



INTERNATIONAL JOINTS AND BEARING COUNCIL NEWSLETTER

NEWSLETTER # 41

March 2009

IT'S NOT TOO EARLY

The IJBRC Executive Committee met on January 5, 2009 with the major topic of discussion being the 7th World Congress on Joints, Bearings and Seismic Systems for Concrete Structures. Barring any major changes the date and location have now been selected. So clear your calendar for the week of **October 2, 2011** and plan on traveling to **Las Vegas, Nevada** for the 7th World Congress.

That being said it is not too early to start thinking about a topic for a technical paper submission to the executive Committee for the 2011 event. The 6th World Congress held in Halifax, Nova Scotia heard 53 technical papers from 15 different countries around the world. Some of the anticipated themes for the 7th World Congress would be in the fields of security, health monitoring and accelerated construction. Joints, bearings and seismic systems certainly play an important part in these critical areas of engineering.

Las Vegas promises to be an exciting venue for the 7th World Congress. In addition to the casinos and world famous night life the Las Vegas area boasts some of the world's greatest golf courses and is also in close proximity to the Hoover Dam site which is one of the engineering marvels of its time. Also at that location a new bridge is under construction which will be completed in time for the Congress. The Hoover Dam Bypass will be the largest concrete arch in North America with a main span of 1060 feet (323 m). The bridge is being built 1500 feet (460 m) south of the dam and the deck is 900 feet (274 m) over the Colorado River. This structure will have some interesting bearings, joints and seismic systems for the attendees to contemplate.

So put on your thinking caps and gather your thoughts on interesting topics for the 7th World Congress on Joints, Bearings and Seismic Systems for Concrete Structures and I'll see you in Las Vegas.

Ronald J. Watson

Chairman

THIRD SYMPOSIUM ON DURABILITY OF BUILDING AND CONSTRUCTION SEALANTS AND ADHESIVES

A co-sponsored symposium by ASTM Committee C24 on Building Seals and Sealants and RILEM, International Union of Laboratories and Experts in Construction Materials, Systems and Structures was held in Denver, Colorado, USA June 2008. Of the many research papers presented, the following ones are of particular interest to IJBRC members. If you require further details on any of the presented papers, please contact the **Symposium Chairman : Andreas T. Wolf, Dow Corning GmbH, Wiesbaden, Germany**

Joint Sealing Systems for Pavements – A New approach for a performance Related Assessment of Capability and Durability – C. Rechnagel and S. Pirskawetz, Federal Institute for Materials Research and Testing, Berlin, Germany

Water Penetration of Cladding Components – Results from Laboratory Tests on Simulated Sealed Vertical and Horizontal Joints of Wall Cladding – M. A. Lacasse, NRC Canada, Ottawa, ON, Canada: and H. Miyauchi, Tokyo Institute of Technology, Yokohama, Japan

Seismic Performance of Four-Sided Structural Silicone Glazing Systems – A. M. Memari, M. Royer, R. Behr, and P. Kremer, Penn State University, University Park, PA, USA

Durability Potential of Silyl Terminated Polyacrylate Based Construction Sealant – Y. Nakagawa, Kaneka Corporation, Takasago, Hyogo, Japan

An Attempt to Find a Correlation between Environmental and Accelerated Weathering According to RILEM TC 139-DBS in Polyurethane One-Component Sealants Applied on Concrete – E. Pozzi, V. Carcano, and A. Ausilio, Mapei Spa, Milano, Italy

Using Rheology Test Methods on Cured Elastomers to Assess Durability Undergoing Cyclic Deformation – G. V. Gordon, L.D. Lower and L. D. Carvary, Dow Corning Corporation, Midland, MI, USA

Predicting the Sealant's Ability to Accommodate Movement Prior to Final Cure – S. Mishra, S. Milano, and T. M. Feng, Tremco Inc., Beachwood, OH, USA

