

MINISTRY OF NATIONAL EDUCATION



**TECHNICAL UNIVERSITY**  
OF CLUJ-NAPOCA

UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA

FACULTATEA DE CONSTRUCȚII

Departamentul de Structuri

# DOSAR DE CONCURS

pentru atribuirea gradajilor de merit personalului didactic din  
Universitatea Tehnică Cluj-Napoca

Anul 2017

CANDIDAT:

Conf. dr. ing. Zsolt NAGY



Nr. dep. 144/02.11.2017

**CĂTRE:**

Universitatea Tehnică Cluj-Napoca  
Departament Structuri  
Facultatea de Construcții  
Attn: director departament  
conf.dr. ing. Attila Puskás

**DOMNULE DIRECTOR,**

Subsemnatul **Zsolt NAGY** născut la data de 06.04.1970, în localitatea *Tîrgu Mureș*, jud *Mureș* absolvent al *Facultății de Construcții din Cluj-Napoca*, secția *CCIA*, *Conferențiar* la *Universitatea Tehnică din Cluj-Napoca*, *Facultatea de Construcții*, *Departamentul de Structuri*, Nr. telefon: 0743-060494, conform Metodologiei de organizare și desfășurare vă rog să binevoiți a-mi aproba înscrierea la concursul pentru atribuirea gradărilor de merit personalului didactic din *Universitatea Tehnică Cluj-Napoca* la locurile disponibile alocate *Departamentului de Structuri*, *Facultatea de Construcții*.

Menționez că sunt doctor din data de 21.03.2007 în domeniul de specialitate *Inginerie Civilă*.

Data: 25.10.2017

Semnătura

## INFORMAȚII PERSONALE

**Zsolt NAGY**


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Skype: dr.nagy.zs

Sexul Masculin | Data nașterii 06/04/1970 | Naționalitatea Maghiară

 LOCUL DE MUNCA ACTUAL/  
POZIȚIA

Universitatea Tehnică Cluj / Facultatea de Construcții /  
Departamentul de Structuri / Conferențiar

## EXPERIENȚA PROFESIONALĂ

2009 - prezent

**Conferențiar**

Universitatea Tehnică din Cluj-Napoca, [www.utcluj.ro](http://www.utcluj.ro)

- Activități didactice și de cercetare-dezvoltare, conducere diplomă de licență
- Industrial Constructions – an IV – Civil Engineering – pregătirea materialelor de curs și aplicații – 14 module de curs noi, 7 lucrări de laborator noi. Modulele de curs au fost elaborate în format electronic (.ppt, .pdf)
- Composite Structures – an IV Civil Engineering – Modulele de curs au fost elaborate în format electronic (.ppt, .pdf), pregătirea materialelor de aplicații
- Steel Structures – an III+IV Civil Engineering – pregătirea materialelor de aplicații
- Structuri din bare cu pereți subțiri – an IV Inginerie Civilă și Master, Inginerie Structurală – Modulele de curs au fost elaborate în format electronic (.ppt, .pdf), pregătirea materialelor de aplicații

Tipul sau sectorul de activitate: Învățământ superior

2006 - prezent

**Director**

Gordias SRL Cluj-Napoca, [www.gordias.ro](http://www.gordias.ro)

- Activitate de consultanță și proiectare în cadrul companiei Gordias SRL
- Traininguri de dezvoltarea resurselor umane ale clienților și partenerilor Gordias SRL
- Cursuri la disciplina "Construcții metalice" - cursuri (anul III, IV și V) la disciplina Construcții Metalice în cadrul UAIM București
- Management de proiecte construcții civile și industriale

Tipul sau sectorul de activitate: Proiectare, Consultanță, Management de Proiect

1995 - 2006

**Director Tehnic / Director Cercetare - Dezvoltare**

Lindab SRL, București, [www.lindab.ro](http://www.lindab.ro)

- Activități manageriale și de cercetare-dezvoltare în domeniul profilelor formate la rece
- În aceasta perioadă am contribuit la realizarea a mai multor obiective importante contractate de compania Lindab : depozite și fabrici de producție pentru industria berii (Brauunion-Heineken: Miercurea -Ciuc, Constanța, București, Craiova, Hațeg)
- Service autocamioane Volvo, București, fabrică de produse textile Transilvanian Trousers Company, Sf. Gheorghe, extindere clădire a universității Cantemir, Tg. Mureș.
- Am contribuit la dezvoltarea unor noi produse de succes „Construcții Ușoare” și „Soluții de Hale Industriale Tipizate”, parte și azi ale portofoliului de produse Lindab
- Am făcut parte din echipa internațională de cercetare a concernului Lindab, care avea sarcina dezvoltării produselor și serviciilor întregului concern,
- Am fost responsabil de relația cu Universitățile de profil și mediul de cercetare, precum și de producerea de materiale tehnice pentru aceste medii

Tipul sau sectorul de activitate: Industria materialelor de construcții din oțel subțire

**EDUCAȚIE ȘI FORMARE**

1999-2006	<b>Doctorat (PhD)</b> Universitatea „Politehnica” Timișoara <ul style="list-style-type: none"> <li>▪ S-a studiat comportamentul structurilor și a îmbinărilor realizate din profile de oțel cu pereți subțiri formate la rece, s-au realizat încercări experimentale pe noduri și pe cadre la scară reală,</li> <li>▪ Titlul tezei de doctorat: <i>”Studiul soluțiilor constructive și performanțelor structurale ale halelor ușoare cu structura realizată din profile de oțel formate la rece”</i></li> </ul>	Nivelul EQF 7
2001-2005	<b>Diploma Profesională în Management</b> Open University Business School – București <ul style="list-style-type: none"> <li>▪ S-a studiat managementul resurselor umane, manament general, marketing, management financiar,</li> <li>▪ Atenție deosebită s-a acordat procesului de cercetare și dezvoltare în cadrul organizațiilor, rolul procesului de inovare în dezvoltarea produselor și a serviciilor organizației,</li> <li>▪ Titlul lucrării de licență: <i>” CLIMATUL PENTRU INOVARE ȘI PROCESUL DE REALIZARE A PRODUSELOR NOI ÎN ORGANIZAȚIA LINDAB ”</i></li> </ul>	Nivelul EQF 6
1989-1994	<b>Diploma de Licență – Inginer Constructor</b> Universitatea Tehnică din Cluj Napoca <ul style="list-style-type: none"> <li>▪ S-a studiat proiectarea structurilor din beton armat și a structurilor metalice,</li> <li>▪ Titlul lucrării de licență: <i>”Proiectarea unui patinoar artificial de 5000 de locuri cu structură din beton armat și acoperiș suspendat pe cabluri”</i></li> </ul>	Nivelul EQF 5
1984-1988	<b>Diploma de Bacalaureat</b> Liceul de Matematică – Fizică din Miercurea Ciuc	Nivelul EQF 4

**COMPETENȚE PERSOANELE**

Limba maternă      Limba maghiară

## Alte limbi străine cunoscute

	INTELEGERE		VORBIRE		SCRIERE
	Ascultare	Citire	Participare la conversație	Discurs oral	
Limba română	C2	C2	C2	C2	C2
Limba engleză	B2	B2	B2	B2	B2

Niveluri: A1/2: Utilizator elementar - B1/2: Utilizator independent - C1/2: Utilizator experimentat  
 Cadru european comun de referință pentru limbi străine

## Competențe de comunicare

## Competențe organizaționale/manageriale

Abilități de comunicare dobândite prin susținerea continuă a numeroase prezentări de specialitate, îmbunătățite în permanență prin activitatea desfășurată

Competențe manageriale, Leadership, Interpersonale:

- Competențe manageriale: Ca director de cercetare și dezvoltare al firmei Lindab am contribuit la extinderea portofoliului de produse al organizației, rezultatul fiind un venit suplimentar din vânzări de peste 1,200.000 Eur în anul 2004. Obiectivul propus a necesitat planificarea și efectuarea unor serii de activități de management și marketing,
- Ca director al firmei Gordias am realizat cu echipa proprie numeroase proiecte de succes premiate la competiția națională AICPS
- Leadership: Ca unul din liderii firmei Gordias conduc o echipă de proiectare, răspund de motivarea oamenilor din subordine (echipă de 9 persoane) și îi evaluez periodic,
- Competențe interpersonale: La derularea proiectelor lucrez alături de o echipă de 9 oameni și colaborez cu echipe complexe de proiect. Rezultatele bune necesită flexibilitate și colaborare

