



**Acta Technica Napocensis: Civil Engineering & Architecture  
Vol. 50 (2007)**

Journal homepage: <http://constructii.utcluj.ro/ActaCivilEng>

**ISSN 1221-5848**



**ISSN: 1221-5848**

**WWW:** <http://constructii.utcluj.ro/ActaCivilEng>

**Editor-In-Chief: Prof. Cosmin G. Chiorean**

*(Tech. Univ. of Cluj-Napoca, Romania)*

Phone/Fax: 40-264-594967

E-mail: [cosmin.chiorean@mecon.utcluj.ro](mailto:cosmin.chiorean@mecon.utcluj.ro)

**Affiliation to Organization:**

Technical University of Cluj-Napoca, Faculty of Civil Engineering, Romania

**Editorial Office Address:**

Technical University of Cluj-Napoca

15 C Daicoviciu Str., 400020 Cluj-Napoca, Romania

**Published by:**

UTPRESS

34 Observatorului Str., 400775 Cluj-Napoca, Romania

Phone: 40-264-401999

E-mail: [utpress@biblio.utcluj.ro](mailto:utpress@biblio.utcluj.ro)

Fax: 40-264-430408

**Abstracting and Indexing**



**Aims and Scope:** *Acta Technica Napocensis: Civil Engineering & Architecture* provides a forum for scientific and technical papers to reflect the evolving needs of the civil and structural engineering communities. The scope of *Acta Technica Napocensis: Civil Engineering & Architecture* encompasses, but is not restricted to, the following areas: infrastructure engineering; earthquake engineering; structure-fluid-soil interaction; wind engineering; fire engineering; blast engineering; construction materials; structural mechanics; water resources; hydraulics and coastal engineering; structural reliability/stability; life assessment/integrity; structural health monitoring; multi-hazard engineering; structural dynamics; optimization; expert systems and neural networks; experimental modeling; performance-based design; engineering economics, constructional management; architecture; planning and built environment studies. *Acta Technica Napocensis: Civil Engineering & Architecture* also publishes review articles, short communications and discussions, book reviews, and a diary on national and international events related to any aspect of civil engineering and architecture. All articles will be indexed by the major indexing media, therefore providing maximum exposure to the published articles.

## Editorial Board

**Editor in chief:** Prof.dr.ing. Radu MUNTEANU

**Vice editor in chief:** Prof.dr.ing. Aurel VLAICU

**General Editorial Secretary:** Prof.dr.ing. Ironim Martian

**Editorial board:** Prof.dr.ing. Horia-Aurel ANDREICA  
Prof.dr.ing. Gheorghe ARGHIR  
Prof.dr.ing. Nicolae BATAGA  
Prof.dr.ing. Petru BERCE  
Prof.dr.ing. Cornel BIA  
Prof.dr.ing. Nicolae BURNETE  
Prof.dr.ing. Dan CIUPE  
Prof.dr.ing. Radu CIUPE  
Prof.dr.ing. Horia COLAN  
(member of Romanian Academy)  
Prof.dr.ing. Tiberiu COLOSI  
Prof.dr.ing. Dan COMSA  
Prof.dr.ing. Iosif IGNAT  
Prof.dr.ing. Nicolae LUNGU  
Prof.dr.arh. Adriana MATEI  
Prof.dr.ing. Dorina MATIESAN-JICHISAN  
Prof.dr.ing. Costin MIRON  
Prof.dr.ing. Sergiu NEDVSCHI  
Prof.dr.ing. Ioan PASTRAV  
Prof.dr.ing. Nicolae PLITEA  
Prof.dr.ing. Ioan Gh. POP  
Prof.dr.ing. Gavril TODEREAN  
Prof.dr.ing. Ioan VIDA SIMITI

**Editor –In-Chief of Civil Eng & Arch :** Prof.dr.ing. Ironim Martian

**Abstracts of**  
**Acta Technica Napocensis: Civil Engineering & Architecture, Vol. 50, 2007**

**COMPOSITE COLUMNS OF CIRCULAR SECTIONS. ANALYSIS OF DESIGN METHODS** (Pages 27-38)  
V. Pacurar, C. Moga, St. I. Gutiu

**ABSTRACT**

This paper presents the design of composite columns of concrete - filled circular hollow sections subjected to axial compression, in accordance with Eurocode 4 and also with others design standards. The working example given in this paper regarding the evaluation of the load carrying capacity of an axial compression composite column using all the norms presented, facilitates the design methodologies understanding and also allows formulating some useful observations and comments for the analyzed subject.

