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newsletter

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http://www.samco.org

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SAMCO NEWS

Structural Assessment Monitoring and Control

SAMCO at the 3rd WCSC-Congress in Como

The **3rd World Conference on Structural Control** takes place from 7-12th April in Como, Italy. It is held within the scope of the *A. Volta Cultural Center*, located in *Villa Olmo*. The conference is organized by the International Association of Structural Control (IASC).

The conference seeks to bring together engineers, architects, builders and other experts. It will include keynote lectures presented by the authorities in structural control and monitoring, state-of-the-art reports and special theme sessions.

A whole session will be devoted to the SAMCO Network. Six presentations on different tasks within the SAMCO Network – like an introduction to SAMCO, end user requirements and the SAMCO database – will be held. The session will take place on Thursday, 11th April in the morning.

More Information

http://www.3wcsc.jrc.it

▲▼ The conference venue: Villa Olmo in Como © www.thais.it//como/index/ villa_olmo/.htm

3rd Steering Committee Meeting in Como

The **Steering Committee** is responsible for the scientific networking as well as the dissemination progress of the network.

The next Steering Committee Meeting takes place on **April 12**, 2002 in Como in the frame of the World Congress on Structural Control.

The content of the discussion will be:

- Status **of the members** joining the network
- **Development of the SAMCO Network** in general
- **Summer Academy** planned for the summer 2003

Besides decisions on the next work packages will be taken.

▲ The Steering Committee © VCE

Ideas for the Sixth Framework Programme

Sixth Framework Programme

The Framework Programmes for Research and Technological Development (RTD) are programmes of the European Community activities lasting for several years and aiming at a contribution towards the creation of the European Research Area.

The next programme, the Sixth European Framework Programme (6FP) will span the period 2002-2006 to replace the current Fifth Framework Programme, under which SAMCO is running.

The Commission proposals for FP6 are based on the preliminary conclusion of the debate in the European Parliament, the Council and other institutions, taking also into account the views expressed by the Member States, the scientific community and industry. The 6FP will be restructured around three targets:

Integrating Research

These activities will represent the bulk of the efforts deployed by 6FP and are intended to integrate research efforts and activities on a European scale and to develop knowledge.

Structuring the European Research Area

Defining the various activities in such a way as to enable them to exert a more structuring effect on the research activities conducted in Europe thanks to a stronger link with national, regional and other European initiatives.

Strengthening the foundations of the European Research Area

Simplifying and streamlining the implementation arrangements on the basis of the intervention methods defined and the decentralised management procedures envisaged.

Call for ideas

The wording of the programme will be in progress from April to summer 2002 and an invitation to bring forward specific subjects will be sent out to the network coordinators.

A generic problem specification is desired; therefore action is required from the members of the network in helping to launch the 6FP, which might be a good basis for successful projects.

Suggestions for generic problem statements to be implemented in the 6FP proposal shall be ready after the April workshop in Como. Therefore **decisions on the network's 6FP-activities** shall be taken in the **October 2002 meeting**. Every partner is called to contribute to the development of future projects.

Please send your ideas and suggestions to the coordinator: samco@vce.at

Outlines of integrated projects

Some basic ideas have been collected for integrated projects within 6FP. These projects could concern the following items:

- **Seismic Evaluation**
- **Monitoring and Assessment of the Infrastructure**
- **Risk Management**
- **Monitoring for Natural Disasters**

Topical Information

To keep the network as informed as possible, the coordinator will provide topical information about the 6FP on the SAMCO-Homepage. Material will be provided to download from the page.

More Information

http://www.cordis.lu/rtd2002/fp-debate/fp.htm

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First Benchmark Test: Wind Effects on High Rise Buildings

Structural Engineering at its limits

In the last decade the construction of high rise buildings was drastically increased. The city of **Frankfurt** is an example for the fast development of a high-rise skyline. In the meantime urban planners have reached the 300 metre limit for the high rises. Apart from the socio-economic problems arising with them, the structural engineers have to face the following hurdles concerning the construction and the dynamic behaviour of the buildings.

