napoca, "Eftimie Murgu" University of Reșița, "Lucian Blaga" University of Sibiu, University of Petroșani.

OBJECTIVES

CNCCO - The main objective of the centre is the developing of highly qualified human resources for higher education and scientific research.

Special attention is given to youth training, by attracting students to major research programs performed by our experienced team, in which they are making use of our high-performance research infrastructure,

CNCCO - offers research, expertise, consulting design and testing services for structures and materials used in civil and mechanical engineering.

MAIN RESEARCH FIELDS

➤ *Nonlinear analysis of structures*

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

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

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

➤ *Earthquake Engineering*

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

➤ *Fatigue and fracture of materials*

Keywords: fatigue, fracture

Researches in *NONLINEAR ANALYSIS OF STRUCTURES*

FIELD DESCRIPTION

Nonlinear elastic and elastic-plastic analysis of structures under static and dynamic loads is treated. The influence of beam-to-column joint flexibility on the structural behaviour is evaluated. Post critical analysis is performed. Several connection types are taken in consideration. An optimum response of the entire structure is the final goal.

ACTIVITIES

➤ Intensive numerical and experimental investigations were performed on the behaviour of steel frames, plane plates and shells in both pre and post-buckling domains

- Experimental tests were performed in order to find the mechanical characteristics of materials

RESEARCH TEAM

- Prof. PhD. Eng. Marin IVAN
- Prof. PhD. Eng. Mircea IEREMIA
- Ass. Prof. PhD. Eng. Adrian IVAN
- As. Eng. PhD student Dumitru FLORESCU
- PhD student Eng. Viorel POPA-ALBU
- PhD student Eng. Teodor LEȚ
- Eng. PhD student Dănuț CĂLUGĂR
- Eng. PhD student Vinicius PRECUPAȘ

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. Complex project-partnership, Contract no. 31-099/2007: *Modern technology for enhancing the durability of steel structures*, Beneficiary: National Center for Project Management, Bucharest, Value: 1,951,062 RON

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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. PhD. Eng. Adrian IVAN
- As. Eng. PhD student Both IOAN
- As. Eng. student Dumitru FLORESCU
- As. Eng. PhD student Eugen DOGARIU
- Eng. PhD student Dănuț CĂLUGĂR

RESEARCH OFFERS

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

RESEARCH PROJECTS

Contract no. BC121/29.07.2008, *Technical expertise of the roof structure of the machine room of Gogosu Iron Gates II*, Beneficiary: S.C Hidroelectrica S.A. Bucharest, Iron Gates I Subsidiary, Value: 51,170 RON

FURTHER DEVELOPMENTS

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

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Researches in EARTHQUAKE ENGINEERING

FIELD DESCRIPTION

The main objectives of the range are: keeping the safety of the new civil engineering works through designing, cladding and maintenance, assessment of the residual bearing capacity of damaged elements of a structure, recovering the initial bearing

capacity of the damaged structures to resist to the new seismic events, new resistant systems for the high-raised steel buildings.

ACTIVITIES

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

RESEARCH TEAM

- Prof. PhD. Eng. Marin IVAN
- Prof. PhD. Eng. Mircea IEREMIA
- Prof. PhD. Eng. Iuliu DIMOIU
- Prof. PhD. Eng. Zoe REGEP
- Ass. prof. PhD. Eng. Adrian IVAN
- As. Eng. PhD student Both IOAN

RESEARCH OFFERS

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

PUBLISHED PAPERS

Ionel Balcu, A. Ivan, Adina Segneanu, Corina Macarie, Nadina Vlatanescu, Cristian Vaszilcsin, *The influence of concentration and inhibitor type over corrosion rate*, The Scientific Bulletin of the Politehnica University of Timisoara, Transactions on Chemistry, 2008

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RESEARCH TEAM: STEEL STRUCTURES AND BRIDGES

GENERAL PRESENTATION

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

In the last 10- 15 years an increased number of composite railway bridges have been built on the Romanian Railway Network. The principal advantages of these bridges are: a better functional response, reduction of maintenance costs, minimization of noise and environmental problems. These structures have been adopted on the new railway lines, or for replacing the existing old

bridges. For small spans ($L = 5 - 20$ m) slabs with included steel (embedded) profiles are used; for spans between 6 – 32 m plate girder bridges are preferred. For large spans $L = 30 - 80$ m cross sections formed by two composite truss girders gives very suitable solutions in terms of economy and maintenance.

OBJECTIVES

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

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

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

A special field of collaboration is the introduction of the new proceeding of friction stir welding in the case of steel bridges.

MAIN RESEARCH FIELDS

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

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

➤ *New Welding Technologies – Friction Stir Welding*

Keywords: friction stir welding, aluminium alloys, state of the art, fatigue.

➤ *Composite bridges - Structures with embedded girders*

Keywords: concrete deck, steel girders, embedded girders, railway, examples, projects.

Researches in SAFETY IN OPERATION AND REHABILITATION OF EXISTING STEEL BRIDGES

FIELD DESCRIPTION

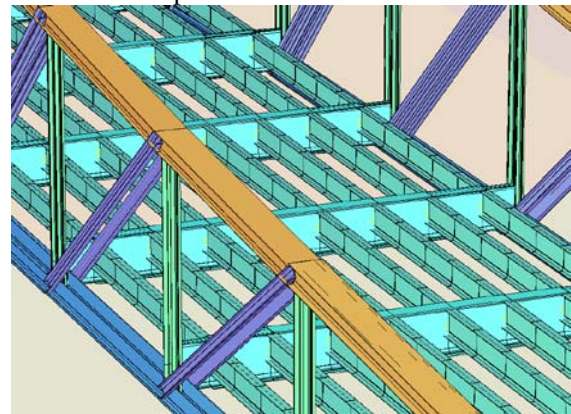
Rehabilitation and maintenance of existing steel bridges is one of the most important actual problems. The infrastructure in Romania and in other East – European countries has an average age of about seventy to ninety years. Many of these structures, particularly railway bridges, have already achieved an age of ninety, hundred or even more years and are still in operation after damages, several phases of repair and strengthening. To maintain these structures is one of the most important tasks of our society. Today, the budget of the administration and the owners (i.e. the railways and highway companies) get smaller. In consequence it is necessary to invest the available money where there will be the greatest benefit. Therefore, those responsible for the decisions need information about the safety of the structure, the remaining life, the costs for maintenance etc. Nobody will take the responsibility for failure of a structure as a result of budget restrictions. During service, bridges are subject to wear. In the last decades the initial volume of traffic has increased. The present tendency to raise the speed on the main lines to a level of $v \leq 160$ km / h (European corridors) must be emphasised.

There is a big variety of structural types. Most of the bridges are simple supported girders (rarely continuous); depending on the cross section there are deck or trough bridges. The majority of them are plate or truss girder bridges; other constructive systems like twin girders or embedded girders can also be noticed.

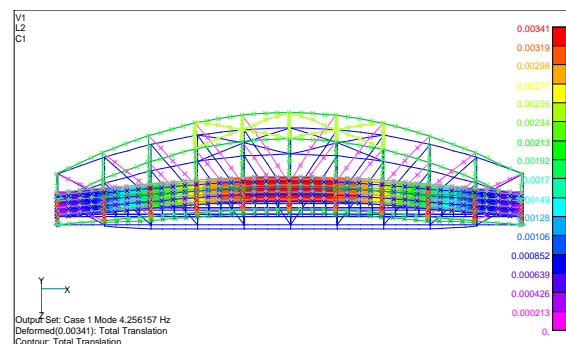
Therefore many bridges require an inspection. The examination should consider the age of the bridge and all repairs, the extent and location of any defects etc. A continuous maintenance, which generally must increase in time, is important in order to assure the safety in operation of the

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.

However, from the overall examination of a large number of bridges many defects can be pointed out. The defects are widespread, having a heterogeneous character from the point of view of location, development and development tendency; their amplification was also due to the climate and polluting factors that caused the reduction of the cross section due to corrosion. Statistically, in 283 from among 1090 welded bridges cracks were detected and repaired.



Modelling of the Traian Bridge in Arad



Modelling of Savarsin Bridge

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

ACTIVITIES

- Processing of experimental crack growth rate for welded details.
- Fracture mechanics approach based on FM experimental tests in order to establish the crack growth rate.
- Procedure to assess the safety in operation of existing steel bridges – riveted and welded bridges.

RESEARCH TEAM

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

RESEARCH OFFERS

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

RESULTS**TECHNICAL PROJECTS**

1. Contract 82/2008: The in situ test of the rehabilitated bridge in Savarsin (1897 / 2008) – technical project. Director: Prof.dr.eng. Radu Bancila; Team: Sen. lect. dr. eng. Dorel Bolduş, Sen. lect. dr. eng. Edward Petzek, Ass.Prof. dr. eng. Attila Földvary, Phd. Stud. Ramona Gabor, Phd. Stud. Lucian Blaga.



The in situ test of the structure

PUBLISHED PAPERS

1. Băncilă, R., Petzek, E., Bolduş, D., „*General Concept Regarding the Rehabilitation of Existing Steel Bridges*”, Proceedings of the 7th International Conference on Steel Bridges: Advanced Solutions & Technologies-Guimarães, Portugal ECCS, ISBN:92-9147-000-88.
2. Petzek E., Băncilă, R., Schmitt V., „*EUROSTEEL 2008, General Rehabilitation Concept of a Historical Representative Cantilever Truss Girder Bridge in Arad* 5th European Conference on Steel and Composite Structures - Graz, Austria”, ISBN 92-0147-000-90

FURTHER DEVELOPMENTS

- Proposal for actualization of the present Romanian Code.

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**Researches in NEW WELDING
 TECHNOLOGIES – FRICTION STIR
 WELDING**

FIELD DESCRIPTION

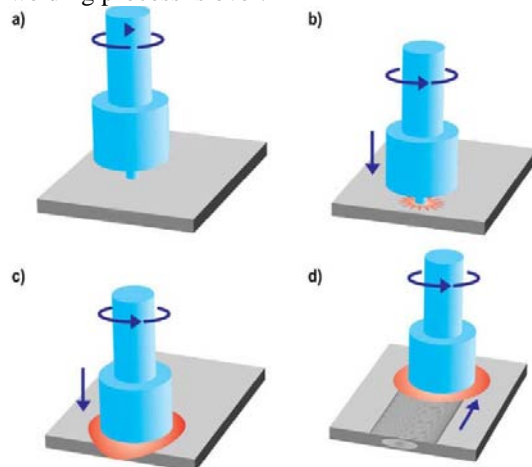
Friction Stir Welding - FSW was invented and patented in 1991. The research are focused on the application of this new proceeding in the field of bridges. Some typical details and their behavior on fatigue will be studied.

