Issue 13 January. 2004

newsletter

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SAMCO NEWS

Structural Assessment Monitoring and Control Issue 13 January 2004

contents

Published by VCE.

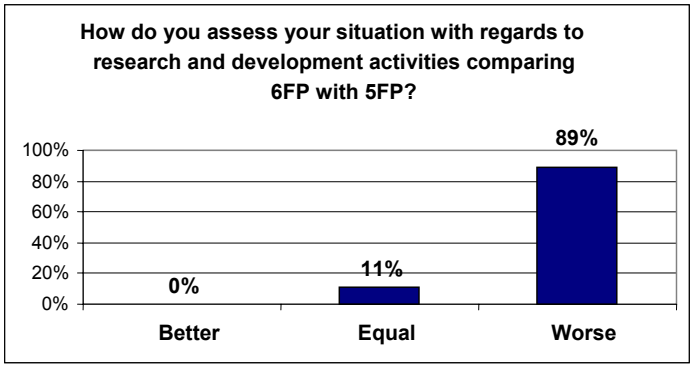
The 6th Framework Program: Success or Flop?

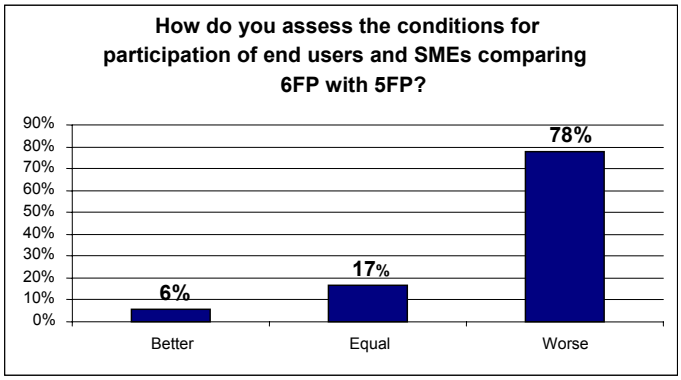
A questionnaire has been sent out to the members of the SAMCO network asking them to comment on their experience with the 6th framework program. The response is shocking. In comparison of FP5 with FP6 89% responded that the situation has become worse. The assessment of the conditions for end users and SMEs is 87% negative. The question of future engagement on research on European level has been assessed negative by 77%. There has been an almost equal representation of industry SMEs and research community.

In conclusion NMP is not an industrial research program anymore. Successful development is stopped and the Lisbon criteria are further away than ever.

The current trend to establish European technology platforms also does not support the monitoring and assessment community. It fits to large sectors of industry. Development work of many years is lost. This is a call on everyone to carry this message to Brussels.

Your Coordinator,
Dr. Helmut Wenzel.





Harmonization Workshop at the Joint Research Centre

I-SAMCO (International - Structural Assessment, Monitoring and Control) is a Specific Support Action (SSA) under the 6th European Framework Programme for Research (FP6) having the main objective of supporting the extension to International Collaboration of the activity of the FP5 Thematic Network SAMCO. The Harmonization Workshop, the initial action toward the implementation of the mentioned objective, was held from September 27th to 28th, 2004 at JRC-Ispra, Italy. The Workshop follows other initiatives taken by NIED (workshop, Dec 14th 2000, Tokyo, Japan), NCREE (joint NCREE/JRC workshop, Nov 17th to 20th 2003, Taipei, Taiwan) and NSF/NEES (extraordinary meeting at the 13WCEE, Aug 4th 2004, Vancouver, Canada).

40 persons participated in the Harmonization Workshop which was the first step towards International Collaboration, in order to discuss the possibilities how to enable international collaboration, how to harmonise communication and how to standardise data and protocols.

A lot of interesting input to create tools that make ancient records readable and discussions around the different data storage philosophies took place in Ispra with a couple of participants from the U.S. and Asia.