- The currently available codes for wind loads are designed for buildings with a maximum **height of 200 metres.** Appropriate transfer modalities are missing.
- Strong wind events of the last years, which can be mainly attributed to the **change of the global climate**, cause considerable damage to the fronts of buildings.
- The economic pressure exerted by the BOT Project (Build-Operate-Transfer) leads to the construction of more and more slim buildings. These extremely slim towers are exposed to huge wind loads, which cause considerable **vibration problems.**
- The **mutual dynamic effects** of high rises situated closely to each other are insufficiently studied. Impacts like shielding, which leads to a reduction of wind loads and the increase of the wind loads through the dynamic part of the wind, are only basically examined.

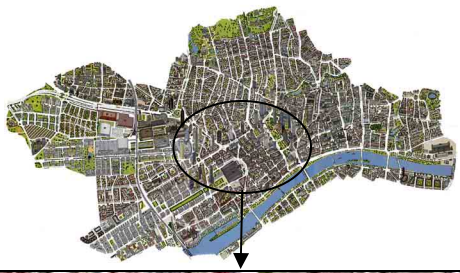
Socio-economic effects

From the socio-economic point of view the following problems occurred with high rise buildings:

- The building of new high rises in an urban region leads to a dramatic **impact on the wind conditions** and on the local climate within a city.
- By the so-called “nozzle”-effect between neighbouring high rises, the wind is strengthened. This leads to:
  - **noticeable loss of comfort** for the pedestrians and
  - **considerable wind noise**.

The city-map of Frankfurt ►

Frankfurt has a huge number of high rise buildings, among them the Commerzbank, Dresdner Bank, Deutsche Bank, City-House and Euro tower. **VCE** installed permanent monitoring systems in some of them.



Detail-view of the high rise quarter in Frankfurt ▼

- Problems with the dynamic behaviour of a structure in slim high rises cause **noticeable vibrations**. The latter have a negative influence on the health and quality of life of people residing and working in such buildings.

Project Task & Execution

There are no investigations, which examine the relationship between the structural responses of a structure and the appropriate wind loads. However, such an investigation is necessary for the assessment and the development of new standards and regulations for high rise buildings.
This project aims at answering some of these questions: Several high rises, among them the highest building in Europe, the Commerzbank, are monitored over a **period of 2 years**. By the installation of permanent systems at these high rises, the **vibration** can be continually recorded in connection with the **wind speeds**. These systems deliver dynamic data, which characterise the structural response of the high rise during wind events. After the correlation of the two parameters (vibration and wind speed) and the evaluation of the structural behaviour, detailed statements on the effect of wind on high rises can be made.

VCE - with its long-standing experience in structural assessment and monitoring - carries out this project, in partnership with the **Darmstadt University of Technology** (Institute of Concrete Structures and Materials). This Institute recently joined the network as a new “member” and is an expert in the field of high rise buildings. (http://www.tu-darmstadt.de)

The examined objects

The first two buildings, which are instrumented, are the Commerzbank with a height of 259 m and the Dresdner-Bank with a height of 166 m. The method applied is the BRIMOS approach, developed by VCE. The “BRIMOS-Recorder” used is installed as high as possible on the buildings. Consequently the point where the measurements are taken is at a height of approx. 200 m in the case of the Commerzbank building, and at approx. 166 m in the case of the Dresdner-Bank building.

Some details

The recorder is a small box including a vibration sensor, the acquisition and storage unit, a GPS-system and a modem. In the following please find some details on the equipment used:

- **The sensor** is a three-dimensional accelerometer that notices vibrations up to 1/1,000,000,000 g (g=earth gravitation) and in a frequency range between 0.1 Hz and 50 Hz.
- **The acquisition and storage** unit continuously measures and starts to record the data stream when a given threshold-trigger is reached.
- **The GPS-system** is used for time correlation. The update interval is one hour so in fact there is no relevant time drift.
- **A PCMCIA-modem** allows getting the data via telecommunications.

First data

The high rise project is the first **benchmark test** carried out within the SAMCO Network. As the benchmark test is to enable further research and development within the SAMCO Network, the first data will be **freely accessible** via the SAMCO database as soon as possible. The installation of the monitoring systems at the buildings was done in January. There are already some interesting data like the first natural frequency or the dynamic behaviour of the two buildings at similar wind events.

P.S. Thanks to Mr. DI Andreas Bachmann, (Darmstadt University of Technology) for taking these nice photos for us!

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▲ The high rise skyline in Frankfurt – In the foreground the Commerzbank

▲ Dresdner Bank

▲ Commerzbank

SAMCO Network Expands Again: NAS Proposal Successful!

