



Composite Bridge Alliance Europe

February 2005 COBRAE NEWS No. 02-05

COBRAE NEWS is distributed to over 1.900 addresses among the composites industry, bridge builders, bridge designers & bridge owners.

COBRAE NEWS gives information about the development and application of fiber reinforced polymer composites in bridge and other engineered constructions. COBRAE News is a collection of news items gathered from many sources, such as papers, magazines, newsletters, our readers, exhibitions within AND outside the Composite Industry. Contributions from other sources are welcome and will be included, if they fall within the scope of COBRAE news, so please submit your articles and news!

This newsletter features:

COBRAE Membership Info

- * Delegate registration list bridge engineering with polymer composites
- * Student poster session
- * Abstracts of papers are now available on the COBRAE website
- * Not a COBRAE Member yet?

COBRAE Members

Bridges News Flashes

- * FRP in infrastructure in Europe, why a slowdown?
- * Aluminium bridge deck
- * Grass bridge over the 'Slachte' dike in the Netherlands
- * Innovative steel fibre composite solution to restrictive city project
- * ipv bridge systems: standard bridges, attractive design
- * New composite structures development centre in UK
- * First modular composite pole installed in Ontario's live grid
- * Preventing decay in wood composites
- * Golden Gate Bridge to withstand earthquake
- * Structural strengthening with composites
- * Revised report on strengthening concrete
- * UNR scientist simulate quake to assess damage to model bridge
- * UK council strengthens concrete tunnel with Sika carbon fibre
- * The global composites industry saw a record growth of 8.7% in 2004
- * Record results for Martin Marietta Materials, Inc.
- * Reinforced plastic rail guards on trial
- * Invited design competition for new crossing of the river Wear, Sunderland
- * SAMPE bridge building contest set for May symposium and exhibition - contest entrants invited
- * Hey! Want to buy a bridge?
- * Innovative precast concrete technology reduces weight of components up to 66%
- * Zoltek wins contract for reinforcing concrete with carbon fiber
- * UK consultants elevate cyclists with composite flyover project

WWW

* <http://pacifi.ca/pick.html>

* <http://www.massroads.com>

New Announced Events

* Life cycle assessment of composites

* 18th BIM-congress

* 2nd International fib congress: abstract deadline March 10

Event Calendar

* If you would like to be removed from this mailing list, please reply to info@nedland.nl and type in the subject line "remove: e-mail address" (please type e-mail address you received this e-mail at).

* If you would like to add people or companies to this e-mail list, please give us their contact details/ e-mail.

* To become a Founding Member of the COBRAE Alliance, please fill out the enclosed form.

Visit COBRAE on the Internet at <http://www.cobrae.org/>

COBRAE MEMBERSHIP INFO

Bridge engineering with polymer composites

31 March - 1 April 2005

EMPA Akademie, Dübendorf, Switzerland

Delegate registrations are coming in from all over the world. COBRAE still has a few rooms available at the IBIS Hotel in Zürich, if you wish to secure accommodation we advise you to book as soon as possible.

Below you will find a list of companies represented at this conference:

Alcan T&M	SWITZERLAND
ApATeCh - Applied Advanced Technology Company	RUSSIA
Armoproject Company Ltd.	RUSSIA
Bedford Reinforced Plastics	USA
Bouwdienst Rijkswaterstaat	THE NETHERLANDS
Buro Happold Limited	UNITED KINGDOM
Celuprojekts I/S	LATVIA
COBRAE	THE NETHERLANDS
Company Armoproject Ltd.	RUSSIA
Daewon Science College, Dept. of Civil Engineering	SOUTH KOREA
Dr. Schippke + Partner	GERMANY
Dep. of Civil Engineering, National University of Singapore	SINGAPORE
EMPA	SWITZERLAND
Ernst Kühne Kunststoffwerk GmbH & Co. KG	GERMANY
Exchem Mining & Construction	UNITED KINGDOM
Gordon Composites	USA
Huntsman Advanced Materials	SWITZERLAND
Institute of Steel Construction	GERMANY
Intelligent Engineering	UNITED KINGDOM
ISIS Canada, University of Sherbrooke	CANADA
Knippers Helbig, Beratende Ingenieure	GERMANY
Kookmin University	KOREA
Korea Institute of Construction Technology	REPUBLIC OF KOREA
Leonhardt, Andrä und Partner GmbH	GERMANY
Maag Technic AG	SWITZERLAND
Martin Marietta Composites	USA
Ministry of Transport, Public Works and Water Management	THE NETHERLANDS
Owens Corning	BELGIUM
Plastic Lining Association	JAPAN
Politechnika Warszawska, Instytut Drog i Mostow	POLAND
Schöck Bauteile GmbH	GERMANY
Setra	FRANCE
Sika Deutschland GmbH	GERMANY
Sika Services AG	SWITZERLAND
Stahlton AG	SWITZERLAND
STO Scandinavia AB	SWEDEN
Swissfiber AG	SWITZERLAND
Technical University of Lodz	POLAND
Tenax Fibers GmbH	GERMANY
TRADECC NV	BELGIUM
TU Darmstadt, FG Konstruktiver Leichtbau	GERMANY
Universität Kassel, Fachbereich Maschinenbau	GERMANY
Universität Stuttgart, ITKE	GERMANY
University of Massachusetts	UNITED STATES
Wardrop Engineering Inc.	CANADA
Zürcher Fachhochschule Winterthur	SWITZERLAND

COBRAE Conference 2005
Bridge Engineering with Polymer Composites
30 March - 1 April
EMPA Akademie, Dübendorf (Zurich), Switzerland

STUDENT POSTER SESSION

In the ongoing quest to find lighter, more durable and easier to install components for modern bridges and other engineered structures, fibre reinforced polymer composites are finding a more and more prominent place. Because especially bridge structures often have to cope with unusual dynamic and static loading conditions, besides thermal, weathering and environmental attacks, the decision to incorporate composites into the structure requires careful considerations.

Many Developers, Composite Companies and Research Institutions around the world today are involved in design, testing and applying products and systems for these structures. It is important to exchange theoretical and applied research findings, field experiences and even failures in order to increase the know-how and knowledge of those who want to use composites in these very often critical applications.

Therefore COBRAE organises the COBRAE Conference 2005 with the theme: Bridge Engineering with Polymer Composites.

STUDENT POSTER SESSION

Students throughout the World are invited to write a paper (poster) on their PhD research into Bridge Engineering with Polymer Composites.

Proposals for posters can be submitted in text version first (1 A4 page) and when accepted, students will be asked to submit A0 sized posters in PDF format, ready for printing. (A0 orientation preferably standing)

TIME SCHEDULE POSTER SUBMISSIONS

Proposals -	ASAP
Acceptance -	ASAP
Poster in PDF-	before March 5th, 2005

To submit a poster, please send a text version of your proposed poster (1 A4 page) and a short resume of the author to our e-mail address or to our fax number: +31 33 4343 501.