Does Imposed Strain Affect Modulus Change in Sealant Subjected to Outdoor Weathering? - C. White, D. Hunston, K. T. Tan, National Institute of Standards and Technology, Gaithersburg, MD, USA; and S. Williams, Forrest Products Laboratory, Madison, WI, USA

High Strain Rate Testing of Structural Silicone - E. Bull, Momentive Performance Materials, Waterford, NY, and D. Buckley, GE Global Research, Nishayuna, NY, USA

Nondestructive Field Testing of Sealed Joints – D. Huff, Consultant, Salem, OR, USA

Evaluation of Silicone Sealants at High Applied Load Velocities - K. Yarosh, Dow Corning Corporation, Midland, MI, USA; and A. T. Wolf and S. Sitte, Dow Corning GmbH, Wiesbaden, Germany

Durability by Design: New Results on Load Carrying Silicone Bonding - D. M. Burns, K. M. White, and S. R. Austin, 3M Center, Maplewood, MN, USA

High Performance Acrylic Sealant for Tilt-Up Applications - V. Demarest, A. Liss, and R. Queenan, Rohn & Haas, Springhouse, PA, USA; and P. Gorman, Moisture Protection, El Paso, TX, USA

Development of Adhesion of Organic and Silicone Sealants on Wet and Dry Concrete – F. Gubbels and C. Calvet, Dow Corning, Seneffe, Belgium

Sealant to Sealant Adhesion - J. Klosowski and D. Nicastro, Engineering Diagnostics, Inc., Bay City, MI, USA

Effects of Water Immersion on Building and Civil Engineering Joints and the Use of the Arrhenius Method in Predicting Adhesion Lifetime of Water-Immersed Joints - A. T. Wolf, Dow Corning GmbH, Wiesbaden, Germany

Durability Requirements for Substrates used in Silicone Structural Attachment – L. D. Carbary, Dow Corning Corporation, Midland, MI, USA

Quantifications of the Effect of Enforced Cyclic Movement and Regional Exposure Factors on the Weatherability of Construction Sealants – N. Enomoto, Sunstar Engineering, Yamanashi-Perf., Japan; A. Itou, Auto Chemical Industry, Ibaragi-Pref, Japan; and K. Tanaka, Tokyo Institute of Technology, Yokohama-shi, Japan

An Accelerated Weathering Study – J. M. Klosowski and P. Gorman, Klosowski Scientific Inc., Bay City, MI, USA

ASTM MEETING MINUTES

SUBCOMMITTEE: D04. 32 Bridges and Structures

DATE: Thursday, December 11, 2008

LOCATION: Fontainebleau Resort
Miami Beach, Florida

TIME: 9:00 a.m.

Following roll call and approval of the minutes from the Denver Meeting the following action items were discussed:

- The 10 documents under the jurisdiction of this subcommittee are all current. The next document up for review is D4017 which is the standard practice for use of Portland Cement Concrete Water Barrier Membrane Systems and carries a 2005 date.
- There were no balloted items since the previous meeting.
- A proposed new specification on two component spray applied deck waterproofing membranes was circulated at the Denver Meeting with comments requested. At this time the subcommittee chair has suggested that the specification go out for subcommittee ballot.
- The next meeting will be held in Vancouver, British Columbia on Thursday June 18, 2009.
- The meeting adjourned at 9:27 a.m.

ASTM MEETING MINUTES

SUBCOMMITTEE: D04. 34 Preformed Joint Fillers & Sealers and Sealing Systems

DATE: Thursday, December 11, 2008

LOCATION: Fontainebleau Resort
Miami Beach, Florida

TIME: 8:00 a.m.