After the integration of the new members (see last issue), the SAMCO network is expanding again: The expert evaluation of the proposal for an **extension of the SAMCO network to the "Newly Associated States"** (submitted under the NAS- 1st call) was successful!

Now the kind of participation and contact of the new partners must be defined. They will probably be included as "members". The evaluators want a wide dissemination within the NAS countries to be guaranteed. This shall be done by means of better defined dissemination and exploitation plans.

Besides, the work-plan and the allocation of manpower must be clarified. The invitation included the following organisations from the Newly Associated States:

IFTR -Institute of Fundamental Technological Research, Poland.

ZAG -Slovenian National Building and Civil Engineering Institute.

GGRI- Geodetic and Geophysical Research Institute of the Hungarian Academy of Sciences.

We will continue reporting about that process…

Some Features of the SAMCO Database

The development of the database is in its end phase. The prototype will be accessible by the end of April *at the latest*. Then it will be presented to a restricted group – to the consortium of the SAMCO network – in order to test the functionality of the database. Beforehand please find some features here the database-prototype will have:

Entities

The database will supply different types of information. The information will be wrapped into *entities*, a kind of **container or folder containing a series of information**. All the entities have a number of attributes. These attributes are the identifiers by which information is found in the database. As the database is accessible by means of the internet, the entity is usually passed to the user in HTML format. This format is readable by all internet browsers' software.

The advantage of the relational database design applied at the SAMCO Database is that it will be possible in the **future to define new entities** without significant alteration of the existing data tables. So if the database is, apparent from the "test-drive", not able to fit the requirements of the user community, it can be adapted. The following entities, which deliver the information of the database, are implemented:

- **Benchmark tests** are a number of ongoing or finished references carried out within SAMCO or the framework of other projects. The benchmark tests aim at allowing a comparison of very different approaches and methods used in the field. This shall help to learn from the gained data in order to develop methodologies as well as codes and standards.
- **Laboratory tests** are finished or ongoing experimental tests. Their aim is further research and development by answering key questions of structural dynamics and allowing interested parties to use the data for e.g. further research work or to check new technological approaches. Besides, the tests shall increase the recognition of experimental capabilities and methods within the engineering community.
- **Project reports** are documentations about the great number of projects, which have been carried out in the fields of SAMCO. These projects are:
  - **Research Projects**, which provide information on and links to the research and development achievements made through research projects, and
  - **Reference Projects,** which serve as demonstration cases e.g. for a certain technical approach.
- **State-of-the-art reports** contain specialized publications and technical guidelines e.g. for applications, technologies, tools (like software, hardware or algorithms).
- **Literature** contains specialized literature references.
- **Methods** contain the different approaches, methodologies and technologies developed in the field.
- **Raw data** of the benchmark and laboratory tests. These data will be the essence of the database. They will allow the community to make further examinations on the basis of the data.
- **Organizations** being active in this field are listed. That includes research institutions as well as practicing companies and other organizations. Apart from their activities and tasks, the database comprises the services and applications offered by them.

These entities are further specified, e.g. projects as *reference* project or *research* project. etc.

Subject Areas

Besides the user interface will distinguish between two main **subject areas** of the database (a third will be established later) so that the user will easily find the desired data. The subject areas will be:

- **Research & Development**
- **Practice & Application**

Besides, there will be **search engines** to search for a certain object in the database or to restrict the search by means of certain criteria.

Adding Data

If you would like to add data to the database, e.g. a research project, you will just have to go through the following steps:

- **Register** with the database
- **Choose** from Data Management: the "**Add new project**" - link
- **Fill in the delivered form**: Attributes like name of the project, short description, termination date must be specified by you. You tell the database where to find or upload the data.

Ready!

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The database will be accessible via the SAMCO Homepage ▶

http://www.samco.org

The software tool used is the Generic Information Server Toolkit (GIST), developed at the JRC, an open source product ▼

http://gist.jrc.it

Relevant Projects for the SAMCO Network – Part I

IMAC

Integrated Monitoring and Assessment of Cables is a project of the 5th European Framework Programme. The main target of the project is to develop a non-destructive methodology to locate, assess and find damage in existing cables embedded in structures and a method that enables quality control of external cables during construction as well as a cheap and quick maintenance.