The first day was dedicated to International Collaboration, where some presentations where held on what strategies, methodologies and techniques should be used on the establishment of testing procedures to generate data sets such as data on dynamic response of bridges and buildings. The second day was devoted to data formats, communication and distributed testing. Interesting input on Database and Communication Management was presented wherein the use of a common standard (using XML, XML Schema) was pointed out. Data could be transformed between partners without touching each partner native data base and keeping the highest flexibility.

Dr. Wenzel (VCE) led a discussion dealing with the approach to standardization, benchmark tests, exchange of information and exchange of researchers. In view of the common major interest of the partners, the first achievement should be the setting up of an International Network for Earthquake Engineering Simulation facilities, which play a major role in the field of earthquake disaster mitigation research. A resolution on the mentioned international collaboration has been worked out an agreed by a considerable number of international partners.

Finally I-SAMCO should play a major role in facilitating the transition from International Collaboration based on temporary agreement to permanent structure for cooperation after 2006, which is the deadline for the I-SAMCO SSA under FP6.

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More Information

Documents and photos can be downloaded from the SAMCO database. Go to “Workshops”: http://samco.jrc.it/.

International SAMCO "I-SAMCO" launched

The standardization initiative embedded in SAMCO quickly identified the international demand for standardization initiatives. Besides large networks and projects have been identified worldwide, which are acting along the same lines as SAMCO.

Therefore the specific support action (SSA) I-SAMCO started in July 2004 and is scheduled to operate 30 month. I-SAMCO intends to contribute to enhancing international collaboration between key institutions, academia and industry to share knowledge, methodologies, tools and results of past and future research. International collaboration shall be installed through networking, joint participation to international projects, exchange of researchers and contribution to national projects of common interest.

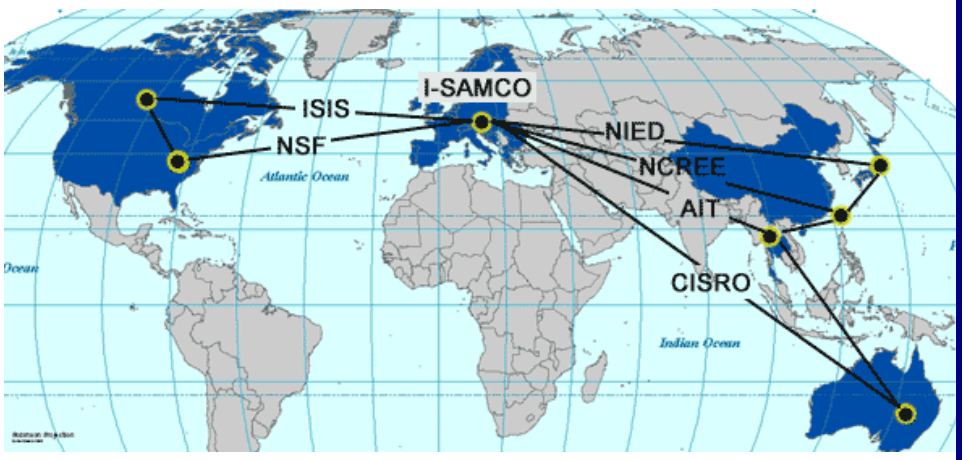
It is recognised that the will for international collaboration exists in the engineering community. Nevertheless the basis for successful work lacks the necessary tool and an initiative determined to actively pursue the objectives. I-SAMCO shall become the driver from the European side and shall in a long term develop into an organisation which is self-supporting.

Targets of International Collaboration

The concept of International Collaboration in the framework of I-SAMCO should include the achievement of the following targets:

- Become a center of interest for a wide community of researchers, professors and end-users by offering them the information, the contacts and the links they could need.
- Function as center of knowledge and service for knowledge transfer (in synergy with SAMCO) to emerging countries (e.g. Armenia, Mexico, etc.) in areas relevant to structural assessment, monitoring and control.

