Marketing/Technical Sessions

of the Composites Institute's

International Composites EXPO '99

May 10-12, 1999
MONDAY AFTERNOON

SESSION 1

MATERIAL ADVANCEMENTS FOR AUTOMOTIVE AND COMPRESSION MOLDED APPLICATIONS


1-B “Development of New Glass Mat Structural Thermoplastic Composites,” Enamul Haque and Walt Bassett, AZDEL Inc.

1-C “A New Low Profile Additive for Pigmentable SMC/BMC Molding,” N. Ujikawa and M. Takamura, NOF Corporation

1-D “Analysis of Fiber Wetting in SMC Formation,” Shoujie Li and L. James Lee, The Ohio State University; James E. Rinz, Premix

1-E “Newly Developed Low Pressure SMC Molding System,” Yasuhiro Obata, Hirohumi Izumi and Kouji Arakawa, Yamazaki Works, Hitachi Chemical Co., Ltd.

SESSION 2

ADVANCED FIBER ARCHITECTURE IN COMPOSITES:
BRAIDING, TEXTILE AND PREFORM TECHNOLOGY

Session Manager: Rick Price, A&P Technology


2-C “Performance and Productivity: Designing with Multiaxials,” Timothy A. Johnson, Brunswick Technologies, Inc.

2-D “The Use of Braided Reinforcements in RTM for High Volume, Low Cost Aerospace Parts,” Carla Caputo, Intellitec


2-F “Designing and Building with Non-Crimp Composite Reinforcements,” Philip Steggall, Johnston Industries Composite Reinforcements
MONDAY AFTERNOON

SESSION 3

ADVANCEMENTS IN CORROSION-RESISTANT APPLICATIONS AND MATERIALS

Session Manager: Frank Cassis, FAC Associates

3-A “Case History: A High Aspect Ratio FRP Stack Replaces Failed Steel,” Alfred L. Newberry, FEMech Engineering; Roger Beman, Palmer Industrial Products

3-B “Selecting Intermediate Performance Polyester Resin Systems for Corrosion-Resistant and High-Strength Applications,” Richard Martens, Reichhold

3-C “Lower USPE Emissions by Vinyl Toluene Modifications,” James Van Fleet, BP Amoco Chemical; Melvin Duhon, Deltech Corporation

3-D “High Performance Epoxy Vinyl Ester Line Meeting Current and Future Environmental Concerns,” L. Dean Doza, Ashland Specialty Chemical Company

SESSION 4

CONCRETE AND MASONRY REPAIR AND UPGRADE: COMPOSITES INCREASE THE SERVICE LIFE OF STRUCTURES

Session Manager: Gordon Brown, Clark-Schwebel Tech-Fab Company

4-A “The HITEC Evaluation Program for Composite Column Wrap Systems for Seismic Retrofit,” David Reynaud, HITEC, Civil Engineering Research Foundation; Vistasp M. Karbhari and Frieder Seible, University of California

4-B “Seismic Testing and Dynamic Analysis of Masonry Bearing and Shear Walls Retrofitted with Overlay Composite,” Ghassan K. Al-Chaar, USAERDC; Husein A. Hasan, TVA

4-C “Pile Restoration of the Lake Pontchartrain Causeway Using an All-Polymer Encapsulation (APE) Process,” Nancy Dulzer and Chris Ball, Master Builders, Inc.

4-D “Experimental Fracture Mechanics for the Bond between Composite Overlays and Concrete Substrate,” Victor Giurgiutiu, Jed Lyons, Michael Petrou and Dorothy Laub, University of South Carolina; Shannon Whitley, Underwriters Laboratories

4-E “Seismic Repair and Upgrade of Structural Capacity of Reinforced Concrete Connections: Another Opportunity for Polymer Composites,” Ayman S. Mosallam, California State University-Fullerton
SESSION 5

COMPONENTS FOR ACHIEVING DURABILITY THROUGH SUPERIOR DESIGN


5-B "Titanate and Zirconate Coupling Agent Applications in Thermoset Composites—1999 (I)," Salvatore J. Monte, Kenrich Petrochemicals, Inc.

