Issue 15 / June 2005

newsletter

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SAMCO NEWS

Structural Assessment Monitoring Control Issue 15 / June 2004

contents

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SAMCO Summer Academy 2005

May we kindly invite you to join this year's Academy, taking place in Austria from the 5th to the 9th of September? Top experts will report on their work in the fields of structural assessment, monitoring and control and the future development of those sectors will be discussed?

Why Participating?

The SAMCO Summer Academy will offer you first hand information on current practical experience and state of the art. A range of top experts from all over the world have already agreed to give lectures on the following topics:

- Advanced Bridge Monitoring (Dr. Wenzel)
- Special Monitoring Projects and System Identification (Prof. Del Grosso, Prof. De Roeck, Prof. Proverbio)
- Experimental Work (Dr. Ohtani, Dr. Renda, Mr Queval, Dr. Feltrin, Dr. Rücker, Prof. Flesch, Dr. Kolakowski)
- Monitoring Projects (Prof. Fujino, Prof. Aktan, Prof. Lau, Dr. Mufti)
- Forensic Engineering (Prof. Brownjohn, Prof. Del Grosso, Dr. Wenzel, Dr. Woodward et al.)
- World Largest Test & Facility Networks (Dr. Tsai, Dr. Koh)
- Decision Support Systems (Dr. Wenzel)
- Network for Earthquake Engineering Simulation (NEES) (Dr. Pauschke)
- Natural Hazards and Practical Bridge Management (Dr. Pellegrini, Prof. Pitilakis, Dr. Pardi)
- FP 7 & European Research Projects (Dr. Katalagarianakis, Prof. Beer)
- European Research Practice (Dr. Ortega, Dr. Dumoulin)

Facts

Funding

European Commission; DG Research
5th FP (Competitive & Sustainable Growth)

Organisation

Thematic Network SAMCO
EC-2001-063
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Registration

Please register by filling in the registration form available on the website http://www.samco.org

and sending it via FAX to the number **(+43-1) 90 292 2123**.

The Early Booking Fee amounting to **€ 450,-** is valid for registration before June 30th 2005.

We will do our best to make it an unforgettable event for you. We are looking forward to meeting you in September in beautiful Zell am See.

Your SAMCO Organising Committee

10th SAMCO Workshop at BAM Berlin / Germany

Review

The 10th SAMCO Workshop took place on April 28th and 29th at BAM (Federal Institute for Materials Research and Testing) in Berlin / Germany and was well attended by 28 participants from all over Europe.

Lecture Hall at BAM

A range of members of the SAMCO Community, top experts in their fields, delivered insight into a wide spectrum of opinions on what should be the main subject areas for the research agenda in the future.

Outcome of the First Day

Mr Luis Ortega (GEOCISA, Spain), proposed that first of all the terms "monitoring" and "control" should be clearly defined, easy to understand for everyone.

Mrs Livia Pardi (AUTOSTRADE, Italy) reported on the European Construction Technology Platform (ECT). According to her speech the research agenda will be decided by a high level group by June 2006. New fields within ECT have just been launched and should be approached by the SAMCO Community. Many monitoring activities interfering with other branches are currently carried out. National platforms being active in different fields are formed up at the moment or already exist, but a common approach as lobby is still lacking. The leader of the ECT platform is the Council for Science and Technology Policy (CSTP) in France. Mr Christos Tokamanis (European Commission) steers the platform from Brussels.

Claude Dumoulin (BOUYGUES, France) explained his opinion concerning the important points to be considered in monitoring and demanded by industry, which are:

- structural assessment
- geometry control
- dealing with uncertainties (mainly with tunnel boring machines)
- risk management
- waste traceability
- reduction of noise
- logistics of construction
- automation (robotics)
- transparent ground (analysis of ground condition surrounding a TBM)
- locating workers in tunnels
- substituting workers in tunnels
- to know what is going on

As a result noise and environmental questions are major issues for the contractors, furthermore vibration and safety.

Mr Brownjohn (University of Sheffield, UK) spoke about his experience in vibration limits in D-RAM productions. He expressed the opinion that additional static monitoring might be useful.

Mr Del Grosso (University of Genoa – DISEG, Italy) presented visions and breakthroughs as well as objectives of automated monitoring systems. An important issue is the improvement of reliability of the systems. Smart materials are demanded for their construction. According to Mr Del Grosso a rapprochement towards more general categories of structures has to be achieved, as well as the availability of additional information along with the response. Another concern is the integration of automated monitoring into existing systems (not only roads and rails but also pipelines). The application to underground systems is of priority.