Since a significant interest is growing in Structural Health Monitoring, I-SAMCO should facilitate the setting-up in Europe of a dedicated community, which could take significant advantage from accessing large facilities to perform measurements before and after damaging tests on full/large scale structural models.



Activities within I-SAMCO

The following activities are proposed within I-SAMCO:

- I-SAMCO shall play an active role in ISHMII
- International collaboration agreements shall be pursued with JRC as the European partner, in order to facilitate the sustainability of such agreements after the termination of I-SAMCO
- Building up an international database of reference projects
- Coordination of international events
- Exchange of information on international level on tests and projects going on
- Establishment of a researchers network
- Extension of the work on codes and standards to the international level
- Works on data formats and meta-data protocol with all related issues
- Joint participation of the European participants in the planned global events
- Implementation of international collaboration aspects in European research projects
- Organisation of an international benchmark test

Launched Activities in I-SAMCO

The Harmonization Workshop has been the first action programmed in the framework of this SSA. The Workshop was intended to stimulate International Collaboration between Europe (JRC-EC, CEA-France, University of Bristol-UK and possibly other Partners), USA (NSF/NEES) and Asia (NCREE-Taiwan).

The interest shown by the participating organizations for setting-up this collaboration at least in harmonization of data models and distributed testing technologies is a success for I-SAMCO.

Within an I-SAMCO working tour contacts in Asia have been established with University of Tokyo/ Department of Civil Engineering, National Research Institute for Earth Science and Disaster Prevention (NIED) in Japan, National Centre for Research on Earthquake Engineering (NCREE) in Taiwan, Highways Department of Hong Kong, Polytechnical University of Hong Kong and the Asian Institute of Technology (AIT)/ School of Engineering.

Networking Earthquake Engineering Simulation Capabilities

It is proposed to set-up International Collaboration in Earthquake Engineering Simulation between Large Scale Facilities. The latter should start with a Partnership including JRC, CEA-France and University of Bristol-UK from Europe, NSF/NEES from USA, University of Carleton from Canada, NCREE from Taiwan and NIED from Japan.

The following important issues shall be addressed for a successful collaboration at international level:

- International agreement
- Codes and standards
- Common database, data format, metadata protocol
- Data interrogation
- Networking
- System integration
- Education and training
- Exchange of researchers
- Management of the collaboration

The initiatives previously taken by relevant research organizations have clearly shown willingness on international collaboration in Networking Earthquake Engineering Simulation capabilities. This brings to the decision to start international collaboration in this field. It is agreed that steps for short term should be decided in order to start soon the collaboration.

It is proposed to set-up International Collaboration in Earthquake Engineering Simulation between Large Scale Facilities. The latter should start with a Partnership including JRC, CEA-France and University of Bristol-UK from Europe, NSF/NEES from USA, University of Carleton from Canada, NCREE from Taiwan and NIED from Japan.

The I-SAMCO Steering Committee will define and propose a Coordinated Research Project which should be innovative and should involve multiple laboratories in order to coordinate worldwide efforts in Earthquake Engineering (e.g., Performance Based Approaches, retrofitting and/or repair of existing structures, etc.).

The exchange of researchers is aimed. This should be done among the organizations included in the collaboration and should be opened also to young researchers from other research organizations and universities.

A Working Group on Training and Mobility of Researchers will be established to provide the Steering Committee with information relevant to this action by investigating possible funds, setting-up common database and harmonizing mobility policies.

It is aimed to set-up procedures and actions for the coordination of educational and outreach materials for schools and media. The following initiatives should be considered:

- The IDEERS initiative at Bristol University www.ideers.bris.ac.uk (competitions held in UK, NCREE, Greece)
- The US/NEES, PEER, MAE, MCEER initiatives.
- The Media requests/visits to JRC and other laboratories.

I-SAMCO is coordinated by Dr. Helmut Wenzel, VCE Holding GmbH. He is supported by Dr. Vito Renda, JRC-Ispra.