DELEGATE FEES

Student Fee EURO 245,- incl. VAT - incl. all activities.

For more information visit the COBRAE website to download the conference brochure at <http://www.cobrae.org/conference.html>.

ABSTRACTS OF PAPERS ARE NOW AVAILABLE ON THE COBRAE WEBSITE

Abstracts can now be found on the COBRAE website. Please follow this link: <http://www.cobrae.org/conference.html> and find a link to the abstract page in the Conference Menu.

The programme includes two demonstrations in the Structural Engineering Research Laboratory of EMPA, site visits to two very different applications of Polymer Composites in bridges, a visit to Carbo-Link Company, very interesting presentations and a fun side programme.

For up-to-date information, we refer you to our website: <http://www.cobrae.org/conference.html>. On this website you can also download a registration form, find information on the hotel, the conference venue and the sponsoring opportunities. Regular reports on the development of the programme and conference will be listed in this Newsletters.

TENTATIVE PROGRAMME COBRAE CONFERENCE 2005

Wednesday March 30th, 2005

10.00 - 12.30 Meetings Working Groups COBRAE at EMPA

14.00 Opening of the conference by Urs Meier, Chairman COBRAE

Opening Presentation: Innovative design concepts for composite bridges in Germany - Technology and aesthetics *Jan Knippers, University of Stuttgart, Germany*

14.45 Session 1: COMPOSITE REINFORCEMENTS OF CONCRETE (3 papers)

15.45 Demonstrations in the "Structural Engineering Research Laboratory": CFRP-post-strengthening of large bridge girders
Masoud Motavalli, and Christoph Czaderski, EMPA, Switzerland

16.45 Session 2: TECHNOLOGY AND RESEARCH (3 papers)

19.30 OPTIONAL: Dinner in the great ancient armoury in Gassen (Zeughauskeller) in Zürich, also known as the "Yellow Armoury" built in 1487 (not included in the conference fee)

Evening programme:

Walk through a part of the historic town of Zürich guided by Urs Meier

Thursday March 31st, 2005

09.30 Cont. Session 2: TECHNOLOGY AND RESEARCH (5 papers)

11.25 Departure by bus for the Site visits:
KEMPT FRP BRIDGE AND CABLE STAYED STORK BRIDGE NEAR WINTERTHUR

14.15 Cont. Session 2: TECHNOLOGY AND RESEARCH (2 papers)

15.00 Session 3: MONITORING OF STRUCTURES (2 papers)

15.45 Demonstrations in the "Structural Engineering Research Laboratory":
On the vibration mitigation on a FRP bridge
Masoud Motavalli and Daniel Gsell, EMPA, Switzerland

16.30 Session 4: STANDARDS AND CODES FOR COMPOSITE MATERIALS AND DESIGN CRITERIA (3 papers)

Evening programme:

Dinner in the Zunftsaal of the Restaurant zur Zimmerleuten, Limmatquai 40 in Zürich

Friday April 1st, 2005

09.00 Session 5: DESIGN AND CASES (7 papers)

10.15 Visit to the "Carbo-Link Company", a young Spin-Off Company of EMPA. Carbo-Link is producing CFRP tensile elements for civil and mechanical engineering. They were and still are developing CFRP stays and other elements for the winner of the Americas Cup: 'Alinghi'.

12.00 CLOSING PRESENTATION:
How to bridge the credibility gap
Urs Meier
EMPA, Dübendorf, Switzerland

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NOT A COBRAE MEMBER YET?

We would like to ask our readers to become a member of this Alliance. COBRAE will need more members to accomplish all its goals. The Alliance has already established a close co-operation with IABSE and the MDA. For more information about the Alliance and its goals, please visit our website at <http://www.cobrae.org>. You are also invited to contact the administrative office to discuss activities or actions, which you think COBRAE should take. You can either call to (31) 33 4343 500 or e-mail to info@cobrae.org

We look forward to your positive response. In the end of this newsletter you will find a registration form for membership.

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To register as a founding member, please fill out the attached form (last page of this document) and return it to the KCA office.

Bridge News Flashes

FRP IN INFRASTRUCTURE IN EUROPE, WHY A SLOWDOWN?

Grant Godwin of Martin Marietta:

There is a question on which I would appreciate your insight --- why the initial work in Europe in late '80's/early '90's with FRP in infrastructure and then very little since then? The reason that I am asking is that in early March, I am doing luncheon keynote at the Corrosion conference sponsored by ACMA in Las Vegas. In preparing, I reviewed FRP usage in infrastructure in Europe, Far East and North America and it appears Europe had a clear lead for several years, but then U.S. surged ahead at least in pedestrian/vehicular bridges if not in overall reinforcements. The normal conjecture might be lack of strong government support, suppliers not stepping up, codes, others. Would appreciate your insight.

Prof. Urs Meier of EMPA (chairman of COBRAE):

You ask for the reason why there was strong initial work in Europe in late '80's/early '90's with FRP in infrastructure and then very little from that time on.

Your question is justified, if you are talking about bridge decks, cables for suspension and cable stayed bridges, classical rebars, tendons for pre- and post-tensioning. The reason is that in all these fields the FRP industry is dealing with the public domain as customer. Bridge owners care for the lowest investment cost and they do not consider the life cycle of a bridge. They are forced to do so.

On the other side if we talk about the life cycle of a stay cable for instance we do not yet have a real full scale proof that it will last at least 50 years without maintenance. The large Stork bridge CFRP cables are doing perfect, however only since 1998. That is nothing compared to the expected life of such a bridge.

Your question is not justified if talking about retrofitting of existing structures with FRP especially CFRP. To my best knowledge Europe and Japan are leading in this domain. In Switzerland in 90% of all cases CFRP replaced steel. This was first the case in industrial buildings (private sector) and later (about 1998) also for bridges (public sector).

ALUMINIUM BRIDGE DECK

Seen at the 'International Building Expo' in Utrecht, the Netherlands

This prototype bridgedeck is subject to a Master Thesis Study at the University of Delft. It will have to serve as a replacement of orthotropic steel deck. Research is focussed on fatigue performance of welded connections.



GRASS BRIDGE OVER THE 'SLACHTE DIKE' IN THE NETHERLANDS

For more than a thousand years the dike called 'Slachte' has been a safety barrier in the Netherlands. These days however the grass dike is cleft by a freeway. Every year a cultural marathon is held along the 42 km long dike, but there was no crossing over the freeway. Therefore an arch bridge with a through shape was designed by Rein Hofstra of Hofstra/Douma Architects in Grou, the Netherlands. The through shape will make it possible to grow grass on the walking path of the bridge and connecting one end of the grass dike with the other side in contrast and recognition. The collection of funds for the placement of this bridge have just been rounded off and the building will start soon.