Competențe dobândite la locul de muncă	Cunoașterea proceselor organizaționale: <ul style="list-style-type: none"> <li>• o bună cunoaștere a proceselor interne organizaționale (fiind responsabilitatea mea dezvoltarea produselor și a serviciilor organizației)</li> </ul>
Competențe informatice	Bună cunoaștere a aplicațiilor asociate proiectării structurilor metalice și compozite: <ul style="list-style-type: none"> <li>• Aplicațiile Tekla Structures și Consteel sînt utilizate în activitatea curentă didactică / munca cu studenții</li> </ul>
Alte competențe	<ul style="list-style-type: none"> <li>• Aptitudini de coordonare, urmărire și verificare a activității de proiectare – consultantă și a activității de cercetare,</li> <li>• Capacitate de analiză, asistare, coordonare, organizare și planificare,</li> <li>• Fermitate și viteză de reacție în situații critice,</li> <li>• Aptitudini de organizare profesional-științifice: am organizat patru seminarii pe tematica structurilor din oțel și din profile cu pereți subțiri cu participare națională și internațională:                     <ul style="list-style-type: none"> <li>• J. Michael Davies – de la University of Manchester – Marea Britanie (2003 - București)</li> <li>• Reinhold Schuster – de la University of Waterloo – Canada (2005 - București)</li> <li>• "Construiește cu Steel" – organizat la Universitatea Tehnică Cluj (Edițiile mai 2010, mai 2011 și noiembrie 2015)</li> </ul> </li> </ul>
Permis de conducere	<ul style="list-style-type: none"> <li>• Categoria B</li> </ul>

**INFORMAȚII SUPPLEMENTARE**

Publicații	•Vezi anexă – Lista de publicații
Prezentări	Prezentare susținută în cadrul programului de formare continuă a specialiștilor de la Centrala Atomică Paks – Ungaria, în colaborare cu UBB Cluj, 5-7 mai, 2011
Seminarii	<ul style="list-style-type: none"> <li>•"Construiește cu Steel" – organizat la Universitatea Tehnică Cluj (Edițiile 2010, 2011, 2015)</li> <li>•Seminar susținut în cadrul programului de suport "Steel days" al integrării Turciei în Uniunea Europeană, pe tema utilizării profilelor formate la rece pe rol de structură principală de rezistență. Seminarul a fost intitulat : „Soguk Şekillendirilmiş Hafif Çelik ile Yapı Tasarımı (Utilizarea profilelor formate la rece în aplicații industriale” desfășurat la Istanbul 22-24 aprilie 2009. Seminarul s-a bucurat de suportul asociațiilor producătorilor de structuri metalice din cele două țări: Asociația Producătorilor de Construcții Metalice din România - APCMR și din Turcia - Türk Yapısal Çelik Derneği (TUCSA).</li> <li>• Seminar "Construcții metalice ușoare pentru clădiri civile și industriale" (2003 - București)</li> <li>• Seminar "Noi tendințe în proiectarea structurilor metalice ușoare" (2005 - București)</li> </ul>
Distincții	<ul style="list-style-type: none"> <li>•4th International Conference on Thin-walled Structures, ICTWS'2004, Loughborough, Anglia, 23-24 Iunie 2004. În cadrul conferinței s-a acordat de către comitetul științific premiul special „THE BEST CONFERENCE PAPER” articolului: „MONOTONIC AND CYCLIC PERFORMANCE OF JOINTS OF COLD FORMED STEEL PORTAL FRAMES echipa de cercetători: D. Dubină, A. Stratan, A. Ciutină, L. Fulóp, Zs. Nagy;</li> <li>•Premiul Special al Juriului câștigat la competiția națională de proiecte AICPS (Asociația Inginerilor Constructori Proiectanți de Structuri) ediția 2009 cu lucrarea: „STRUCTURA DE REZISTENȚĂ A PATINOARULUI ARTIFICIAL DIN TG. MUREȘ”;</li> <li>•Premiul III câștigat la competiția națională de proiecte AICPS ediția 2010 cu lucrarea: „RECONVERSIA CENTRULUI COMERCIAL METECOM DIN SATU MARE ÎN GRAND MALL METECOM”;</li> <li>•Premiul III câștigat la competiția națională de proiecte AICPS ediția 2011 cu lucrarea: "EXTINDEREA PE VERTICALĂ ÎN SOLUȚIE METALICĂ A UNEI CLĂDIRI MULTIETAJATE: CLĂDIRIA DE BIROURI SIGMA, CLUJ-NAPOCA”;</li> <li>•Premiul I câștigat la competiția națională de proiecte AICPS ediția 2013 cu lucrarea: "SALĂ MULTIFUNCȚIONALĂ DE SPORT, CLUJ-NAPOCA</li> <li>•Premiul II câștigat la competiția națională de proiecte AICPS ediția 2014 cu lucrarea: "STRUCȚURA METALICĂ A TEATRULUI NAȚIONAL DE OPERETĂ ION DACIAN, BUCUREȘTI</li> </ul>

•Premiul I câștigat la competiția națională de proiecte AICPS ediția 2016 cu lucrarea: "RECONVERSIE CLĂDIRI AGRICULTURALE ÎN CLĂDIRI DE BIROURI, SÂNTIMBRU, Jud. Alba

- Afilieri**
- International Association for Bridge and Structural Engineering - IABSE,
  - Asociația Inginerilor Constructori Proiectanți de Structuri - AICPS din România,
  - Asociația Producătorilor de Construcții Metalice din România – APCMR
  - European Convention for Constructional Steelwork - ECCS, membru activ din 2004 în comitetul tehnic TC7 – TWG7.5 (Thin Walled Group - Practical Improvement of Design Procedures) și TWG7.10 (Thin Walled Group - Connections in cold-formed steel structures)
- Specializări**
- Fire design of steel structures – organizat de ECCS la Bruxelles în perioada 23-24 martie, 2017
  - Advanced fire design of steel structures – organizat de ECCS la Bruxelles în 24 mai, 2017
  - Structural glass –Technology an design – organizat de CMM la Lisabona în 18-19 noi., 2016
  - Bursier post-doctoral în cadrul programului 4D-POSTDOC, perioada 2010-2013;
  - Cercetare post-doctorală în cadrul programului 4D-POSTDOC la VTT – Research Centre of Finland, Espoo, perioada 13 iunie-13 iulie 2011;
  - Specializare în cadrul programului DIDATEC, perioada martie-septembrie 2012
  - Specializare în cadrul unei burse ERASMUS, Staff Training la BUTE (Budapest University of Technology) , perioada 9-15 septembrie 2012 ;
  - Cercetare post-doctorală în cadrul programului 4D-POSTDOC la UPC – UNIVERSITAT POLITÈCNICA DE CATALUNYA • BARCELONATECH, Barcelona, Spania, perioada 16 noiembrie-17 decembrie 2012
- Proiecte**
- Specializare: "Light Gauge Metal Structures - Recent Advances" (3-7 Iunie, 2002), Coordonat de Dan Dubina, Jacques Rondal la CISM | International Centre for Mechanical Sciences, Udine – Italia
- Conferințe**
- Vezi anexă
- Referințe**
- Vezi anexă

**Teoman Pekoz**, Ph. D., Professor Emeritus, Structural Engineering  
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**Dunai László**, Ph. D, Professor  
Budapesti Műszaki és Gazdaságtudományi Egyetem  
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ANEXE

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- Lista publicațiilor;
- Lista proiectelor de cercetare;
- Lista proiectelor mai importante;
- Documente justificative SIMAC 2014, 2015, 2016

Universitatea Tehnică Cluj  
Facultatea de Construcții  
Departament de Structuri  
Conf. dr. ing. Zsolt NAGY

## LISTA

### lucrărilor științifice în domeniul disciplinelor din postul didactic

#### A. Teza de doctorat

STUDIUL SOLUȚIILOR CONSTRUCTIVE ȘI PERFORMANȚELOR STRUCTURALE ALE HALELOR UȘOARE CU STRUCTURA REALIZATĂ DIN PROFILE DE OȚEL FORMATE LA RECE

Teze de doctorat ale UPT, Seria 5, Nr. 3, Editura Politehnica, 2006, 188 pagini, 124 figuri, 20 tabele. ISSN:1842-581X, ISBN (10):973-625-389-9, ISBN (13):978-973-625-389-8

#### B. Cărți și capitole în cărți publicate în ultimii 10 anii

##### Internaționale– în colaborare:

1.Publicație ECCS nr. 21: „The Testing of Connections with Mechanical Fasteners in Steel Sheeting and Sections”, ISBN 92-9147-000-91



2.Publicație ECCS nr. 123: „Worked examples according to EN 1993-1-3 Eurocode 3, Part 1.3”, ISBN 92-9147-000-86





**Naționale – prim autor :**

3. Studiul soluțiilor constructive și performanțelor structurale ale halelor ușoare cu structura realizată din profile de oțel formate la rece, ISBN 973-625-389-9



6. "Construiește cu STEEL – Ediția 2" Volumul seminarul organizat la Cluj, ISBN 978-973-713-286-4,



**Naționale – în colaborare:**

4. Calculul și proiectarea construcțiilor din profile metalice cu pereți subțiri formate la rece, ISBN 973-86509-4-1



7. "Construiește cu "steel" : lucrările celei de-a XIV-a Conferințe Națională de Construcții Metalice"