**Keywords:** *Composite columns; Eurocode 4; Design;*

**Full bibliographic reference:** V. Pacurar, C. Moga, St. I. Gutiu, Composite columns of circular sections. Analysis of design methods, *Acta Tech. Napocensis: Civil Eng. & Arch.*, Vol. 50, pp. 27-38, 2007.

**CIRCULAR COMPOSITE COLUMNS. THE INFLUENCE OF CONCRETE CLASS ON THE CONFINEMENT EFFECT** (Pages 39-44)

P. Moga, St. I. Gutiu, C. Moga

**ABSTRACT**

In a composite column consisting of a concrete-filled hollow steel section, the circular steel tube encloses the concrete core; hence, lateral compressive confining stresses on the concrete are induced by the confinement provided by the steel tube. This paper presents the confinement assessment in accordance with Eurocode 4 norm and the working example analyzes the influence of the concrete Class on the confinement factor and on the load carrying capacity of a circular composite column subjected to axial compression. Some useful remarks on the design activity of such members are also presented in this paper.

**Keywords:** *Composite columns; Confinement effect; Design.*

**Full bibliographic reference:** P. Moga, St.I., Guitiu, C. Moga, Circular composite columns. The influence of concrete class on the confinement effect, *Acta Tech. Napocensis: Civil Eng. & Arch.*, Vol. 50, pp. 39-44, 2007.

**THE INFLUENCE OF COMPOSITE COLUMN WALL THICKNESS ON THE CONFINEMENT EFFECT** (Pages 45-50)

C. Moga, Cristina Campian

**ABSTRACT**

In a composite column consisting of a concrete-filled hollow steel section, the circular steel tube encloses the concrete core; hence, lateral compressive confining stresses on the concrete are induced by the confinement provided by the steel tube. This paper presents the confinement assessment in accordance with Eurocode 4 norm and the working example analyzes the influence of the column wall thickness on the confinement factor and on the load carrying capacity of a circular composite column subjected to axial compression. Some useful remarks on the design activity of such members are also presented in this paper.

**Keywords:** *Composite columns; Eurocode 4; Confinement effect.*

**Full bibliographic reference:** C. Moga, Cristina Campian, The influence of composite column wall thickness on the confinement effect, *Acta Tech. Napocensis: Civil Eng. & Arch.*, Vol. 50, pp. 45-50, 2007.

**MODERN CONCEPTIONS IN THE CONTROL OF STRUCTURE BEHAVIOR IN CASE OF EARTHQUAKE** (Pages 51 – 56)

Aliz Mathe, P. Alexa

**ABSTRACT**

To design earthquake resistant structures is a central problem of the structure design engineers. A structure is considered „earthquake resistant" if it can take over the seismic action through acceptable deformations so that the main functions are preserved (state of resistance, avoiding dangerous deformations, the possibility of keeping the construction's functions etc) after the design earthquake. This preoccupation of the structure design engineers has always existed (what better proof, if not the antique and medieval constructions that exist even today?), but in analitical forms while those prestandardized date from cca 80 years ago. For a very long time the antiseismic protection was understood and applied through the required dimensioning (often overdimensioning) of the rezistance elements' section of the structures. The recent earthquakes have demonstrated that the „seismic protection" through section overdimensioning is not only non-economical, but also inefficient.