The architects are considering to use pultruded composite planks for decking, covered with artificial grass as used on football fields.

INNOVATIVE STEEL FIBRE COMPOSITE SOLUTION TO RESTRICTIVE CITY PROJECT

Kingspan Structural Products are providing an innovative solution to the parking difficulties and constricted conditions in York City centre, UK.

Due to the confined nature of the Spurriergate site in the historical city of York, which is renowned for its cramped narrow alleys, the engineers and main contractor need to minimise site traffic and crane lifts. One way to do this is to do away with the steel mesh used in the composite floor decking.

Using Dramix Steel Fibres in conjunction with Kingspan's Multideck MD60 gives a mesh-free, proven fire-rated solution. The fibres are added to the hopper during mixing to create 'pre-reinforced' concrete which means several lorry loads and crane lifts could be eliminated from the programme.

Multideck 60 profiled metal decking, from North Yorkshire-based Kingspan Structural Products, was selected as the ideal solution for the project which comprises retail space on the ground floor and 13 two-bedroom apartments over a further three floors. Kingspan approved fixers, Metaldeck of Skelmersdale, are now undertaking all fixing and concrete pumping for the complex steel work layout.

John Williams, Marketing Manager for Kingspan comments: 'The innovative use of Dramix and Multideck 60 has made a huge difference to the timescale and logistics of the Spurriergate development. This system eliminates the need for bulky floor mesh and Spurriergate is an excellent demonstration of how trapezoidal metal floor decking coupled with steel fibre reinforced concrete can provide an effective structural solution for a complex city centre project.'

More information: <http://www.kingspan.com>

Source: NetComposites News, 18 February 2005

Contact: news@netcomposites.com, <http://www.netcomposites.com/news.asp?2768>

IPV BRIDGE SYSTEMS: STANDARD BRIDGES, ATTRACTIVE DESIGN

With the IPV Bridge system it is possible to compile a simple, yet easthetic bridge within short time. The system combines a careful design and a short delivery time with a attractive price level.

There are choices from different sizes, deck constructions, ballast types and girders. The system is equipped for foot-, bicycle and traffic bridges. The maximum module size is 15 meters.



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NEW COMPOSITE STRUCTURES DEVELOPMENT CENTRE IN UK

The first phase of a new £12 million hi-tech research centre that will lead the way for greater use of composite materials was today opened by Industry Minister Jacqui Smith.

The new composite structures development centre based at Airbus UK Filton is the first of several regional centres to open and will concentrate on composites for the aerospace and marine sectors, though it will also see collaborative work with other industry sectors such as automotive, marine and healthcare and will act as the 'hub' of a regional alliance of companies, universities and colleges.

Over the next five years the centre will undertake more than £100 million worth of research and development into composites and will employ around 100 engineers.

The composite centre in Filton will form part of the National Composites Network which is a new and unique £30m Knowledge Transfer Network jointly funded by government and industry that will embrace the entire composites processing and using industry sectors in the UK.

Source: CompositesWeek No. 7, vol. 7, February 22, 2005

Contact: editor@e-composites.com, <http://www.e-composites.com/frontend/newspage.aspx?sno=2363>

FIRST MODULAR COMPOSITE POLE INSTALLED IN ONTARIO'S LIVE GRID

Resin Systems Inc. (RSI) have installed a RSI RStandard modular composite pole in southern Ontario's live power grid, and have also granted a 500,000 stock option of RSI shares.

This RStandard composite utility pole installation occurred in a southwestern Ontario urban centre as a backyard application. Backyard installations are very common in all North American urban areas, where continued development and urban growth has made access to existing power lines extremely challenging.

RStandard modular composite utility poles are well suited to this application. Due to their light modular construction they can be carried into tighter locations, such as backyards or alleyways, where they can be assembled and installed with little or no heavy equipment, thus making installation faster, easier and less costly than with traditional utility poles.

In addition, RSI announced today that it has granted stock options to an arm's length consultant of RSI to acquire 500,000 common shares of RSI at an exercise price of \$1.25 per share and vesting upon certain performance criteria being met, exercisable for a period of two years.

RSI intends to use the proceeds of the offering to fund production equipment to manufacture its RStandard modular composite utility poles, the commercialization and further development of its Version resins and related products, and for general working capital purposes. All of the common shares, warrants and broker warrants issued by RSI pursuant to the private placement are subject to a four month hold period and are subject to restrictions on resale prior to June 15, 2005.

More information: <http://www.grouprsi.com>

Source: NetComposites News, 18 February 2005

Contact: news@netcomposites.com, <http://www.netcomposites.com/news.asp?2761>

PREVENTING DECAY IN WOOD COMPOSITES

The Alberta Research Council (ARC) Inc, Edmonton, Canada, together with Genics Inc, Acheson, Alberta, has developed a means to prevent mould, decay and termite attacks in wood fibre reinforced plastics (wood composites).

For more information:

<http://www.performance-materials.net/htm/f20050209.334785.htm>

Source: ALERT FROM WWW.PERFORMANCE-MATERIALS.NET

Contact: <http://www.performance-materials.net>

GOLDEN GATE BRIDGE TO WITHSTAND EARTHQUAKE

Picture of COBRAE Office

The second phase of adjustments to the Golden Gate Bridge in San Francisco are almost finished. The aim of this phased project is to make the bridge earthquake resistant. Total renovation is to be finished in 2007.

The renovation is phased so that the bridge does not have to be closed of from traffic. In 1998 the renovation was started on the Northern side of the bridge. The pillars and the approaches of the bridge have been strengthened already. The third and final phase is the strengthening of the actual bridge and the renovation of the pillars on



the North side. The pillars are strengthened by a total of circa 2 million kilos of steel plating. The total renovation is budgeted at 393 million dollars.

Source: *Technisch Weekblad*, 18 February 2005 (translated from the Dutch language)

Contact: tw.redactie@bp.vnu.com, <http://www.technischweekblad.nl>

STRUCTURAL STRENGTHENING WITH COMPOSITES

Concrete failure, inadequate design, poor quality construction, damage, change of use and the need to accommodate increased loading, has enhanced demand for the strengthening of many structures and commercial buildings.

A new CDROM from the Concrete Repair Association explains how modern fibre-reinforced polymers have evolved to overcome the problem, the types of composites available, quality control testing and installation procedures etc.