The aim of the project is to offer alternative methods to deal with the problem of the huge peak of repair and retrofit investments expected for the years 2005 onwards. The knowledge gained in system identification technologies is to be adopted to suit the requirements of composite cables. Inspection equipment with software tools to help bridge owners to assess the structures is expected to be the outcome of this project. The knowledge gained in system identification technologies will be further developed to suit the requirements of composite cables, which recently have been widely applied in engineering structures.

▲ Ludwigshafen © VCE GmbH

CaSCo

Consistent Semi-active System Control is a project of the 5th European Framework Programme. The project deals with the development of semi-active damping elements for noise and vibration attenuating measures.

Railway companies are subjected to tremendous resistance against and objections to the building of new railway lines until the problem of vibration exposure to the residents is solved. This problem can be put into a more general context where high intensity traffic, wind, earthquakes and other dynamic impacts generate high noise levels and vibration on systems and structures. Besides, the effects of noise and vibration have a negative effect on the quality and comfort of life, performance levels, health and working environment.

The goal in this project is to use advanced materials to increase the effectiveness of damping elements, while at the same time minimising their geometric dimension. Rheological actuators are installed at critical locations throughout structures and underneath railway tracks to eliminate vibration. Thus, kinetic energy is dissipated locally before it is transferred to other components or to the ground. As a consequence, the size of individual viscous dampers is reduced, allowing a more effective use of materials and minimisation of resource consumption.

▲ Railway bridge © VCE GmbH

ENOVNET

The **European Noise and Vibration Network** is a thematic network, which covers the RDT activities related to techniques and technologies aimed at the active control of noise and vibration for all industrial and environmental sectors.

Noise and vibration have been a major issue for the quality of the living environment for a long term. In the last 30 years scientists and technicians achieved significant progress in the understanding of noise source mechanisms, of noise propagation and finally in the evaluation of the effects of noise exposure on public health. However the actual applications of these scientific and technical achievements have not reached their full potential yet for many reasons.

Among them are the lack of co-ordination between industrial partners; the discrepancies between countries/ organisations; the absence of critical assessment of research results and actual industrial needs.

This network shall improve synergies between participants, within and around the consortia. It is aimed at facilitating the technology transfer between the projects and the outside world, speeding up exploitation and diffusion of results and strengthening the generic character of these technologies by activating better links throughout the operator's chain.

▲ Erasmus bridge © VCE GmbH

For more information:

Imac:
http://www.vce.at/imac.htm

CaSCo:
http://www.vce.at/pages/research/casco.htm

Enovnet:
http://www.euresis.fr/html/enovnet/main_enovnet.htm

Company Profile

arsenal research

Ein Unternehmen der Austrian Research Centers.

History

arsenal research is located in Vienna. The institute was founded in **1950** as a research institution of the government. In the early years it consisted of institutes for Machinery Engineering, Electro-technical Engineering and Geotechnical Engineering. The institute has always been oriented towards practical applications with strong measurement and testing facilities. Very early also a working group on vibrations and acoustics was started. Over the years it has become an important non-university research institution of the republic.

Since **1960** – under the name "*Bundesversuchs- und Forschungsanstalt Arsenal (BVFA)*" – it belonged to the Ministry of Construction and Technology. In **1970** BVFA was shifted to the Ministry of Sciences. In **1997** privatisation was started and BVFA was transformed into a private limited company. In **1998** the internal organisation of arsenal was completely changed and the new name arsenal research was born. In 1999 it became a subsidiary company of *Austrian Research Centers Seibersdorf*.

In June **2001** the Holding Company *Austrian Research Centers* was funded, where seibersdorf research and arsenal research are the two main subsidiary companies.

Business areas

The Republic of Austria is the main shareholder. In the latest organisation form arsenal research consists of the following business areas:

- **Vehicle Testing Station**
- **Transport Technologies**
- **Transport Routes Engineering**
- **Monitoring, Energy and Drive Technologies**
- **Renewable Energy Technologies**
- **Engineering**

Fields of Application

arsenal research, being an application-oriented **R&D** enterprise, offers a comprehensive service portfolio in the areas transport and energy. Qualified employees generate solutions for our customers by using most modern computer simulation as well as top-quality measurement and test engineering,.