5-C "Vacuum-Assisted Resin Transfer Molding of Unsaturated Polyester and Vinyl Ester Resins—SCRIMP," Huan Yang and L. James Lee, The Ohio State University

5-D "Using a Collaborative Process to Derive Analysis Methods, Computer Codes and Design Data for Composite Structures," Rudy Lukez, ESDU International

SESSION 6
THERMOSETTING COMPOSITES I: VOC REDUCTION TECHNOLOGY

Session Manager: Richard Martens, Reichhold

6-A "Low Emission Gel Coats," Larry Chirpich, CCP
6-B "The Effectivity of Styrene Suppressants," Edward Dotson and Dan Breidenbach, BYK-Chemie USA, Inc.
6-C "Reducing Emissions Using Equipment," Chad Macer, Glas-Craft
6-D "Styrene Emission Control," Trevor Lawton, AirProtekt Limited

SESSION 7
ADVANCEMENTS IN THE STRUCTURAL DESIGN OF PLASTIC LUMBER APPLICATIONS

Session Manager: Prabhat Krishnaswamy, Engineering Mechanics Corporation

7-C "Mechanical Properties of Recycled Plastic Lumber and Implications in Structural Design," Vijaya K. A. Gopu, National Science Foundation; Roger K. Seals, Louisiana State University

SESSION 8
ANSWERING THE QUESTION OF DURABILITY

Session Manager: Doug Barno, Composites Institute

As fiber-reinforced polymer (FRP) composites gain increased acceptance in structural applications, the designers, owners and constructors, who are largely unfamiliar with these materials, ask questions about composites’ in-service durability. Key among their concerns included long-term retention of structural properties, moisture resistance,
SESSION 8 (continued)

freeze/thaw and fire performance. The Market Development Alliance (MDA) has been working with the Civil Engineering Research Foundation (CERF) to identify the information needs of the civil engineer and the durability information available to address these concerns. This session reviewed the program with representatives of the program’s User and Research Panels presenting the results of their group’s investigations from the workshop organized by CERF in September 1998.

SESSION 9

PULTRUDED COMPOSITES FOR THE INFRASTRUCTURE

Session Manager: Jeff Martin, Martin Pultrusion Group, Inc.

9-A “Lateral-Torsional Response of FRP Beams under Three-Point Loading and LRFD Approach,” Mojtaba B. Sirjani, Norfolk State University; Zia Razzaq and Ram Prabhakaran, Old Dominion University

9-B “This Las Vegas Project Is Complicated, Innovative, and Invisible. How Do We Do It?” Dave Dooley and Kevin Shehee, Seasafe Inc.

9-C “An Overview—Composite Material Application in the Design of the U.S. Navy Causeway System,” Ben Oh, Naval Surface Warfare Center—Carderock Division

9-D “Beam-Column Design Equations for Pultruded Structural Shapes,” Ever Barbero, West Virginia University; Dustin Troutman, Creative Pultrusions, Inc.

9-E “Step-by-Step Engineering Design Equations for FRP Structural Beams,” Pizhong Qiao, Julio F. Davalos and Ever J. Barbero, West Virginia University; Dustin Troutman, Creative Pultrusions, Inc.

SESSION 10

CONCRETE REINFORCEMENT: AN FRP SOLUTION

Session Manager: Mike Guglielmo, Glasforms, Inc.

10-A “Advancements in GFRP Materials Provide Improved Durability for Reinforced Concrete,” Todd Boris and Max Porter, Iowa State University

10-B “Testing, Evaluating GFRP Cables for Prestressing,” Srinivasa L. Iyer and Ramu Mathukari, SDSM&T

10-C “FRP Dowel Bars,” Max L. Porter, Iowa State University

10-D “Case History: FRP Dowel Bars Stand Test of Time in Ohio Roadways,” Jim McCallion, RJD Industries, Inc.; Mike Guglielmo, Glasforms, Inc.
SESSION 11

PROACTIVE ENVIRONMENTAL STRATEGIES

Session Manager: Catherine Randazzo, Composites Institute


11-C "An Energy Balance Study of a Newly Developed Recycling System for Waste Plastics," Kanemasa Nomaguchi; Shinya Hayashi, Ship Research Institute

11-D "FRP Recycling in Japan," Kanemasa Nomaguchi

SESSION 12

PRACTICAL APPLICATIONS OF PLASTIC LUMBER

Session Manager: Prabhat Krishnaswamy, Engineering Mechanics Corporation of Columbus

12-A "RPLDB 1.0—Development of an Interactive Recycled Plastic Lumber Database for the Design Engineer," Prabhat Krishnaswamy, Engineering Mechanics Corporation of Columbus; Nu D. Ghadiali, Battelle Polymer Center


12-C "PVC Decking Boards and Docks," John H. Kampmann, Jr., MEA Engineers, Inc.

