Issue 2 January 2002

newsletter



supported by the DG Research of the European Union

www.samco.org

content

Recognizing R&D page 1

Steering Committee Meeting at JRC, Ispra

Proposal Submission to NAS Call

SAMCO Extension page 3

GIST as Basis for the **SAMCO** Database

In Planning Stage: **SAMCO Summer** Academv page 4

News of the Profession & Practice:

Monitoring of Vibrations and Sound Immissions

SAMCO Quiz

Company Profile: AUTOSTRADE

Notable Dates & News in Brief



"A

qood

Structural Assessment Monitoring and Control

SAMCO

question partly includes the answer." The general public demands that everything works perfectly. Teachers, mechanics, and doctors provide answers and trivialise our world. This cannot yet be said from researchers, which are often misunderstood. They often stand for another reality, which has nothing to do with our daily environment. Citizens ask questions, also in such areas where the general believe is, that everything is solved. Public relation work is required to close this gap. Furthermore researchers are encountered in their golden cage, and their solutions are very often not understood because they use a wording, which does not exist in every day's language. Ideally we guess why a research subjects might be

Bertrand Russell said:

important, but general we don't understand the background.

Knowing these facts it makes sense to invest in all means of dissemination of results in an understandable way. The public shall be made aware of the important work done and the consequences from new development. It is taken for given that everything works perfectly, but the hard effort behind it is not recognized and awarded. For the field of structural assessment monitoring and control our SAMCO Network shall be a platform for these activities. Information shall be provided in а most understandable way and shall support the research community with the necessary raw material. It is our understanding that by giving away raw data for free, we will achieve a better environment to carry out our work. We therefore encourage everyone to use our material and to help in further Any contribution dissemination. is welcome and will be considered.

Yours Network Co-ordiantor Dr. Helmut Wenzel (VCE)



published by VCC





Steering Committee Meeting at JRC, Ispra

The first Steering Committee Meeting took place at the Joint Research Centre in Ispra, Italy, on the 27th November. The members of the Steering Committee are (in the picture from left to right): Mr. Parag Das (TRL), Mr. Helmut Wenzel (VCE), Mr. Claude Dumoulin (BYTP), Mr. Fabio Casciati (UNIPV), Mr. Rainer Flesch (ARSENAL Research), Mr. Werner Rücker (BAM), Mrs. Livia Pardi (Autostrade), Mr. Vito Renda (JRC). The following items were discussed in detail:

The SAMCO Database

The intended structure of the database and the configuration were discussed. The open in-house tool GIST (Generic Information Server Toolkit) shall be applied (see page 4). GIST will be implemented on an apache server with a Linux operating system and the free database program MySql. The data shall be kept as decentralized as possible with the database as connecting medium. In the near future, the specification of the database will be done.

New SAMCO Members

In the last months the consortium recommended several organisations to be admitted to the network. In the last meeting a list of members has been compiled out of the organisations proposed to the Steering Committee. The list was improved by all of the members (see page 3).

Bridge Management (WP9)

In work package 9 the state of the art in bridge management shall be reported and the enduser's requirements shall be defined. In addition technologies and methodologies shall be assessed. It was decided, that the database shall contain all aspects of bridge management, including



Members of the Steering Committee, November 27, Ispra

© VCE

new developments. The question of the seriousness of the content of the database was raised. The Steering Committee agreed, that it would be necessary to find a good balance between scientific and commercial aspects. At first a golden page will be worked out, that will include all areas of bridge management. Besides a conception about introduction of bridge management within the database shall be developed. The introduction shall be very attractive and should meet the enduser's needs.

Workshop

The 1st workshop was decided to take place during the World Congress on Structural Control in Como in April 2002. The format of the workshop will be defined in the immediate future. Within the congress a full session will be devoted to SAMCO. The Co-ordinator is making a proposal, however contributions are required from other partners.

The End user Forum

The End user Forum will happen in close connection to the workshops: It shall be a virtual platform communicating mainly via internet, but with the possibility to meet at the workshops.

Thematic Groups

The co-coordinator reported about the activities of the Thematic Group on "Whole Life Costing and Risk Management". The establishment of the other Thematic Groups shall be accelerated.