More Information

on I-SAMCO can be found on the SAMCO general website at: www.samco.org

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I-SAMCO Consortium

- **VCE** - Vienna Consulting Engineers -Austria
- **JRC** - European Laboratory for Structural Assessment at the Joint Research Centre - Italy
- **CEA** - Seismic Mechanic Study Laboratory DEN/Saclay of the French Atomic Energy Commission - France
- **BAM** - Federal Institute for Materials Research and Testing - Germany
- **EMPA** - Swiss Federal Laboratories for Materials Testing and Research - Switzerland
- **ITAM** - Institute of Theoretical and Applied Mechanics of the Academy of Sciences of Czech Republic – Czech Republic
- **CLSMEE** - Central Laboratory for Seismic Mechanic and Earthquake Engineering of the Bulgarian Academy of Sciences - Bulgaria

List of International Partners:

- **NEES** - Network of Earthquake Engineering Simulation, NSF, USA
- **NIED** - National Institute for Earth Observation and Disaster Prevention, Japan
- **NCREE** - National Centre for Research in Earthquake Engineering, ROC/Taiwan
- **ISIS** - Intelligent Sensing for Innovative Structures, Canada Research Network
- **AIT** - Asian Institute of Technology, Thailand
- **CSIRO** - Commonwealth Scientific & Industrial Research Organization, Australia
- **UniTokyo** – University of Tokyo, Department of Civil Engineering
- **UniBristol** – University of Bristol
- **University of Carleton**

News from the Profession & Practice

New Sensors System for Monitoring of Traffic Load

Introduction

There are known technical systems performed to monitor Traffic Load. Weigh In motion (WIM) techniques have been developed to collect data for statistical purposes.
WIM systems are sensitive to the excitation produced by car tire pressing on it. There are used several kinds of WIM systems like: bending plate, load cell, bridge WIM, piezoelectric sensors etc.
Most of the WIM systems have been designed in USA or western Europe. They are able to measure: vehicle gross weight, individual axle weight, vehicle class, vehicle length, wheel base, individual axle separation, vehicle speed.
In USA WIM systems are classified into four types according to their speed range, data gathering capabilities and application. Type I is intended to collect traffic data for speed range 16 – 113 km/h, while type IV is mounted in weight enforcement stations and works for speed range 24 – 84 km/h [1]. Current WIM systems are able to measure weight of the car with 10 % accuracy for (95% confidence level).

Testing Bench

The test bench includes a steel pipe supported at the ends (see figure 1).
Piezoelectric actuator is used to generate the excitation. Two piezoelectric patches located symmetrically on surface of the pipe are used to measure the parameter of excitation.
Sinusoidal signal is used to simulate tire force exerted by running car on the structure. In real road conditions cars have different speed, weight and the position of the wheel on the road. We have to take into account these three factors while making the tests.
When the pipe is bent the current signal is produced by piezoelectric sensors.
Design of the stand enables us to put the actuator in few different positions along the test pipe. The electric signal of various values of an amplitude and period can be used to drive the actuator. Waveform of signal driving the actuator is shown in figure 2.

Algorithm of Load Calculations

The aim of the algorithm is to identify the excitation bending the pipe. In real road conditions cars have different technical and motion parameters that is why algorithm should be sensitive to:
- position of tire forces pressing on the structures,
- speed of the car,
- weight of the car.

In first step the algorithm should recognize where the excitation is located on our structure. Position of load X' can be determined by use of the following formula:

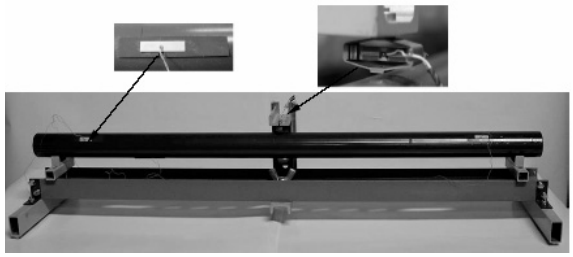
$$X' = \frac{(Al - Ar)}{(Al + Ar)}$$

where, if the load is applied in the middle of the tube, then X'= 0. If the load is applied closer to the left senor X'>0 and if it is applied closer to the right senor, X'<0. From the function x=f(X') (determined experimentally) we can get the real position of the load.
The time of lasting of the excitation T' can be calculated. Time strongly depends on the speed of the car, so after measuring it we can preliminary estimate speed of the car.
The dependence between position, time of excitation and ratio of amplitude of input signal to amplitude of output signal can be obtained experimentally or numerically.
FE model of real prototype of the road testing stand which will be tested soon is presented in figure 3. The vectors of forces pressing on a plate simulate the influence the car tire on the structure.
Finally if we determine the position of excitation and time of excitation we can obtain the value of third unknown parameter K given by the formula

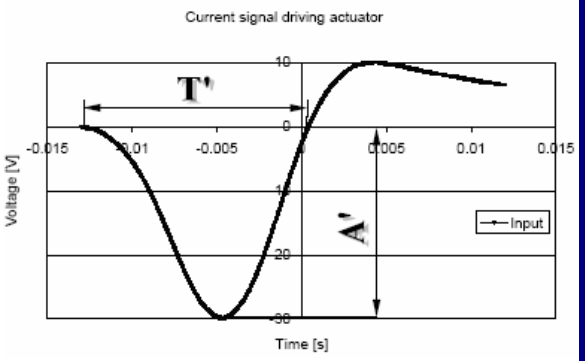
$$K(X', T') = \frac{A'}{(Al + Ar)}$$

Finally, the load intensity A' affecting LDD can be calculated from the formula

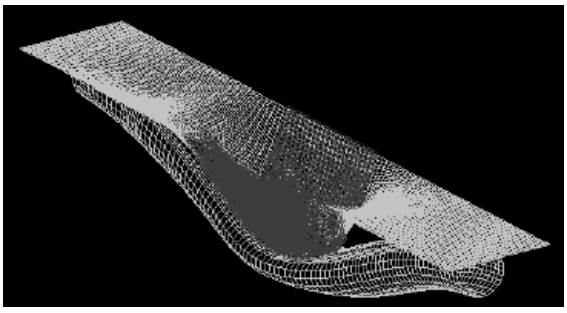
$$A' = (Al + Ar) \cdot K(X, T).$$



▲ Figure 1: View of the testing stand



▲ Figure 2: Waveform of the current signal driving the actuator where:
A' – amplitude of signal driving the actuator,
T' – period of signal driving the actuator.



▲ Figure 3: FE model of the prototype of LDD

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Network Profile

NEES - a Major Research Equipment Project of the National Science Foundation (NSF)

The George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) will provide a national resource that will shift the emphasis of earthquake engineering research from current reliance on physical testing to integrated experimentation, computation, theory, databases, and model-based simulation. As a national resource, NEES will:

- Include 15 major earthquake engineering experimental research equipment installations networked through the high performance Internet. [Initially through 2004, NEES will include equipment sites funded through NSF program solicitations. NSF envisions, however, that other globally significant earthquake engineering equipment sites will participate in NEES and bring unique experimental capabilities to NEES.]
- Be developed by September 30, 2004.
- Be operational through September 30, 2014.
- Improve the seismic design and performance of our Nation's civil and mechanical infrastructure systems.
- Use advanced experimental and simulation capabilities to test and validate more complex and comprehensive analytical and computer numerical models.
- Provide end-to-end system connectivity to operate distributed experimental research equipment, including teleobservation and teleoperation, and to enable computation and distributed simulation for earthquake engineering experimentation.
- Provide researchers with remote access to a curated repository of databases, user-developed simulation software, and models for use in model-based simulation and visualization through access to a computational grid.
- Form an integrated network that facilitates interdisciplinary global collaboration among scientists and engineers.
- Enable participation from a broader earthquake engineering community, including educators, students, practitioners, and public sector organizations and individuals, who will have access to the equipment, data, models and software from NEES.