SESSION 13

2ND CERF/MDA DURABILITY WORKSHOP

Session Manager: Steve Cauffman, CERF; Joannie Chin, NIST; Vistasp Karbhari, UCSD

The 2nd CERF Durability Workshop was an open forum to continue the important FRP composites durability work that began in September 1998. The Research Panel will take the lead in identifying critical durability information needs, technology/information gaps, and a path forward to developing essential data over the next 12–18 months. The outcome of this workshop was to provide a dialogue of information regarding durability of composites. One of the critical tasks of the workshop determined the method, location, form and responsibility for an interactive international FRP composites durability database.
TUESDAY AFTERNOON

SESSION 14

REGULATORY NEWS: LEARN ABOUT THE REGULATORY ENVIRONMENT THAT AFFECTS YOUR BUSINESS

Session Manager:  Catherine Randazzo, Composites Institute


14-B “Update on EPA’s Toxic Release Inventory,” Marlae Fry, Society of the Plastics Industry, Inc.

14-C “ISO Certification for Processors/Fabricators,” Pat Toner, Society of the Plastics Industry, Inc.

14-D “OSHA’s Regulation of Workplace Exposure to Styrene,” Daniel Boyd, Daniel P. Boyd & Associates

14-E “SPI’s Compliance Assistance Program,” Marlae Fry, Society of the Plastics Industry, Inc.

SESSION 15

THERMOPLASTIC COMPOSITES: NEW INNOVATIONS

Session Manager:  Cliff Watkins, PPG Fiber Glass


15-C “Titanate and Zirconate Coupling Agent Applications in Thermoplastic Composites—1999 (II),” Salvatore J. Monte, Kenrich Petrochemicals, Inc.

SESSION 16

IRACC PLENARY SESSION

Session Manager:  Tony Nanni, University of Missouri-Rolla

The international organization, “International Research on Advanced Composites in Construction,” (IRACC) had a special meeting during the CERF/MDA Durability Workshop. One of IRACC’s most important functions is to provide timely information on FRP composites’ R&D activities around the world and to assist in the development and commercialization of composite applications. Participants discussed durability
TUESDAY AFTERNOON

SESSION 16 (continued)

issues and the generation of international durability information as they relate to national codes, design guidelines, materials specifications and test methods. In this special plenary session, plans for IRACC to contribute to a new international FRP composites durability research database were discussed. IRACC will offer its assistance in gathering and distributing pertinent technical information in support of a new FRP composites durability database. IRACC’s activities will be in collaboration with the MDA-sponsored CERF Durability program.

SESSION 17

DURABILITY WORKSHOP—THE NEXT STEPS

Moderator: Joannie Chin, NIST; Vistasp Karbhari, UCSD

This workshop presented the next steps to document, catalogue, and provide access to this wealth of data, which must be determined to allow users, researchers, and the composites industry to communicate in the future. Decisions reached during this important step will be the key to the future.

SESSION 18

IMPROVING THE DURABILITY OF COMPOSITES IN DEMANDING ENVIRONMENTS

18-A “Aging Effects in Polymer Composites,” Christos C. Chamis, NASA Lewis Research Center; Hugh L. McManus, Massachusetts Institute of Technology

18-B “Durability Fatigue Analysis of Adhesively Bonded Structural Joints,” Ken Lambert, Jeff Parker, Nurten Emek and Dan Leeser, ITW Plexus


18-E “Phenolic Composites in Japan,” Kanemasa Nomaguchi, Masami Kasai and Ichizo Weda, Japan Reinforced Plastic Society
WEDNESDAY MORNING

SESSION 19
LOAD AND RESISTANCE FACTOR DESIGN PROTOCOL FOR STRUCTURAL COMPOSITES

Session Manager: Joannie Chin, NIST

This session explored key topics including (1) What is LRFD?; (2) What benefits will the civil engineering and composites industries derive from a composite LRFD?; and (3) What steps and resources will be required to successfully develop an LRFD design protocol for composites?