Friction stir welding (FSW) is a bending procedure that takes place in solid state which is based on the heating of the materials through friction and plastic deformation realized at the interaction between the non-consumable pin tools which is rotating at surface of the joined elements.

Due to the high frictional forces between the wear resistant tool and the parent material the workpiece temperature rises to a hot forging level.

The process can be described in the following principal steps:

- the tool starts to rotate in the air;
 - after that plunged into the material and start to forged; because of the forging between the tool and the material, the material achieved a temperature that permits to the pin of the tool to move „almost melted“ material from one side (advancing side) of the weld to the other side (retracting side) and produced the plasticization of the materials and a new recrystallization;
 - the tool moves across of the weld line;
- at the end of the joint the tool will retract and the welding process is over.



The process was first time used to weld aluminium. We can actually say that it was invented for aluminium. From the first begin to weld aluminium elements (plates) with FSW seem to be very proper. FSW has several advantages over commonly used fusion welding techniques. Following from its relatively low process temperature, below the melting point, the method is suited for joining thin or difficult to weld materials.

Even if the process wasn't reported to often in the field of civil engineering, it still represents a challenge also for this domain just like it was using of aluminium in bridge construction. Nowadays, because of the quality demonstrated in time and because of the price drop for aluminium productions, it became a suitable and an economic alternative to the usual bridge materials: structural steel and concrete.

Using FS welds to aluminium bridge erection provide us light structures – the dead load is reduced, no additional weight from rivets or screws, with good corrosion behaviour in contact with salt (used against frozen road bed during the winter time), the biggest enemy of the steel bridges. It is generally known that the fusion welding of aluminium alloys is accompanied by the defects like porosity; slag inclusion, solidification cracks

etc., and these defects deteriorate the weld quality and joint properties.

ACTIVITIES

- Experimental program about of the resistance of the FS Weld.
- Choice of some FSW typical details for bridges.
- Application of different solution for bridge decks.

RESEARCH TEAM

- Prof. dr. eng. Radu Băncilă, *steel welded structures*
- Lect. dr. eng. Edward Petzek, *fracture mechanics and choice of materials*
- Phd. Stud. Ramona Gabor, *Friction Stir Welding, technology and welding procedure.*

RESEARCH OFFERS

- Welds analysis and design.
- Design of welded steel structures especially aluminium bridges.

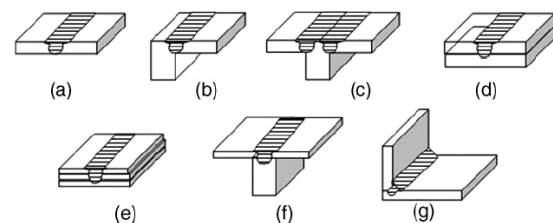
RESULTS

RESEARCH PROJECTS

Proiectul de cercetare de excelenta P-CD 66/2006 Program CEEEX – MATNANTECH, TIMPAV, (2006-2008) „Tehnologii inovative și ecologice de procesare a materialelor avansate, prin frecare cu element activ rotitor”.

FURTHER DEVELOPMENTS

- Design of an experimental program for studies of typical connections with FSW for bridge structures, especially bridge decks.
- PhD Degree Application of FSW in the field of civil engineering (bridges)

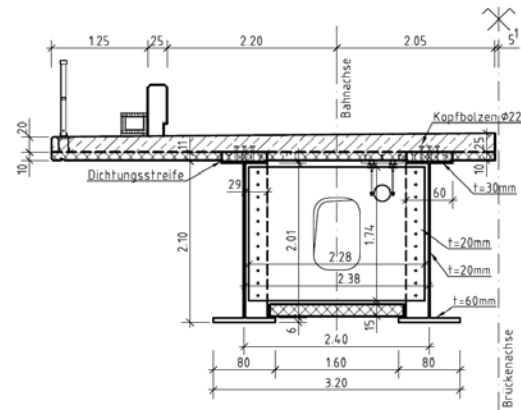


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Designed railway bridge

Researches in COMPOSITE BRIDGES - STRUCTURES WITH EMBEDDED GIRDERS

FIELD DESCRIPTION

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

ACTIVITIES

- Design guide for bridges with embedded girders.

RESEARCH TEAM

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

RESEARCH OFFERS

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

FURTHER DEVELOPMENTS

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

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Researches in STEEL BRIDGES - DESIGN OF NEW STRUCTURES

FIELD DESCRIPTION

The team is involved in the design of efficient new steel bridges, like railway, highway and pedestrian bridges.

ACTIVITIES

- Study of efficient new highway and railway bridge solutions.
- Efficient pedestrian crossings (footbridges)
- Application of the Eurocode principles in the design of new structures
- Innovative materials in bridge constructions



RESEARCH TEAM

- Prof. dr. eng. Radu Băncilă, *composite structures and bridges*
- Assist. prof. dr. eng. Edward Petzek, *composite bridges*
- Lect. dr. eng. Dorel Bolduş
- PhD Stud. Lucian Blaga, *innovative materials in bridge construction*

RESEARCH OFFERS

- Design of new steel bridges
- New materials in bridge construction.
- Consulting in the field of steel bridges.
- Design examples for typical bridges.

RESULTS

PUBLISHED PAPERS

Bolduş, D., Băncilă, R., Petzek, E., "Short span railway bridges of heavy plates", Proceedings of the International Conference Construction 2008, Cluj-Napoca, vol II
 Blaga, L., "Solution for provisory bridges", Proceedings of the National Scientific Session CIB 2008, Braşov, Vol II

FURTHER DEVELOPMENTS

- Design examples for steel structures and bridges according to Eurocodes

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RESEARCH CENTRE FOR MATERIALS AND STRUCTURES (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

- **Flexural strengthening of RC beams with FRPs**
Keywords: RC beams; FRP; retrofitting; strengthening.

➤ **Structural strengthening of RC columns**

Keywords: RC structures; FRP; rehabilitation procedures

➤ **Innovative Structural Systems Using Steel-Concrete Composite Materials and Fiber Reinforced Polymer Composites**

Keywords: composite joints, composite structural walls, numerical analysis, experimental research, FRP composites

➤ **RC Walls Strengthened by FRP composites**

Keywords: reinforced concrete walls, fiber reinforced polymer composites, seismic retrofit, cut-out openings.

➤ **Protection against corrosion of steel reinforcement in concrete, using porphyrins and metalloporphyrins**

Keywords: porphyrins, corrosion inhibitors, surface nanolayers

➤ **Composite steel-concrete structures**

Keywords: steel-concrete composite beam, moment resisting frame, stiffness, reinforced concrete

➤ **Checking the quality of the construction materials using destructive and nondestructive methods**

Keywords: Physico-mechanical materials; concrete; cement; reinforcement; masonry materials.

➤ **Lab studies concerning the composition of the selfcompacting concrete**

Keywords: Cement; aggregates; additives; technology; physico-mechanical characteristics; optimal composition

➤ **Multifunctional nanocomposites for advanced materials mavoptel**

Keywords: Multifunctional nanocomposites; supramolecular architectures; optoelectrical, photochemical, electrochemical and biological properties.

➤ **The durability and strengthening of the existing bridges. Experimental researches on reinforcement and prestressed concrete**

Keywords: concrete bridges; experimental research, concrete, steel reinforcement, technical expertise.

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Researches in *FLEXURAL STRENGTHENING OF RC BEAMS WITH FRPS*

FIELD DESCRIPTION

Behavior of different types of FRP strengthening systems for RC beams.

ACTIVITIES AND RESULTS

The objective of this research was to clarify some aspects regarded to the influence of some special anchorage and their influences to the overall behaviour of the RC beams subjected to flexure. Based on the performed experiment, respectively on the behaviour of the tested specimens, the favourable effects of mechanical as well as chemical anchorages were experimentally demonstrated, both for bottom and laterally applied composites.

RESEARCH TEAM

- Lect. Tamás NAGY-GYÖRGY, PhD
- Prof. Valeriu STOIAN, PhD
- Assoc. Prof. Daniel DAN, PhD
- Dan DIACONU, PhD stud.
- Assist. Cosmin DĂESCU, PhD stud.
- István DEMETER, PhD Stud.
- Codruț FLORUȚ, PhD Stud.

Researches in *STRUCTURAL STRENGTHENING OF RC COLUMNS*

FIELD DESCRIPTION

Behaviour of different types of strengthening systems for RC columns.

ACTIVITIES AND RESULTS

- Experimental tests undergoing for RC columns strengthened with FRP
- The main objective is to establish the interaction between the components of rehabilitation systems.
- The retrofitting method studied can lead to a significant increase in the ultimate horizontal load.
- The ductility increase ranges between 8.5% and 75% for the monotonically tested specimens and between 26% and 46% in the case of the cyclically tested columns.

RESEARCH TEAM

- Assist. Cosmin DĂESCU, PhD stud.
- Prof. Valeriu STOIAN, PhD
- Lect. Tamás NAGY-GYÖRGY, PhD
- Assoc. Prof. Daniel DAN, PhD
- István DEMETER, PhD Stud.
- Dan DIACONU, PhD stud.
- Codruț FLORUȚ, PhD Stud.

Researches in *INNOVATIVE STRUCTURAL SYSTEMS USING STEEL-CONCRETE COMPOSITE MATERIALS AND FIBER REINFORCED POLYMER COMPOSITES*

FIELD DESCRIPTION

In the last years, the use of the composite steel-concrete structures extended a lot in common design and practice. This solution is ideal for multi-storey buildings, which require a higher degree of detailing in common design. Recent earthquakes revealed an inadequate structural behaviour of these types of structures, this meaning that an extensive research program is required in the field of composite elements. This task continues a program of experimental testing on composite steel-concrete joints that have a unique structure. The proposed joints are to be tested for asymmetrical loads. One part of the project will be dedicated for the study of the structural composite steel-concrete shear walls in multi-storey buildings.