SAMCO Mailing List

A SAMCO mailing list shall be compiled for the network, which includes important addresses from key figures. Every partner should submit relevant addresses to the co-coordinator, who collects and joins them. Following the list will be included into the database.

Proposal Submission to NAS Call of the Commission

The Commission presented a range of initiatives dedicated to further improve participation of the *Newly Associated States* (NAS) in Fifth Framework Program (FP5) and their integration into the European Research Area (ERA). On September 1st 2001 there was a NAS Call for proposals.

The Commission has launched initiatives at several levels: Among other initiatives, there exists the possibility of project cooperation: That means that NAS participants from NAS can join existing projects considering the added value of their contribution (via the thematic programmes). The invitation of new members to the SAMCO Network included the following organisations from the so called Newly Associated States:

IFTR -Institute of Fundamental Technological Research, Poland.

ZAG -Slovenian National Building and Civil Engineering Institute.

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

Therefore the co-ordinator submitted a proposal on behalf of those NAS organisations to become partners in the Thematic Network running contracts.







SAMCO Extension: 27 New Members Joined the Network

It was decided from the beginning of the project, to ask for a wide spread participation, to cover all aspects of the subject of SAMCO. Besides of the 20 principal contractors, there is sufficient room designated for a huge number of new members. The choice of the members shall depend on their possible contribution and suitability for the project. Furthermore it was tried to attract the leading organisations dealing with the subject of SAMCO worldwide.

The consortium recommended several organisations during the last months. In the last Steering Committee Meeting 27 organisations were selected on the basis of their possible contribution, to join the network.

The new members will have different functions: There will be a group, which shall support the benchmark tests to be carried out within the network.

The so-called "working members" should contribute to the technical targets of the network.

The group of "end users" could partly provide data or help the consortium in achieving their targets.

The specific scope of duties will be defined out of the qualification, type and subject of the possible contribution.

The new members are as follows:

TUD Darmstadt University of Technology

Contact person: Mr. C.A. Graubner On recommendation of: VCE

LCPC Laboratoire Central des Ponts et Chaussees

Contact person: Mr. Christian Cremona On recommendation of: VCE

ACTS Austrian Technical Consulting Services

Contact person: Dr. Dieter Pichler On recommendation of: VCE

MA 29 Stadt Wien Magistratsabteilung für Brückenbau

Contact person: Mr. Gunter Winter On recommendation of: VCE

ASAG Alpen Straßen AG

Contact person: Klaus Fink On recommendation of: VCE **TIWAG** Tiroler Wasserkraftwerke AG Contact person: Herbert Hoenlinger On recommendation of: arsenal research

UNINA University of Naples "Federico II", Dipartimento di Analisi a Progettazione Strutturale

Contact person: Giorgio Serino On recommendation of: UNIPV

UNINA University of Naples "Federico II", Dipartimento di Scienza delle Construzioni

Contact person: Alessandro Baratta On recommendation of: JRC

ENEA Ente per le Nuove Tecnologie, l'Energia e l'Ambiente

Contact person: Alessandro Martelli On recommendation of: JRC

UPC University of Catalonia, Department of Applied Mathematics III Contact person: Jose Rodellar On recommendation of: UNIPV

■ IDPA (CNR) Contact person: Alberto Marcellini On recommendation of: UNIPV

FEUP Department of Civil Engineering, Faculdade de Engenharia

Contact person: Rui Carneiro-Barros On recommendation of: UNIPV

DISTRG Politecnici di Torino

Contact person: Alessandro De Stefano On recommendation of: UNIPV

RENFE Red Nacional de Ferrocarriles Espanoles

Contact person: Luis Lopez On recommendation of: GEOCISA

KUL Katholieke Universiteit Leuven, Department of Civil Engineering

Contact person: Guido De Roeck On recommendation of: LMS

INRIA-IRISA

Contact person: Albert Benveniste On recommendation of: LMS

GeoSIG

Contact person: Christoph Kuendig On recommendation of: LMS

SMARTEC

Contact person: Dr. Daniele Inaudi On recommendation of: LMS

Dirección General de Carreteras, Comunidad de Madrid

Contact person: Pablo Usán Mas On recommendation of: GEOCISA

Dirección General de Carreteras, Ministerio de Fomento

On recommendation of: GEOCISA

ENAUSA Empresa Nacional de Autopistas Contact person: Gloria Ramos

On recommendation of: GEOCISA

NTUA National Technical University of Athens, Institute of Structural Analysis and Aseismic Research