Another issue mentioned on the first day of the workshop was homeland security, for which the action plan 2010-2020-2030 was presented.

Social Programme

Reichstag / Berlin

After the lectures and discussion, the participants of the workshop had the possibility to get to know the City of Berlin by taking part in a two hours sightseeing tour by bus.

Tour of the Halls of BAM

Before the joint dinner the Federal Institute for Materials Research and Testing was visited.

FP7 Research Agenda

The second day of the workshop was aimed at producing a research agenda.

Mr Rohrmann (BAM, Germany) spoke about the elaboration of a range of ISO codes and relevant standards such as the.

German “Merkblatt 89”. He also presented a very comprehensive statistic on the 48 projects handed in by the members, according to which monitoring application varies widely. The demand for structural health monitoring system software packages is among the greatest. The terms CMS (Continuous Monitoring System), PMS (Periodic Monitoring System) and EMS (Event Monitoring System) were clearly defined by Mr Rohrmann. A further issue mentioned is to elaborate concepts on data management.

Mr Holnicki-Szulc (IFTR, Poland) gave a presentation on work concentrated on damage detection and structural control carried out in the recent years and covering the following subjects:

- automatic damage detection
- load identification
- impact energy absorption
- retrofit

He presented examples of signal transmission of over 60m in pipelines where Piezzo Electric Sensor Actuators are used for damage detection. This method could be applied to water networks with possible leakages and could also be used in the field of security.

Mr. Geier (ARSENAL, Austria) gave a presentation based on the vision of ERTRAC (www.ertrac.org). He explained that in the Austrian guideline RVS 13.71 "Monitoring, Control and Assessment of Civil Engineering Structures, Road Bridges" the inspection interval could be increased from 6 to 10 years if monitoring methods were applied, which is a first step towards standardisation.

Mr Renda (JRC, Italy) spoke about the current situation of the Joint Research Centre whose main duty is to support the European Commission. The new targets of the JRC are safety, security and earthquake engineering as a main focus of institutional research.

Mr Goltermann (RAMBOLL, Denmark) stressed the importance of infrastructure management based on facts from monitoring to operate efficiently. According to his lecture one of the main targets of the next few years should be an improvement of efficiency in monitoring. Furthermore damage detection had to be enforced and probabilistic approaches were necessary to deal with uncertainties. Considering existing monitoring systems Mr Goltermann referred to fixed big systems in few structures which should be replaced by more mobile systems, or ideally a handheld device would provide an inspector with the necessary data.

In his lecture Mr Huth (EMPA, Switzerland) presented a model of a cable stayed bridge carrying a wireless network of sensors, which is currently tested by EMPA. Referring to Mr Huth one of the main targets to be reached in the near future should be the seismic resistance assessment. Other points he mentioned concerned smart materials for construction such as titan-nickel alloys and the use of recyclable materials.

The Audience

The decision to hold the final meeting of SAMCO in March 2006 at EMPA in Switzerland as proposed by Mr Huth was reached by the workshop’s audience.

Mr Demarie (POLITO / Italy)

historical heritage - relevant for SAMCO in many sectors - with a fixed duration of 2 years and a budget estimated at €800.000,--. The target of the project is to develop low-cost distributed technologies for monitoring, furthermore:

- data mining and processing,
- low cost sensors,
- management of noisy data, probability of distribution of parameters (base distribution) and
- wireless systems

EMPA / Switzerland

Mr Caussignac (LCPC, France) presented his view on future monitoring and inspection of bridges. According to his speech aerial inspection of structures is currently tested in France, which requires unmanned aircraft or model helicopters. Considering monitoring and the application of existing technologies to it, promotion of training and planning in this field should assure proper use.

Mr Demarie (POLITO, Italy) spoke about a new Italian research project of national interest on monitoring and control of the

Mr Wenzel used his final presentation to explain the current practice in ambient vibration monitoring and its planned integration into the research agenda.

More Information

http://samco.jrc.it

To download documents choose “Workshops” from the bar on the left.

Company Profile

Aristotle University Thessaloniki

Laboratory of Soil Mechanics and Foundation Engineering

Establishment of AUTH

The **establishment** of the University of Thessaloniki, as the second Greek university, was legislated under Law 3341/1925, during the premiership of Alexandros Papanastassiou, during the period of the first Greek Democracy.