SESSION 20
THERMOSETTING COMPOSITES II: PROGRESS IN CURING TECHNOLOGY

Session Manager: Tim Pepper, Ashland Specialty Chemical Company


20-B “Effects of Curing Agents on Kinetic and Rheological Changes of Vinyl Ester Resins at Low Temperatures,” Ling Li and L. James Lee, The Ohio State University

20-C “The Role of Monomeric and Dimeric Oligomers of Methyl Ethyl Ketone Peroxide in the Cure of Unsaturated Resin Formulations,” Delphine Nwoko and Ted M. Pettijohn, Witco Corporation

20-D “Effect of Secondary Monomer on Shrinkage Control of the Unsaturated Polyester (UP) Resin Cured at Low Temperature,” Xia Cao and L. James Lee, The Ohio State University

SESSION 21
ADVANCEMENTS AND UNIQUE PULTRUSION PROCESSING TECHNOLOGIES

Session Manager: Jeff Martin, Martin Pultrusion Group, Inc.

21-A “Enhancing Pultrusion Throughput for Greater Profit,” Stefan Uwe Koschnieder, Witco Corporation

21-B “Simulation and Experimental Verification of Resin Flow and Cure in the Injection Pultrusion Process,” Zhongman Ding, Shoujie Li, Huan Yang, L. James Lee, The Ohio State University; Herbert Engelen and P. M. (Mac) Puckett, The Dow Chemical Company
SESSION 21 (continued)

21-C “Experimental Comparison of Resin Injection Methods for Pultrusion,” Herbert Engelen, The Dow Chemical Company; Shoujie Li, The Ohio State University


21-E “Effects of Fillers on Pultrusion Processing and Pultruded Properties,” Ellen Lackey and James G. Vaughan, University of Mississippi; Frank Washabaugh and Doug Usifer, Engelhard Corporation; Paul Ubrich, Shell Chemical Company

SESSION 22

OVERCOMING OBSTACLES TO USING COMPOSITES IN THE INFRASTRUCTURE

Session Manager: Charlie McClaskey, Reichhold

22-A “Materials Design Considerations for the Use of FRP Composites for Renewal of Civil Infrastructure,” Vistasp M. Karbhari, University of California

22-B “FRP Composites for the Twenty-First Century Civil Infrastructure—Concepts for Structures Designed with Composites,” Vistasp M. Karbhari, University of California

22-C “Durability of FRP Reinforcement for Wood,” Beckry Abdel-Magid, Winona State University; Eoin Battles, Habib Dagher and Mohamed Iqbal, University of Maine

22-D “Structural Integrity Monitoring Using Smart Magnetostrictive Composites,” Jonathan Trovillion, Jason Kamphaus, Robert Quattrone and Justin Berman, U.S. Army Construction Engineering Laboratory

22-E “Magnetostrictive Tagging of Composites for Health Monitoring,” Scott R. White, University of Illinois at Urbana-Champaign

SESSION 23

THE ENGINEERED WOOD PRODUCTS INDUSTRY IN NORTH AMERICA . . . AN OPPORTUNITY FOR FRP COMPOSITES

Session Manager: Habib Dagher, University of Maine

In this session, leaders from the wood and composite industry explored opportunities for product development and new market growth.
WEDNESDAY AFTERNOON

SESSION 24

FOCUS ON REINFORCED GLULAM ... THE OPPORTUNITIES AND CHALLENGES

Session Manager: Doug Barno, Composites Institute

In this session, researchers and marketing representatives explored the application opportunities as well as the technical and commercial challenges facing the reinforced glulam technologies. The session concluded with a panel discussion of how FRP manufacturers and material suppliers can capitalize on the growing market of engineered wood composites.

SESSION 25

COMPOSITE BRIDGES: A CIVIL INFRASTRUCTURE SOLUTION

Session Manager: John Burke, PPG Fiber Glass

25-A “A Systematic Design Approach for FRP Bridges,” Julio F. Davalos and Pizhong Qiao, West Virginia University

25-B “Review of Field Data on the All-Composite Highway Bridge, TECH 21,” Dan Richards and Greg Solomon, Martin Marietta Composites; Rob Jack, North Carolina State University; Doug Thomson, Foster-Miller; Chris Dumlao, ACME Fiberglass Inc.


25-D “West Seboeis Stream FRP-Glulam Highway Bridge,” Robert F. Lindyberg and Habib J. Dagher, University of Maine