Contact person: Costas Syrmakezis On recommendation of: UNIPV

NPRA Norwegian Public Roads Administration

Contact person: Ian Francis Markey On recommendation of: AUTOSTRADE

IBDIM Road and Bridge Research Institute

Contact person: Tomasz Twierzbicki On recommendation of: AUTOSTRADE

UNIPG Univerity of Perugia

Contact person: Marco Mezzi On recommendation of: JRC

UniS University of Surrey Contact person: M. K. Chryssanthopoulos On recommendation of. AUTOSTRADE

DCT University of Padova, Dipartimento de Construzioni e Transporti *Contact person:* Giovanna Zanardo

On recommendation of: AUTOSTRADE

For more information:

SAMCO Proposal: Annex 1 "Description of work": page 34 ff.

www.samco.org

SAMCO Newsletter Issue 2 January 2002





GIST as basis for the SAMCO Database

GIST (Generic Information Server Toolkit) is a tool for the development of interactive web based information servers. It has been designed to allow user communities to share information and communicate without the need for a full-time technical web master.

With the help of GIST the SAMCO database will work as a single database, despite the fact that the offered data are distributed more or less all over Europe. As GIST allows the construction of a dynamic, user community based Information Server. Each member of the community will be responsible for maintaining their own information.

The database will be accessible via a web site and will have a **standard web interface**. So it will be clear to everyone who is familiar with web browsing, which definitely is the majority of the users. It is important that the interface is adjusted to the users of the database, which probably are engineers from industry and research, so that they can find the desired data quickly in an uncomplicated way.

There will be different types of **user access**, which mainly depends on the function within the network (data provider or data user) and on the authorization: To a part of the information there will

be free and *anonymous access* for everybody. If a user registers on the site (*public access*), he can login and obtain all data in the database. *Restricted access* will only be given to data providers. They will be allowed to login as privileged users, who can manipulate the data.

The database will be based, on **MySQL**. This is a popular open source database server used in many websites, data warehouses and business applications (http://www.mysql.com). The communication protocol will be **HTTP** (Hypertext Transfer Protocol), which is an object-oriented protocol, designed for distributed collaborative hypermedia information system. (http://www.w3.org/Protocols/).

The foundation of the database will be a structure of reference tables, which contains hyperlinks (**URL**). These URLs are so called hyper objects. Depending on user queries the hyper objects will be presented to the user by means of a form in a web browser.

In the immediate future a **data model** must be set up. This involves identifying the information that is important to the community, setting it up in a relational data model and then implementing it into GIST.



© http://gist.jrc.it

For more information:

http://gist.jrc.it http://www.mysql.com

In planning stage: SAMCO Summer Academy 2003

Without knowledge about new methodologies novel ideas and developments will not meet with acceptance among end user and engineers. Many outstanding results have been achieved within the European Framework Programs, but could not satisfactory be exploited. Since the end users are not sufficiently aware of research and development achievements made through the EU projects. In addition education is not picking up the new technologies fast enough to improve the knowledge among engineers and end users.

SAMCO Network aims to bridge this gap between developers and users. Apart from the knowledge and reference centre at JRC (Joint Research Centre, Ispra), a summer academy shall help to improve the level of knowledge of the practicing engineers.

The SAMCO Summer Academy, which shall be held annually, will provide information on the highest standard available in Europe, for training and education of the engineering community, which includes owners, end users, engineers and academics. The Summer Academy will be a 5-day event, including arrival and departure. The lectures will be held by authorities in the field from all over the world. They will impart their knowhow, by sharing their knowledge and experience in their area of expertise. The main themes will be monitoring and assessment, risk and whole live costing as well as information from the European Commission about the 6th Framework Program.

