## newsletter



supported by the DG Research of the European Commission

### http://www.samco.org

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Structural Assessment Monitoring and Control Issue 4

May 2002

### **Integrated Projects for 6FP**

The new instrument of Integrated Projects in the 6th Framework Programme is a challenge for the research and development world. It is expected that activities around a certain research subject, coordinate their intentions before a submission is made. A vital key point will be the coordination of such projects. comprising work with a value of 10 -30 Million €..

SAMCO is the ideal platform for such a coordinated action. It was decided at the last workshop in Como, that integrated projects will be prepared in the subjects of health monitoring and seismic assessment. It is expected that some 30 - 40 partners will form the consortia. They shall be composed of the key players in each field.

An expression of interest shall be submitted by June 7<sup>th</sup> 2002, containing the basic idea and the concept for the implementation.

It is the time now to express your interest in participation by sending an e-mail to samco@vce.at and by participating in the planned workshop on September 30<sup>th</sup> and October 1<sup>5</sup> 2002, where the main basics of the consortia will be formed. Participation to the project is almost unlimited, but funding can be expected only for partners of those countries having an agreement with the European Union.

More details will be available on our from homepage mid June (http://www.samco.org). We are hoping on a huge interest in our IP's and a good participation in the respective workshop in October.

Your coordinator Helmut Wenzel

### Contact

VCE Vienna Consulting Engineers vce@atnet.at









# SAMCO WORKSHOP

### An Annual Workshop

The network management is planning to hold an annual workshop in order to gather all members and participants for **demonstration cases and discussion**. It will be the opportunity for the End User Forum to meet and for interested parties to build up relations and partnerships for future activities.

### Main Objectives are

Demonstration of the SAMCO Network to the end user community.

■ Presentation of the state of the art in the field of structural assessment, monitoring and control and dissemination of the knowledge.

■ Receiving insider information from the European Commission concerning the 6<sup>th</sup> Framework Programme.

Definitions of future integrated projects and creation of partnerships.

### **Preliminary Programme**

The workshop will contain presentations by the **SAMCO consortium** about current activities and the coming tasks within the network.

Another part of the workshop is focused on future EU funded projects. A representative of DG Research of the European Commission will explain the **6<sup>th</sup> Framework Programme.** Project Coordinators will describe the European research activities.

The workshop will be divided into 2 main topics: health monitoring and seismic evaluation.

For each topic there will be at least 6 contributions, reporting about the results of projects in the field and giving an outlook onto prospective activities. There will be a forum on each subject where the topic can be discussed and the end users have the possibility to

### **Going into Partnerships**

convey their point of view.

The workshop will focus on the predefinition of integrated projects to be carried out within the 6<sup>th</sup> Framework Programme and the selection of the prospective partners.

### Time and Place

### Date: September 30 - October 1, 2002

Location: Novotel Brussels Centre Tour Noire Rue De La Vierge Noire 32 Brussels, 1000 Belgium http://www.novotel.com

The Novotel is situated in the city centre near the subway station. It can be reached by:

Railway station: Gare Centrale Subway Line 1A/1B Station: De Brouckere

### Organization

The workshop is organized by the network coordinator VCE (Vienna Consulting Engineers) and ULB (L'Universite Libre des Bruxelles).

### Registration

The fee for the workshop is **200 EUR** before September 1 and **210 EUR** after September 1. Please find the registration form attached to this newsletter. Besides, it is available on the SAMCO homepage (URL below).

#### **More Information**

The detailed schedule will be available on the homepage as soon as possible.

URL: http://www.samco.org/workshop.