ACTIVITIES AND RESULTS

- research activity in the field of the steel concrete structures, mainly for those placed in seismic area;
- the comparative design of structural joins, both metallic and composite ones.
- numerical analyses for the calibration of experimental elements.
- experimental testing of asymmetrical loaded composite joints.
- comparative study between symmetrical and asymmetrical loaded composite joints.
- numerical analysis and design of the structural composite steel-concrete shear walls.
- experimental testing of the structural composite steel-concrete shear walls.
- rehabilitation of the structural composite steel-concrete shear walls, using composite polymeric materials.
- new innovative solutions for the design of the composite shear walls, using polymeric composites.
- high performance composite joins, made out of polymeric materials.

RESEARCH TEAM

- Assoc. Prof. Daniel DAN, PhD
- Prof. Valeriu STOIAN, PhD
- Lect. Tamás NAGY-GYÖRGY, PhD
- Alexandru FABIAN, PhD stud.
- Assist. Cosmin DĂESCU, PhD stud.
- Codruț FLORUȚ, PhD Stud.
- István DEMETER, PhD Stud.

Researches on *PRECAST RC WALL PANELS WITH CUT-OUT OPENINGS STRENGTHENED BY FRP COMPOSITES*

FIELD DESCRIPTION

The structural system of precast Reinforced Concrete (RC) large panels was extensively used in Romania, from 1950 to 1990, for housing buildings

with 5 and 9 stories. Cut-out openings are often required to facilitate direct access from outside or between adjacent apartments, predominantly at the ground floor, where both gravity and seismic capacity demand is maximum. However, cut-out openings performed in structural walls results in the modification of the internal force flow paths, loss of load bearing capacity and reduced structural safety. The experimental research program was conceived in order to investigate the shear behaviour of the precast reinforced concrete wall panels with cut-out openings subjected to in-plane seismic loading conditions and to assess the shear capacity gain obtained using externally bonded Fiber Reinforced Polymer (FRP) composites as retrofit solution.

ACTIVITIES AND RESULTS

The experimental program consisted of eight 1:1.2 scaled wall specimens, including three single and five double tests. The experimental variables were represented by the opening type (without opening, i.e. solid wall, narrow door, and wide door), the opening nature (as-built, and cut-out) and the strengthening state (not strengthened, post-damage, and prior-to damage). The experimental elements were subjected to pseudo-constant axial and in-plane reversed cyclic lateral forces, simulating the seismic loading conditions at a quasi-static rate.

The characteristic shear behaviour mode of the wall panels was exhibited by the pinched hysteresis loops. As the displacement level was increased, the stiffness diminished gradually, but more significantly around the zero displacement value and less at the peak displacement. The tests on the strengthened elements indicated increased horizontal displacement capacity and the same or higher lateral load bearing capacity in comparison with the not-strengthened walls.

RESEARCH TEAM

- István DEMETER, PhD Stud.
- Lect. Tamás NAGY-GYÖRGY, PhD
- Prof. Valeriu STOIAN, PhD
- Assist. Cosmin DĂESCU, PhD Stud.
- Assoc. Prof. Daniel DAN, PhD
- Dan DIACONU, PhD Stud.
- Codruț FLORUȚ, PhD Stud.

Researches in *PROTECTION AGAINST CORROSION OF STEEL REINFORCEMENT IN CONCRETE, USING PORPHYRINS AND METALLOPORPHYRINS*

FIELD DESCRIPTION

The abilities of porphyrins and derivatives to inhibit the steel corrosion are based on their properties to adsorb on the metal surface and to block the access of aggressive agents, both for the anodic and cathodic reactions. These properties were illustrated by potentiodynamic curves obtained on carbon steel in 1N H₂SO₄, indicating a decrease of the current in the active region of the anodic polarization

curve. The inhibiting effect was verified on steel fibers, directly by determining the mass loss of the metal and indirectly by measuring the hydrogen evolved in the cathodic reaction. The corrosion inhibition was between 35-88%.

ACTIVITIES AND RESULTS

Studies of corrosion inhibition using the polarization curves obtained on the potentiostat. Determination of the corrosion rate by mass loss in different aggressive solutions. Determination of the corrosion rate by measuring the hydrogen volume. Effect of porphyrinic corrosion inhibitors on the adherence of concrete on steel fibers.

RESEARCH TEAM

- Assoc. Prof. Gheorghe FĂGĂDAR, PhD
- Prof. Corneliu BOB, PhD
- Prof. Iosif BUCHMAN, PhD
- Assoc. Prof. Eugen JEBELEAN, PhD
- Lect. Sorin DAN, PhD
- Lect. Cătălin BADEA, PhD
- Assist. Liana IUREȘ, PhD candidate

Researches in COMPOSITE STEEL-CONCRETE STRUCTURES

FIELD DESCRIPTION

Behaviour of composite steel-concrete beams part of moment resisting frames placed in seismic areas; assessment of concrete slab behaviour.

ACTIVITIES AND RESULTS

- Tests on portal frames at full scale, when the reinforcement is changed

Ph.D. Thesis defended by Lute Marina - Contributions to Calculus and Composition of Composite Steel-Concrete Structures.

RESEARCH TEAM

- Assist. Marina LUTE
- Prof. Valeriu STOIAN, PhD
- Assoc. Prof. Agneta TUDOR, PhD

Researches in CHECKING THE QUALITY OF THE CONSTRUCTION MATERIALS USING DESTRUCTIVE AND NONDESTRUCTIVE METHODS

FIELD DESCRIPTION

Quality verification of: concrete, road concrete, cement, reinforcement, ceramic materials-delivered by different contractors

ACTIVITIES AND RESULTS

- Establishing the density and resistances of concretes
- Establishing the physico-mechanical characteristics of cements
- Establishing of mechanical characteristic of the reinforcement
- Establishing the density and compression resistances of the ceramic elements for masonries

-Supplying testing certificates for the tested characteristics to the contractors (The "Holcim" concrete station, SC Cristian Andronic Timisoara and others).

RESEARCH TEAM

- Prof. Iosif BUCHMAN, PhD
- Lect. Cătălin BADEA, PhD
- Assoc. Prof. Eugen JEBELEAN, PhD
- M. Boabes
- I. Mihalache

Researches in LAB STUDIES CONCERNING THE COMPOSITION OF THE SELFCOMPACTING CONCRETE

FIELD DESCRIPTION

Lab testing of many different compositions of selfcompacting concrete in order to find the optimal compositions

ACTIVITIES AND RESULTS

The testing of different compositions of selfcompacting concretes;

- Characteristics' verification;
 - Establishing the optimal compositions
- Establishing the optimal compositions in the CEEX where the research team acts as a partner

RESEARCH TEAM

- Prof. Corneliu BOB, PhD
- Prof. Iosif BUCHMAN, PhD
- Assoc. Prof. Eugen JEBELEAN, PhD
- Assoc. Prof. Gheorghe FĂGĂDAR, PhD
- Lect. Cătălin BADEA, PhD
- Assist. Liana IUREȘ, PhD candidate

Researches in MULTIFUNCTIONAL NANOCOMPOSITS FOR ADVANCED MATERIALS MAVOPTEL

FIELD DESCRIPTION

Nanocomposites based on supramolecular architectures with optoelectric, photochemical, electrochemical and biological properties are studied- forerunners for the advanced materials MAVOPTEL.

ACTIVITIES AND RESULTS

Theoretical studies and experimental research concerning in the field of nanocomposites for advanced materials MAVOPTEL. The goals of a CEEX where the research team acts like a partner have been accomplished.

RESEARCH TEAM

- Assoc. Prof. Gheorghe FĂGĂDAR, PhD
- Prof. Iosif BUCHMAN, PhD
- Lect. Cătălin BADEA, PhD
- Assoc. Prof. Eugen JEBELEAN, PhD
- Prof. Corneliu BOB, PhD
- Assist. Liana IUREȘ, PhD candidate
- Lect. Sorin DAN, PhD

Researches in THE DURABILITY AND STRENGTHENING OF THE EXISTING BRIDGES. EXPERIMENTAL RESEARCHES ON REINFORCEMENT AND PRESTRESSED CONCRETED

FIELD DESCRIPTION

Non-destructive tests realized on infrastructure and structure of concrete bridges. Technical expertise realized on reinforcement and prestressed concrete bridges

ACTIVITIES AND RESULTS

Research contract to made non-destructive tests on concrete from infrastructure and structure of 3 (three) concrete bridges which are existing on national roads from west country.

Research contract to elaborated 10 (ten) technical expertise regarding roads on national roads from west country.

RESEARCH TEAM

- Prof. Cornel Jiva, PhD
- Assoc. Prof. Eugen JEBELEAN, PhD
- Lect. Cătălin BADEA, PhD

RESEARCH PROJECTS

1. CNCISIS-UEFISCSU, PN-II, RU, TD-8, nr 2/02.10.2007: *RC walls strengthened by FRP composites*. Project coordinator: István DEMETER.
2. CEEEX National Project: *Advanced Systems for Strengthening Reinforced Concrete Structural Elements as Beams, Columns, Walls and Slabs Using Fibre Reinforced Polymer Composite Materials*, Director: Lect. Tamás NAGY-GYÖRGY
3. CNCISIS National Grant: *Strengthening Reinforced Concrete Structural Walls and Slabs with Cut-Out Openings Using Fiber Reinforced Polymer Composites*, Director: Prof. Valeriu STOIAN
4. CEEEX National Project: *Multifunctional Nanocomposites Based on Supramolecular Architectures Having Optoelectronic, Photochemical, Electrochemical and Biologic Properties – Precursors for Advanced Materials - MAVOPTEL*, Director: Assoc. Prof. FĂGĂDAR-COSMA G
5. CEEEX National Project: *Innovative Solution for Optimisation of Self-Compacting Concrete Composition for Performance Using at Prefabricated Concrete Elements - SICOBET*, Director: Prof. Corneliu BOB

PUBLICATIONS

BOOKS

1. E.Jebelean, C.Bob, I.Buchman, C.Badea, Liana Iures - *Quality evaluation of anorganic and organic building materials*, Ed. Orizonturi

universitare, Timisoara, 2008, ISBN: 978-973-638-395-3

2. Eugenia Fagadar-Cosma, Dana Vlascici, Gh. Fagadar-Cosma, *Porfirinele: de la sinteză la aplicatii*. Ed. Eurostampa (acreditata CNCISIS), Timisoara 2008, 288 p., ISBN: 978-973-687-680-6