Integration in international science networks enables arsenal research to extend the service portfolio according to the respective requirements in order to meet the customers' demands.

arsenal research started a new thematic positioning in the area transport and infrastructure technologies. The corporate strategic focus is on the topics:

- **vehicles**
- **transport infrastructure**
- **energy systems**

Transport Routes Engineering

The business area, which is involved in the **SAMCO Network,** is Transport Routes Engineering. The unit covers the fields road monitoring, traffic safety, transport telematics, acoustics, vibration and shock testing, vibration and structure borne noise protection, structural dynamics and earthquake engineering as well as structural monitoring. The structural dynamics related activities are represented in more detail:

- **Earthquake resistant design** of structures (bridges, buildings, dams, etc).
- **Dynamic in-situ testing** of structures in order to elaborate dynamic properties of existing structures. FE-modelling of structures. Model updating. Assessment of earthquake capacities of existing structures. Measurements for retrofit and seismic upgrading.
- **Structural monitoring**. Safety inspection via measurement of vibrations. Quality assessment.
- **Vibration and shock tests** in the laboratory.
- **Vibration and structure borne noise protection**, especially in railway engineering, prognosis of vibration and structure borne noise, measures for reduction. In 2002 the Business Area will have 15 co-workers, among them 8 graduated in the field of civil engineering, mechanical engineering, agricultural engineering, electronics and computer sciences.

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In every issue another organization of the consortium is presented. Please send your Company Profile to the editorial staff: bgeier@vce.at.

CALL
TO THE CONSORTIUM

MAPPING OF THE KEY-PLAYERS in the Area of the SAMCO Network

One of the SAMCO strategies is to identify the National Key-Points in Europe. That means the identification of the key players in each technical subject and the relevant research bodies as well as decision makers.

This is mainly addressed to the group leaders in respect of technical expertise, but also to all other contractors, particularly on the national level. Therefore we kindly ask you to work out a list of the key players in your field and country. This comprises:

- **End users**, responsible for monitoring assessment and maintenance of structures
- **Relevant railway and road authorities**
- **Companies**, offering relevant services in the market
- **Suppliers** of hard- and software
- **Consultants**, offering services
- **Universities** and **research institutes**, doing R&D work on the subject
- **Any other** related bodies and companies

First of all this list is to concentrate on your field and country, but finally shall cover the whole of Europe and particularly the NAS Countries. Please send your list to: samco@vce.at

Notable Dates

2002

APRIL

- **7-11.** World Conference on Structural Control, *Como, Italy*. http://dipmec.unipv.it/wc/frame3wcsc.html
- **12.** SAMCO Steering Committee Meeting, COMO, Italy.

APRIL/ MAY

- **28-1.** Seismic Conference on Highways and Bridges, *Portland, OR*. mceer@acsu.buffalo.edu
- **21-25.** Seventh U.S. National Conference on Earthquake Engineering, *Boston, MA*. www.eeri.org/7nceesubmit

JUNE

- **10-12.** SEM Annual Conference on Experimental and Applied Mechanics, *Milwaukee, WI*. www.sem.org
- **18-21.** Vibration Measurements by Laser Techniques, *Ancona, Italy*. www.sem.org

JULY

- **8-11.** 9th International Congress on Sound and Vibration, *Orlando, FL.*
- **14-17.** IABMAS 2002: Conference on Bridge Maintenance, Safety and Management, *Barcelona, Spain.* http://www.cimne.upc.es/congress/iabmas02/

JULY/AUGUST

- **31-2.** CSCE International Conference on Short & Medium Span Bridges, *Vancouver, BC, Canada.* www. bridgeconference.com

SEPTEMBER

- **2-5.** Fifth European Conference on Structural Dynamics - eurodyn 2002, *Munich, Germany*. www.eurodyn2002.de
- **11-13.** IABSE Symposium towards a Better Built Environment – Innovation, Sustainability, Information Technology, *Melbourne, Australia.* www.iabse.ethz.ch/conferences/melbourne/melbourne.html

OCTOBER

- **9-12.** SEWC Congress on Structural Engineers World Congress, *Yokohama, Japan.* www.sewc2002.gr.jp
- **13 –18** *fib* Congress, Concrete Structures in the 21st Century; *Osaka, Japan.* www.fib2002.com

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
http://europa.eu.int

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

Competitive and Sustainable Growth Programme
http://www.cordis.lu/growth/

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