Volumul conferinței organizat la Cluj, ISBN 978-973-713-334-2,



**Editor :**

5. "Construiește cu STEEL – Ediția 1" Volumul seminarul organizat cu ocazia aniversării profesorului VASILE PĂCURAR la 70 de ani, ISBN 978-973-713-271-0,

### C. Lucrări indexate ISI/BDI publicate în ultimii 10 anii - Reviste

1. Nagy, Zsolt; Gîlia, Lucian , Călin Neagu , EXPERIMENTAL INVESTIGATIONS OF COLD-FORMED JOINTS FOR MULTI-STOREY STEEL FRAMED STRUCTURES, Proceedings of the Romanian Academy Series A-Mathematics Physics Technical Sciences Information Science, ISSN : 1454-9069, Volum 18, Nr. 3/2017, pp : 256-264
2. Zs. Nagy, A. Pop, I. Moiş and R. Ballok, Stressed Skin Effect on the Elastic Buckling of Pitched Roof Portal Frames (extended version of conference article), Journal of Structures, Volume 8 , pp/227 – 244, 2016  
DOI: <http://dx.doi.org/10.1016/j.istruc.2016.05.001>
3. Nagy, Zsolt; Gîlia, Lucian; Ballok, Robert, Romanian application of cold-formed steel beams with screwed corrugated webs, Steel Construction 6 (2013) ISSN 1867-0520, Journal for ECCS members - European Convention for Constructional Steelwork, No. 2, published by Ernst & Sohn pp/139-143
4. Zs. Nagy, L. Fülöp, A. Talja, ARE WE TOO CAPITALISTS FOR A COMFORTABLE LIFE? BUSINESS MODELS FOR FUTURE AND EXISTING FLAT BUILDING ADMINISTRATION, QIEM 2012 Proceedings, Special Issue of the Journal "Quality-Access to Success, Vol. 13, S5, November 2012, indexed in Elsevier SciVerse Scopus (Dec. 2012), pp. 205-210
5. P. Pernes, Zs. Nagy, FE modeling of cold-formed steel bolted joints in pitch-roof portal frames, Acta Technica Napocensis: Civil Engineering & Architecture Vol. 55, No. 3 pp. 234-242 (2012)
6. P. Pernes, Zs. Nagy, C. Câmpian, M. Pop, Optimized sections for cold formed steel channel profiles under compression and bending according to EN1993-1-3, Acta Technica Napocensis: Civil Engineering & Architecture Vol. 55, No. 3 pp. 243-250 (2012)
7. Zs. Nagy, D. Dubina, THERE IS POSSIBLE TO BUILD LOW RISE MULTI STOREY COLD-FORMED STEEL FRAMED STRUCTURES IN ROMANIA?, BULETINUL INSTITUTULUI POLITEHNIC DIN IAȘI, Publicat de Universitatea Tehnică „Gheorghe Asachi” din Iași, Tomul LIV (LVIII), Fasc. 4, 2011, Secția CONSTRUCȚII - ARHITECTURĂ, pp. 97-108
8. Zs. Nagy, Z. Kiss, I.M. Cristuțiu, Penthouse Steel Structure for a Five Story Building – Extension of the “Sigma” Office Building, Cluj-Napoca, Romania, Acta Technica Napocensis: Civil Engineering & Architecture Vol. 54 No. 2 pp. 135-143 (2011)

9. L. Gîlia, Zs. Nagy, V. Păcurar, Structural Behavior of Corrugated Web Cold-formed Girders, Acta Technica Napocensis: Civil Engineering & Architecture Vol. 53, pp.221-230 (2010)
10. D. Dubina, V. Ungureanu, A. Stratan, Zs. Nagy, FULL – SCALE TESTS ON COLD-FORMED STEEL PITCHED-ROOF PORTAL FRAMES WITH BOLTED JOINTS, Advanced Steel Construction Vol. 5, No. 2, pp. 175-194 (2009)

**Lucrări publicate în ultimii 10 anii în reviste și volume de conferințe cu referenți**

1. Zs. Nagy and R. Ballok , LOCAL AND GLOBAL STABILITY ANALYSIS OF CFS STRUCTURAL MEMBERS WITH PARTICULAR SHAPES USING SPOT WELDING TECHNOLOGY, Proceedings of The International Colloquium on Stability and Ductility of Steel Structures – SDSS 2016, 30 May – 01 June 2016, Timisoara, Romania
2. Zs. Nagy, V. Ungureanu, D. Dubina and R. Ballok, EXPERIMENTAL INVESTIGATIONS OF COLD-FORMED STEEL TRAPEZOIDAL BEAMS OF SCREWED CORRUGATED WEBS, Proceedings of The International Colloquium on Stability and Ductility of Steel Structures – SDSS 2016, 30 May – 01 June 2016, Timisoara, Romania
3. Zs. Nagy, A. Pop, I. Moiş and R. Ballok, Stressed Skin Effect on the Elastic Buckling of Pitched Roof Portal Frames, Proceedings of The Eighth International Conference on Advances in Steel Structures, 21-24 July 2015 - Lisbon, Portugal
4. Zs. Nagy, M. Cristuțiu, “Required performance level of an existing building for overroofing”, Proceedings of The second International Conference on Structures & Architecture – ICSA2013, Guimaraes, Portugal, (2013)
5. Zs. Nagy, M. Cristuțiu, “Reconversion process of an old building into a modern commercial centre”, Proceedings of The second International Conference on Structures & Architecture – ICSA2013, Guimaraes, Portugal, (2013)
6. Zs. Nagy, M. Cristuțiu, Local and Global Stability Analysis of a Large Free Span Steel Roof Structure, Proceedings of The Eleventh International Conference on Computational Structures Technology, 4-7 September 2012 - Dubrovnik, Croatia, ISBN: 978-1-905088-54-6, paper 31
7. Zs. Nagy, P. Pernes, A Parametric Study of Cold-Formed Steel Bolted Joints in Pitch-Roof Portal Frames, Proceedings of The Eleventh International Conference on Computational Structures Technology, 4-7 September 2012 - Dubrovnik, Croatia, ISBN: 978-1-905088-54-6, paper 33
8. I.M. Cristuțiu, Zs. Nagy, (2012) Behaviour of a large steel pitched-roof portal frame with welded plate tapered members and king post truss rafter at the mid span, Proceedings of 10th International Conference on Advances in Steel Concrete Composite and Hybrid Structures, Singapore, 2 – 4 July 2012, ISBN: 978-981-07-2615-7 : doi:10.3850/978-981-07-2615-7 294, pp. 134-141
9. Zs. Nagy, I.M. Cristuțiu, Nunes, L. - Seismic behaviour of a large span welded steel structure considering lateral restraints and initial imperfections: a case study, Proceedings of 7th International Conference - BEHAVIOUR OF STEEL STRUCTURES IN

- SEISMIC AREAS – STESSA 2012, Santiago Chile, CRC Press/Balkema, ISBN: 9780415621052 pp. 479-484 (2012)
10. P. Pernes, Zs. Nagy, CALIBRATION OF A FINITE ELEMENT MODEL FOR EVALUATION OF COLD-FORMED STEEL BOLTED JOINTS IN PITCH-ROOF PORTAL FRAMES, Proceedings of the 6th International Conference on Thin-walled Structures, ICTWS'2011, 5-7 September 2011 Timișoara, pp.537-544
  11. Zs. Nagy, D. Dubina, V. Ungureanu, APPLICATION OF COMPONENT METHOD: BOLTED JOINTS FOR LOW RISE MULTI STOREY COLD-FORMED STEEL FRAMED STRUCTURES, Proceedings of the 6-th European Conference on Steel Structures, Eurosteel 2011, August 31 - September 2, 2011, Budapest, Hungary, Vol. A. pp. 273-278
  12. Zs. Nagy, M. Cristutiu, APPLICATION OF MONITORING TO ENSURE STRUCTURAL ROBUSTNESS, Proceedings of the 6-th European Conference on Steel Structures, Eurosteel 2011, August 31 - September 2, 2011, Budapest, Hungary, Vol. C. pp. 1965-1970
  13. S. Brad, A. Chioreanu, Zs. Nagy, Product Innovation in SMES: a Web Based supporting Tool, Proceedings of the METNET seminar 2011, 12-13 October, Aarhus, Denmark, ISBN: 978-951-784-556-4, pp.110-122
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  18. Dubina, D., Stratan, A. and Nagy, Zs. (2007). *Full - scale testing of cold-formed steel pitched-roof portal frames of back-to-back channel sections and bolted joints*. The Sixth International Conference on Steel and Aluminum Structures, Oxford, UK, pp. 931-939.
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23. Dubina, D. , Stratan, A., Ciutina, A., Fulop, L., Nagy, Zs. (2004). "Performance of ridge and eaves joints in cold-formed steel portal frames". Proc. of the 17th int. Specialty conf. "Recent advances and developments in cold-formed steel design and construction", Orlando, Florida, USA, 04-05 Nov. 2004. Univ. of Missouri-Rolla, Ed. R.A. LaBoube, W-W. Yu, p. 727-742.
24. Dubina, D., Stratan, A, Ciutina, A., Nagy, Zs. (2004). "Experimental research on monotonic and cyclic performance of joints of cold-formed pitched roof portal frames". Proc. "The Second Int. Conf. on Steel & Composite Structures ICSCS'04", Ed. C.K. Choi, H.W. Lee, H.G. Kwak, 2-4 September 2004, Seoul, Korea. pp: 176-190.
25. Dubina, D. , Stratan, A., Ciutina, A., Fulop, L., Nagy, Zs. (2004). „Strength, stiffness and ductility of cold-formed steel bolted connections”. Proc. Of the Fifth International Workshop, Ed. F.S.K. Bijlaard, A.M. Gresnigt, G.J. van der Vegte, Amsterdam, The Netherlands, 3-4 June 2004, pp: 263-272
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#### **E. Proiecte de cercetare**