The CD Rom contains audio-visual programmes entitled 'Structural Strengthening with composites' and 'The Route to Successful Concrete Repair'. It also contains copies of the CRA publications, Members' Directory, a bibliography of allied publications and a list of useful addresses. To obtain a FREE copy check the following website:

[http://www.concreterepair.org.uk/cra_pubs.htm#CRA%20Presentation%20on%20CD%20\(free\)](http://www.concreterepair.org.uk/cra_pubs.htm#CRA%20Presentation%20on%20CD%20(free))

REVISED REPORT ON STRENGTHENING CONCRETE

A major revision of Technical Report (TR) 55, Design guidance for strengthening concrete structures using fibre composite material, has been published by the Concrete Society, UK. Go to *Advanced Composites Bulletin* and download it online

<http://www.performance-materials.net/htm/f20050210.317845.htm>

Source: *ALERT FROM WWW.PERFORMANCE-MATERIALS.NET*

Contact: <http://www.performance-materials.net>

UNR SCIENTISTS SIMULATE QUAKE TO ASSESS DAMAGE TO MODEL BRIDGE

By TOM GARDNER, ASSOCIATED PRESS

Researchers simulated a powerful earthquake on a model concrete bridge at the University of Nevada, Reno on Thursday to assess damage scientists hope will help engineers design safer highway structures.

The simulated temblor was more potent than the 6.7 magnitude Northridge quake in Southern California 11 years last month that left 72 dead, 9,000 injured and \$25 billion in damage, researchers said.

The test produced such a powerful vibration that it nearly went past the breaking point, causing pillars holding up one section of the structure to begin to fail. Concrete flaked off the 4-foot pillars, exposing reinforcing bars underneath.

"We're interested in our little friend here. He's taken quite a hit," David Sanders, associated professor in the Department of Civil and Environmental Engineering, said after the first test.

Sanders said researchers had planned a second, stronger shock on Thursday that would put the model bridge close to its structural limits, but decided instead on an "aftershock" of about magnitude 4-4.5.

"We don't want structures falling. We push the structures to the point of falling," he said.

The 70-foot, 135-ton model bridge was supported by six pillars, two of them 8 feet tall, two 6 feet tall and the damaged ones, 4 feet.

While all the pillars showed some degree of damage, the shorter ones received the most because they are stiffer, engineers said. The pillars varied in height the same as supports for a real bridge would, reflecting on the terrain the road passes over.

Thursday's simulated quakes were the 19th and 20th of the current series. Lines drawn on the pillars with ink markers showed each crack and are numbered by the test in which they occurred. Pencil-thick cables linked more than 300 channels of data from sensors on the bridge to measuring equipment.

This week's experiment was supported by a \$300,000 National Science Foundation grant.

"To my knowledge, this is the largest structure ever tested in the entire world," project director M. Saiid Saiidi said.

The work began in September 2003. By Monday, the model bridge will be gone to make room for a new experiment.

UNR's large scale structures laboratory holds three shake tables, which simulate earthquakes by moving the models back and forth. Movement in Thursday's second test was more pronounced because of the damage from the first.

"The structure has dropped about a quarter of an inch," Sanders said.

The next simulation later this year will cost \$2 million and will test a bridge that's twice as long, Saiidi said.

He is a professor in the Department of Civil and Environmental Engineering, which has received nearly \$15 million in research funds over the past five years.

"Our purpose is to improve design so as to reduce earthquake damage and reduce the loss of life," Sanders said.

Along with UNR, schools participating on Thursday included the University of California, Berkeley; the University of California, Davis; the University of Texas at Austin, and the University of Washington.

Nevada Seismological Laboratory: <http://www.seismo.unr.edu/>

UNR Center for Environmental Sciences and Engineering: <http://www.unr.edu/cese/>

Source: Infoshare 48/2005

Contact: webmaster@thomastelford.com, <http://www.infoshare.org.uk/downloads/GR48.htm>

UK COUNCIL STRENGTHENS CONCRETE TUNNEL WITH SIKA CARBON FIBRE

Leeds City Council has selected Sika's carbon fibre wrap system for Phase 2 of the refurbishment and strengthening of the Matthew Murray Tunnel in Leeds, UK.

The reinforced concrete tunnel is 160 metres long and was built in 1974 as part of the dual carriageway A463 Ingram Road Distributor that runs between Junction 2 of the M621 and the Armley Gyratory. To keep traffic disruption to a minimum, work was carried out during night hours, with a contraflow operating in the northbound tunnel.

Over the years, continuous attack from de-icing salts has contaminated the pier between the two carriageways, leading to corrosion of the steel reinforcement and spalling of the cover concrete.

To bring the tunnel back up to strength, particularly in relation to accident impact damage, the tunnel has been refurbished in two phases.

Phase 1 was completed in 2003 and involved the removal of all defective concrete and reinforcement in the northbound tunnel, and replacing with new reinforcement and sprayed concrete.

For phase 2, which has been recently completed, Leeds City Council chose a more radical solution.

Deterioration of the southbound tunnel had not been so extensive, but some repairs and additional strength was required to complement the work completed on the northbound side of the pier. Balvac Limited were appointed main contractors to carry out repairs and install the Sika fabric wrap reinforcing system.

Following removal of any defective concrete, local repairs were completed using SikaCem 133 Gunite, a one part, dry spray micro repair concrete. Up to seven layers of SikaWrap carbon fibre fabric wrap were then bonded to the intermediate wall by Balvac Limited, using the SikaDur range of epoxy resins. Sika said that this process adds considerable strength to the wall, helping to contain the concrete and retain the integrity of the structure in the event of impact forces being applied.

<http://www.sika.co.uk>

<http://www.leeds.gov.uk>

Source: NetComposites News, 11 February 2005

THE GLOBAL COMPOSITES INDUSTRY SAW A RECORD GROWTH OF 8.7% IN 2004

The global composites industry saw a record growth of 8.7% in 2004. The worldwide composites consumption in 2004 was 13.5 billion lbs (6.1 million ton). Except for wind energy and aerospace markets, all the major market segments (transportation, construction, pipe & tank, marine, consumer, electrical and electronics) saw over 5% growth in 2004 according to a new market study 'Global Composites Market 2004 2010: Opportunities, Market & Technology' published by E-Composites, Inc. The composites industry in North America and Europe made a substantial recovery in 2004 from the slump of the past three years (2001-2003).

In 2005, a lot could change - for better and for worse. Although overall economic growth will be about the same as in 2004, there will be significant change in growth rates in various market segments. Moreover, there will be some shakeup in the ranks of winners and losers in material suppliers and end use markets.

To learn more about this report visit:

*E-mail: troy.abernathy@e-composites.com
<http://www.e-composites.com/MarketGlobal2004.htm>*

Source: CompositesWeek No. 6, vol. 7, February 16, 2005

Contact: editor@e-composites.com, <http://www.e-composites.com/MarketGlobal2004.htm>

RECORD RESULTS FOR MARTIN MARIETTA MATERIALS, INC.