3. Iures L., Badea C., *Building materials science- Practical guide for quality evaluation*, Ed. Eurostampa, ISBN 978-973-687-776-6

PUBLISHED PAPERS

1. Dan D., Stoian V., Nagy-György T., *Experimental and Theoretical Studies Concerning the Load Bearing Capacity of Steel and Composite Joints for Buildings Placed in Seismic Areas, Contemporary Civil Engineering Practice 2008*, Novi Sad, Serbia, ISBN 978-86-7892-103-2, pp. 65-89
2. Sas G., Demeter I., Carolin A., Nagy-György T., Stoian V., Täljsten B., *FRP strengthened RC panels with cut-out openings, Challenges for Civil Construction (CCC 2008)*, Porto, Portugal, 2008, ISBN 978-972-752-100-5, pp.196-197(+8)
3. Dan D., Stoian V., Nagy-György T., Dăescu C. A., Floruț C., *Improvement of Energetic Performances of the Student's Hostels Belonging to the Politehnica University of Timișoara*, Acta Technica Napocensis, 51/I-2008, Civil Engineering, ISSN 1221-5848, pp. 345-352
4. Dăescu C. A., Stoian V., Nagy-György T., Dan D., Demeter I., *Experimental Studies on Ductility Increasing for Reinforced Concrete Columns*, Acta Technica Napocensis, 51/II-2008, Civil Engineering, ISSN 1221-5848, pp. 41-48
5. Demeter I., Nagy-György T., Stoian V., *Analytical and numerical models for predicting the behaviour of in-plane loaded precast RC wall panel experimental elements*, Acta Technica Napocensis, 51/II-2008, Civil Engineering, ISSN 1221-5848, pp. 49-56
6. Diaconu D., Nagy-György T., Stoian V., Floruț S.C., *RC Slabs Strengthened with FRP Composites – Case Studies*, Acta Technica Napocensis, 51/II-2008, Civil Engineering, ISSN 1221-5848, pp. 57-62
7. Floruț C., Nagy-György T., Stoian V., Diaconu D., *Strengthening of a Hollow Core Precast Slab Using FRP Composite Materials - Testing and Rating*, Acta Technica Napocensis, 51/II-2008, Civil Engineering, ISSN 1221-5848, pp. 69-74
8. Nagy-György T., Stoian V., Dăescu C., Diaconu D., Dan D., *Research results on dapped beam ends strengthened with FRP composites*, Acta Technica Napocensis, 51/II-2008, Civil Engineering, ISSN 1221-5848, pp. 173-180

9. Dan D., Stoian V., Nagy-György T., Dăescu C. A., Floruț C., *Theoretical and Experimental Studies on Welded Composite Joints for Buildings Placed in Seismic Areas*, Acta Technica Napocensis, 51/III-2008, Civil Engineering, ISSN 1221-5848, pp. 85-92
10. Dăescu C., Stoian V., Nagy-György T., Dan D., Demeter I., *Ductility increasing for concrete columns – experimental results*, Fourth International Conference on FRP Composites in Civil Engineering (CICE2008), Zurich, Switzerland, 2008, ISBN 978-3-905594-50-8, pp. 56 (+6 pp.)
11. Nagy-György T., Stoian V., Dan D., Dăescu C., Diaconu D., Demeter I., *RC Beams Strengthened with FRP Systems – Results in Dapped-ends and Increase of Flexural Capacity*, IABSE, Chicago, 2008, ISBN 978-3-85748-118-5, pp. 86-87 (+6pp)
12. Dăescu C., Stoian V., Nagy-György T., Dan D., Demeter I., *Ductility increasing for concrete columns. Experimental results*, IABSE, Chicago, 2008, ISBN 978-3-85748-118-5, pp. 510-511 (+6pp)
13. Dan D., Stoian V., Nagy-György T., Dăescu C. A., *Steel–concrete composite joints for buildings - Theoretical and Experimental Study under Symmetrical and Asymmetrical Loads*, EUROSTEEL 2008, Graz, Austria, ISBN 92-0147-000-90, pp. 459-464
14. Dan D., Stoian V., Nagy-György T., Demeter I., Floruț C., *Experimental Studies on Steel and Steel Concrete Composite Joints for Buildings*, WSEAS EMESEG'08, Greece, 2008, ISBN 978-960-6766-88-6, ISSN 1790-2769, pp. 90-95
15. Demeter I., Nagy-György T., Stoian V., Dan D., *Quasi-static Loading Strategy for Earthquake Simulation on Precast RC Shear Walls*, 12th WSEAS International Conference on SYSTEMS, Greece, 2008, ISBN 978-960-6777-83-1, ISSN 1790-2769, pp. 813-829
16. Demeter, I. (2008), *RC wall panels strengthened with FRP composites*, Proc., 7th International PhD Symposium in Civil Engineering, (CD-ROM), Paper No. 5.1.
17. C. Badea, C. Bob, I.Balcu, S.Dan, I.Buchman, A.Gruin - *The Carbonatation Proces Influence on Concrete Durability*, Proceedings of the 1 st WSEAS International Conference on MATERIALS SCIENCE (MATERIALS'08), pp.11-15, ISBN:978-960-474-024-6
18. C. Badea, C. Bob, I.Balcu, S.Dan, I.Buchman, - *Experimental Researches on Efficient Building Materials Made with Ultra Fine Fly Ash*, Proceedings of the 1 st WSEAS International Conference on MATERIALS SCIENCE (MATERIALS'08), pp. 16-19, ISBN:978-960-474-024-6
19. C. Badea, C. Bob, I.Buchman, I.Balcu, S.Dan, *Building Materials With Dense Slurry From Power Plant*, "UNIVERSITARIA SIMPRO 2008", Editura UNIVERSITAS, Petrosani, pp. 5-8, ISBN: 1842-4449
20. E. Fagadar-Cosma, C. Enache, D. Vlascici, G. Fagadar-Cosma, *Nanomaterials based on 3,4-dimethoxy-phenyl substituted porphyrin entrapped in silica matrix*, Journal of Porphyrins and phthalocianines, vol. 12 (3-6), 2008, 505, ISSN 1088-4246, www.u-bourgogne.fr/jpp/
21. E. Fagadar-Cosma, C. Enache, D. Dascalu, Gh. Fagadar-Cosma, R. Gavrilă, FT-IR, *Fluorescence and Electronic Spectra for Monitoring the Aggregation Process of tetra-Pyridylporphyrine Entrapped in Silica Matrices*, Optoelectronics and Advanced Materials-Rapid Communications, 2008, 2(7),437-441, ISSN: Print: 1842-6573
22. Fagadar-Cosma E., Ianasi C., Vasile M., Enache C., Armeanu I., Fagadar-Cosma G., Dudas Z., *Potential catalysts for oxidation based on silica-metalloporphyrins micro- and nano-materials.*, 15th Symposium on Analytical and Environmental Problems, SZAB Szeged, Ungaria, 22 Sept. 2008.

PhD THESIS

1. DĂESCU Cosmin - Rehabilitation of structural elements using composite materials
2. DEMETER István - RC walls strengthened by FRP composites. PhD advisor: Prof. Stoian V.
3. FABIAN Alexandru - Contribution To The Calculus Of The Structural Composite Steel-Concrete Shear Walls With Rigid Reinforcement. PhD advisor: Prof. Stoian V.
4. DIACONU Dan – RC Structural elements reinforced with FRP composites
5. FLORUT Codrut - Performance study of the elements subjected to bending strengthened with FRP composites
6. BEREVOESCU Luiza – Contribution in hygrothermal rehabilitation of the residential buildings
7. CAPOTESCU – Theory of military architecture

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.

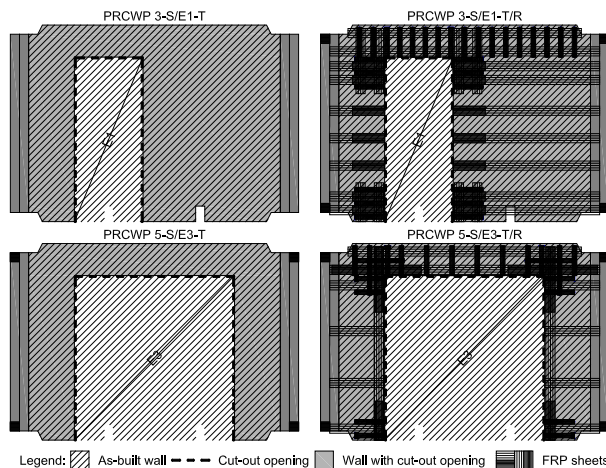
FURTHER DEVELOPMENTS

- In the field of construction materials will be developed new materials like high performance concrete, high performance concrete additives, fly-ash, phosphogypsum, self-compacting concrete, etc.
- In the field of structural rehabilitation of reinforced concrete and masonry structures

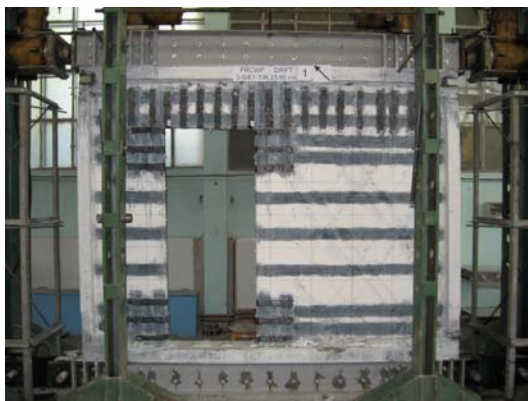
- new modern and efficient solutions are studied, tested and used in practice
- Behaviour and rehabilitation of masonry shear walls at seismic actions will be developed and new solutions will be studied
- New alternative methods for design of reinforced concrete structural elements are developed and proposed for different reinforced concrete structural elements
- Further optimization of composite steel-concrete building structures in seismic area will be performed
- Non-destructive research on concrete and steel reinforcement of structure and infrastructure bridges
- Bridges technical expertise
- Concrete dispersed reinforced with short fibers.