*Contracte de cercetare naționale, rol de colaborator (2) :*

1. Proiectul MEC-CNCSIS, Grant 3853 A11/164 "Studiul experimental al cadrelor pentru construcții civile și industriale în zone seismice", încheiat în 2006;
2. Proiect de cercetare între UTCN și SC. Teraplast SA Bistrița: SISTEM INTEGRAT INOVATIV PENTRU CONSTRUCȚII: STRUCTURĂ METALICĂ ASAMBLATĂ DIN PROFILE UȘOARE ZINCATE ȘI ANVELOPĂ DIN PANOURI TERMOIZOLANTE DIN SPUMĂ POLIURETANICĂ", cu Nr.inreg/ Cod SMIS: 329/5754, Nr. contract 109/09.03.2010 POSCCE, total contract 12,000 Euro
3. Proiect cercetare în parteneriat UTCN și Proman Romania SRL, PN-III-P2-2.1-C1-2017-0113 : Sistem integrat de proiectare, verificare la cutremur și ofertare a structurilor de rafturi, total contract 45,000 Lei

*Contracte de cercetare internaționale, rol de colaborator (1) :*

1. Proiectul EUREKA cu titlul : "SISTEM E-FORUM PENTRU IMPLEMENTAREA EUROCODURILOR PENTRU STRUCTURI METALICE ÎN ROMÂNIA – SEFIE-RO; încheiat în anul 2006

*Contracte de cercetare naționale, rol de director proiect (1)*

1. Bursă Postdoc cu proiectul ÎNCERCĂRI EXPERIMENTALE PE NODURI INOVATIVE DE CADRE MULTIETAJATE CU PROFILE DIN OȚEL FORMATE LA RECE PENTRU CLĂDIRI CIVILE ÎN ZONE SEISMICE, desfășurare 2010-2013; buget 34,000 euro

*Contracte de cercetare cu mediul economic (3):*

1. Dezvoltarea produsului „Construcții Ușoare” - proiect dezvoltat de SC Lindab în colaborare cu UP Timișoara, responsabil proiect din partea Lindab, total 30,000 euro
2. Tabele cu capacități portante pentru profile Z, C, Sigma, contr. 62/2013 între Universitatea Tehnică Cluj și Plastsistem SA, buget 5,600 euro
3. Tabele cu capacități portante pentru panouri sandwich, contr. 4645/27.02.2014 și 11162/21.05.2014 între Universitatea Tehnică Cluj și Plastsistem SA, buget 5,000 euro

**Data: 25.10.2017**

**Semnătura**

Centralizator punctaje SIMAC

2014, 2015, 2016

Nume: Nagy  
 Prenume: Zsolt  
 Grad didactic: Conf. dr. ing.

An	Activitate didactica [A]	Activitate de cercetare [A]	TOTAL [A]
2014	0 3,826	1,32000 4,000	7,826
2015	0 5,320	3,52120 4,000	9,320
2016	1660 4,461	3,69478 4,660	9,121
TOTAL			26,267

1,320  
 3,52120  
 5,35478  
 10,19598

Director DMCDI  
 conf.dr.ing. Ovidiu Nemes

Rezultate verificate  
 de către echipa de  
 auditori în mai 2017

## Apreciere sintetică asupra activității desfășurate în ultimii 3 ani

SECTIUNEA 1			
Realizari raportate in Sistemul Integrat de Evaluare a Activitatilor Didactice, Cercetare si Management (SIMAC)	Punctaj declarat	Punctaj acordat	Justificare
a) Punctajul total realizat în anul k-1 de raportare în SIMAC: total echivalent A (1A = 10)	7.83		
b) Punctajul total realizat în anul k-2 de raportare în SIMAC: total echivalent A (1A = 10)	9.32		
c) Punctajul total realizat în anul k-3 de raportare în SIMAC: total echivalent A (1A = 10)	9.12		
<b>TOTAL SECTIUNEA 1</b>	<b>26.27</b>	<b>0.00</b>	
i. La aceasta sectiune este obligatoriu un minim cumulată pe cei 3 ani de puncte după cum urmează: profesor: 35 puncte; conferențiar: 21 puncte; asist. lucrări: 15 puncte; asistent: 4,5 puncte.			
SECTIUNEA 2			
Alte realizari in planul activitatii didactice (care nu sunt incluse in sistemul integrat de evaluare SIMAC)	Punctaj declarat	Punctaj acordat	Justificare
a) Discipline noi asimilate, corelate cu standardele naționale introduse în planul de învățământ.	20.00		Curs Bare cu Pereti Subtiri
b) Profesor invitat pentru activitati didactice la universități din țară/ străinătate.	20.00		Profesor invitat Sesiune științifică Studențească Timisoara 2016, Dunaujvaros 2017, Workshop Steel&Earth - Tampere
c) Organizarea unor activități cu studenții (practică în țară/ străinătate, cursuri de vară, etc.).	20.00		Organizare vizita santier Fabrica de bere Sansimon 2016, Curs de vara pentru studenti 2015, Participare student eminent la Workshop Consteel - Budapesta
d) Dezvoltarea bazei materiale la nivel departamental în concordanță cu standardele specifice.			Sustinerea incercarilor experimentale pentru doctoranzi (Maria Pop, Fodor Robert, Balok Robert) cu specimene, materiale pentru incercari
e) Dezvoltarea de noi laboratoare.			
f) Recunoasteri ale performanțelor didactice educaționale. Stabilit pe baza evaluării cadrului didactic.	20.00		Pe baza evaluarilor
g) Activități de management în procesul de învățământ (decan de an, tutorerie ECTS, etc.).	20.00		Tutor an IV Civil engineering, tutorat pentru doctoranzi Feleki A., Cristea A., Pop A., Mois I.
h) Alte activități educaționale semnificative diferite de cele de la punctele (a - g).	20.00		Activitati extrauniversitare cu studentii Ceng (prezentari despre proiecte), prezentari in cadrul conferintelor organizate de PPTT editia 2016, 2017, Workshop Steel&Earth cu ECCS Cluj, Cea mai buna lucrare de licenta Kupas Peter.
<b>TOTAL SECTIUNEA 2</b>	<b>120.00</b>	<b>0.00</b>	
Obligatoriu minim 40 de puncte cumulată pentru toți cei 3 ani de raportare			
SECTIUNEA 3			
Activități manageriale și administrative în sprijinul procesului didactic, de cercetare-dezvoltare, etc.	Punctaj declarat	Punctaj acordat	Justificare
a) Funcții executive de conducere (punctajul se acordă pentru ultimii 3 ani):			
1) Rector			
2) Prorector			
3) Decan			
4) Prodecan			
5) Director de departament			
b) Funcții deliberative de conducere:			
1) Presedinte al senatului			
2) Vicepresedinte al senatului			
3) Cancelar al senatului			
4) Alte funcții de conducere asociate activitatilor desfășurate în interiorul institutiei.	10.00		Membru senat
<b>TOTAL SECTIUNEA 3</b>	<b>10.00</b>	<b>0.00</b>	
SECTIUNEA 4			
Activități la nivel de departament / facultate care nu sunt incluse în secțiunile anterioare	Punctaj declarat	Punctaj acordat	Justificare
a) Activitatea de întocmire a documentației de acreditare	20.00		
b) Activitatea de întocmire a statelor de funcții și a orarului			
c) Activitatea de promovare, pregătirea, desfășurarea admitenței la licență, masterat			
d) Activitatea în cadrul cercurilor științifice studentești altele decât cele definite la S3-h	20.00		
e) Organizarea zilei absolvenților ziua porților deschise a facultății			
f) Organizarea concursurilor studentești locale, naționale și internaționale			
g) Ținuta morală și comportarea academică	20.00		
h) Alte activități semnificative la nivel de departament/facultate diferite de cele de la punctele (a-h)	20.00		
<b>TOTAL SECTIUNEA 4</b>	<b>80.00</b>	<b>0.00</b>	

## OBSERVAȚII:

a) Punctajul de la secțiunea 2 este confirmat de către directorul de departament. Se accentuează că punctajul acordat trebuie să fie între 0 și punctajul maxim, nuanțat în strict acord cu performanțele realizate în cei 3 ani de raportare.

b) Punctajul de la secțiunea 3 este acordat de către directorul de departament din care provine candidatul, calculat pe durata ultimilor 3 ani pentru toate funcțiile deținute.

c) Punctajul de la secțiunea 4 este atribuit integral de către directorul de departament cu acordul consiliului de departament.