Martin Marietta Materials, Inc. reported financial results for the fourth quarter and year ended December 31, 2004. Net earnings of \$37.0 million, or \$0.77 per diluted share, was at a record level for the quarter. For the year, net earnings of \$129.2 million, or \$2.66 per diluted share, was also at a record level. Cash provided by operating activities in 2004 was \$266.8 million inclusive of a \$51 million voluntary contribution to the Corporation's pension plan. The Corporation repurchased 1.5 million shares of its common stock through open-market purchases, including 881,000 shares during the fourth quarter, and ended the year with \$161.6 million in cash.

Net sales for the year were \$1.551 billion in 2004 compared with \$1.476 billion in 2003. Operating earnings increased 16 percent to \$226.6 million in 2004 versus \$195.5 million in 2003. The Company posted after-tax earnings of \$1.0 million on discontinued operations compared with an after-tax loss of \$6.7 million in 2003. For the year, 2004 net earnings were \$129.2 million, or \$2.66 per diluted share, compared with 2003 net earnings of \$93.6 million, or \$1.91 per diluted share, inclusive of an accounting change.

Source: CompositesWeek No. 6, vol. 7, February 16, 2005

Contact: editor@e-composites.com, <http://www.e-composites.com/frontend/newspage.aspx?sno=2339>

REINFORCED PLASTIC RAIL GUARDS ON TRIAL

The Public Works Department is experimenting with a new fibre-reinforced plastic guard rail in a pilot project being carried out on several new federal roads in Kelantan. The move is to put an end to the theft of metal guard rails for sale to either scrap metal dealers or contractors installing guard rails along roads.

Explaining the trial project, Works Minister Datuk Seri S. Samy Vellu said:

"Many things (safety aspects, durability) have to be ascertained before commissioning it to be used along federal roads and highways, if needs be." Samy Vellu said a PWD engineer in Kota Baru designed the reinforced plastic guard rail.

Malaysian Highway Authority director-general Datuk Dr George George said he was not aware that plastic guard rails were being tried out.

"Probably it is in its early stage. Usually PWD and MHA work together in developing new safety gadgets for roads. But I have not heard of the fibre-reinforced plastic guard rail." He, however, acknowledged that it

was possible to use fibre-reinforced plastic for guard rails. "Technology has changed tremendously and these chemically-engineered products could be stronger than the metal rail guard."

Dr George said highway concessionaires were increasingly using fibre glass sign boards. "This is also due to theft, presumably by drug addicts or syndicates." Dr George said that while fibre glass sign boards do not last as long as metal sign boards, they do deter theft. Theft of metal equipment has been rising in tandem with the rising price of scrap metal in the world market.

M.K. Megan

Source: JEC Composites Weekly Newsletter

Contact: webmaster@jeccomposites.com,

http://www.jeccomposites.com/news/news_fiche.asp?id=1656&

INVITED DESIGN COMPETITION FOR NEW CROSSING OF THE RIVER WEAR, SUNDERLAND

The City of Sunderland and Sunderland arc announce the launch of a design competition for a new crossing of the River Wear at Sunderland. The competition is being organised by the Royal Institute of British Architects (RIBA) in association with the Institution of Civil Engineers (ICE).

The bridge will be a major new vehicular and pedestrian crossing of the River Wear, and forms part of the wider Sunderland Strategic Transport Corridor (SSTC) initiative. Expressions of interest are sought from architect or engineer-led teams to design a landmark, circa £43 million pound structure, that will act as a gateway to the city centre and put Sunderland on the map. Up to six teams will be invited to develop design proposals, for which each team will receive an honorarium of £8,000 plus VAT.

Deadline for Expressions of Interest is 12.00 noon on Monday 7 March 2005.

For further details please visit <http://www.ribacompetitions.com>

Source: Infoshare 47/2005

Contact: webmaster@thomastelford.com, <http://www.infoshare.org.uk/downloads/PUB47.htm>

SAMPE BRIDGE BUILDING CONTEST SET FOR MAY SYMPOSIUM AND EXHIBITION - CONTEST ENTRANTS INVITED

Rules for the 2005 Light Weight Bridge Building Contest held at the annual May 1-5, 2005 SAMPE exhibition in Long Beach, California are now available on the SAMPE website, This year, in addition to the bridge contest, SAMPE will also feature a WING contest to design and build a light weight dihedral shaped airfoil. Rules for that contest are also on the website.

**Any questions contact Dr. Howard S. Kliger at E: hskliger@patmedia.net
<http://www.sampe.org>**

Source: Composites eNews #7, Vol.7, February 10, 2005 - 238th Issue

Contact: steve@CompositesNews.com, <http://www.compositesnews.com/cni.asp?articleID=7425>

HEY! WANT TO BUY A BRIDGE?

"If you believe that, I have a bridge to sell you in Brooklyn" - so goes the old saw. Now NY Governor George Pataki may actually be willing to sell you that span. Pataki's administration has introduced a proposal that may see many of the state's roads, bridges and highways and byways wind up in private hands.

Newsday reported Thursday that private firms could soon begin "buying" state transportation venues, which would provide much-needed cash for state coffers. To recoup their investment, the private firms would charge tolls for the use of the roads and bridges with an eye toward making a profit.

"There are capital needs all over the state, and this is a creative, modern way of looking at it," David Sigman, a senior vice president at LCOR, a Pennsylvania developer, told the paper. Sigman's firm is looking

at building a new bridge to replace New York City's Tappan Zee Bridge, then administer it over the long run.

For Pataki, the idea isn't a new one. He's been thinking about it for a decade.

In 1995, the paper reported, he told a group of Republican governors, "New York's transportation facilities, such as the airports and Thruway, are worth billions."

He has already submitted a legislative proposal to the state Legislature which "would permit the state and its authorities to sell or lease a wide variety of facilities from bus stations to ferries," the paper reported.

Private businesses could begin charging tolls and fees at tunnels, bridges and other roadways where they currently exist or where improvements are made, says the paper.

Nothing has been finalized, Pataki officials said, but the idea is getting serious consideration. To get it approved, however, state law regarding privatization of state assets would have to be changed.

[Ed. Note - If this goes forward, private control may lead to value engineering upgrades, repairs, and new construction. Being private money, this could open opportunities for FRP composites in bridge decks and superstructures, and for CFRP composites for repair, rehabilitation and strengthening of reinforced concrete structures.]

<http://www.newsmax.com/archives/ic/2005/2/4/145712.shtml>

Source: *Composites eNews #7, Vol.7, February 10, 2005 - 238th Issue*

Contact: steve@CompositesNews.com, <http://www.compositesnews.com/cni.asp?articleID=7412>

INNOVATIVE PRECAST CONCRETE TECHNOLOGY REDUCES WEIGHT OF COMPONENTS UP TO 66%

CarbonCast™ uses composite fiber grid instead of steel for secondary reinforcing and shear transfer; ideal for architectural and wall panels, double tees, more CarbonCast, an innovative precast concrete technology that replaces conventional reinforcement with a non-corrosive, high-strength carbon fiber grid that allows thinner precast sections, can reduce the weight of architectural and structural components by up to 66 percent while offering significantly improved corrosion resistance, durability and insulation value.