Following roll call and approval of the minutes from the Denver Meeting the following action items were discussed:

- Specifications D 1751-04 and D 1752-04 were balloted for reapproval and received no negatives with one abstention with comment from Rebecca McDaniel. She indicated that the scope needs to be revised to add non-rationalized SI units in parentheses. Tom Verrill volunteered to contact Rebecca to discuss this issue. In any case this would be an editorial modification and would not prevent the documents from being reapproved.
- Revisions to Specification D 3542 were balloted and received no negatives. The revisions were made to put D 3542 in conformance with AASHTO M 297. The same abstention with comment was received on this ballot and will be addressed.
- The balance of the documents under the jurisdiction of this Subcommittee are current. Specifications D 2628 and D 7174 carry 2005 dates and are up for review at this time.
- A proposed new specification on preformed silicone joint seals for bridges was circulated to the Subcommittee members at the Denver Meeting. The Subcommittee Chairman is recommending that this document go to Subcommittee ballot.

NEW PITT RIVER BRIDGE UNDER WAY IN VANCOUVER

Associated Engineering is part of a design-build team with Peter Kiewit sons and MMM Group to complete the Pitt River Bridge and Mary Hill Bypass Interchange in Port Coquitlam, Vancouver. The \$200 million project is part of B.C.'s Gateway Program to improve the movement of traffic and good in the Lower Mainland of B.C. The new bridge replaces two existing swing bridges with a seven-lane cable-stayed structure across Pitt River, providing 16 metres of vertical marine clearance.

Associated Engineering worked with International Bridge Technologies of California to develop the bridge concept. It has two main pylons with three planes of cable stays. The cable stay bridge design means there needs to be only one pier in the river, providing benefits for the environment. The project is due to be completed in November 2009. Don Kennedy is design manager for the Associated Engineering team.

Canadian Consulting Engineer,
1/7/2009

EXPANSION-CONTRACTION-CREEP SHRINK ON CIVIL ENGINEERING STRUCTURES

In my experience working on bridges and structures of all types for the past 60 years, I am always amazed at what happens at the expansion joints. It is common practice to make an educated guess at the anticipated movement, and then stand back to see what really happens

In practice we find that there are many reasons to cause major concrete structures to experience regular changes in length, such as the type of bridge (concrete/steel), the longitudinal shape of the girder (curved or straight), fluctuations in air temperature, and creep-shrink.

It must be remembered that girders are always moving and changing their length. Expansion joints have failed due to the permanent shortening of girders. This can be corrected, but it would be nice if we could accurately predict this phenomenon.

In my experience, I developed a special formula to predict the movement of a girder. I would calculate the predicted movement using conventional arithmetic, and add 100% for creep shrink, which in my opinion, was a safe movement calculation.

It is always nice to be correct when predicting the movement at the expansion joints, it just takes a little practice.

Submitted by
Stewart C. Watson

IN MEMORIUM

Gerard Francis Fox, Honorary Member of IABSEE, of Garden City, NY, passed away on December 12, 2008. Born in 1923, he graduated from Cornell University with distinction in 1948. He was a bridge designer at HNTB Corporation for 40 years, after having been a Partner for 21 years. A renowned expert in bridge design, he continued to consult on major bridge projects until 2007. He taught engineers at Columbia University for many years. He received numerous recognitions including, his designs for the Rio-Niteroi Bridge in Brazil and the Dames Point Bridge in Florida, which were awarded the ASCE Grand Conceptor Award. He received ASCE Howard and Roevbling Awards for innovation in long span bridges.

IJBRC extends its sincere condolences to his family and friends.

**SEISMIC DESIGN AND DETAILING OF
BRIDGE PROTECTION SYSTEMS**

**TECHNICAL SESSION - ACI
CONVENTION, NOVEMBER 2008**

**CO-SPONSORED BY IJBRC AND ACI
COMMITTEE 341**

The session was co-chaired by Ronald J. Watson, IJBRC Chairman and Joan Zhong-Brisbois of ACI Committee 341. The following abstracts provide a brief summary of the 6 papers presented. If you wish further detail, please contact the author(s) directly.