REMARKABLE ACHIEVEMENTS

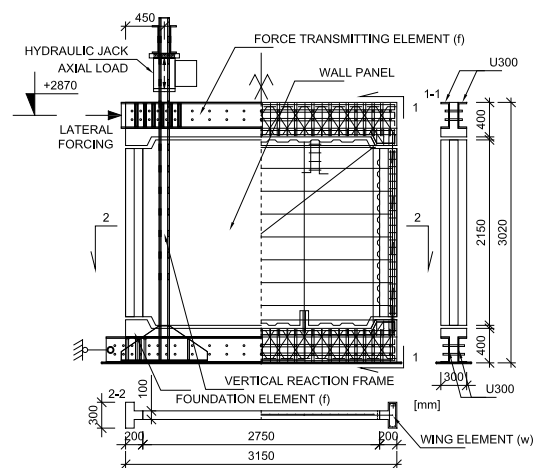
1. Precast RC wall panels with cut-out openings strengthened by FRP composites – Ongoing research



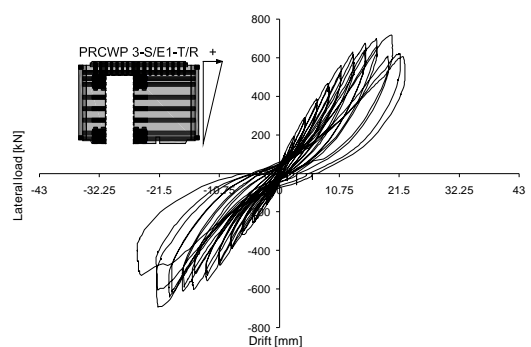
Tested wall specimens



Precast wall panel with cut-out opening strengthened by FRP composites

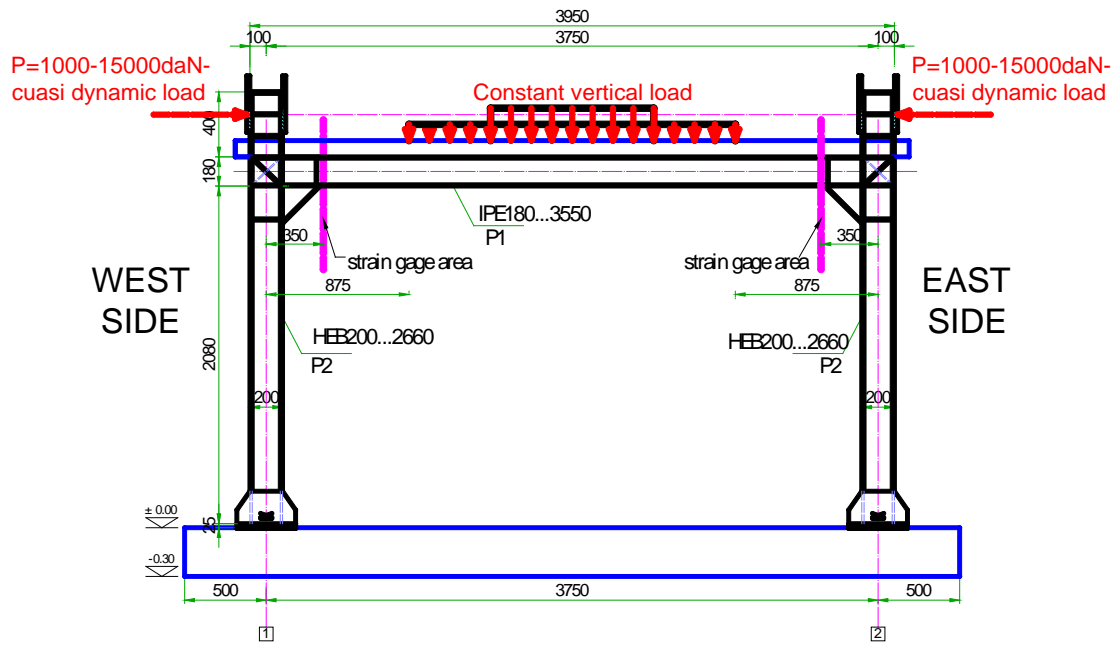


Test set-up



Load – displacement hysteresis diagram

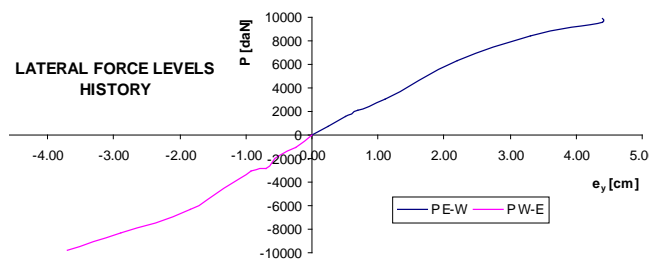
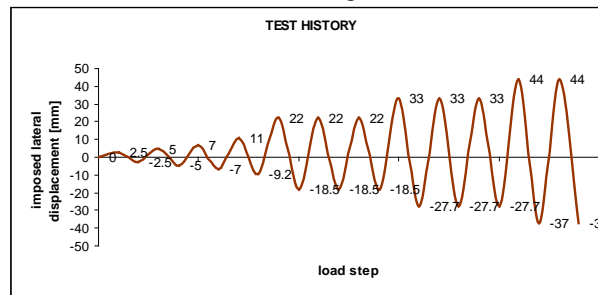
2. Composite steel-concrete structures



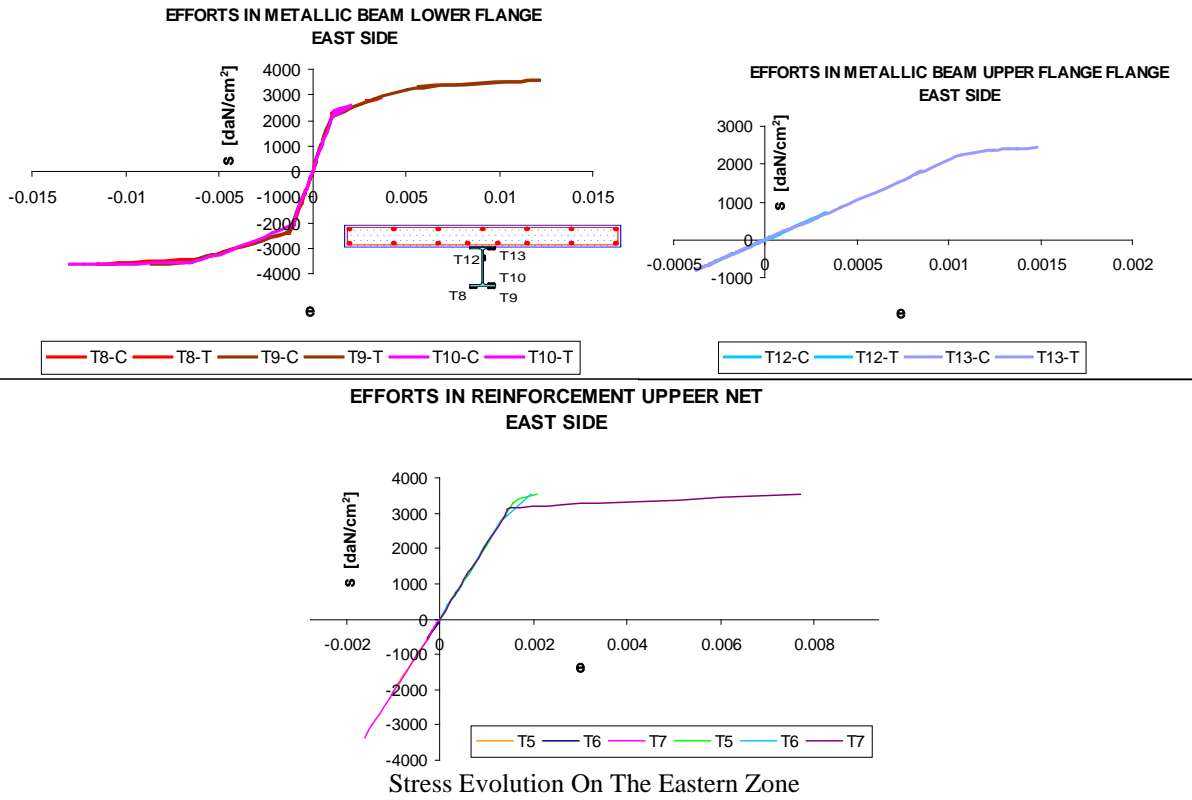
Stand design



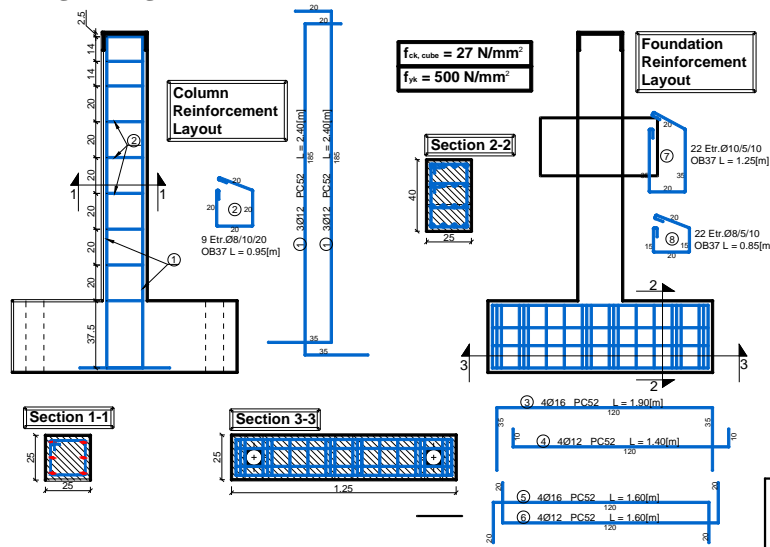
Photo during test



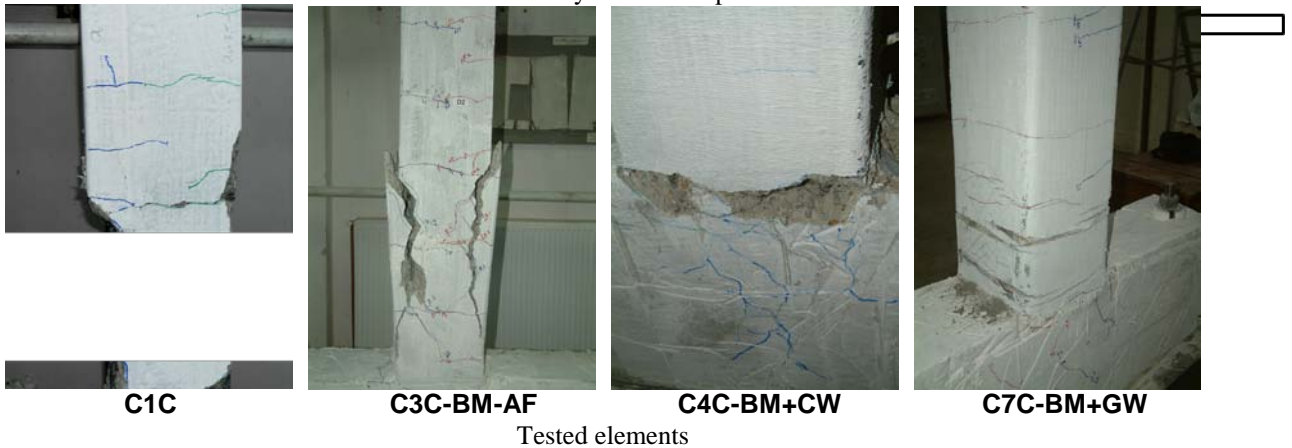
Load Cycles with corresponding lateral displacements