The need for the establishment of the University of Thessaloniki arose, undoubtedly, from the outcome of the Balkan Wars and the incorporation of the area of Northern Greece, which was then called "the New Countries", into the main body of the Greek State. Yet, the establishment of the new institute of higher education was brought about by another factor, perhaps not as important as the first but nevertheless interesting as is shown by the views of two of the people who played a leading part in the foundation of the University, the Prime Minister Alexandros Papanastassiou and the Minister of Education, I. Liberopoulos.

Internal Organisation of AUTH

The Aristotle University **today** consists of more than 40 Departments as well as many other units, such as laboratories, study rooms, libraries, clinics, etc.., which make it the largest university in the country in terms of the staff, the number of students and the facilities offered. At the same time, due to the research work and the activities undertaken by the teaching and scientific staff, the University has gained international recognition.

Schools and Faculties

There are 42 schools currently in operation within the Aristotle University of Thessaloniki organised into nine faculties:

- Geotechnical Sciences
- Health Sciences
- Theology
- Exact Sciences
- Fine Arts
- Law, Economic and Political Sciences
- Education
- **The Polytechnic**
- Philosophy
- Independent Schools

The Polytechnic Faculty

This faculty is again devided into the following eight departments:

- Rural and Surveying Engineering
- Architecture
- Electrical and Computer Engineering
- Mechanical Engineering
- **Civil Engineering**
- Chemical Engineering
- General School of the Polytechnic Faculty
- Physical Planning and Growth Engineering in Veria

Civil Engineering Department

One laboratory within this department is the **Laboratory of Soil Mechanics and Foundation Engineering** - Research Unit of Soil Dynamics and Geotechnical Earthquake Engineering.

Research Activities

Research activities of this laboratory comprise:

- Geotechnical Engineering
- Geotechnical Earthquake Engineering
- Engineering Seismology – strong ground motion – site effects
- Environmental Geotechnical Engineering
- Lifeline Earthquake Engineering
- **Aseismic design** of technical projects
- **Soil dynamics**
- Development of new technology and innovative methods to **assess the dynamic soil properties**
- Development of methods and technology to improve and **enhance static and dynamic soil properties**
- Dynamic **Soil-Foundation-Structure Interaction**
- **Numerical and stochastic methods** in geotechnical / earthquake engineering
- **Landscape preventing** and remedial measures
- **Microzoning** studies
- Seismic **vulnerability** assessment
- Protection of **monuments and historical structures** against natural hazards

Major research projects coordinated or assisted by the laboratory comprise amongst others the partnership in the SAMCO project, a range of EU funded projects dealing with earthquakes, soil dynamic testing or for instance some microzoning studies.

Fundamental Research

Considering the field of fundamental research the laboratory's main targets are:

- to conduct **experimental & theoretical research** for improving existing methods, tools and procedures that estimate local ground motion variations due to site specific effects within the context of engineering applications
- to **develop and improve methods**, models and tools for hazard vulnerability and risk assessment
- to **enhance the earthquake resistance** of ordinary R/C buildings and bridges
- to contribute to the ongoing **elaboration** of the new generation of **Eurocode 8**

- to create **a database** of high quality data easily and world-widely accessed from researchers through Internet for validation and improvement of existing methods as well as for the development of new approaches in earthquake engineering

EUROSEIS-RISK
(Seismic Hazard Assessment, Site Effects & Soil Structure Interaction Studies in an Instrumented Basin)

The research unit's project EUROSEIS-RISK (EVG1 – CT – 2001 - 00040), running from 2002 to June 2005, is funded by the RESEARCH DG of the European Commission, within the context of the Environment Programme "Global Change and Natural Disasters".

Objectives

EUROSEIS is a large physical laboratory (Test Site), located at the Mygdonian valley, only 30 km distant from Thessaloniki, in northern Greece. It is a multi-functional test site for the study of Engineering Seismology, Seismology, Geotechnical Earthquake Engineering and issues concerning Earthquake Engineering.

The EUROSEIS-RISK project includes integrated experimental and theoretical research studies in seismology, applied geophysics, engineering seismology, earthquake engineering, soil dynamics and structural engineering. More specific topics are on seismic hazard assessment, monitoring of seismicity, design of 2D and 3D soil models for site response evaluation, 2D / 3D theoretical computations, site effects, SSI effects in the presence of buildings or bridges yielding, validation of retrofitting techniques, etc.