Developed and introduced by the AltusGroup™, the first-ever national partnership of precast concrete manufacturers, CarbonCast products use conventional steel rebar or strand for primary reinforcing and 1mm-thick C-GRID™, a resin-bonded carbon fiber grid, for secondary reinforcing and shear transfer. Developed by TechFab, LLC, of Anderson, S.C., high-strength, ultra-durable C-GRID has superior tensile properties when compared to steel and requires only 1/4" of concrete cover to be effective compared with 3/4" to 3" for steel reinforcing). It also controls shrinkage cracks up to 50 percent better than steel mesh in panels and tees, and creates a 100 percent structurally composite section between the outer and inner wythes of insulated wall panels.

Lower weight, thinner C-GRID reinforced sections will not rust, so CarbonCast surfaces will not stain or spall as will sometimes occur with conventional steel reinforcement. And, because C-GRID is thermally non-conductive, CarbonCast sandwich wall panels deliver 100% of the R-value of the insulation used between the outer and inner wythes of a wall panel.

The reduced weight and section thickness of CarbonCast panels and tees translate to lower transportation and erection costs — as well as savings on building superstructure. At the same time, the improved insulating properties of CarbonCast panels lead to more energy-efficient buildings with lower operating costs, making CarbonCast a suitable choice for environmentally friendly designs.

"CarbonCast takes a proven 20th century technology — precast concrete — and makes it work better for the 21st century," said William Dausch, Esq., Chairman, AltusGroup. "For decades, architects and engineers have depended on the strength, durability, economy and aesthetic beauty of precast concrete. With CarbonCast, they can add superior long-term durability, lighter weight, finer finishes and improved insulating properties to the list of benefits."

CarbonCast ideal for wide array of products

The unique benefits of CarbonCast technology can be realized in a number of important architectural and structural applications. Commercial Systems

- Architectural & Hardwall non-load bearing panels: CarbonCast all-precast Architectural and Hardwall ribbed panels weigh up to 66 percent less than conventional precast panels and can reduce building superstructure costs. The patented CarbonCast rib design delivers value-added insulation performance of up to R-12. CarbonCast panels are a lightweight and affordable, and can have an even finer finishes than conventional precast cladding. They can be considered as an alternative to conventional precast as well as insulated metal, masonry or EIFS cladding.
- Wall Panels: Lightweight and load bearing or non-load bearing, CarbonCast Wall Panels weigh up to 40 percent less than conventional precast and, can have even finer finishes than conventional precast. Patented CarbonCast shear reinforcing design yields a 100% structurally composite panel that delivers value-added insulation performance of up to R-24 in an 8" thickness. They can be considered as an alternative to conventional precast, tilt-up or masonry construction.
- Double Tees: CarbonCast Double Tees for garage floor and roof decks weigh up to 20 percent less than conventional precast and, like Architectural and Wall Panels, can significantly reduce superstructure costs. Non-corrosive C-GRID reinforcing means CarbonCast Double Tees are less likely to crack, rust, stain or spall.



Multi-family Residential Systems

- Residential Wall Panels: Load bearing and non-load bearing CarbonCast ribbed Residential Wall Panels weigh up to 60 percent less than conventional precast panels and have a patented rib design that delivers value-added insulation performance of up to R-13. They are specially designed to make drywall furring with metal studs quick and easy and can be formed or finished to simulate stucco, brick, stone and even clapboard siding.
- Residential Decks: CarbonCast Residential Floor and Roof Decks are made of triple tees that are only 10" deep, have an easy to cut 3/4" flange, and can span up to 28' to provide wide open interiors. They are specially designed to make drywall application of drywall ceilings quick and easy. CarbonCast decks weigh less than solid concrete slabs or hollowcore slabs and can easily accommodate electrical, mechanical, plumbing, alarm and communication systems within their shallow depth.

AltusGroup, comprised of five of the nation's leading precast manufacturers — Oldcastle Precast Inc., Building Systems Division (Edgewood, Md.); HIGH Concrete Structures, Inc. (Lancaster, Pa.); precasters JW Peters and Iowa Prestress of Cretex Companies (Elk River, Minn.); Metromont Corporation (Greenville, S.C.); and Rocky Mountain Prestress (Denver, Co.) — and C-GRID provider, TechFab, LLC, establishes a new paradigm for the way precast products are promoted and made. Through their more than 25 architectural and structural precast manufacturing locations in the United States, the companies have agreed to market and manufacture CarbonCast products under consistent and exacting standards. AltusGroup will provide centralized technical expertise and information and nationally available, consistent, high quality products -- regardless of where they are made. "With CarbonCast products provided exclusively by AltusGroup founders and licensees, architects and engineers can be assured of easy access to the information they

need and high quality product availability virtually anywhere in the United States and even some parts of Canada," said Gary Graziano, AIA, Secretary, AltusGroup.

"The formation of AltusGroup makes CarbonCast the first national brand for a system of architectural and structural precast products," said Graziano. "And CarbonCast products are just the beginning. We're committed to working together to develop and market other advanced precast technologies and systems."

Michael Drabenstott

Phone: +1 (484) 821-0922

<http://www.altusprecast.com>

<http://www.techfabllc.com>

Source: JEC Composites Weekly Newsletter 2 feb 2005

Contact: webmaster@jeccomposites.com,

[http://www.jeccomposites.com/news/news_fiche.asp?id=1594&";](http://www.jeccomposites.com/news/news_fiche.asp?id=1594&)

ZOLTEK WINS CONTRACT FOR REINFORCING CONCRETE WITH CARBON FIBER

Zoltek Companies, Inc. has signed a multiyear supply agreement with TechFab, LLC that marks the start of commercial shipments of carbon fiber for an application of considerable potential: the use of carbon fibers as a reinforcing material that will add strength and provide dramatic weight savings in concrete components and structures that are far less bulky than conventional steel-reinforced structures.

Using Zoltek carbon fiber, TechFab, LLC of Anderson, South Carolina, has developed a patented carbon reinforcing grid (known as C-GRID (TM)) that can deliver up to seven times the tensile strength of steel reinforcement by weight. That allows designers and engineers to build streamlined structures from precast concrete that are just as strong as conventional steel reinforced sections, but weigh less than half as much with improved corrosion resistance, durability and insulation properties. In addition, the reduced weight contributes to lower shipping and erection costs, and possible substructure savings. New architectural, industrial and residential precast products incorporating C-GRID are now possible.

"This is a commercial application for carbon fibers with significant growth potential," noted Zsolt Rummy, Zoltek's Chairman and Chief Executive Officer. "Zoltek has been our primary fiber supplier and advocate from day one," said John Carson, Director of Commercial Development and Program Leader for C-GRID technology at TechFab. "We are pleased to have them as our partner going forward in providing a better way to build with precast."