Contact

Engineers

vce@atnet.at

VCE

**Helmut Wenzel** 

Vienna Consulting



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▲ The Novotel Centre Tour-Noire



#### The inside of the Novotel



#### ▲ The location of the Novotel 200 m Place du 200 vds age NOVOTEL Centre Belge de la Bande Dessinée Centre Tour Noir Catherine de la Monnaie Bourse Cathédrale des Sts Michel & Gudule Gare Centrale Parc de Bruxelles Manneken Musée Europe Pis Bruxellois font Parliame de la Gueuze Musées Royaux des Beaux-Arts C Lonely Planet The location of the Novotel





### News from the Profession & Practice

### **GECOR8** Corrosion Rate Meter for Steel in Concrete

**GECOR8** is a new corrosion rate meter for steel in concrete to be used in large structures developed by Institute Torroja IETcc, a Spanish Research Centre (<u>www.ietcc.csic.es</u>), and GEOCISA, a Spanish firm of DRAGADOS Group (<u>www.geocisa.com</u>), which include 4 different techniques in one equipment.

The acquired experience since 1992, during the manufacturing and commercialisation of *GECOR6*, allowed us the development of the new device, which improves in technology and features the former version. *GECOR8* is commercialised by James Instruments (<u>www.ndtjames.com</u>) due to an agreement between this company and GEOCISA (in Spain by GEOCISA).

The GECOR8 features include:

■ A quick method that combines the classical mapping of corrosion potential (mV) with the measurement of resistivity (Kohm.cm) getting a fast evaluation of the structure.

An advanced modulated confinement technique for corrosion rate measuring  $(\mu A/cm^2)$ .

Possibility of working in submerged or very wet structures.

■ New technique for measuring the efficiency of cathodic protection without switching-off the current.

Available sensors A and B with Ag/AgCl reference electrodes recently developed which are detachable minimising its maintenance. These are an alternative to the well-known and more extended Cu/CuSO<sub>4</sub> reference electrodes.



■ Data transmission between *GECOR8* and PC through PCMCIA card or by standard RS-232.

Task programming and postprocessing software designed for the preparation of predefined task and for an easily stored and process of all results (picture below).



© GEOCISA

▲ Task programming & post-processing software

### Field Techniques for Corrosion Measurement of Concrete Reinforcements

### Mapping

**GECOR8** combines the classical mapping of Ecorr, with a measurement of the resistivity,  $\rho$  (unconfined galvanostatic pulse) registered in the time range of 1-2 seconds (1). The technique is applied through a very small sensor (sensor B), which enables mapping of each electrochemical parameter individually as well as the combination of the two parameters.

#### **Measurements in aerial structures**

**GECOR8** offers an advanced Modulated Confinement Technique (MCT) (2) provided by the two reference electrodes controlling the guard ring in order to accurately delimit the area to be polarised. It measures the Polarisation Resistance (Rp, true) through a galvanostatic pulse, which lasts from 30 to 100 seconds in order to reach a





▲ Measurement with Sensor B for mapping and maps obtained

Quasi-steady-state condition. The corrosion current lcorr obtained is referred to the area of reinforcement below a circle delimited by the two reference electrodes, which control the guard ring (guard controllers). MCT having the Guard Electrical-Field Controllers (GEFC) is the only technique able to give accurate values of lcorr and to minimise measurement errors in much localised corrosion.



© GEOCISA A Measurement with Sensor A





### Measurement in submerged or very wet structures

When the concrete is very wet, the resistivity is so low that the current may reach long distances and the area polarised is very large. In order to overcome the difficulty and to avoid the use of large electrodes, Attenuation of Potential Technique (APT) (3), which is based on the monitoring of the potential attenuation with the distance, has been implemented in GECOR8. The technique is applied through a longitudinal sensor (sensor C), which measures the critical length. Lcrit. and enables an accurate measurement of the Rp, true through Feliu's formula (3).

### Measurement in structures with cathodic protection

The checking of the efficiency of cathodic protection without switching-off the current is made through the Passivity Verification Technique (PVT). The technique is based on the analysis of the impedance obtained from an alternated with current applied modulated confinement (sensor A) and it gives the efficiency of the cathodic protection in percentage considering well protected over 90 %.