Punctajul acordat trebuie să fie între 0 și punctajul maxim, nuanțat în strict acord cu performanțele realizate în cei 3 ani de raportare.

DECAN

DIRECTOR DEPARTAMENT



## Lista proiectelor mai importante

1. Proiectul STRUCTURA DE REZISTENȚĂ A PATINOARULUI ARTIFICIAL DIN TG. MUREȘ, distins cu Premiul Special al Juriului, competiția națională de proiecte AICPS (Asociația Inginerilor Constructori Proiectanți de Structuri) ediția 2009;



2. Proiectul RECONVERSIA CENTRULUI COMERCIAL METECOM DIN SATU MARE ÎN GRAND MALL METECOM distins cu Premiul III, competiția națională de proiecte AICPS (Asociația Inginerilor Constructori Proiectanți de Structuri) ediția 2010;



3. Proiectul EXTINDEREA PE VERTICALĂ ÎN SOLUȚIE METALICĂ A UNEI CLĂDIRI MULTIETAJATE; CLĂDIRIA DE BIROURI SIGMA, CLUJ-NAPOCA distins cu Premiul III, competiția națională de proiecte AICPS (Asociația Inginerilor Constructori Proiectanți de Structuri) ediția 2011;



4. Proiectul structurii de rezistență a Teatrului Național de Operetă "Ion Dacian" din București distins cu Premiul II, competiția națională de proiecte AICPS (Asociația Inginerilor Constructori Proiectanți de Structuri) ediția 2013;



5. Proiectul structurii de rezistență sediu Transavia din Sântimbru distins cu Premiul I, competiția națională de proiecte AICPS (Asociația Inginerilor Constructori Proiectanți de Structuri) ediția 2016



6. Extinderea complexului hotelier Flora din Mamaia (anul 2010)



7. Proiectul de reabilitare a halelor industriale "Ina Shaeffler" localitatea Cristian, jud. Brașov (anul 2008);



8. Proiectul "BaseCamp" pentru forțele militare baza Nato – Kogălniceanu, jud. Constanța (anul 2008);



9. Proiectul extinderii studiourilor ProTV, București (anul 2007);



10. Consultant la realizarea silozurilor de porumb de 9700 tone al societății Monsanto, localitatea Sinești Ialomița (anul 2008);



11. Proiecte pentru reprezentanțe auto Toyota (Suceava, Constanța), Ford (Suceava), Opel (Focșani, Galați, Deva), Hyundai (Reșița), Reprezentanță Dacia (Simpotrans – București) perioada 2006-2010;

## Participări la conferințe - manifestări științifice internaționale mai importante

1. Second World Conference on Steel in Construction, Donostia San Sebastian, Spania 11-13 Mai, 1998;
2. XVII Congresso C.T.A., Napoli, Italia, 3-7 Octombrie 1999;
3. International Conference on Steel Structures of the 2000's - Istanbul, Turcia, 11-13 Septembrie 2000;
4. The 9-th Nordic Steel Construction Conference - NSCC2001, Helsinki, Finlanda, 18-20 Iunie, 2001;
5. Eurosteel 2002 - Third European Conference on Steel Structures, Coimbra, Portugalia, 19-20 Septembrie 2002;
6. Fifth International Conference on Stability and Ductility of Steel Structures, Budapest, Ungaria, 26-28 Septembrie 2002;
7. A VIII-a ediție a Zilelor Academice Timișene - Preocupări actuale în construcții metalice și sudură, Timișoara, România, 23 Mai 2003;
8. 4-th International Conference on Thin-walled Structures, ICTWS'2004, Loughborough, Anglia, 23-24 Iunie 2004;
9. 17-th int. Specialty conference "Recent advances and developments in cold-formed steel design and construction", Orlando, Florida, SUA, 4-5 Noiembrie, 2004;
10. A IX -a ediție a Zilelor Academice Timișene, Timișoara, Romania, Mai 2005;
11. International Conference on Metal Structures ICMS 2006 "Steel - a new and traditional material for building", Poiana Brașov, 20-22 Septembrie, 2006;
12. Sesiunea Aniversară a Facultății de Construcții din Cluj-Napoca - C55 / Conferința Internațională "Construcții 2008" -C2008 Cluj-Napoca, 9-10 Mai 2008;
13. 7-th EUROMECH Solid Mechanics Conference, ESMC'2009, Lisbon, Portugal, 7-9 Septembrie 2009;
14. First International Conference on Structures and Architecture, ICSA 2010 Guimarães, Portugal, 21-23 Iulie 2010,
15. International Colloquium on Stability and Ductility of Steel Structures (SDSS' Rio 2010), Rio de Janeiro, Brazilia, 8-10 Septembrie 2010;
16. Eurosteel 2010 - 6th European Conference on Steel and Composite Structures, | Budapest, Hungary 31 August - 2 Septembrie, 2011;
17. The 6-th International Conference on Thin Walled Structures, Timisoara, Romania, 05 - 07 Septembrie 2011;
18. 7-th International Workshop on Connections in Steel Structures, Timișoara, Romania, 30 Mai - 2 Iunie, 2012;
19. The Eleventh International Conference on Computational Structures Technology (CST 2012) Dubrovnik, Croatia, 4-7 Septembrie 2012;
20. The second International Conference on Structures & Architecture - ICSA2013, Guimaraes, Portugal, 2013;
21. The Eighth International Conference on Advances in Steel Structures, 21-24 July 2015 - Lisbon, Portugal;
22. The International Colloquium on Stability and Ductility of Steel Structures - SDSS 2016, 30 May - 01 June 2016, Timisoara, Romania;

# ASOCIAȚIA INGINERILOR CONSTRUCȚORI PROIECTANȚI DE STRUCTURI

MEMBRU AL ASOCIAȚIEI DE STANDARDIZARE DIN ROMANIA (ASRO)  
MEMBRU COLECTIV AL UNIUNII ASOCIAȚIILOR INGINERILOR CONSTRUCȚORI DIN ROMÂNIA (UAICR)  
MEMBRU COLECTIV AL ASOCIAȚIEI GENERALE A INGINERILOR DIN ROMANIA (AGIR)



## Consiliul de Conducere AICPS acordă

- pentru performanță și calitate în proiectarea structurilor de construcții -

### *Premiul II*

#### Structuri metalice în domeniul culturii: Teatrul Național de Operetă "Ion Dacian" din București

PROIECTANT GENERAL: CĂRPAȚI PROIECT - BUCUREȘTI  
PROIECT STRUCTURA METALICĂ: CONF. DR. ING. ZSOLT NAGY, ING. DUMITRU CANDALE  
S.C. GORDIAS S.R.L. - CLUJ NAPOCA

PROIECTANT INFRASTRUCTURĂ: PROF. DR. ING. IOAN PAUL  
S.C. PROFESIONAL CONSTRUCT SRL - BUCUREȘTI

VERIFICATOR STRUCTURĂ: PROF. DR. ING. ZOLTÁN KISS  
S.C. PLAN 31 RO S.R.L.

ARHITECTURĂ: ARH. ELIODOR POPA

SUBANTREPRENOR STRUCTURA METALICĂ: LINDAB S.R.L.  
MONTAJ STRUCTURĂ: MOBICON PRODIMPEX S.R.L.