**Keywords:** *Antiseismic; Earthquake resistant; Seismic protection.*

**Full bibliographic reference:** [Aliz Mathe, P. Alexa, Modern conceptions in the control of structure behavior in case of earthquake, Acta Tech. Napocensis: Civil Eng. & Arch., Vol. 50, pp. 51-56, 2007.](#)

### **STRUCTURAL PROBLEMS OF SCAFOLDS USED IN REHABILITATION WORKS OF HISTORICAL BUILDINGS (Pages 57-67)**

AI. Catarig, L. Kopenetz

#### **ABSTRACT**

The historical buildings have, in most of the cases, large dimensions. Structural interventions (at large hights) to these buildings require the erecting of scaffolding on their own design performed by experienced engineers. The structural analysis of scaffolding structures involves special problems due to their large dimensions in both, plane and elevation. This is why the paper deals with several aspects of dimensioning the structural and nonstructural members that strongly influence the sructural safety, specially because their design work does not require design checking.

**Keywords:** *Scaffolds; Historical building; Structural analysis.*

**Full bibliographic reference:** [Al. Catarig, L. Kopenetz, Structural problems of scaffolds used in rehabilitation works of historical buildings, Acta Tech. Napocensis: Civil Eng. & Arch., Vol. 50, pp. 57-67, 2007.](#)

### **COMPOSITE MATERIALS FOR ART WORKS INFRASTRUCTURE (Pages 67-70)**

L. Kopenetz, AI. Catarig

#### **ABSTRACT**

The profound changes in the economic field force the designers to use poor quality soils for foundation works. The main common characteristic of these soils is that they are crossed, with exterior loads, by big and unbalanced deformations. This paper presents another technique for improvement, this technique is called: weaved soil technique, which helps obtain the system formed of foundation soil, micro piles and horizontal injections. This technique is an efficient and advantageous way compared to the classical known approaches.

**Keywords:** *Composite materials; Weaved soil technique; Infrastructure.*

**Full bibliographic reference:** [L. Kopenetz, AI. Catarig, Composite materials for art works infrastructure, Acta Tech. Napocensis: Civil Eng. & Arch., Vol. 50, pp. 67-70, 2007.](#)

### **SELF-COMPACTING CONCRETE COMPOSITIONS WITH SILICA FUME (Pages 71-76)**

Henriette Szilagy, T. Onet

#### **ABSTRACT**

Self-Compacting Concrete (SCC), the concrete that is compacted under its own weight with no intervention of vibrating compaction, has many qualities, such as: faster construction with reduction of manpower, increasing productivity during building, high-quality surface finishes, improved durability etc. Additions are commonly used in SCC compositions in order to improve and maintain cohesion and segregation resistance. One of the pozzolanic, type II additions, which can concur at SCC fresh and hardened properties, is silica fume. The paper presents a research aiming the optimal design and execution of self-compacting concrete in laboratory, following specific mix compositions, with or without silica fume and establishing the concrete properties in fresh and hardened state.

**Keywords:** *Self compacting concrete; Optimal design; Silica fume;*

**Full bibliographic reference:** [Henriette Szilagy, T. Onet, Self-compacting concrete compositions with silica fume,](#)

*Acta Tech. Napocensis: Civil Eng. & Arch., Vol. 50, pp. 71-76, 2007.*

**SELF-COMPACTING CONCRETE ROBUSTNESS (Pages 77-82)**

Henriette Szilagyi, T. Onet

**ABSTRACT**

Robustness of Self-Compacting Concrete (SCC) refers to the specific ability of the SCC mixture to maintain its fresh properties and compositions pre- and post casting of a single batch or successive batches due to the composition of the mixture and due to some small changes in the contents of the ingredients of the mixture. Improved robustness of concrete could be obtained by using Viscosity Modifying Admixtures (VMA) in its compositions, making SCC easier to control for the producer and the user. This paper presents several SCC mixes designed for two strength classes: C50/60 and C30/37, which were tested in fresh and hardened state, comparatively to water, aggregate proportions, high range water reducing (HRWR) admixture and VMA variations.