- (1) FELIÚ, S.; ANDRADE, C.; GONZÁLEZ, J.A., ALONSO, C. "A new method for in-situ measurement of electrical resistivity of reinforced concrete". RILEM. Materials and Structures/ Matériaux et Constructions, Vol.29, July 1996, 362-365.
- (2) POLDER, R., ANDRADE, C., ELSENER, B., VENNESLAND, O., GULIKERS, J., WEIDERT, R., RAUPACH, M. "Test methods for on site measurement of resistivity of concrete". RILEM. Materials and Structures/ Matériaux et Constructions, Vol.33, December 2000, 603-611.
- (3) FELIÚ, S.; GONZÁLEZ, J.A.; FELIÚ S. Jr.; ANDRADE, C. "Confinement of electrical signal for in situ measurements of polarisation resistance in reinforcement concrete. Mater. J. ACI, sep-oct 1990, 457-460.
- (4) BROOMFIELD, J.P., RODRÍGUEZ, J., ORTEGA, L.M., GARCÍA, A.M. "Corrosion measurements in reinforcement rate concrete structures by a linear polarization device" Concrete Bridges in Aggressive Environments International Symposium, SP-151-9, 163-181, 1994.
- (5) FELIÚ, S; GONZÁLEZ; ANDRADE, C. "Multiple electrode method for estimating the polarization resistance in large structures". Journal of applied electrochemistry 26, 1996.

### Contact

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The Dragados Group is formed by different Division companies that cover construction activities, industrial activities, services, real state and transport infrastructure concessions.

Dragados Obras Y Provectos is the Division company of Dragados Group involved in construction activities, on domestic and international market (Africa, America, Asia and Europe). It also includes different companies in Spain (GEOCISA), UK, Portugal, Morocco, Venezuela and Argentina.

GEOCISA's activities are highly diversified in a number of specialized areas such as soil engineering, treatment of polluted soils, soils study and treatment, construction of special foundations, structure engineering and restoration of cultural heritage monuments. **GEOCISA** is deeply involved in the assessment and repair of

structures and cultural heritage monuments.

Since its creation in 1968, GEOCISA has included in its organisation a series of laboratories that initially covered the specialities belonging to the world of Construction - Buildings and Civil Works and which with the passage of time have been expanding their sectors of activity in connected fields, such as the industrial sector and environmental problems. These laboratories have also been furnished with the appropriate facilities so that they can expand their work capabilities and have the possibility of developing their own measurement methods and equipment suited to their needs.

#### For more information

GEOCISA. http://www.geocisa.com





### Relevant Projects for the SAMCO Network – Part II

### SPACE

Semi-active Passive Control of the Dynamic Behaviour of Structures Subjected to Earthquake, Wind and Vibration

2000-2003

#### Background

The proper functioning of industrial equipment and provision of safe working environment require techniques to reduce the effects of earthquakes, wind and traffic-induced vibrations on structures. Present technologies applied - isolation and passive energy dissipation - have limitations. The aim of this project is the development of innovative systems for *reducing the effects of seismic-induced vibrations*. Based on the performance needs of various types of structures & industrial plants, selected in the project, such innovative devices will be designed, manufactured and tested.

### **Scientific Objectives and Approach**

The objectives of the project are to develop:

Semi-active vibration control system using hydraulic dampers based on magneto-rheological smart fluid.

Floor isolation system operating in 3 directions.

■ 3D floor isolation system incorporating the semi-active dampers developed.

Prototype devices will be developed, manufactured and widely tested also incorporated in mock-up structures.

### **Project Phases**

Definition of structures for the application of semi-active and passive devices.

Development of a semi-active control system.

■ Numerical models of the devices, of the structures and mock-ups and dynamic analyses.

Characterisation tests of devices, structures and mock-ups.

Evaluation of technical and economical benefits.

■ User manual (design procedures for the implementation of the semi-active control and for passive technologies).