AltusGroup, a partnership of five of the nation's leading precast concrete producers (with combined revenues of more than \$1 billion), has begun a nationwide marketing and sales campaign for CarbonCast (TM) concrete structures made using C-GRID reinforcement. CarbonCast components, which usually replace secondary steel reinforcement with C-GRID, are "lighter, stronger and more durable than conventional precast." The AltusGroup promises coast-to-coast availability, consistent quality and uniform design standards regardless of project location.

Source: CompositesWeek No. 3, vol. 7, January 24, 2005

Contact: editor@e-composites.com, <http://www.e-composites.com/frontend/newspage.aspx?sno=2311>

UK CONSULTANTS ELEVATE CYCLISTS WITH COMPOSITE FLYOVER PROJECT

White Young Green are part of a consortium to develop a flyover project that could revolutionize cycling in industrial cities.

The project which intends to utilise the lightweight and durable qualities of composites is being developed by White Young Green (WYG), consultants to the built, natural and social environment, Fitzpatrick plc, the multidisciplinary construction organisation, and The Scyways Consortium.

The aim is to build elevated Cycle Expressways, giving the potential for cycling to become a central aspect of transport solutions for British cities over the coming decades.

The partners of the Scyways Consortium are confident that the proposed Cycle Expressway would be effective in increasing the number of cyclists on the roads, offering a more cost effective and efficient mode of transport (avoiding the peak time queues), whilst affording all kinds of environmental and health advantages.



Gerald Hodgson, the Managing Director of Scyways stated that "the basic problem addressed by the Cycle Expressway idea is that it is not generally possible to widen roads in cities to create additional space for cycles. The idea of creating an additional deck over existing carriageways is a concept which has not been generally explored. There are significant practical limitations to the application of this concept for motor vehicles, but for lightweight cycles it is an entirely feasible option. We are prepared to do a free preliminary survey and report on any city in Britain interested in looking at the concept".

The envisaged structure will have the following features:

- ❖ A light and elegant appearance to add an aesthetically pleasing element to the streetscape;
- ❖ Open to the sky with a superstructure supported or cantilevered from single columns;
- ❖ Centrally supported at a height of approximately 5.7m down the central reservation of dual carriageway where available;
- ❖ Cantilevered at a height of approximately 2.5m over and from the edge of pavements where circumstances permit eg alongside sports stadia, under bridges;
- ❖ Cantilevered at a height of approximately 5.7 m from the edge of the pavement over carriageways and crossing at this height side road intersections, cross roads and roundabouts;
- ❖ Ground level sections through parks where possible;
- ❖ Access at start and finish and major intersections where space permits by means of ramps, maximum gradient of 1 in 3 with side ramps to wheel cycles up and down;
- ❖ Exclusive use by cyclists; no pedestrians or motor cycles;
- ❖ Complete sections between columns to be factory assembled, minimising time and public disruption on site.

The incorporation of ducting to carry service pipes and cables which are easily accessible without the need for roadworks. (This is one of the innovative steps incorporated in the patent pending).

David Kendall, Director of White Young Green Specialist Structures Division based in Southampton added that "the Expressway would be constructed in modular units in the factory allowing production costs to be reduced, manufacturing tolerances to be tight, and critically to ensure the structure can be erected in the minimum possible timeframe with minimum disruption to traffic flows and the area in general. These modular units can be transported to the route and slotted onto pre positioned supports.

The use of modern fibre reinforced polymer (FRP) composite materials is being investigated for the complete structure of the cycle expressway, except for the foundations and columns. Such material would provide a lightweight solution, fully factory finished, enabling rapid installations. FRP composites have been accepted by the Highways Agency for use on structures such as bridges and motorway gantries and their

incredible durability provides significant savings in through life costing by reducing maintenance requirements to a minimum".

If a city in Britain would be interested in taking this opportunity to transform their city and meet the demand for transport solutions in the years and decades to come they should contact Gerald Hodgson directly.

Contact: <http://www.wyg.com>

Source: NetComposites News, 04 February 2005

Contact: news@netcomposites.com, <http://www.netcomposites.com/news.asp?2734>

WWW

The following websites can be of interest:

Almost over the edge



Good thing there are railings on bridges.

<http://pacifi.ca/pick.html>

Build your own arch bridge picture, beam bridge picture, build foot bridge construction spans, build your own cabin, deck railing dimensions, design bridge picture, foot bridges, free foot bridge plans, free shed plans, greenhouse, making garden bridge, model bridge plans, pedestrian bridge drawing, pre-fab, railing pieces, simple bridge plans, span creek bridge, wooden bridge plans, wooden garden bridge plans.

<http://www.massroads.com>

Interesting website of major bridge and other structures in the Massachusetts Highway Infrastructure.

<http://www.cobrae.org>

NEW ANNOUNCED EVENTS

Life Cycle Assessment of Composites (workshop meeting)

7 April 2005

United Kingdom

On Thursday 7 April 2005, the Advanced Composites Manufacturing Centre will host a workshop (discussion meeting) on Life Cycle Assessment of Composites.

The respective sessions will be introduced by

- | | |
|---|---|
| * John Summerscales (ACMC) | The context for the meeting |
| * Jeremy Tomkinson (National Non-Food Crops Centre) | Natural material sources for composite materials |
| * Ian Hamerton (University of Surrey) | Thermoplastics vs thermosetting resins |
| * Lunch | |
| * Stephen Pickering (University of Nottingham) | Routes to recycling or disposal of thermoset composites |
| * Paul Thistlethwaite (BRE Environment) | A methodology for (quantitative) life cycle assessment |

It is anticipated that the majority of each session will be an open discussion amongst all present.

More details are available at

<http://www.tech.plym.ac.uk/sme/acmc/cpd/lca.htm>

18th BIBM-congres

11-14 May 2005

RAI , Amsterdam, NL

The 18th BIBM congress will be organized by the Dutch concrete products industry. This congress will take place in the RAI in Amsterdam, the ultimate centre for international exhibitions and congresses in the Netherlands.

The use of precast concrete products is increasing. For contractors precast concrete means the solution to their problems; for end users it is a satisfaction of their needs. During this 3 day programme emphasis will be laid on the following themes: Applications, Marketing and Technology of Precast Concrete. These main themes will be discussed by prominent speakers from around the world and from a variety of sectors. All the main concrete product areas will be represented.