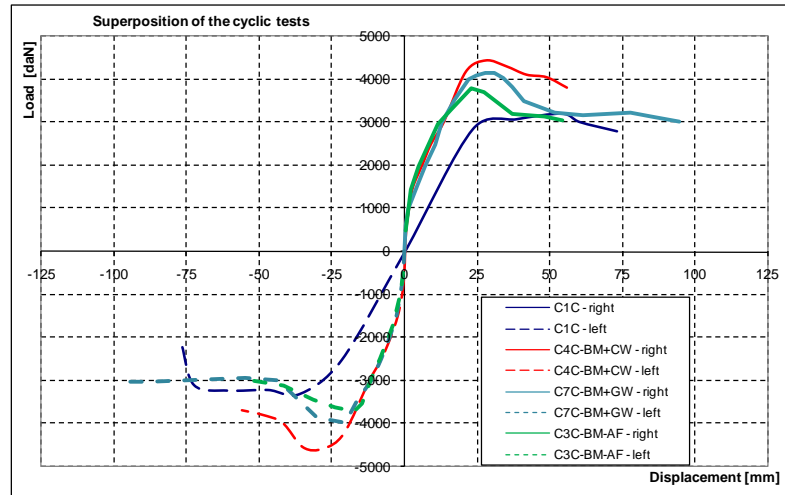


3. Structural strengthening of RC columns



Reinforcement lay-out of the specimens





Superposition of the cyclic tests.

RESEARCH CENTRE FOR BUILDING SERVICES

GENERAL PRESENTATION

In the Department of Building Services is functioning the Research Center for Building Services (CCIC), approved by CNCISIS in the year 2001 (certify with the number 57/CC-C) and the National Building Services Laboratory, abilities by MLPAT (authorization number 1019.04.08/2006) to effect technical agreements for products, proceeds and equipments for building services.

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

OBJECTIVES

The objectives of CCIC are the improvement of the complex specialization activities for building services, contributing with the obtained results to their perfection/modernization, efficiencies, renewing and to raise the qualification level of their members.

MAIN RESEARCH FIELDS

- ambient comfort
Keywords: comfort, heating, ventilation, water supply, electrical energy, temperature, humidity, air velocity
- buildings energy
Keywords: energy economy, energy management, heat transfer, buildings envelop, installations

systems, certification energetically audit, thermal rehabilitation

- reducing energetically consumptions and loses 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 Ambient Comfort"
- Participation to national and international scientific manifestations

RESULTS

RESEARCH PROJECTS/CONTRACTS

1. Contract no. 105 / 2008, *Studies and documentation in order to obtain the technical agreement for high pressure systems that evacuate household wasted water*, Beneficiary: CSORBA ZRT Ungaria, 5,158 RON
2. Contract no. 106 / 2008, *Consultancy and pressure proof for heating,, sanitary and gas installations*, Beneficiary: SC EUROCONTOR Timișoara, 5,712 RON
3. Contract no. 806 / 2008, *Fez ability study and technical project for the canalization network and filtering station of waste water in the Becicherecu Mic commune*, Beneficiary: Town hall of Becicherecu Mic, Value: 118,000 RON
4. Contract no. 119 / 2008, *Assistance, specialty consultancies and effectuations of pressure proofs for heating-, sanitary- and gas installations*, Beneficiary: SC TROVACASA Timisoara, Value: 5,712 RON
5. Contract no. 801 / 2008, *Fez ability study and technical project for the canalization network and filtering station of waste water in the Carand commune*, Beneficiary: Town hall of Carand, District Arad, Value: 38,350 RON
6. Contract no. 0406 / 2003 phase 2008, *Professional perfecting program of engineers for building services, in order to obtain the certification as energetically auditor in buildings*, Beneficiary AIIR Timisoara, Value: 38,325 RON
7. Contract no. 01 / 2008, *Fez ability study and technical project for the water supply and canalization network in the Tapia commune*, Beneficiary>Town hall of Lugoj, District Timiș, Value: 30,300 RON
8. Contract no. 165 / 2008, *Consultancy and pressure proof for heating,, sanitary and gas installations*, Beneficiary: SC PROMPT SA Timișoara, 5,712 RON

BOOKS

1. Retezan, A., Sârbu, I., Borza, I., Cinca, M. (ed.) *Proceedings of the International Conference "Building Equipment and Ambient Comfort"*, Politehnica Publishing House, Timișoara, 2007, ISBN 973-625-305-8, 528 p.

PUBLISHED PAPERS

1. Sârbu, I., Ostafe, G., *Energetically optimization of water distribution systems in large urban centers*, Periodical Polytechnica Budapesta nr.52/1, 2008, ISSN 0324-6051, pp. 149-160
2. Sârbu, I., Popină, O., *Energetically analysis for unbalanced functioning of the heating systems*, Tehnica instalațiilor nr.8(60), 2008, ISSN 1582-6244, pp. 26-28
3. Iosif, A., Sârbu, I., *Comparison of velocities and pressures blade of pump-turbine runner*, 24 th IAHR Symposium on Hydraulic Machinery and Systems, Foz cho Iguassu, Brazil, 2008, ISBN978-85-60858-13-1, pp. 1-9
4. Brata, S., Jura, C., *Efficient analytical methods for optimized dimensioning of electrical networks with multiple sources*, Tehnica instalațiilor nr. 9(61), 2008, ISSN 1582-6244, pp. 11-13
5. Cinca, M., Ianca, S., *Case study regarding the thermal energetically rehabilitation of a school building in Ineu*, International Conference "Building installation and ambient comfort" Timișoara, ISSN 1842-9491, 2008, pp. 269-279
6. Păcurar, C., Retezan, A., *Energetically economy through the isolation of domestic warm water pipes*, International Conference "Building installation and ambient comfort" Timișoara, ISSN 1842-9491, 2008, pp. 308-313
7. Bancea, O., *The necessary air load for comfort ventilation*, International Conference "Building installation and ambient comfort" Timisoara, ISSN 1842-9491, 2008, pp. 399-406
8. Dorhoi, S., Bancea, O., *Humidification of inlet air in order to assure the comfort conditions in the winter period*, International Conference "Building installation and ambient comfort" Timisoara, ISSN 1842-9491, 2008, pp. 416-422
9. Sârbu, I., Bura, H., Popina, O., *Analysis models of thermal and olfactory comfort in a room*, Acta Technica Napocensis, Cluj-Napoca, ISSN 1221-5848, 2008, vol IV, nr. 51, pp. 445-456
10. Sârbu, I., Brata, S., *Energetically audit of a building*, International Conference "Building installation and ambient comfort" Timisoara, ISSN 1842-9491, 2008, pp. 208-292
11. Brata, S., *The influence of solar load in establishing the annual heat necessity of buildings*, International Conference "Building installation and ambient comfort" Timisoara, ISSN 1842-9491, 2008, pp. 225-232

12. Iosif, A., *Numerically solution of the Laplace equation for two directional thermal conduction*, International Conference "Building installation and ambient comfort" Timișoara, ISSN 1842-9491, 2008, pp. 133-142
13. Retezan, A., Bancea, O., Dorhoi, S., *Technical and energetically aspects of filtering*, 14 th Internat. Conf., Building Services, Mechanical and Building Industry days, Debrecen Hungary, 2008, ISBN 978-963-473-124-5 pp. 144-149
14. Bancea, O., Retezan, A., Dorhoi, S., *Aspects of air filtering in heating, ventilating and air conditioning services*, Conference "Building installation and energy economy" Iasi, ISSN 1843-3510, 2008, pp. 78-82
15. Retezan, A., Retezan, R., *Local canalization networks – necessities and possibilities*, 43th National Conference for Building Services, Sinaia, 2008, ISBN 978-973-755-249-5, pp. 476-483.