More information concerning this project:

http://euroseis.civil.auth.gr

Study of SSI effect on 6-storey building

Equipment / Infrastructure of the Unit

The current value of the laboratory's infrastructure is estimated to **€ 1,5 Million**.

Within an **area of 450 m²** you find laboratories, offices, lecture and seminar rooms and complementary spaces.

The in-situ (cross-hole, down-hole), laboratory & computer equipment is one of the most advanced at an international level.

The equipment comprises four CMG-40T-1 sensors (Guralp) and four recorders RefTek (Refraction).

The Laboratory's Certification

Reasonant Column Apparatus

Software Development

The activities of the research unit also comprise development of software such as ASING (Asynchronous Support Input Generator) for bridge pile foundations with spatial variability, possible site effects and suitable for soil-structure interaction analysis.

Scientific Publications 1992-2002

- over 25 scientific journal publications
- over 60 international conference publications
- over 10 invited lectures given by scientific responsible Prof. Kyriazis Pitilakis
- over 250 scientific publications since the operation of the laboratory

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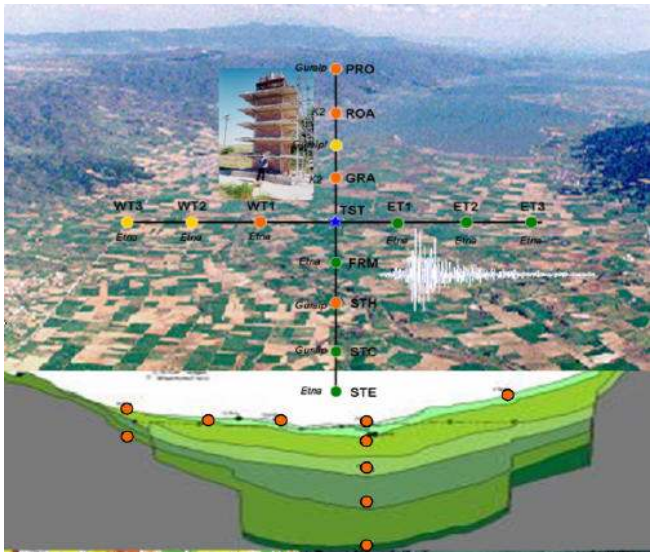
Submission of Company Profiles

In each issue one organization of the consortium is presented.

Please send your Company Profile to the editorial staff:

formann@vce.at



EUROSEIS Test Site with 6-Storey Building

arsenal research - SAMCO Certification

arsenal research is participating in WP 3 and WP 4 of the SAMCO project. Main subject of work is related to WP 4 – Certification. Within WP 3 arsenal is contributing to the establishment of codes and guidelines in the field of monitoring and assessment of civil engineering structures. Main contribution to WP 4 was related to the summary of "Current practice in Structural Assessment" to consider state-of-the-art techniques in a future assessment code. Currently, work concerning the Monitoring Guideline is carried out.



Main subject area of arsenals contribution to SAMCO is devoted to WP 4 – Certification. A first draft of the certification program entitled "Draft Procedure for Certification" was submitted to the coordinator in 2004.

As stated in the project proposal, certification should cover personnel engaged in vibration testing as well as hardware and software components used for testing. Recent work on the certification program brought up, that certification of individuals carrying out and interpreting tests is from vital importance. This is the crucial point to improve existing approaches. It is assumed that, if the engaged person is well educated, further quality control of the applied technology (hardware and software tools) will be enabled. Therefore, it was decided to concentrate on certification of personnel as first priority.

Within the review of existing state-of-the-art and already established certification programs several points of intersection were identified. Whereas some certification programs already exist for personnel engaged in non-destructive testing, adequate developments within the civil engineering community and in particular vibration monitoring techniques area are still missing. Certification programs focus for example on investigation of different types of welds in mechanical engineering. But nowadays also in civil engineering a trend towards further improvement of educational aspects is clearly recognizable.

Within the last year of the project the main progress concerning the certification program was performed. In particular this work was related to the screening and catch up on existing certification programs, the existing guidelines and codes as well as certification steps which will be accepted from practice. From this point of view it clearly turned out, that some codes are already existing related to certification of personnel. These codes are valid for non-destructive testing and inspection, and are therefore also valid for vibration technologies employed within this project.