Coordination: Maurer Soehne GmbH & Co. KG

### CONVURT

Control of Vibrations from Underground Railway Traffic

2001-2003

### Background

Electrified underground rail systems provide the apparent solution to mass transport of people in cities but their future success and growth require a high degree of eco-efficiency. Metro rail systems cause vibrations which create noise disturbance in adjacent habitation (see picture beside) CONVURT is aimed at creating the innovative tools where ground-borne vibrations can be predicted and minimised.

The proposal is to create a validated computer-based prediction model as well as prototype innovative vibration reducing products, both able to be applied to worldwide sales. CONVURT will also develop novel monitoring and maintenance techniques that will prevent deterioration of vibration performance with time. The project will make unique, invaluable input to the development of ISO rail noise standards and produce 'Best Practice Guidelines'.

### Scientific Objectives and Approach

The objectives of the project are:

■ To create validated innovative and quantitative modelling tools to enable prediction of locations where ground-borne vibration transmission and thereby noise will occur in metropolitan railway networks.

■ To develop and evaluate innovative and cost-effective track and tunnel equipment to reduce ground-borne vibration capable of being retrofitted and exported worldwide.

To provide scientific input to allow the preparation of International Standards.

■ To prepare Good Practice Guides for underground railway operation in order to maintain minimum vibrations for the lifetime of operation.

### **Coordination:**

London Underground Limited



© http://www.convurt.com

#### For more information

CONVURT: http://convurt.com

If you are involved in a project that is thematically relevant for the SAMCO Network, please **present it here in the newsletter!** 

Contributions please send to: bgeier@vce.at





### Company Profile



### **ELSA European Laboratory** for Structural Assessment

### The Joint Research Centre

JRC is the European Union's scientific and technical research laboratory and an integral part of the European Commission of which it is a Directorate General. The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

JRC work is split between institutional research in support of Commission policymaking, direct support for specific Directorates-General (DGs) and competitive activities in strategic relationships with the scientific and business communities. JRC guideline is that of 'adding value' where appropriate, rather than competing directly with establishments in the EU Member States.

In the framework of the Thematic Network SAMCO, JRC is engaged through its

### Institute for the Protection and Security of the Citizen (IPSC)

having the mission of providing research-based, systems-oriented support to EU policies so as to protect the citizen against economic and technological risk. The Institute also maintains and develops expertise in information, communication, space and engineering technologies in support of its mission.

### The "European Laboratory for Structural Assessment" (ELSA)

a unit within IPSC has the mission of performing research in areas of



© JRC

structural mechanics where structural safety is the key. Most of the research work consists of experimental testing assisted by numerical simulation in two areas of main concern for the European citizen: civil construction and transport.

### The main objectives are

To contribute to European norms on earthquake resistance of structures through large-scale tests, numerical modelling and numerical simulation;

To contribute to transport safety through precision crash tests, validation of behaviour models and development of advanced numerical tools in transient dynamics.

To contribute to the "European Research Area" by promoting European research networks in structural mechanics. more specifically in earthquake engineering and transient dynamics;

To support the competitiveness of European industry through validation tests of advanced materials and new technologies in civil and automotive engineering.

### The research performed at ELSA

is focused on the consequences of natural and man-made hazards on structures. These structures are buildings, bridges, means of transport, and also cultural heritage monuments. The two main facilities of ELSA, the Reaction Wall (RW) and the





Model of building at ELSA



Model of cable-stayed-bridge in ELSA © JRC



Large dynamic test facilities



### Published by

### Large Dynamic Test Facility (LDTF)

are unique by their dimensions and characteristics for Europe. The LDTF consists of a large Hopkinson bar permitting very high strain-rate precision tests to be performed on samples, components and part of vehicles. The dimension of the two arms (100m each) of the facility allows impact tests without disturbances due to wave reflection, thus yielding clean and meaningful results.