CERTIFIED LABORATORY

National Building Services Laboratory, abilities by MLPTL (authorization number 1019.04.08/2006)

PHD RESEARCH ACTIVITIES

1. *Prof.dr.eng.eur.eng. Ioan SÂRBU*, supervisor in the field of *Civil Engineering*
PhD students:
 - Călin SEBRCHIEVICI: *Optimization of building and industrial services in order to reduce energy consumption and the CO₂ emissions*
 - Doru PELIVAN: *Comfort and energetically efficiency assurance in buildings by using renewable resources*
2. *Prof.dr.eng. Ioan BORZA*, supervisor in the field of *Civil Engineering*
PhD student:
 - Denisa PĂTRU MIC: *Studies and contributions in realizing of installation systems using unconventional energies*
3. *Prof.dr.eng. Adrian RETEZAN*, supervisor in the field of *Civil Engineering*
PhD students:
 - Teodor VALE ROMEL : *Contributions and new solutions for fire protection in underground spaces*
 - Laurențiu NEAGOE: *Contributions to the buildings energetically rehabilitation*

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. Silvana Brata: *Thermo-technique for installations and buildings, Buildings energy, Hydraulic for thermal network*
- Assoc. prof. dr. eng. Mihai Cinca: *Thermal comfort, Heat recovering in industrial processes, Applications for informatically calculus*
- Lecturer dr. eng. Anton Iosif: *Hydraulic, Air and water pollution reducing systems, Numerically models and simulations*
- Assist. eng. Ladislau Kardos: *Water and heat supply of buildings, Water treatment, Environment protection*
- Assist. eng. Gabriel Ostafe: *Thermo technique for installations and buildings, Energy economy*
- Assist. eng. Cristian Păcurar: *Optimizing the heating systems, Energy management in buildings*
- Assist. eng. Florin Lăcătuș: *Electrical installations, Lightening systems*

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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*

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. *Studies and experimental researches and laboratory analyses for optimal preparation technology for ash from C.T.E. Deva. Laboratory determination for consolidated soils, Beneficiary: S.C. I.S.P.E. S.A., Value: 8,925 RON Team Assoc. prof. dr. eng. Ion BOGDAN, Assist. Dr.Eng.Alexandra CIOPEC*
2. *Studies and experimental researches and laboratory analyses for optimal preparation technology for ash from C.T.E. Govora. Laboratory determination for consolidated soils, Beneficiary: S.C. I.S.P.E. S.A., Value: 8,925 RON Team Assoc. prof. dr. eng. Ion BOGDAN, Assist. Dr.Eng.Alexandra CIOPEC*
3. *Technical assistance at the execution of some research work for foundation soils and geotechnical documentation, Beneficiary : S.C. ATELIER A S.R.L ARAD., Value: 4,998 RON, Team: Prof. dr. eng. Virgil HAIDA, Teach. Assist. Dr. eng. Cristina VOICU, Tehn. Ana BAICU.*
4. *Plate tests for compaction checking of the foundation pillows and other fillings at Air separation Factory Otelu Rosu, Beneficiary S.C. ANTREPRIZA LUCA S.R.L. Total*

- value: 17,136 RON, Team: Prof. dr. eng. Virgil HAIDA., Teach. Assist. Dr. eng Monica MIREA..
5. *Geotechnical study for light bituminous pavement on DJ 684B Pietroasa - Poieni.*, Beneficiary: S.C. SEARCH CORPORATION BUCURESTI Value: 7,140 RON, Team: Prof. dr. eng. Virgil HAIDA
 6. *Laboratory Geotechnical tests and results interpretation for elaboration of the geotechnical study for highway Nadlac –Arad Timisoara – Deva*, Beneficiary: S.C. CARA S.R.L. , Value:4,760 RON, Team: Assoc. prof. dr. eng. Ion BOGDAN
 7. *Test on slime obtained from Industrial Park Resita*, Beneficiary: INCERC Timisoara., Value: 11,157 RON, Team: Prof. dr. eng. Agneta GRUIA
 8. *Laboratory tests for determination of the soils geotechnical parameters on placements in Timis county and Caras Severin county* Beneficiary: S.C. GEO TOLS S.R.L. Dumbravita, Value:13,556 RON, Team: Prof. dr. eng. Agneta GRUIA
 6. G. Leucuta, M. Marin – *Short drilled piles used for industrial halls*, 11th – National Conference for Soil Mechanics and Foundation, pp. 446-454
 7. Luiza Roman – *Soil stabilization by using geosynthetic materials*, 11th – National Conference for Soil Mechanics and Foundation, pp. 471-476
 8. Alexandra Ciopec – *Stabilization solution with anchored piles for a slope analyzed with F.E.M.*, 11th – National Conference for Soil Mechanics and Foundation , pp.477-484
 9. G. Belea – *The productivity of the horizontal vibrodrilling installations* 11th – National Conference for Soil Mechanics and Foundation, pp. 510-515
 10. I. Bogdan, H. H. Rasool - *Sandy soils compaction by vibropunching*, 11th – National Conference for Soil Mechanics and Foundation, pp. 529-536
 11. I. Bogdan, H. H. Rasool - *Weak foundation ground compaction by plots method realized by punching*, 11th – National Conference for Soil Mechanics and Foundation, pp.537-542

PUBLICATIONS

PUBLISHED PAPERS

1. Monica Mirea, Cristina Voicu, V. Haida, *Considerations on the bearing capacity of semispherical foundations in punched holes*, 11th – National Conference for Soil Mechanics and Foundation, pp. 188 - 195
2. S. Muj, Agneta Gruia, Monica Mirea – *Solutions for the infrastructure of a building executed near a ground floor – real estate*, 11th – National Conference for Soil Mechanics and Foundation, pp. 278 – 284
3. M. Marin, O. Roman, H. H. Rasool – *Geodynamic study for the evaluation on the impact of tall buildings above near by areas, in case of earth quakes* , 11th – National Conference for Soil Mechanics and Foundation, pp. 392 – 401
4. M. Marin, O. Roman, V. Ighian – *The foundation system for the rebuilding and modernization of the multipurpose sport hall in Craiova*, 11th – National Conference for Soil Mechanics and Foundation, pp. 402 – 409
5. V. Haida, Cristina Voicu, Monica Mirea – *Foundation pillows executed in steel slags*, 11th – National Conference for Soil Mechanics and Foundation, pp. 410-418
12. Alexandra Ciopec, Ioan Boldurean, Ion Bogdan - *Monitoring of a slope consolidated by reinforced concrete piles stabilization system*-11th – National Conference for Soil Mechanics and Foundation, pp.727-733
13. Carmen Peptan, V. Haida, F. M. Brebu – *Aspects of the working of structure – foundation – soil for special buildings*, 40 International Conference of Agriculture Faculty Timisoara, 8 pp.
14. Carmen Peptan, V. Haida, G. Peptan, F. M. Brebu – *Calculus and technological aspects of the anchorage foundation for special building*, 40 International Conference of Agriculture Faculty Timisoara, pp. 8
15. Agneta Gruia, C. Boangiu, L. Ardelean – *Site investigation for a pile of buildings*, 11th National Conference of soil mechanics and foundation , pp. 15 – 20.

BOOKS

1. Haida V., Marin M., Mirea Monica – *Soil Mechanics* , Ed. Orizonturi Universitare, ISBN 978-973-638-311-3

PHD STUDENTS

Scientific coordinator: Prof. dr. eng. Virgil HAIDA

1. Eng. Alexandra Ciopec presented the thesis in July 2008: *Contributions regarding the study of soil slopes stabilization*”

2. Eng. Carmen Aurelia Peptan presented the thesis in December 2008: *“Contributions regarding the study of some efficient foundation systems for special constructions”*
3. Eng. Marian Daniel GAINA: *“Contributions regarding the study of some efficient technologies of execution for embankments of land communication ways”*
4. Eng. Valeria SMARANDA: *“Contributions regarding the study of roads stability and resistance in Gorj county”*
5. Eng. Aurelian BORDOS: *“Contributions regarding the study of behavior in exploitation of slopes on difficult soils”*
6. Eng. Ciprian COSTESCU: *“Contributions regarding the study of some influence factors upon technical state of roads in Banat area”*
7. Eng. Mihaela Cecilia CHEZAN: *“Contributions regarding the efficiency of cadastral works in construction field”*
8. Eng. Adrian Ciprian MAYER: *“Contributions regarding the behavior in time of railway embankments”*
9. Eng. Valentin Sorin VLADASEL: *“Contributions regarding the study of some consolidation solutions for foundations and foundation ground”*
10. Eng. Luiza PIESZ: *“Contributions regarding the study of geo-synthetics reinforced embankments stability”*
11. Eng. Marius LUCACIU: *“Contributions regarding the study of some realization solutions for road structures on difficult soils”*
12. Eng. Nicolae Ion BABUCA: *“Contributions regarding the efficiency of survey works in constructions field”*

Scientific coordinator: Prof. dr. eng. Marin MARIN

1. Eng. Octavian ROMAN: *“Contributions regarding some particularities of earthquake hazard of Timisoara placement”*
2. Eng. Hatam Hamed Rasool: *“Researches regarding solutions and procedures for industrial foundations works”*
3. Eng. Valentin Ighian: *“Considerations regarding study of the foundation solutions on piles”*

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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.

ACTIVITIES AND RESULTS

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

RESEARCH TEAM

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

RESEARCH PROJECTS

1. *Streets modernization in Ghilad, Beba Veche, Stiuca, Rovinta Mare, Giroc, Mosnita* Beneficiary: S.C. TRISKELE S.R.L. , Value: 11,900 RON. Team : Prof. dr. eng. Ion COSTESCU

2. *Streets modernization in Curtea village,* Beneficiary: Curtea Mayor, Value: 7,140 RON. Team : Prof. dr. eng. Ion COSTESCU
3. *Streets modernization in village Parta.,* Beneficiary: Route Consult, Value: 8,520 RON. Team: Prof dr. eng. Ion COSTESCU
4. *Bypass variant for Timisoara city DN6 Km 549 + 076, DN69 Km 6 + 460* Beneficiary: D.R.D.P. Timisoara, Value: 40,879 RON. Team: Prof dr. eng. Gheorghe LUCACI, Prof dr. eng. Ion COSTESCU, Prof dr. eng. Florin BELC, Tehn. Stefan BETEA.
5. *Rehabilitation for DN6, Lugoj-Timisoara, km 500+400–km552+600* Beneficiary: D.R.D.P. Timisoara., Team: Prof dr. eng. Gheorghe LUCACI, Prof. Dr. eng .Florin BELC, Prof. dr. eng. Ion COSTESCU, Tehn. Stefan BETEA Value: 41,650 RON.
6. *Laboratory tests on natural aggregates, filler and asphalt samples in order to elaborate two asphalt mixtures dosages* Beneficiary: S.C. AXELA S.R.L. Team: Prof. dr. eng. Gheorghe LUCACI, Prof dr. eng. Florin BELC, Tehn. Stefan BETEA Value: 8,330 RON.
7. *Physichal-mechanical tests on natural aggregates, binder stabilized materials asphalt, elaboration of dosages for asphalt mixtures factories and checking quality of works.”* Beneficiary: S.C. CONSTRUCMOD S.R.L., ORADEA Team: Prof dr. eng. Florin BELC, Prof. dr. eng. Ion COSTESCU, Prof. dr. eng. Gheorghe LUCACI, Tehn. Stefan BETEA Value : 16,600 RON.
8. *Laboratory tests asphalt samples realized by S.C. CONFORT S.R.L. “* Beneficiary : S.C. CONFORT S.R.L., Team: Prof dr. eng. Ion COSTESCU, Value : 2,142RON.
9. *Laboratory tests on asphalt* Beneficiary: S.C. SAMCIF S.A., Team: Teaching Assist. Dr. eng. Cornel BANCEA, Value : 12,000 RON.
10. *Technical survey of railway infrastructure Brasov - Sichișoara,* Beneficiary: SC PROIECT CF S.R.L. Bucuresti, Team: Assoc. prof. dr. eng. Alexandru HERMAN, Value: 17,664 RON.
11. *Modernization of village road 290, DN 79 Tamasda,* Beneficiary: S.C. ADP S.A. Timisoara, Value: 8,925 RON. Team: Prof dr. eng. Gheorghe LUCACI, Prof dr. eng. Florin BELC, tehn. Stefan BETEA.