In addition, specific codes and personnel certification programs for dynamic testing and inspection of rotating machines exist. Based on the clear and distinct vibration response of such machines as well as - in comparison to civil engineering structures – rather simple mechanical systems a clear advance of these technologies in terms of diagnosis and application in practice is recognizable. Thus, several certification programs, guidelines and codes are available.

The certification program developed within SAMCO should consider these experiences and already accepted programs. At the beginning of the project, certification of personnel and methodology was aimed in general. In this context methodology comprises the application of hardware and software tools which are required to reach a specific target. As it was assumed to achieve certification of methodology much earlier than personnel, several concepts were elaborated how to test and certify different components. This comprises for example the correct designation of hardware tools for specific tasks in testing (frequency range, sensitivity, etc.) as well as regular calibration of major equipment. It was suggested that, by presentation of the measurement chain and the submission of technical data sheets, a general suitability of the system for application in dynamic testing in civil engineering could be derived.

But it turned out soon, that the situation concerning certification of software is much more complicated. To enable serious certification of software components, it would be required to show working principles of the programs and tools (codes). Due to confidentially reasons this is difficult to obtain from a practical point of view. A general applicable certification programme considering software seems therefore difficult to implement.

A possible approach for certification is the analysis of specific measurement data which are submitted to the company under certification by an independent organisation. This could be done either using artificially generated data or by performing shaking table tests. In the framework of SAMCO such preliminary tests have already been carried out on a shaking table, resulting in a wide range of results which was a real setback. An additional lack turned out during common testing of a railway bridge. Within this benchmark test carried out by means of suitable equipment, a wide range of different results was submitted. The detailed analysis of both, the shaking table and the bridge test have shown that the major cause for this wide variety of results was a different and mainly wrong interpretation of the measurements. In general, objective values obtained by the equipment are used for a subjective interpretation by a responsible individual.

These tests clearly demonstrated that improved education and quality control of personnel is of major importance. Moreover certificated and higher educated personnel will select and further improve measurement techniques with higher sense of responsibility. Certification of personnel is therefore highest priority for the SAMCO network. Hence a concept was elaborated, which covers the cores of the future certification program:

- Certification of personnel according to levels I – III
- Evidence of professional suitability (sufficient education)
- Minimum requirement concerning practical experience in the respective area
- Minimum requirement concerning duration and content of certification courses
- Limited validity of certificate - re-certification required
- Objective, neutral examination using multiple-choice tests
- Low costs for certification to enable wide acceptance in practice
- Designation of national contact points using the same material for training courses and supervise exams

Based on the major aspects of the certification program several questions are still remaining and must be answered together with an expert-pool:

- Definition of an examination catalogue with different questions (some of them are selected for the exam)Creation of course materials for training
- National organisation of these courses in cooperation with the European (SAMCO) institution
- Definition of national contact points responsible for training and examinations
- Assessment of exams either central or at the national organisation

Based on the decisions made during the Steering Committee Meeting in Brussels, certification will gain in importance in the future and also within the SAMCO project. Therefore it is possible to draw up a higher budget to this issue.

In this context the creation of a forum of international experts taking care of the open questions in order to create a satisfying and practicable certification program should be achieved. In particular the definition of possible exam questions (examination catalogue) for the different levels of individuals is of importance.

The national organisation of training courses and exams could be carried out for example by the current SAMCO partners. The expenses required for the presenter as well as the exams should be financed by certification fees. One annual training course as well as one or two exams at minimum should be considered for realisation.

As an alternative the designation of a central, European certification agency (SAMCO institution) is possible. For example the SAMCO Summer Academy as well as the cooperation with other annual European Conferences (such as SHM – Structural Health Monitoring Conferences) could be established perennially. This proposal should also be discussed and decided within the proposed expert pool.