A proposal for the location of the SAMCO Summer Academy was made by BRE (Building Research Establishment Limited). After detailed discussion with the cocoordinator, a preliminary reservation has been done at the Robinson College of the Cambridge University from July 14th to 18th in 2003. Up to 250 people could take part in this high profile event.

Detailed information and a short schedule will be. available on the SAMCO Homepage soon!

Contact

Helmut Wenzel VCE GmbH vce@atnet.at

© http://www.robinson.cam.ac.uk



© http://www.robinson.cam.ac.uk







News of the Profession & Practice

Monitoring of Vibrations and Sound Immissions

for Railway Munich-Verona in the Lower Inn-Valley/ Austria

Since 1999 the project team arsenal research and TIWAG (Tirolean Waterpower) is involved into the railway project Unterinntal (lower Inn-valley). A new line with two tracks, mainly located in tunnels with a total length of about 40 km will be built until 2007. The project is one section of the new railway axis Munich-Verona. The line is erected by Brenner Eisenbahngeselschaft (BEG). The lower Inn-valley is densely populated, hence many buildings are very close to the new line. The task for the project team is the monitoring of vibrations and structure borne noise. The monitoring started with the assessment of the status in certain houses before the start of the project as a baseline. During the construction phase vibrations are monitored in order to protect the houses and to guarantee an acceptable situation for the users of the buildings. At the moment some preliminary construction work is carried out, especially the blasting of pilot galleries. The main construction phase will probably start in the 4th quarter of 2002. After the start of train operation the project team will also measure vibrations and structure borne noise due to train traffic in order to check if all means for vibration - protection (e.g. mass-springsystems) work efficient and everything is according to the Austrian standard ÖNORM S 9012.

In order to be able to compare the state of buildings after the opening of the railway line to the previous condition it was necessary to assess the present state of several buildings. The necessary measurements were conducted in selected buildings in which vibrations already occur (e.g. residential houses near the existing Westbahn railroad or near frequently used roads). Furthermore measurements were carried out in firms, which cause vibrations of their own because of the working processes running there (e.g.: Darbo, Tyrolit, Jenbacher Werke). There it is especially relevant to record the present state, since external vibrations could disturb the production process. Also some historical important buildings were examinated, such as Schloss Matzen (castle Matzen) or Rolandsbogen (monument from the 10t^h century). Additional measurements were carried out on sensitive points in the terrain in order to be able to evaluate the danger of rockslides. Further, in some vibrations resulting from cases construction work (e.g. packing of ground)



Data transmission and scheme of VDB

were recorded. For some buildings, which were included in our measurement program, measurement data and vibration prognosis data were available from earlier work for the declaration of environmental compatibleness.

Normally sensors were placed at the foundation level of the buildings, further in the middle of representative floors and also at load bearing walls in one or more upper storeys. Further, in order to calculate transfer spectra (differential spectra) it is advantageous to place sensors in the terrain near the building.

In many cases the recording of "present state" was conducted through "manned measurements". Vibrations were recorded in three orthogonal directions during an interval of several hours. The advantage of these manned measurements is, that unwanted disturbances can be detected during the recording. This makes it possible to distinguish vibrations caused by the inhabitants of a house from that ones created by trains or other sources. Further, additional information like type of the train and velocity can be provided at the same time. "Unmanned measurements" are used where no additional observations are necessary. For every examinated building a report including a picture of the building and the most important data is available. The exact positions of each single sensor can be found in the materials. The reports contain tables with data about all recorded

© arsenal research

events, including the values for v_{max} (maximum velocity vector of oscillation), KB_{Fmax} (normalized vibration magnitude), and also the frequency of the major component of oscillation. The values taken at the foundations and the floors are all listed separately.

After recording the *"present state"* the measurements concentrate at the moment on areas where first construction work is conducted. All in all the number of objects being monitored during the construction phase will be much larger than the number of buildings where the *"present state"* was recorded.

All results are stored in the ORACLE database VDB (run by TIWAG). The scheme of data transfer and of VDB is shown in Figure above. The data for each object can be easily accessed. It is immediately evident whether the maximum values of velocity of oscillation (v_{max}) are within the limits set by the standard DIN 4150-3, depending on the type of the building (see. Figure 2). If the permissible values are exceeded, e.g. in the case of rock blasting, the construction - supervisor is informed. Alarms are immediately submitted via SMS.