BENEFICIAR: TEATRUL NAȚIONAL DE OPERETĂ „ION DACIAN” BUCUREȘTI



Președinte AICPS  
Dr. Ing. Traian Popp







JOURNAL OF CONSTRUCTIONAL  
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Sl. No.	Article Title	Journal Issue	Research Paper	Decision	Decision Date	Reviewer 1	Reviewer 2	Reviewer 3	Reviewer 4	Reviewer 5	
4	Seismic Performance of Reinforced FRP Corrocores Joined to Box Column Using Rib Stiffeners	JCSR-D-16-00519	Research Paper	Decision in Process	Dec 12, 2016	Jan 20, 2017	Dec 14, 2016	Jan 11, 2017	Jan 15, 2017	34	Muhammad Saif Ghobadi, PhD
2	In-plane Bending Hysteretic Behavior of Cuckform Diaphragm Welded Joints with Axial Force	JCSR-D-16-00360	Research Paper	Completed - Accept	Aug 09, 2016	Oct 26, 2016	Aug 14, 2016	Sep 08, 2016	Sep 26, 2016	48	Ji-Ha Xing
2	Experimental Investigation into the Post-fire Mechanical Properties of Hot-rolled and Cold-formed Steels	JCSR-D-15-00799	Research Paper	Completed - Accept	Dec 26, 2015	Jan 02, 2016	Jan 02, 2016	Jan 25, 2016	Feb 14, 2016	50	Hongbo Liu, PhD
1	System reliability evaluation of steel frames with semi-rigid connections	JCSR-D-15-00447	Research Paper	Completed - Accept	Aug 26, 2015	Jan 02, 2016	Aug 29, 2015	Oct 11, 2015	Oct 11, 2015	46	Hui Tai Thai, PhD
2	Experiments on cold-formed ferrous stainless steel slender sections	JCSR-D-14-00401	Research Paper	Completed - Accept	Jan 09, 2015	Feb 17, 2015	Jan 11, 2015	Feb 12, 2015	Feb 12, 2015	37	Maria Bick
3	Axial load behaviour of perforated composite walls with strength enhancement devices	JCSR-D-14-00391	Research Paper	Completed - Accept	Jan 07, 2015	Mar 17, 2015	Jan 07, 2015	Feb 10, 2015	Feb 11, 2015	39	Chandaker Amer Hosain, PhD
2	Experiments on cold-formed ferrous stainless steel slender sections	JCSR-D-14-00440	Research Paper	Completed - Accept	Oct 20, 2014	Feb 17, 2015	Oct 21, 2014	Nov 19, 2014	Nov 30, 2014	41	Maria Bick
3	Axial load behaviour of perforated composite walls with strength enhancement devices	JCSR-D-14-00093	Research Paper	Completed - Accept	Jul 22, 2014	Mar 17, 2015	Jul 23, 2014	Aug 21, 2014	Aug 24, 2014	33	Chandaker Amer Hosain, PhD
2	Roll-hole elongation stiffness and prediction of the behaviour of cold-formed steel connections	JCSR-D-13-00181	Research Paper	Completed - Withdrawn	Nov 20, 2013	Oct 17, 2016	Nov 21, 2013	Jan 01, 2014	Jan 06, 2014	47	Wei Ye, MSc
2	Roll-hole elongation stiffness and prediction of the behaviour of cold-formed steel connections	JCSR-D-13-00016	Research Paper	Completed - Withdrawn	Jul 11, 2013	Oct 17, 2016	Jul 11, 2013	Jul 11, 2013	Aug 23, 2013	43	Wei Ye, MSc
1	Design of cold-formed steel oval hollow section columns	JCSR-D-11-00297	Research Paper	Completed - Accept	Sep 08, 2011	Nov 30, 2011	Sep 08, 2011	Oct 20, 2011	Oct 24, 2011	46	Ben Young
1	Compression tests of cold-formed plain and rimmed steel columns	JCSR-D-10-00383	Research Paper	Completed - Accept	Dec 02, 2010	Jul 25, 2011	Dec 05, 2010	Jan 13, 2011	Mar 28, 2011	116	van Bac Nguyen, PhD

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## ASOCIAȚIA INGINERILOR CONSTRUCTORI PROIECTANȚI DE STRUCTURI

MEMBRU COLECTIV AL UNIUNII ASOCIAȚIILOR INGINERILOR CONSTRUCTORI DIN ROMÂNIA (UAICR)  
MEMBRU COLECTIV AL ASOCIAȚIEI GENERALE A INGINERILOR DIN ROMANIA (AGIR)

# Consiliul de Conducere AICPS acordă

- pentru performanță și calitate în proiectarea structurilor de construcții -

## *Premiul I*

“Reconversia unor hale agricole într-un ansamblu de birouri ultramoderne”

PROIECTANT GENERAL: BIROU DE PROIECTARE STRĂJAN - ALBA IULIA

PROIECTANT STRUCTURĂ METALICĂ: S.C. GORDIAS S.R.L. - CLUJ NAPOCA

CONF. DR. ING. ZSOLT NAGY, ING. ATTILA FELEKI

ARHITECTURA: ARH. IOAN STRĂJAN, ARH. VLAD STRĂJAN

EXPERT TEHNIC: PROF. DR. ING. PAVEL ALEXA

VERIFICATOR STRUCTURĂ: PROF. DR. ING. VASILE PĂCURAR

ANTREPRENOR GENERAL: CON-A S.R.L. - SIBIU

INVESTITOR: TRANSAVIA S.A.



Președinte AICPS  
Dr. Ing. Traian Popp



AICPS





A Magyar Tudományos Akadémia  
**Nagy Zsoltot**

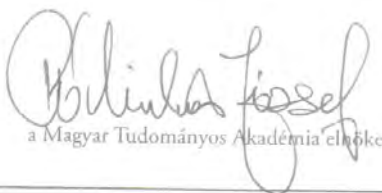
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2013. november 3-i hatállyal

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## Challenges in structural designing of egg-shaped steel structure

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### Abstract

This paper presents the evolution and challenges of structural designing of a highly unusual three-storey steel structure. The construction will operate as an office building, having an egg-shaped form and it will tower in between the existing reconverted single-storey buildings. In addition, includes the structural design of the additional necessary objects for reversion process, such as skylights and connecting greenhouse. The article provides detailed examples, methods and results of structural design, accomplishing the challenges of multi-criteria decision making through structural efficiency, building implementation, environmental issues and project costs.

**Keywords:** multi storey steel structure, steel detailing, joint design, buckling analysis

### 1 Introduction

In Romania, many of the buildings have reached the service life stage, when retrofit is unavoidable. The majority of old buildings are not part of a maintenance program; therefore, their level of degradation is quite high. Usually, unused industrial spaces are demolished, creating a significant amount of environmentally harmful construction debris. Reason why a mixed reversion solution was applied in the case of our project: the middle concrete tower was demolished and the two remaining longitudinal concrete halls, having 105 m length each, were refurbished and reconverted to office buildings.

The architectural design process started in March 2015, however numerous cladding and partitioning details were modified during the structural detailing and erection work. These changes presented an additional challenge, also provided significant time pressure for the design

team. The structural design process of the structure started in June 2015 and was completed in November 2015 (see evolution on Fig. 1).



Fig. 1: Structural walkthrough

The client's main requirements were the followings:

- achieving the required egg-shape of the three storey office building (hereinafter C1) at a sophisticated level, from both structural and architectural perspective;
- to establish an interior space, rich in natural light, which initial destination was agricultural building with no requirement of natural light;
- to retain and refurbish the original prefabricated concrete structure (hereinafter C2 and C3) in order to maximize the usable office area.

Under these conditions, the design team had the following main requirements:

- full design of C1 building, which provides the gorgeous esthetical view of the whole facility;
- to bring natural light, placing skylights on the roof of C2 and C3 buildings;
- to join the non-conventional form of C1 new building with the existing C2 and C3 buildings, breaking straight lines and following the architectural conception with curved surfaces.

The article describes the applied structural solutions, the detailing procedure of the nonconventional joints and presents the erection process of the steel structure. Furthermore, discusses some environmental and cost issues of the project.

## 2 Building description

### 2.1 Architectural facts

Transavia, the client's company, is one of Romania's leader in preparation and processing of poultry meat. The company celebrates 25 years in 2016, hence the initiative to develop an ultramodern administrative headquarter. The project consists in functional reconversion of a set of existing agricultural buildings, which included a mill unit, a grain sorting station and two grain storage halls. As conceptual level, the ovoid shape of C1 (Fig. 2) links to the essential business premises with poultry. The 'egg' symbol is definitely the starting point, the genesis for any living being. Furthermore, this design is the perfect solution to interconnect the two existing buildings.

The cumulative area of C1 is 1350 m<sup>2</sup>, while C2 and C3 are 2050 m<sup>2</sup> each.