The main aim is to support the European Commission in the definition of rules and standards in the area of automotive crashworthiness and, more generally, in areas such as safety in transport and industrial installations. Computational mechanics plays a fundamental role in the context of this activity.

### The Reaction Wall (RW)

Is the kernel of the European Laboratory for Structural Assessment.

The vertical wall and the horizontal floors are designed to resist to the high forces (typically several MN) that are necessary to deform and seriously damage the fullscale test models of structures. The facility allows static and cyclic tests on large structures and components but is mainly operated according to the so-called <u>pseudo-dynamic</u> (PSD) test technique. The PSD enables the simulation of earthquake loading of full-scale buildings.

In order to obtain the maximum benefit from it and make full use of the existing expertise within the Member-states, the facility is exploited within the framework of European Union wide integrated research programmes. To this end the

### European Association of Structural Mechanics Laboratories

was set up at the instigation of the ELSA Unit of the ISPC. The association has more than twenty-five members and is helping to define the test programmes undertaken to assess the response of civil engineering structures under severe loads (such as generated by earthquakes).

The research programmes involve both the study of the non-linear dynamic behaviour of structures and the development of appropriate testing methods.

In the framework of SAMCO, JRC will be the focus of the Centre of Knowledge of the Thematic Network through the relevant Database accessible via Internet. The latter will make available to the scientific community the most significant data in the field of structural assessment, monitoring and control.

#### For more information:

http://elsa.jrc.it http://www.jrc.it

Contact

Vito Renda European Commission - JRC ELSA vito.renda@jrc.it

Kent Mehr European Commission - JRC ELSA kent.mehr@jrc.it





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Car crash test in LDTF







### OECD-NEA Workshop on the Relations between Seismological Data and Seismic Engineering Analyses

A recommendation of the OECD Workshop on the engineering characterisation of seismic input hosted by the United States Nuclear Regulatory Commission and organised by Brookhaven National Laboratory on November 15-17, 1999 was to foster the growth of interaction between "design engineers" and "ground motion specialists". <u>The objective of this workshop</u> to be held in 2002 is to address this recommendation.

It is foreseen that the workshop will give opportunities to seismologists to present observed damages and their related ground motions and to design engineers to present current techniques used in the evaluation of seismic hazards. Bridging the gap is a key objective and this workshop could be a forum for discussion bringing together the two communities. In addition, the location of the Workshop is particularly interesting and will provide possibilities to several of the host country participants to present the 1999 Kocaeli earthquake.

As usual for CSNI workshops, participation will be restricted, for reasons of efficiency, to experts (utilities, industry representatives, research organisations, safety authorities, and regulatory agencies). Nominations should be made through the NEA Secretariat or CSNI members.

**Time and Place** 

17<sup>th</sup> – 18<sup>th</sup> October 2002 Istanbul, Turkey Best Western President Hotel

### Registration

The Organising Committee (OC) will confirm the acceptance of registration for the workshop. The registration fee amounts to  $150 \in$ .

### **Abstracts and Papers**

Submission of abstracts by June 1, 2002. Papers to be received by October 1, 2002 and should contain a maximum of 10 pages including pictures. Nevertheless the OC will consider longer papers of particular interest. Submit to: eric.mathet@oecd.org





### Calendar Of Events – Year 2002

### JUNE

■ 10-12. SEM Annual Conference on Experimental and Applied Mechanics, *Milwaukee, WI*. URL: <u>http://www.sem.org</u>

■ **18-21.** Vibration Measurements by Laser Techniques, *Ancona, Italy.* URL: <u>http://www.sem.org</u>

### JULY

**8-11.** 9<sup>th</sup> International Congress on Sound and Vibration, *Orlando, FL.* 

14-17. IABMAS 2002: Conference on Bridge Maintenance, Safety and Management, Barcelona, Spain. URL: <u>http://www.cimne.upc.es/ congress/iabmas02/</u>