**SLIDING ISOLATION SYSTEMS FOR
CONCRETE BRIDGES**

Ronald J. Watson, President
R. J. Watson Inc.

The use of sliding isolation systems dates back to the early 1990's. Bridge engineers are choosing sliding isolators over conventional rubber bearings due to their low profile and high damping features.

Several case histories will be presented which highlight the benefits of sliding isolation bearings. In addition a discussion of the research which led to the development of sliding isolation bearings will be covered.

**SEISMIC/WIND CONTROL OF THE SUTONG
BRIDGE
USING HYBRID VISCOUS DAMPING DEVICES**

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Robert Schneider, Industrial/Seismic Products Sales
Manager
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ABSTRACT

The design of a component to provide combined spring and damping output is strongly driven by scaling issues for the discrete mechanical elements used to provide the required output forces. Multiple design concepts and technologies are available to provide damping and/or spring forces and the relative force requirements, life cycle, operative environment, and space envelope available usually will result in a specific type of damper and a specific type of spring being optimum.

The spring-damper isolator described was designed and manufactured for use on the world's largest cable stayed bridge – the Sutong Bridge over China's Yangtze River, completed in 2008.

**THE CONSTRUCTION PHASE FOR THE
REPLACEMENT OF THE
EXPANSION JOINT FOR THE ALEX
FRASER BRIDGE**

Eric de Fleuriot

Four modular joints (single support bar system) were replaced. We had implemented asphalt ramps and reinforced concrete temporary bridges to span a gap of approximately 5m on the bridge to enable demolition of the existing joints. Hydro-demolition combined with the use of jack hammers was utilized during demolition. The joints were installed successfully. Traffic management which was expected during planning stages to be a major issue went very well. No accidents were recorded. We used Agilia, a propriety cementitious material for the construction of the ramps and the joint. This material was placed at a slope of 5%, in one uninterrupted pour, during the night. Full closure of an entire carriageway was needed for the installation of the joint. The authors will be Bill Szto, Peter Chiu and myself.

**NEW SRMD DESIGN TOOL – THE MULTI–
SURFACE SLIDING ISOLATOR**

Paul Bradford

Sliding isolators are a type Seismic Response Modification Device, or SRMD, capable of producing high damping ratios for low to moderate movements. However, because of their property of near constant friction, as earthquake levels become higher their damping ratios fall. For very high seismic demands damping ratios may fall to that of high damping rubbers. For applications with high accelerations coupled with low allowable displacements, standard sliding isolators must be coupled with supplemental dampers to produce the desired response.

A multi-surface sliding isolator was developed to address this shortcoming. In this design, sliding interfaces are linked together in parallel to produce effective coefficients of friction three times that of standard isolators. The design was prototype tested and eventually incorporated in a small historic structure located outside Seattle, Washington. This presentation outlines the design, development and project testing for the multi-surface isolator.

**CFRP JACKETS AS AN EMERGENCY
REPAIR AND A PROTECTION SYSTEM
FOR BRIDGE COLUMNS**

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Abstract

As the urgent need for repair and rehabilitation of an aging infrastructure grows globally, so also does the adoption and use of CFRP by the structural engineering community. Recent large scale testing at the University of Nevada at Reno (UNR) of an emergency repair scheme has successfully demonstrated the complete rehabilitation of damaged bridge columns using CFRP jackets. As part of a continuing emergency repair research program funded by Caltrans, a two-span bridge meeting current seismic design guidelines was tested, repaired, and retested to failure. The objective was to determine how fast a bridge column that is out of service as a result of a major seismic event can be but back into service. The columns of the most critical pier were first tested until the longitudinal steel showed clear signs of the onset of buckling. Loose concrete was removed and replaced with a fast set grout. In addition, cracks were epoxy injected and the surface was prepared for CFRP wraps. The CFRP repair was completed and the bridge was re-tested after only 2-days and 5-hours. After undergoing simulated nearfault ground motions, the columns were subjected to a static push over test until a displacement ductility ratio of approximately twelve (12) was reached. It was verified that the bridge could be re-opened after only 3-to-4 days and that it could easily withstand aftershocks. This paper discusses the material characteristics of the CFRP repair and Caltrans emergency repair program as well as reports the results of UNR testing of the rehabilitated bridge columns.