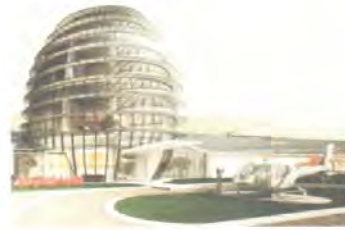


Figure 2. Architectural rendered view

### 2.2 Design loads of the structure

In order to evaluate the structural response, in the design process were considered the following loads (characteristic values):

- Curtain walls (security glass) self-weight:  $q_k = 0,65 \text{ kN/m}^2$ ;
- Composite slab dead load:  $q_k = 4 \text{ kN/m}^2$ ;
- Composite slab live load:  $q_l = 4 \text{ kN/m}^2$ ;
- Partition walls dead load:  $q_k = 5 \text{ kN/ml}$ ;
- Technological load on the roof of technical spaces:  $q_l = 1,5 \text{ kN/m}^2$ ;
- Temperature variation effects between interior (18 degrees) and outer surface (40 degrees during summer days) on the skylights;
- Snow loads with corresponding roof shape coefficients according to CR 1-1-3-2012 [1] (EN1991-1-3),  $s_{0,k} = 1,5 \text{ kN/m}^2$ ;
- Wind loads on building envelope according to CR 1-1-4-2012 [2] (EN1991-1-4),  $v_{b,0} = 27 \text{ m/s}$ ,  $q_{ref} = 0,4 \text{ kN/m}^2$ , calculated with Reynolds number;
- Seismic action according to P100-2013 [3] (EN1998-1), with peak ground acceleration  $a_g = 0,10g$ , control period of seismic motion  $T_c = 0,7 \text{ sec}$  and behavior factor  $q = 2$ ;
- Load combination for ultimate limit state (ULS) and serviceability limit state (SLS) according to CR-0-2005 [4] (EN 1990).

### 2.3 Structural solution and conceptual design of steel structure

#### 2.3.1 C1 building

The major issue regarding the structural configuration of C1 was to maintain the initial ovoid shape with the adequate structural rigidity

(Fig. 3). To address this issue, building information modelling (BIM) was used with continuous consultation with the steel manufacturer and architectural team in order to obtain the best solution both structural and execution point of view. Selection of the most appropriate structural solution has been driven by a number of factors including the span, building geometry, load to be carried, aesthetics and the use of sustainable construction materials.

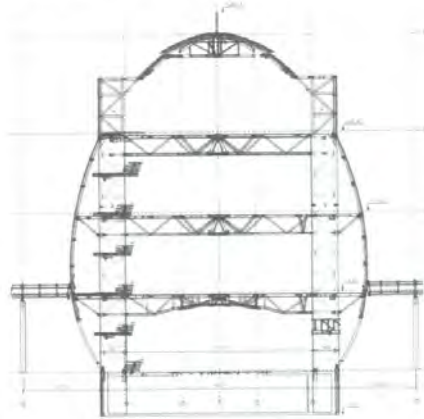


Figure 3. Transverse section through C1

The C1 static scheme's main concept features 10 radially positioned RHS truss columns with a height of 16,6 m each, between these being positioned the composite RHS truss girders with a span of 13 m. The columns are fixed through anchor rods in the diaphragms of the basement, and are embedded in on-site poured reinforced concrete (180 cm x 30 cm final dimensions) to increase their stiffness and fire resistance. For the composite interaction between steel and concrete, welded shear studs have been used on the floor beams, which are simply supported through pin-ended joints using D45 mm round bars. On the junction of the truss girders a massive connection joint has been designed using a CH5508\*12 mm middle pipe. To increase the global rigidity of the structure, respectively to provide support for the composite floor, HEA truss beams were positioned radially between the columns.

The selection of the curtain wall bearing structure (structural ribs) had to address the previously mentioned aesthetic issue. RHS160x80x5 profile has been used, although the initially required welded segmentation of the structural ribs would have resulted in a disadvantageous look. Ultimately, the ribs were curved/rolled in Poland, as the expenses would have been too high in Romania. Since the utilization of wind bracings was forbidden on the ground-, 1<sup>st</sup>, and 2<sup>nd</sup> floors, horizontal circular pipes were placed to link and stabilizing the structural ribs at every 1,80 m.

To create a completely column free interior space on the 3<sup>rd</sup> floor, a self-supporting dome structure was provided. The upper end of the structural ribs is pinned with a bolt connection to a circular horizontal truss beam system, which forms the top of the dome. To provide lateral stability, rigidly connected wind bracing system was used (Fig. 4). Due to the limited space between the ribs, on-site welding was necessary to position the bracings. The structural steel with S235 steel grade ( $f_y=235 \text{ N/mm}^2$ ) was used.

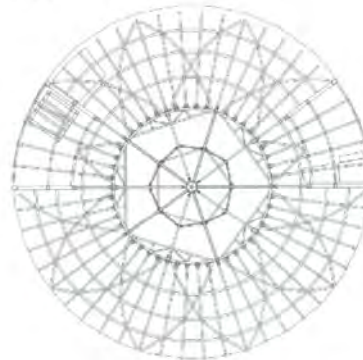


Figure 4. Wind bracing system of C1

Since the diameter of the cross section of C1 is continuously decreasing towards the top of the building, the staircase and the lift's punching the 3<sup>rd</sup> floor glazing surface, by forming two symmetric trapezoidal segments.

The lift's main structure is designed as an individual one, and it is formed by four square hollow sections (SHS 140x8), which are connected and stiffened by horizontal beams.

### 2.3.2 Connection greenhouse

To link C1 with C2 and C3, an independent connecting structure has been designed. The major issue in the case of the greenhouse's structure was the limited interior space which excluded the possibility of an ordinary steel or concrete column in the lobby. Hence a tree inspired steel space column has been designed in order to withstand the accumulated snow load on the roof (Fig. 5).



Fig. 5: Connecting building

The cladding of this building is the similar curtain wall detail as in the case of C1 in the front half, at the back half folded steel sheeting is used because of the increased technological loads ( $150 \text{ kg/m}^2$ ). Furthermore, the roof's shape constantly follows the outlines of C1, which needed a curved perimeter beam. IPE270 was used as primary and curved beam, respectively secondary IPE220 beams provided for the support of the curtain walls.

### 2.3.3 Skylight

The skylights positioned on the middle of C2' and C3's roofs convey the image of a precious diamond jewelry and interconnects the ovoid shape of C1 to the existing buildings. Shaped like turtle shells, these objects ensure the required aesthetical view and the necessary glass surface to bring natural light for the access and office area. On the other hand, this conceptual design avoids the collision with longitudinal purlins, positioned at the ridge of the roof (Fig. 6) and ensures an elegant support without damaging the integrity of the existing concrete structure. The supporting details realized through handcuff-like rod systems secure the necessary assembly tolerances (imperfections in concrete elements were in the means of centimeters) and assured a quick and easy installation. The assembling process of the

structure which included the glass supporting rib system (RHS 80x60x4 welded with CHS48.3x3.2) and the perimeter caisson beams (two IPE270 welded profiles) with a total size of 7.5x15 m, was made by welding under factory conditions. Ultimately, the transport and on-site mounting was conducted as one completely independent element. Figure 6 shows the act of placing the elliptical skylight on the existing structure.

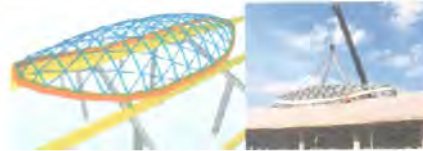


Fig. 6: Skylight BIM and erection

The design of the steel structure was performed following the European standards. For strength, stability and stiffness requirements of the structural elements the prescription of SR-EN1992-1-1 [5], EN1993-1-1 [6], SR-EN1993-1-8 [7], Cidect manuals [8], and P100/2013 [3] were used. For the design of the structural elements, linear elastic structural analysis was performed. The design checks of the structural elements for ULS include persistent or transient design situations (fundamental combinations), where snow loads in combination with live loads play the key role. Also, as the results of seismic analysis, additional stiffener truss beams were positioned between the concrete columns.

For global stability checks Consteel V9 [9] software was used, which calculation procedure is based on the general method of EN1993-1-1 [6]. For individual member checks, both method A and B of EN1993-1-1 [6] was also performed.

## 3 Particular problems in the design process

Due to the non-conventional shape of the building and the intersection with the greenhouse, completely unique joint details resulted. The main challenges in the detailing process were the configuration of connection of radial elements and to include the curved staircase in the existing limits. With the help of BIM, then design team was able to devise the erection phases of the steel

structure, also to observe and prevent the possible clash problems which would cause delay later in the erection process.

During the design process a list of problems and constrains had to be handled, like:

- the central joining of 10 radial truss beams;
- the configuration of the intersection of ribs with the perimeter and floor beams on each level;
- the round connection of ribs on the top of the dome structure on the 3<sup>rd</sup> floor;
- the elimination of ribs at the intersection of the gangway in the ground floor;
- the intersection of the connection greenhouse with building C1;
- the substitution of a regular column with a tree inspired column which helps the structure to sustain the snow pocket on the greenhouse roof;
- the binding of the staircase landings to the structure and the curved radial ramp configuration.

### 3.1 Central connection of radial floor beams

The radial arrangement of columns required the conceiving of a central detail, which allows the joining of the 10 beams competing in the center of the circular floor (Fig. 7). The core of the central assembly is a 508 x 12 mm circular pipe with a height of 1400 mm, which interconnects two discs at extremities and 2 intermediate rings, while gusset plates are radially welded between the discs and rings. In order to provide a continuous detail of the upper (2 x UPN200) and lower (2 x UPN140) chords, each profiles flanges and webs are bolted with M16 and M20 bolts (10.9 grade). The lower disk is subjected to tension from the action of lower chords, respectively the upper disk is subjected to compression, and it is stabilized by the presence of concrete floor. The connections subassemblies were sized to resist the efforts resulted from second order elastic global analysis.