PUBLICATIONS

PUBLISHED PAPERS

1. G. Lucaci, R. Băncilă, F. Belc, A. Tirtea, DP Pavlou, *Stress Concentration Analysis of Rocks containing Interfacial Cracks under Internal*

Singular Loading Sources, NEW ASPECTS OF ENGINEERING MECHANICS, STRUCTURES, ENGINEERING GEOLOGY, pp. 45 – 53.

2. F. Belc, *Effect of roads on the environment in regard to the durability development*, Roads and bridges Magazine, nr. 124, pp. 14-17
3. F. Belc, *Asphaltic emulsion and environment*, Roads and bridges Magazine, nr. 125, pp. 29-32
4. I. Costescu, Mihaela Ianosev, M. Ianosev, A. Scatena – *Slopes consolidation and protection on DN6, Km. 358 + 000 Km. 408 + 895*, 11th National Conference of soil mechanic and foundation, pp. 734 - 742
5. G. Lucaci, R. Bancila, F. Belc, D. Pavlou – *Solution for the calculus of an infinite plate on elastic medium*, 11th National Conference of soil mechanic and foundation, pp. 426 - 433.
2. Eng. Marius BANICA: “*Contributions regarding the technical state improvement for the roads from Gorj County*”
3. Eng Mihaela IOVANOV: “*Contributions regarding usage of the efficient technologies for roads realization*”
4. Eng Romulus KOMOZ : “*Contributions to the improvement of the urban roads management*”
5. Eng Liviu TUDOR: “*Contributions to the study and realizations of modern technologies for roads building*”
6. Eng. Ionut VESA: *Research field: Civil Engineering*

BOOKS

1. *Belc F. – Calculus and design of the overland communication ways . Basic Elements . Ed. Solness, ISBN 978-973-729-149-3*

PHD STUDENTS

Scientific coordinator: Prof.dr Ion COSTESCU

1. Eng. Horatiu SIMION: “*Contributions to the study and application of modern systems for road management and administration*”

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RESEARCH TEAM: SURVEYING AND 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

➤ Surveying Engineering

Keywords: surveying

➤ Special applications of Photogrammetric Exploitation

Keywords: photogrammetry, exploitation

➤ Improving methods for monitoring land movements in mining areas

Keywords: monitoring, land movement, mining

➤ Geodetic Monitoring for Engineering Projects

Keywords: monitoring

Researches in

- **DEVELOPMENT OF THE ROMANIAN GEODETIC CONTROL NETWORK USING PERMANENT GPS STATIONS**
- **VIRTUAL REFERENCE STATIONS**
- **AUTOMATION AND MONITORING LAND MANAGEMENT**
- **GEODETIC EVALUATION OF CRUSTAL MOVEMENTS IN BANAT AREA**
- **USING INTERGRAPH TECHNOLOGY FOR GIS DEVELOPMENT REGARDING SPELEAN CAVITIES SYSTEMATIZATION IN THE NATIONAL PARK SEMENIC CHEILE CARASULUI OF BANAT AREA**
- **SETTING UP DATA BASIS**

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; they provide accurate planimetric and altimetric information, leading to the improvement of the national control network.

With GPS geodesy can be defined the time and locate the area of increased geophysical activity by mapping crustal deformation, seismicity, and other factors. Integration of these spatial data with crustal seismicity, surface geology, and topography through a Geographic Information System (GIS) approach places critical constraints on the geodynamic settings for identifying the distribution, geometry, and type of active crustal faults, for elucidating the spatial relationship between the crustal structures and mantle seismicity.

ACTIVITIES

The measurements are performed in order to increase the reference network for the permanent stations using control points from Timisoara.

These are used for developing cadastral applications, topographic engineering projects, urbanistic evaluation and land management monitoring.

RESEARCH TEAM

- Assoc.prof. Ph. D. Carmen GRECEA
- Lecturer Ph.D. Mihaela STURZA
- Lecturer Ph.D. Sorin HERBAN
- Lecturer Ph. D. Cosmin MUSAT
- Assist.Ph. D. Viorica DAVID
- Assist.Ph. D. Alina BALA
- Ing. Claudiu BOTA

RESEARCH PROJECTS/CONTRACTS

1. Contract no. 138/2008, *Studies and cadastral researches for industrial building authorization to PRO AIR CLEAN platform.* Beneficiary: PRO AIR CLEAN Timisoara, Value: 4.760,00 RON.

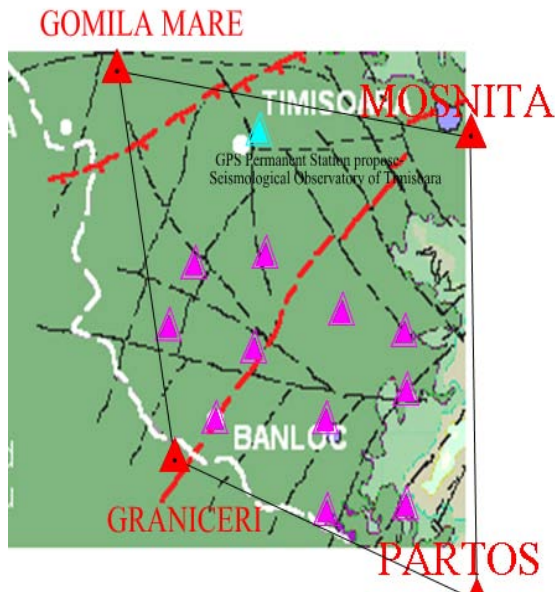
2. Contract no. 61/2008 – *Cadastral and topographical studies for industrial area at MONDO PLAST Timisoara* Beneficiary: MONDO STYLE ROMANIA Value: 7.378,00 RON.
3. Contract no. 73/2008 – *Cadastral and topographical studies in HOLCIM industrial platform* Beneficiary: HOLCIM ROMANIA S.A. Value: 5.950,00RON.
4. Contract no.182/2008 – *Elaboration of data basis for the use of the geospatial information with a view to the administration of the cemeteries from Timisoara – data acquisition and updating.* Beneficiary: Town Hall of Timisoara Value: 17.000,00 RON/2008.

CERTIFIED LABORATORY

- Land Measurement and Cadastre Laboratory, abilities by National Agency of Cadastre and Real Estate (authorization B nr.289/11.02.2003)
- Research Laboratory for Cadastral works automation and GIS

**ACHIEVEMENTS AND FURTHER DEVELOPMENT**

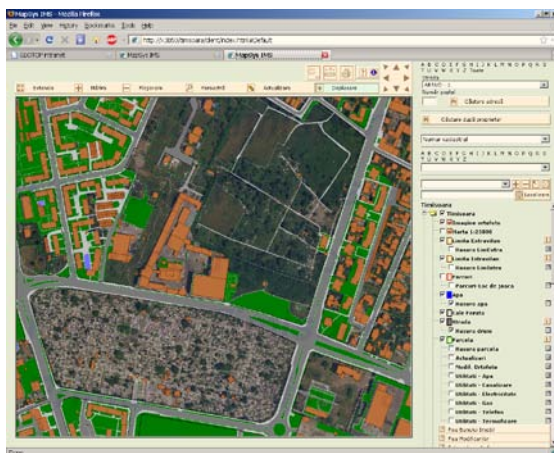
- Monitoring settlements for engineering projects
- Studies and geodetic solutions for future evaluations and monitoring crustal movements in Banat county
- Using GPS virtual stations for improving accuracy in cadastral applications
- Data basis for urban GIS
- Using the Intergraph technology for development of a Registered Research Laboratory (RRL)



GPS monitoring network (proposal) of the Banloc seismicogenic area



Digital image



Using geospatial information for cemeteries administration in Timisoara

PUBLISHED PAPERS

1. Sturza Mihaela, *Abstracting the informations and cartographic generalization*, International Symposium "GeoCAD 2008", University "1 Decembrie 1918" Alba Iulia, May 2008, pp. 35-39 – RevCad'08-Journal of Geodesy and Cadastre, ISSN 1583-2279
2. Grecea Carmen, Herban Sorin, Musat Cosmin, *Research and results in developing models for construction deformation*, *Scientific Bulletin of the Politehnica University of Timisoara*, Vol 2/2008, ISSN 1224-6026 , pag.
3. Musat Cosmin, *Building observation for analysis of displacement and deformation in geodetic networks for civil construction*, University "1 Decembrie 1918" Alba Iulia, May 2008, pp. 97-105 – RevCad'08-Journal of Geodesy and Cadastre, ISSN 1583-2279
4. Grecea Carmen, Bala Alina, Eugen Oros – *Studies and Geodetic solutions for future evaluations and monitoring crustal movements in Banat County*, University "1 Decembrie 1918" Alba Iulia, May 2008, pp. 37-47 – RevCad'08-Journal of Geodesy and Cadastre, ISSN 1583-2279
5. Herban Sorin, *Conception and possible results for interdisciplinary planning of landslides areas from Romania*, University "1 Decembrie 1918" Alba Iulia, May 2008, pp. 89-99 – RevCad'08-Journal of Geodesy and Cadastre, ISSN 1583-2279
6. David Viorica, *The steps to generation of the digital true orthophotos*, University "1 Decembrie 1918" Alba Iulia, May 2008, pp. 99-105 – RevCad'08-Journal of Geodesy and Cadastre, ISSN 1583-2279
7. Grecea Carmen, Sturza Mihaela, Herban Sorin, Musat Cosmin, David Viorica, Bala Alina - *Present experiences in Romanian cadastral engineering*, Gis Open 2008 – International Symposium, University of West Hungary-Faculty of Geoinformatics, Szekesfehervar, Hungary

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