The last step of the investigations will take place after the opening of the railway when measurements of KB-values and of structure borne noise will be carried out during regular train service. Then it will become evident whether the peak values of the oscillation



SAMCO Newsletter Issue 2 January 2002



and the K_r values (weighted averages) are within the bounds set by the standard ÖNORM S 9012.

VDB is most of all a tool to preserve the collected data for a long time. BEG, arsenal and TIWAG have direct access to the data. A software for adding and requesting all data was developed. The system makes it possible conduct to standardized evaluations from the data through webefficient technologies. It supports administration and is the basis for flexible future evaluations. The database is fully in use since September 2000. The VDB is mostly used for the continuous monitoring of buildings close to the construction site of tunnels. But in August 2000 also the data on the measured "present state" of the buildings, which were conducted before the start of the construction work, were added to the database. Data are recorded at the site by "intelligent sensors" (WASAG-Chemie), temporarily stored and sent to the TIWAG headquarters in Innsbruck (Tyrol, Austria) through the transmission technology also used by mobile phones. The software, which is provided by the manufacturer of the sensor and the measurement equipment, visualizes, processes and evaluates the data and also graphs. generates additional The processed data and the graphs are then automatically transmitted to the VDB system. VDB controls all data points, sensors, measurements, generated alarms and further additional relevant information. Multiple backups of the raw data are created, which enables the engineers to reevaluate all data. The VDB system consists of the following main components:

■ VDB-ORACLE server system: uses databases in ORACLE RDBMS for



event specific saving of measurements and additionally required information

VDB web application:

access to the ORACLE database through web-technologies (web-generation from ORACLE Designer: HTML, JavaScript)

VDB saves documents to the server

VDB import interface:

reception of graphs and files containing measurements (ASCII)

VDB export Interface:

the measurements from the database can be saved in ASCII format and evaluated with specialized Windows tools: e.g. Plotit, Statgraphics

VDB is able to show requested data for a specific time, place, event or alarm. The central strategy in the development of VDB was the ORACLE web-generation using the CASE- tool ORACLE Designer.

SAMCO Quiz

The VDB database builds on already processed files (measured values and graphs). After data transmission every night a program sequences starts, which extracts all information necessary to generate the tables and graphs for presenting the events from the previous day.

The system requirements are a Web browser Netscape Version 4.0 or higher/ Microsoft Internet Explorer Version 4.0 or higher, a TCP/IP connection to the local TIWAG area network or via extranet (i.e. analogue Modem/ ISDN modem). The handling of the system is basically easy and can be compared to the use of common web browsers.

Contact

Rainer Flesch arsenal research rainer.flesch@arsenal.ac.at



If you know the answer, send it to same over all The first person, which sends the right answer, is the winner! The first three will be published in the next issue.

Solution of the last SAMCO Quiz:

The bridge, shown in the last issue, was the **Högarkusten Bridge** in Sweden. It is one of the tallest Scandinavian bridges.



© http://www.aerobilder.se/kal_99_e.htm

THE WINNER IS: Mr. Heinz Lutz Structural Engineer at VCE

PAGE 6





Company Profile

autostrade

Autostrade Concessioni e Construzioni Autostrade SpA

Founded in 1956, during the Italian industrial boom, Autostrade has played the leading role in a remarkable development programme which, by coordinating operational, financial and organizational expertise, has given Italy a network of technically advanced tollmotorways in record time.

Today the Autostrade Group principally comprises companies which hold concession for the construction, operation and maintenance of toll motorways and other companies which supply services related to its principal motorway activities, such as

Telecommunication to extend the Group existing network assets and to develop advanced services

Other services: design of collection motorways, toll equipment and provision for paving and traffic information

With more than 3000 km of motorways, the Autostrade Group constitutes the largest such operator in the EU based on the kilometres of its motorway network, traffic and revenues (17% of the European network and 60% of the Italian network).

The network experiences an annual traffic volume of 700 million

vehicles which travel a total of 40 billion kilometers and has a system of highly efficient structures for operational management, services, traffic control, safetv telecommunications and information for drivers, with a 3000-kmlong optical fiber network running along the motorway.