**SELECTION OF EXPANSION JOINT
SYSTEMS TO
ACCOMMODATE LARGE SEISMIC
MOVEMENTS**

Larry Durain
Mark R. Kaczinski, PE

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In areas of high seismic risk, the analyses of existing bridge structures are quite often controlled by earthquake-induced forces and displacements. These structures are particularly vulnerable to earthquake-induced forces and displacements because of insufficient strength in the substructure and superstructure units as well as limited displacement capacities. Ongoing or recently completed retrofit programs for several bridges, including the I-40 Mississippi River Crossing, Golden Gate Bridge, and the Benica Martinez Bridge, have incorporated various bearing isolation systems to reduce seismic forces. Unfortunately, this economical retrofit scheme often leads to even larger multidirectional displacements of the bridge superstructure at the expansion joint locations. In addition, many new long span structures such as the Oakland Bay Bridge, Carquinez Bridge, and the Second Tacoma Narrows Bridge also exhibit large seismic movements. In many cases, conventional expansion joint systems are unable to accommodate the analytically predicted longitudinal, transverse, and vertical displacements for these seismically affected structures.

Conventional large movement bridge expansion joint systems (i.e. modular expansion joint systems and finger joint systems) are designed to accommodate primarily longitudinal joint movements with a limited amount of transverse movement capability.

Furthermore, detailing a watertight and fatigue resistant joint system for longitudinal movements greater than 360 mm is difficult. To solve this detailing problem, several seismic retrofit projects have specified the installation of a swivel joint modular expansion joint system. This special type of modular expansion joint system provides a watertight barrier and can be designed for extremely large longitudinal, transverse, and vertical displacements. In addition, the swivel joint modular expansion joint system has been fatigue tested and a full-scale specimen has also been dynamically tested at velocities in excess of 1 m per second as part of a comprehensive seismic test program.

The presentation will explain the limitations of conventional expansion joint systems and capabilities of the swivel style modular expansion joint assembly. Results of the seismic test program which verified the expansion joint system's performance during high velocity, multidirectional displacements will also be presented.



Gone Electronic

In order to reach you more quickly and help reduce our mailing costs, the IJBRC Newsletter has gone electronic.

Upcoming ACI Conventions

The following is a list of scheduled ACI conventions:

2009 – March 15 -19
Marriott Rivercenter
San Antonio, TX

2010 – March 21 – 25
Sheraton
Chicago, IL

2009 – November 8 – 12
Marriott New Orleans
New Orleans, LA

2010 – October 24 – 28
Westin & Convention Center
Pittsburgh, PA

For additional information, contact:

Event Services, ACI, PO Box 9094
Farmington Hills, MI 48333-9094
Telephone: 248.848.3795
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Please check your address label for accuracy. If changes are required, please notify the IJBRC Secretary by fax or email.

Fax 1-519-894-9169

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NEWSLETTER ARTICLES WANTED

Your IJBRC Executive continues to solicit articles of interest for inclusion in future editions of the IJBRC Newsletter. The semi-annual newsletter is our best way of keeping in contact with our membership. Submissions need to be on the topics of joints, bearings and seismic devices for concrete structures. They may include, but not be restricted to: book reviews, summaries of research in progress or completed, announcements of research grants received by individuals or groups, events or news items pertaining to joints, bearings and seismic devices, congratulations or bereavement notices.

Please forward such items of interest to the IJBRC Secretary by email; lfbraun@golden.net or fax 1-519-894-9169

Individual articles included in this newsletter are the opinions of said author(s)

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