More Information

- British Institute of Non-Destructive Testing – "Bindt", Northhampton / GB

  www.bindt.org

- German Certification Agency – "BAM-DGZfP", Berlin / Germany

  www.bam.de

  www.ndt.net

- Lavender International – non-destructive testing

  www.lavender-ndt.co.uk/resources/certification.asp

- INDUSTRY'S INDISPENSABLE TOOLS
  www.iaea.org/Publications/Magazines/Bulletin/Bull431/article8.pdf

- EFNDT – European Federation for Non-Destructive Testing

  www.efndt.org

- Recommendations of the International Committee of Non-Destructive Testing – "ICNT"
  www.ricoh.co.jp/net-messena/NDTWW/INTERN/ICNDT/DOC85/BASIC/BA4.html

- PCN Certification Scheme (Personnel Certification in NDT): International Program for Certification of Competence of NDT Personnel
- Foundation for the Qualification of NDT Personnel – "SKO"

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Notable Dates

2005

OKTOBER or NOVEMBER

exact date not fixed yet

SAMCO NAS Workshop

NAS (Newly Associated States)

The SAMCO - NAS extension has the objective to establish closer contacts between the new EU member states and the existing European research infrastructure. The SAMCO network has so far won three companies situated in Poland, Slovenia and Hungary to a NAS Membership. The first SAMCO NAS Workshop was held in Poland in 2004.

Venue and Workshop Format

A two-day workshop will probably be held at ZAG (Slovenian National Building and Civil Engineering Institute) / Slovenia in October or November 2005. Perhaps a further venue in Hungary will be chosen.

The workshop's **first day** will partly be devoted to the demonstration of monitoring processes on an existing bridge. Thereby the local partners will demonstrate their monitoring abilities and in addition some new approaches shall be brought in by the participating European partners. The second half of the day will probably be used for general presentations on SAMCO monitoring and control issues.

ZAG / Slovenia

The **second day** of the NAS workshop will be used to present monitoring results and special methodologies as well as to discuss these subjects with the audience

Organisational Issues

The workshop will be organised by the SAMCO-NAS partner Institute ZAG at its premises. The person in charge is Mr Bosiljkov who will invite all important people from his home country, such as authorities, contractors, consultants and scientists of the related universities.

A preliminary programme will probably be finalised by the end of June 2005 and the final programme shall be fixed at the Summer Academy in September.

Comments and recommendations are welcome!

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NOVEMBER

16-18

Second International SHMII Conference

Location

Shenzhen, P. R. of China

Theme

Structural Health Monitoring of Intelligent Infrastructure

For more information and registration, visit the website:

www.hit.edu.cn/shmii-2

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P. R. of China

2006

MARCH

exact date not fixed yet

Final SAMCO Meeting

APRIL

18-22

100th Anniversary Earthquake Conference

A joint conference co-convened by EERI, SSA and OES

Location

Moscone Convention Center, San Francisco, California, USA

Theme

Managing Risk in Earthquake Country

Commemoration of the 1906 San Francisco Earthquake

including:

EERI's Eighth U.S. National Conference on Earthquake Engineering (8NCEE)

For more information and registration, visit the website:

www.1906eqconf.org

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Calendar of Events

2005

JULY 17th – 20th

- **TRB Sixth International Bridge Engineering Conference**
  Boston, MA / USA

AUGUST 31st – SEPTEMBER 2nd

- **COMADEM 2005 INTERNATIONAL**
  The 18th International Congress and Exhibition on Condition Monitoring and Diagnostic Engineering Management is organised by Engineering Mechanics Group, School of Engineering, Cranfield University, Bedfordshire / UK.

SEPTEMBER 5th – 9th

- **2nd SAMCO Summer Academy**
  Zell am See, Salzburg / Austria

SEPTEMBER 12th – 14th

- **5th International Workshop on Structural Health Monitoring**
  Stanford, CA / USA

OKTOBER or NOVEMBER

- **SAMCO NAS Workshop**
  Ljubljana / Slovenia

NOVEMBER 16th – 18th

- **2nd International SHMII Conference**
  Shenzhen / P. R. of China

2006

MARCH

- **Final SAMCO Meeting**
  possibly Vienna / Austria

APRIL18th -22nd

- **100th Anniversary Earthquake Conference**
  San Francisco, CA / USA

JULY 16th – 19th

- **IABMAS'06 - Third International Conference on Bridge Maintenance, Safety and Management**
  Porto / Portugal

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SAMCO Newsletter accompanies the Growth Network SAMCO. It is an information and communication platform for the participants of SAMCO issued every second month.

SAMCO an EU funded Project

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

FP5 has a multi-theme structure, consisting of Specific Programmes. These Specific Programmes are further divided in Horizontal as well as Thematic Programmes. One of these Thematic Programmes is the *"Competitive and Sustainable Growth"* Programme, the basis for SAMCO.

Exact term for SAMCO:

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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