Fig. 7: Central floor detail

The resulted connection has been designed in a way to facilitate the required structural integrity and rigidity of the floor which was essential in the progress of maintaining the fundamental vibration period over the critical limit of 5 Hz.

### 3.2 The round connection of ribs on the top of the dome structure on the 3<sup>rd</sup> floor

The stereotomy of 50 radially positioned ribs which shape the building C1, geometrically intersect at the top of the egg (Fig. 8). To ensure the physically needed space for the connections, it was necessary to keep just those main ribs which were positioned right next to the pillars (10 in total), meanwhile the remaining 40 ribs connection had to be cut and ensured. The configuration of ending subassemblies resulted in ten trussed hemispheres, which connected in a bolted central pentagon through the means of end plates.



Fig. 8 Rib connections at the top of C1

On the other hand, the remaining interrupted ribs also form a larger pentagonal shape, by defining a horizontal truss system, which provides the required diaphragm effect. This horizontal trussed pentagon also means the disruption of the glazing surface, starting from this point trapezoidal sheeting, rigid insulation board and seamed flat sheeting has been used for the sealing of the roof.

### 3.3 Connection between the steel and concrete structure

Since the composite truss beam provides support for the concrete floor just until the pinned joints on the column's face, the support of the additional distance until the margin of the floor was obtained with the help of a 3,4 m cantilever fixed on both sides of the column (Fig. 9).

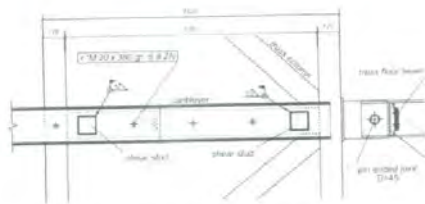


Fig. 9 Shear stud connection of cantilever

Considering the fact that the columns were embedded in concrete just after the erection of the steel elements of the floor structure, the 2 x UPN200 cantilevers were bolted to the trussed column using 4 x M20 threaded rods. In order to prevent the punching of the concrete and to resist the vertical shear force, an additional shear stud was used in the connection: the cantilevers were disposed with two mounting holes, and fixed to the studs of the column with on-site welding. The same detail was used in the case of landing connections of the staircase.

### 3.4 Tree inspired column

As a result of the height difference between C1 and the greenhouse (16,5 m), there is a significant snow pocket which leads an increased load next to the already high permanent and technological loads acting on the roof.

Due to architectural requirements, a regular steel or reinforced concrete column was excluded in the front part of the greenhouse, leaving a span of 4,5 m without support. A tree inspired polygonal column has been configured to overcome these disadvantages, which is convenient both structurally and aesthetically (Fig. 10). The so-called tree (umbel) column is subjected to compression, the fundamental thinking behind this structural system is to direct a group of distributed point loads to one point and from there transmit the total load via a single member to a support point, the point of application of the reaction force providing total equilibrium [10].

The column base is fixed through anchor rods in an independent foundation. Four subassemblies form the main branches of the column, using CHS 101x6 profiles. To provide necessary support for the welding of the elements, interior pipes with

smaller diameter has been used at the shape interruptions. The secondary branches (CHS 89x5) were connected using on-site welding. In the interest of a seamless erection, pinned connections to the roof has been designed, using one M24 or M20 8.8 grade bolt with double shear plates.



Fig. 10 Steel tree

The intersection points of the circular hollow pipes resulted in irregular shaped cross sections, therefore single part drawings with wrap around details were provided to the steel manufacturer.

### 3.5 Global stability checks of the structure

The global stability checks of the structure was performed using Consteel software [9]. To have an overview about the global behavior of the structure, building C1 was calculated and checked using the full 3D model of the structure, including also the concrete columns. According to the buckling analysis, a critical load multiplication factor of  $\alpha_{cr} = 8.63$  was computed for the truss composite beam under the action of permanent and live loads. The truss columns (in erection phase) presented a result of  $\alpha_{cr} = 3.21$ , the ribs  $\alpha_{cr} = 11.47$ , while the skylight's high rigidity (Fig. 11 a) assured a critical load multiplication factor of  $\alpha_{cr} = 29.62$ .



The seismic analysis resulted a 1<sup>st</sup> vibration mode at a frequency of 0.97 Hz with a torsional response from the structure (Fig. 11 b).

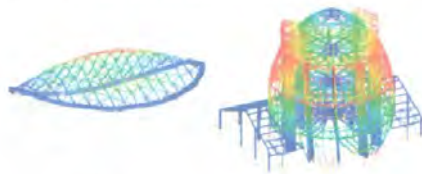


Fig. 11 Global analysis results

#### 4 Erection process and follow up

Due to a very tight deadline, the erection and designing proceeded nearly side by side. In the first step, the truss columns were positioned, followed by the first, second and third floor. The assembling of the intermediate floors was done on the ground: the truss beams were connected

to the central joint then lifted to position by an 80 tonne capacity crane. Due to the expensive transportation of the ribs (total length of 22.5 m), the elements were cut in the shop into two pieces, then erected as the following third step. Because of the limited available space, the concrete works have been started gradually: parallel with the positioning of the ribs, the columns were poured starting from the ground with stops at each floor, where the composite slab works have been done. For all these intermediate phases, the position of the ribs was continuously checked (Fig. 12). Also, another important component of the whole process was the site follow up: during the execution process, each connection detail was carefully checked. Once the structure was erected, all other speciality works were possible to perform.



Fig. 12 Erection phases of C1

#### 5 Environmental issues and sustainability costs

The successful reconversion of an existing building is something to be celebrated. The example presented here creates an ultramodern office facility with a total estimated cost of 5,5 million euro, by transforming two unused, old agricultural halls without demolition. In this way, roughly 2050 tonne (855 m<sup>3</sup>) of construction waste was prevented from environmental pollution and

additional 300,000 Euro cost savings was achieved, keeping the old concrete structure and foundations instead of build a new one. Furthermore, the use of steel for additional constructional objects (such as C1 structure, skylights and greenhouse) provides a long-lasting solution which is almost 100 percent recyclable.

As an unfavourable factor, the glazing surface of C1 causes an excessive energy cost to provide the necessary cooling and heating: the ventilation requirements of the 3<sup>rd</sup> floor, has a total energy

consume as the ground-, first and second floor together. In order to improve the efficiency of the ventilation costs, a system of sunshades was provided on the entire perimeter and height of the glass façade. These sunshades also ensure the possibility of cleaning and maintenance of the glass façade.

As a positive fact, the new reconvered facility transforms not only the old building, but the previously unfriendly industrial platform into an attractive working place for the employees. Additionally, the rural landscape gets new opportunities and opens new development possibilities.

## 6 Discussion and conclusions

This paper presents a number of issues regarding the design and execution process of a highly unusual egg-shaped structure, which represented the main extension work to a reconversion process of an old agricultural building into an ultramodern office facility, highlighting the most significant particularities that characterize this work.

Each reconversion project is unique. The experience accumulated with this project, especially relating the structural solutions, cannot be transferred and applied directly to another building, due to some specific details which are deriving from particular architecture, applicable only in case of this building. It seems though, that the mixing of reconversion works with new-build building presents a number of advantages relating to choice of materials or construction methods and technologies.

Designing the ovoid shaped central building covered entirely in glass, the 13 m free span of the floor with ten radial truss beams intersecting in the centre, the configuration of 16 meter opening dome structure formed exclusively by structural ribs, or the skylights that transmit the image of a precious diamond jewellery shaped like turtle shells were only some of the challenges encountered during the design process. The above mentioned issues were addressed and handled with creative and innovative solutions by the project team, formed of architects and engineers. The authors successfully applied a set of particular

structural solutions regarding unusual situations, demonstrated by complex structural calculations and modelling. These solutions were applied on-site in the manner described in the paper.

This work is another example of the holistic role that must be faced and assumed by structural design engineers in today's changing world. It highlights the fusion of different specialties, when it is required to exceed the designer's limits. Besides the professional satisfaction, it was also a good opportunity to share knowledge, to build interpersonal relationships with wonderful people, as well as to show the power of creativity brought by the collaboration between architects and engineers.

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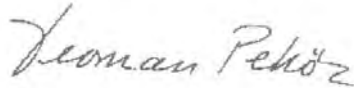
Dear Zsolt,

It was very nice to see you in Cluj and discuss several technical subjects in the area of cold-formed steel structures. Our expertise and interests in the research on the design of cold-formed steel structures coincide closely.

It would be very beneficial for both of us if we could meet in Ithaca at Cornell University in the near future to continue our discussion.

I hope you can arrange a trip to Ithaca in the near future for such a meeting.

Best regards,



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