### JULY/AUGUST

**31-2.** CSCE International Conference on Short & Medium Span Bridges, *Vancouver, BC, Canada.* URL: <u>http://www.bridgeconference.com</u>

#### SEPTEMBER

**2-5.** Fifth European Conference on Structural Dynamics - eurodyn 2002, *Munich, Germany.* URL: <u>http://www.eurodyn2002.de</u>

19-20. Eurosteel – 3rd European Conference on Steel Structures, Coimbra, Portugal. URL: <u>http://www.dec.uc.pt</u>

■ 11-13. IABSE Symposium-Towards a Better Built Environment, *Melbourne, Australia.* URL: <u>http://www.iabse.ethz.ch/</u> <u>conferences</u>

### **SEPTEMBER / OCTOBER**

**30-1.** SAMCO Workshop – Structural Assessment Monitoring and Control *Brussels, Belgium.* URL: <u>http://www.samco.org/workshop</u>

### OCTOBER

2. ECCREDI CEO Workshop, Brussels, Belgium. URL: http://www.e-core.org

**3-4.** Second E-CORE Workshop, Brussels, Belgium. URL: <u>http://www.e-core.org</u>

■ 6-10. International Conference on Concrete in Marine Environments, *Hanoi, Vietnam.* URL: <u>http://www.iabse.ethz.ch/</u> <u>conferences/calenddrevents/Hanoi/Plhanoi.pdf</u>

 9-12. SEWC Congress on Structural Engineers World Congress, Yokohama, Japan.
URL: <u>http://www.sewc2002.gr.jp/english/</u> e\_right.html

13–18 fib Congress - Concrete
Structures in the 21<sup>st</sup> Century;
Osaka, Japan.
URL: http://www.fib2002.com

### NOVEMBER

20-22. International Conference on Design and Dynamic Behaviour of Footbridges, Paris, France. URL: <u>http://otua.org/footbridge/Default\_eng.htm</u>

### DECEMBER

17-20. International Conference on Structural Composites for Infrastructure, Aswan, Egypt. URL: <u>http://www.geocities.com/</u> acm\_egypt\_2002

### SAMCO - an EU funded Project

The SAMCO Network is funded by the European Commission (EU) within the *"Fifth European Framework Programme"* (*FP5*), which covers Research, Technological Development (RTD) and Demonstration activities.

FP5 has a multi-theme structure, consisting of Specific Programmes. These Specific Programmes are further divided into Horizontal Programmes and Thematic Programmes. One of these Thematic Programmes is the "Competitive and Sustainable Growth" Programme, under which SAMCO is running.

SAMCO is running under the exact term: CTG2-2000-33069 Shared-cost RTD and Demonstration project, Concerted Action/Thematic Network Duration: 48 months

#### For more information

European Commission <u>http://europa.eu.int</u>

Fifth European Framework Programme <u>http://www.cordis.lu/fp5</u>

Competitive and Sustainable Growth Programme (GROWTH 2000) http://www.cordis.lu/growth/

### **Scientific Officer**

Mr. Hans Hartmann Pedersen

European Commission DG RTD GROWTH G2

### **SAMCO News**

SAMCO News is a digital newsletter accompanying the SAMCO Network. It is funded by the European Commission in the frame of the GROWTH project SAMCO CTG2-2000-33069. It is an information and communication platform for the participants of SAMCO. It is issued periodically every second month. SAMCO News is available at http://www.samco.org/newsletter

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### **REGISTRATION FORM**

Please fill in the grey boxes and mark with a cross where applicable!

# SAMCO WORKSHOP

### **Novotel Brussels Centre Tour-Noire**

Rue De La Vierge Noire 32 Brussels, 1000 Belgium

First Name			
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O I would like to have an invoice

The deadline for withdrawal from the registration is September 16, 2002. From this date onwards the fee cannot be refunded.

### PLEASE, SEND THE COMPLETED FORM TO Fax: (+43-1) 894 61 70