More Information

Information on NEES Program awards, solicitations, reports, workshops, and other activities may be found at the NSF NEES web site, at http://www.eng.nsf.gov/nees.

Inquiries about NEES can be sent via e-mail to: nees@nsf.gov

Contact

Joy Pauschke
NEES/NSF
(I-SAMCO Partner)

NEESgrid

Building the National Virtual Collaboratory for Earthquake Engineering.

NEESgrid will link earthquake researchers across the U.S. with leading-edge computing resources and research equipment, allowing collaborative teams (including remote participants) to plan, perform, and publish their experiments. NEESgrid, the systems integration component of the NEES project, uses the newest and fastest communications technologies to tie the NEES network together.

Through the NEESgrid, researchers will:

- perform tele-observation and tele-operation of experiments;
- publish to and make use of a curated data repository using standardized markup;
- access computational resources and open-source analytical tools;
- access collaborative tools for experiment planning, execution, analysis, and publication.

The components of the NEESgrid system will be completed by September, 2004, when management and operation of the NEES system will be turned over to a consortium of earthquake engineer researchers and practitioners. The task of designing and creating this infrastructure has been awarded to the National Center for Supercomputing Applications at the University of Illinois at Urbana-Champaign.

Announcements

Sixth International Symposium on Cable Dynamics

Charleston, SC (U.S.A.) – 19-22 September 2005

This series of symposia is dedicated to cable structures and to interchange of ideas between several engineering disciplines relative to overhead electrical lines, guyed masts, cable-supported bridges, cables for marine applications, etc.

Preferred subjects for consideration

1. Models and methods for cable dynamics analysis: The first preferential subject is devoted to the modeling of non-linear problems related to cable structures and methods for their solution.

2. Monitoring, diagnosis and control of cable structures: The second preferential subject is related to real-time diagnosis, health monitoring and any kind of control of cable dynamics.

3. CFD and laboratory testing on cable dynamics problems: The third preferential subject is related to virtual and actual wind-tunnel testing, including moving cylinders or actual cable configurations, with or without 3-D effects and, in appropriate cases, with added mass problems.

Call for Papers!!
(Online Submission)

4. Field experience sharing: This fourth preferential subject is a main concern of the symposium in relation with practical return from observations of any cable dynamics problems. It may also be devoted to future large project including cable problems to suggest discussion and debate on the topic.

Tutorial

A half-day tutorial will be organized on Monday morning, 19 September. It will be entitled "**Real time monitoring of cable structures and related decision planning**". The following topics will be covered:

- vibration problem requiring real-time monitoring
- sensors, transducers and data acquisition systems
- on line identification techniques
- decision process
- case studies, lessons learned

More Information

Website:
http://www.conf-aim.skynet.be/cable

Symposium Administrative Office:
info@aim.skynet.be

ECF16 - 16th European Conference of Fracture

Failure Analysis of Nano and Engineering Materials and Structures

Alexandroupolis, Greece, July 3-7, 2006

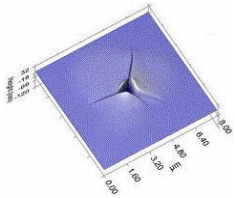
Its scope is to promote world-wide cooperation among scientists and engineers concerned with fracture and fatigue of solids. The conference is under the auspices of the European Structural Integrity Society (ESIS).