One of the strategic goal of the Group is to improve the quality and range of services offered to its customers.

Therefore, Research and Development is directed at finding new solutions and at taking advantage of the opportunities arising from scientific and technological development, management innovation and changing conditions.

Thanks to its long experience in the financial and operational management, Autostrade is more and more exporting its experience, know-how and technology in Italy and abroad (UK, USA, Russia).

Contact

Livia Pardi Autostrade S.p.A. lpardi@autostrade.it



© Autostrade



The network of Autostrade

© Autostrade



Kilometers covered on Autostrade's network in the year 2000

© Autostrade



Mountain road of Autostrade

PAGE 7





Notable Dates

2002

FEBRUARY

4-7. IMAC-XX: Conference and Exposition on Structural Dynamics, Los Angeles, CA www.sem.org

11-13. WRSGC Test and Measurement Conference, Long Beach, CA.

MARCH

11-15. Measurement System Engineering Short Courses, Fort Worth. TX.

www.mse.tcu.edu

APRIL

7-11. World Conference on Structural Control, Como, Italy. congress@icil64.cilea.it

11. SAMCO Steering Committee Meeting at the World Conference on Structural Control, COMO, Italy.

APRIL/MAY

28-1. Seismic Conference on Highways and Bridges, Portland, mceer@acsu.buffalo.edu OR

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. Italv. www.sem.org

JULY

8-11. 9th International Congress on Sound and Vibration, Orlando, FL.

14-17. IABMAS 2002: Conference on Bridge Maintenance, Saftey and Management, Barcelona, Spain. http://www.cimne.upc.es/congress/iab mas02/

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

Impressum

Managing director Dr. Helmut Wenzel

Contributions please send to bgeier@vce.at

For queries about content in the magazine, please contact samco@vce.at

SAMCO Newsletter is a

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

News in Brief

Structural Engineers World Congress 2002

The purpose of the SEWC 2002 conference is to enable structural to gather, meet, discuss and present papers on the latest social environmental and technical aspects of their profession. From the results of these papers and discussions, it is aimed to present to the international engineering community, and to society at large, the future challenges and trends that we can expect to face. At the start of this 21st century, explosive growth in construction is occurring in the Asian area. Asia is a home to distinctive and important cultures, and also has a large burgeoning population, and with the absorbing of spread of global technology, is now able to exhibit a new blend of culture and technology to the rest of the world. For more information:

http://sewc2002.gr.jp/english/e right.html

IABSE Symposium

As structural engineering becomes increasingly reliant on information technology (IT) for the design, evaluation and monitoring of our buildings and bridges, it is an appropriate time to meet for a discussion of the current application and the future potential of these new technologies. The issues of innovative structures, sustainability, and information technology will influence structural engineering for generations to come. These interwoven strands form the theme for this Symposium.

The objective of the Symposium is to provide a forum for practitioners and researchers from around the world to meet and to discuss the best examples of current and developing practice and research, and to exchange ideas on future directions for structures in the built environment. For more information: http://www.iabse.ethz.ch/conferences/calendar_f.html

fib Congress on Concrete Structures in the 21st Century

This Congress is a precious opportunity for engineers and researchers from around theworld to share the experience, knowledge and innovative ideas on structural concrete in the 21st Outstanding technical century. programs, exhibitions, excursions and variety of social functions await the participants in Osaka. For more information:

www.fib2002.com

6th International Conference on Short & Medium Span Bridges 2002

Sponsored by the Canadian Society for Civil Engineering, the 6thInternational Conference (SMSB VI) has been planned to provide a worldwide state-of-the-art forum on short and This conference medium span bridges. traditionally takes place every four years in a different Canadian city. We are particularly excited that the host city for the conference in 2002 is Vancouver, British Columbia.

Publisher



Vienna Consulting Engineers Holding GmbH

Head Office

Diesterweggasse 1 A-1140 Vienna, Austria Phone: +43 1 894 60 21 Fax: +43 1 894 61 70 e-mail: vce@atnet.at Web site: www.vce.at

PAGE 8