**Keywords:** *Self compacting concrete; Viscosity Modifying Admixtures;*

**Full bibliographic reference:** [Henriette Szilagyi, T. Onet, Self-compacting concrete robustness, Acta Tech. Napocensis: Civil Eng. & Arch., Vol. 50, pp. 77-82, 2007.](#)

**HIGH PERFORMANCE CONCRETE USED FOR THE RIGID PAVEMENT OF ROADS (Pages 83-88)**

T.Onet, Andrada Urda

**ABSTRACT**

In the case of some structures (bridges, highways, drilling platforms and so on) exposed to dynamic charge which may vary in intensity, the frequency in time of degradation because of the weariness, may manifest itself both through deforming or Assuring. This paper presents high performance concrete used for rigids pavementand the high durability and how increase the life of the road.

**Keywords:** *High Performance Concrete; Rigid pavement; Roads.*

**Full bibliographic reference:** [T Onet, Andrada Urda, High performance concrete used for the rigid pavement of roads, Acta Tech. Napocensis: Civil Eng. & Arch., Vol. 50, pp. 83-88, 2007.](#)

**THE ADVANTAGE OF USING HIGH PERFORMANCE CONCRETE(HPC) FOR RIGID ROAD PAVEMENT (Pages 89-94)**

T. Onet, Andrada Urda

**ABSTRACT**

The researches have as main objective the discovery of the performances of high performance concrete and the multiple domains of utilization It can be said that the usage of HPC according to technical and economic aspects becomes more and more obvious. This paper presents the different degrees of exposure of the road systems and how this should determined the engineers and the draftsmen to use pavements from HPC.

**Keywords:** *High Performance Concrete; Rigid Road Pavement.*

**Full bibliographic reference:** [T Onet, Andrada Urda, The advantage of using high performance concrete \(HPC\) for rigid road pavement, Acta Tech. Napocensis: Civil Eng. & Arch., Vol. 50, pp. 89-94, 2007.](#)

**TECHNOGENIC SOILS FROM OVERBURDENS REMAINING AFTER PIPELINE CONSTRUCTION (Pages 95-100)**

Daniela PASCA

**ABSTRACT**

The bioremediation of overburdens remaining after pipeline construction and other engineering-technical operation presents a practical and theoretical importance. Were modelled, in laboratory and field recultivation technologies based on spreading of overburdens on the surface of adjacent agricultural fields or mixing of the ploughed soils layer with overburdens in different proportions. Enzymological and chemical analyses were applied. Comparison of crop yields after application of the two recultivation technologies indicated the diminution of crop yields in respect of

technologies applied, and it has been found that the level of enzymatic activity is an indicator of the degree of transforming of these wastes.

**Keywords:** *Bioremediation; Technogenic soils.*

**Full bibliographic reference:** Daniela Pasca, Technogenic soils from overburdens remaining after pipeline construction, *Acta Tech. Napocensis: Civil Eng. & Arch.*, Vol. 50, pp. 95-100, 2007.

## **FLUID FLOW AND PRESSURE DROP SIMULATION IN ALUMINIUM FOAM HEAT EXCHANGER**

(Pages 101-112)

P. Opritoiu

### **ABSTRACT**

Open-cells aluminium foams were investigated using air, as fluid flow, to determine their hydraulic characteristics. Two-dimensional turbulent flow through open-cell aluminium foam heat exchanger is modeled by Fluent code, which has become a very important method in fluid flow and heat transfer simulation. Fluent easily facilitates parametric studies and allows a designer to test multiple design configurations [1,2, 3]. Maximum fluid flow velocities considered were 8.88 m/s. The permeability and inertia coefficient varied from  $4.25 \cdot 10^{-6} \text{w}^2$  and  $603 \text{m}^{-1}$  to  $4.64 \cdot 10^{-5} \text{w}^2$  and  $22060 \text{m}^{-1}$ . It was determined that the flow rate range influenced these calculated parameters. The results obtained in this study are relevant to engineering applications employing metal foams ranging from convection heat sinks to filters and flow straightening devices.

**Keywords:** *Fluid flow; Metal foams; Convection heat.*

**Full bibliographic reference:** P. Opritoiu, Fluid flow and pressure drop simulation in aluminium foam heat exchanger, *Acta Tech. Napocensis: Civil Eng. & Arch.*, Vol. 50, pp. 101-112, 2007.