Contact: **BIBM2005**
 194
 3440 AD WOERDEN
 THE NETHERLANDS
 Tel. +31 348 - 484 484
 Fax. +31 348 - 484 450

E-mail: **info@bibm2005.com**
 <http://www.bibm2005.com>

2ND INTERNATIONAL FIB CONGRESS: ABSTRACT DEADLINE MARCH 10

5-8 June 2006

Naples, Italy

We are pleased to announce that the official website for the 2nd International *fib* Congress has been recently updated. Browsing the site it is possible to have more details on the event and to compile the on-line registration form. We rise this occasion to remind you that the **abstract submission deadline is March 10** and that we look forward to receiving your contributions for the Congress. The abstract should be in English and should not exceed 300 words. Abstracts should be submitted by e-mail to fib2006@unina.it. Abstracts should include:

Designation: Paper or Poster

The topic title to which the paper belongs

The title, author(s) name, affiliation(s), and corresponding author address and e-mail.

Contact: *The Secretariat, 2006 fib Naples Congress*

fib ITALIA

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via Claudio, 21 - 80125 Naples, ITALY

Fax: +39.081.7683491

Email: *fib2006@unina.it*

http://www.naples2006.com

EVENT CALENDAR

2005

- | | |
|---|---|
| 16-18 March 2005
Baltimore, USA | Integral Abutment and Jointless Bridges (IAJB 2005)
Contact: Srinivas.Aluri@mail.wvu.edu,
http://www.cemr.wvu.edu/cfc/conference |
| 21-23 March 2006
University of Cambridge, UK | Advanced Composites in Construction, ACIC'06
Contact: composites@ngcc.org.uk, http://www.bre.co.uk/ |
| 24-25 March 2005
Bordeaux, France | Wood fibre polymer composites, applications and prospectives
Contact: woodpolymer@ctba.fr, http://www.ctba.fr/woodpolymer2005/ |
| 31 March - 1 April 2005
Dübendorf, Switzerland | COBRAE Conference 2005 - Bridge engineering with polymer composites
Contact: info@cobrae.org , http://www.cobrae.org/conference.html |
| 5-7 April 2005
Paris, France | JEC 2005
http://www.jeccomposites.com |
| 7 April 2005
United Kingdom | Life Cycle Assessment of Composites (workshop meeting)
http://www.tech.plym.ac.uk/sme/acmc/cpd/lca.htm |
| 11-13 April 2005
University of Surrey, UK | 5th International Conference on Bridge Management
Contact: j.disney@surrey.ac.uk , http://www.surrey.ac.uk/eng/BM5/ |
| 4-5 May 2005
Victoria, Australia | Composites Australia: Conference 2005
Contact: ciainfo@compinst.asn.au , http://www.compinst.asn.au |

11-14 May 2005 RAI , Amsterdam, NL	18th BIBM-congres Contact: info@bibm2005.com, http://www.bibm2005.com
23 - 25 May 2005 Budapest, Hungary	FIB Symposium: Keep Concrete Attractive Contact: fibSymp2005Budapest@eik.bme.hu, www.eat.bme.hu/fibSymp2005
8 - 10 June 2005 Maastricht, Netherlands	Eurosteel Contact: initiative@eurosteel2005.info, www.eurosteel2005.info
13-15 June 2005 Pittsburgh, USA	22nd annual international bridge conference Presentation by COBRAE representative Contact: eswp@eswp.com, http://www.eswp.com/bridge/bridge-CFP_info.htm
27 June - 1 July 2005 Durban, South Africa	ICCM-15 Contact: iccm15@ukzn.ac.za, http://www.iccm15.com
11-13 July 2005 Lyon, France	Composites in Construction CCC 2005 Contact: l2m@iutal2m.univ-lyon1.fr, http://l2m.univ-lyon1.fr/site_CCC2005/ccc2005_0.html
17-20 July 2005 Boston, Massachusetts	Sixth International bridge engineering conference: Reliability, security, and sustainability in bridge engineering Contact: TRBMeetings@NAS.edu, http://trb.org/Conferences/IBEC/
28 - 30 July 2005 Melbourne, Australia	Exhibit at Infrastructure Australia '05 Contact: eventellas2005@smartemail.co.uk, http://www.tradecom.ae/infra_b/index.htm
14 - 19 August 2005 Maui , Hawaii	International conference on advanced materials for construction of bridges, buildings and other structures - IV Contact: info@eci.poly.edu, www.engconfintl.org/5aa.html
22-24 August, 2005 Vancouver, BC, Canada	CONMAT ' 05 - Construction Materials 2005 Contact: conmat05@civil.ubc.ca, http://www.civil.ubc.ca/conmat05
14-16 September 2005 Lisbon, Portugal	IABSE Symposium Structures and Extreme Events Contact: iabse.lisbon2005@lnec.pt, http://www.iabse.org/lisbon
28-30 September 2005 Colubus, OH, USA	Composites 2005 http://www.acmashow.org
7-10 November 2005 New Orleans Marriott	7th Int. Symposium on Fiber Reinforced Polymer Reinforcement for Reinforced Concrete Structures Contact: frprcs7@ce.umn.edu, http://frprcs7.ce.umn.edu
15-16 November 2005 Rotterdam, the Netherlands	BridgEneering, International Bridge Technology Exhibition Conference session organised by COBRAE Contact: info@briskevents.nl, http://www.briskevents.nl
22-24 November 2005 London, United Kingdom	CIVILS 2005 Contact: russell.kenrick@emap.com, http://www.civils.com

2006

23-24 March 2006
Budapest, Hungary

8th World Pultrusion Conference
Contact: info@pultruders.com, <http://www.pultruders.com>

28-30 March 2006
Paris, France

JEC 2006
<http://www.jeccomposites.com>

5-8 June, 2006
Naples, Italy

Second FIB Congress 2006
Contact: fib2006@unina.it, <http://www.naples2006.com>



COMPOSITE BRIDGE ALLIANCE EUROPE

REGISTRATION FORM FOR FOUNDING MEMBERS

We wish to participate in the COBRAE group as one of the founding members.

We pay Euro 950, - for the period 2005. COBRAE will be an unincorporated association, which will be run by Ketel Consulting Agents B.V. in the Netherlands. The Euro 950, - is made up out of Euro 450, - for annual membership and Euro 500, - for a one time joining fee. Payment can be made after receipt of invoice.

COBRAE's mission is to promote the research, development and application of fibre reinforced polymer composites in rehabilitation, upgrade and new build bridge constructions and infrastructure.

Organisation : (Please write clearly)

Address :

Town :

Postal code : Country:

Phone : Fax :

E-mail :

Website :

This website to be linked from the COBRAE website: yes / no

Contact person :

Payment can only be made by:

Cheque made out to Ketel Consulting Agents

(Inter) National Bank (Euro) Transfer

Credit Card:

MasterCard

Amex

Visa

Diners Card

Credit card number : Expiry date:

Credit card holder :

CVC (Card Validation Code): (VISA only, last 3 numbers on back of the card)

Date : City :

Signature :

Please return this registration form by fax or mail to Ketel Consulting Agents.

COBRAE

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The Netherlands

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<http://www.cobrae.org>