Important Dates

Submission of Abstracts: **June, 2005**
Notification of Acceptance/Rejection: **September, 2005**
Submission of Complete Papers: **January, 2006**
Conference: **July, 2006**

Symposium Topics

- Fracture mechanics of cementitious composites, concrete, stone and masonry
- Micromechanics of cementitious composites
- Advanced sensing techniques for structural health monitoring
- Engineering performance and modeling for early age concrete
- Degradation, repair and rehabilitation of concrete structures
- FRP's and textiles in cement composites



More Information

Website:
http://ecf16.civil.duth.gr

Organiser:
egdoutos@civil.duth.gr

Calendar Of Events

January 2005

■ **24. Deadline** for receiving the paper at the University of Nevada for 'Nevada Medal For Distinguished Graduate Student Paper In Bridge Engineering'
URL: http://bric.ce.unr.edu/announc/announc.html

February 2005

■ **19.-22.** IABSE Conference 'Role of Structural Engineers towards Reduction of Poverty'. New Delhi (India);
Deadline early registration: 15.01.05
URL: http://www.iabse.org/conferences/newdelhi2005/index.php

April 2005

■ **28. – 29. SAMCO Workshop** at BAM, Berlin, Germany.
URL: www.samco.org/workshops

May 2005

■ **20.-23.** Fourth Middle East Symposium on Structural Composites for Infrastructure Applications 2005 'Sustainability of Knowledge', Egyptian Society of Engineers, the Faculty of Engineering Ain Shams University and co-sponsored by the Egyptian Group of IABSE; Alexandria, Egypt.
URL: http://www.MESC4-Egypt2005.4T.com

June 2005

■ **13.-16.** 9th World Seminar on Seismic Isolation, Energy Dissipation and Active Vibration Control of Structures; Kobe , Japan.
Deadline for registration: 31.03.05.
URL:http://www008.upp.so-et.ne.jp/javit/seminar/

■ **12.-14.** AMCM 2005, Analytical Models and new Concepts in Concrete and Masonry Structures. Ustron (Poland);
Call for papers: 15.02.05.
URL: http://amcm.bud.polsl.gliwice.pl

July 2005

■ **6.-8.** 8th International Conference on Technology Policy and Innovation, "Value-Added Partnering In a Changing World". Lodz (Poland);
Deadline for Abstracts: 28.02.05
URL: http://in3.dem.ist.utl.pt/lodz2005/

August 2005

■ **7.-12.** 18th International Conference on Structural Mechanics in Reactor Technology; Bejing (China);
Deadline for registration: 31.03.05
URL: http://www.smirt-18.org.cn/T

September 2005

■ **19.-22.** Sixth International Symposium on Cable Dynamics in Charleston, SC. (USA)
URL: http://www.conf-aim.skynet.be/cable

■ **5.-9-. SAMCO Summer Academy in Zell am See / Austria**
URL: www.samco.org/academy05

■ **14.-16.** IABSE Symposium 'Structures and Extreme Events'. Selection of abstracts is made. Authors have been informed. Lisbon (Portugal).
URL: http://www.iabse.org/conferences lisbon2005/index.php

October 2005

■ **3.-5.** 2nd H & mH International Conference On "Vulnerability of 20th Century Cultural Heritage to Hazards and Prevention Measures. Kos, (Greece);
Deadline for early registration: 30.03.05
URL: http://soalinux.comune.firenze.it/cicop/

■ **26.-28.** EVACES 2005, Conference co-sponored by IABSE 'Experimental Vibration Analysis for Civil Engineering Structures'. Bordeaux (France);
Call for papers: 15.12.04
URL:http://pfe.enpc.fr/web2003/dyn/pdf/45035.pdf

December 2005

■ **1.-6.** International Conference on Computational and Experimental Engineering & Sciences (ICCES), Hyderabad (India);
Deadline for full paper: 15.09.05
URL: www.icces.org/

July 2006

■ **3.-7.** ECF16 16th European Conference of Fracture – 'Failure Analysis of Nano and EngineeringMaterials and Structures'; Alexandroupolis, Greece,
URL: http://ecf16.civil.duth.gr

Imprint

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/news

Funding

The SAMCO Network is funded by the European Commission (http://europa.eu.int) within the *"Fifth European Framework Programme",FP5,* (http://www.cordis.lu/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 (http://www.cordis.lu/growth/) 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

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