

FINAL PROGRAM



WORKSHOP ON COMPOSITES

AUGUST 23-27, 2006

RYERSON UNIVERSITY

Room LG11, George Vari Engineering Building
245 Church Street
Toronto, Ontario, Canada



Sponsored by

CANMET Natural Resources Canada

Pratt & Whitney Canada

Diamond Aircraft Canada

Kyoto Institute of Technology, Kyoto, Japan

Kobe University, Kobe, Japan

Ryerson University, Toronto, Canada

Concordia Centre for Composites, Concordia University, Montreal, Canada



WORKSHOP SCHEDULE



THURSDAY, AUGUST 24, 2006			
8:00-8:30	Introductory Remarks	12:05-14:00	Lunch
8:30-10:10	Natural Fiber Composites	14:00-15:40	Nanocomposites and Structures
10:25-12:05	Natural Fiber and Nanocomposites	15:55-17:35	Manufacturing
FRIDAY, AUGUST 25, 2006			
8:30-10:10	Mechanics I	14:00-15:40	Physical and Mechanical Properties
10:25-12:05	Mechanics II	15:55-17:35	Poster and Networking Sessions
12:05-14:00	Lunch	19:00-22:00	BANQUET
SATURDAY, AUGUST 26, 2006			
8:30-10:10	Applications	12:05-14:00	Closure of Workshop
10:25-12:05	Non Destructive Evaluation		Lunch

S O C I A L E V E N T S

A banquet will be held on Friday, August 25, 2006 at 19:00 at the Medieval Times Castle located in Toronto's Exhibition Place.

O P T I O N A L E V E N T S

The following activities are not included in the registration fees of the workshop. Each participant must pay his/her own meals (lunch and dinner) on August 23 and 27.

Wednesday, August 23, 2006

Industrial Tour of Two Canadian Companies

Departure at 8:30 from Ryerson University

☞ *Morning:* Tour of Diamond Aircraft

☞ *Lunch*

☞ *Afternoon:* Tour of Pratt & Whitney Canada

Arrival back to Ryerson University at 17:00

Sunday, August 27, 2006

Tour of Niagara Falls and Surrounding Region

Departure at 8:00 from Ryerson University

☞ *Morning:* Tour of Niagara Falls

☞ *Lunch*

☞ *Afternoon:* Tour of Niagara region

☞ *Dinner*

Arrival back to Ryerson University at 22:00

TECHNICAL PROGRAM

Thursday, August 24th

8:00 – 8:30 **INTRODUCTORY REMARKS**

- i. K. Behdinan (Ryerson University)
- ii. J. Lo (Natural Resources Canada)
- iii. T. Nishino (Kobe University)
- iv. C. Poon (Ryerson University)
- v. H. Hamada (Kyoto Institute of Technology)
- vi. S. V. Hoa (Concordia University)

8:30 – 10:10 **NATURAL FIBER COMPOSITES**

CO-CHAIRS: H. Kishi (University of Hyogo)

F. Trochu (Ecole Polytechnique de Montreal)

Self Reinforced Ecomposites, T. Nishino, N. Arimoto, S. Yamauchi, Kobe University, Japan

Poly (lactic acid) Nanocomposites: Fabrication Microstructure and Performance, J. Denault, M. T. Ton-That, F. Perrin-Sarazin, K. C. Cole, Industrial Materials Institute, National Research Council of Canada

Prediction of Environmental Effects on the Mechanical Behavior of Hemp and Coir Fibers Using Artificial Neural Networks, T. N. Ho, A. D. Ngo, Ecole de Technologie Supérieure, Université du Québec, Canada

Jute-Polyester and Jute-Epoxy Composites – A Comparative Analysis, S. Sahoo, U. S. Ishiaku, A. Nakai, H. Hamada, Kyoto Institute of Technology, Japan

Dispersion of Soybean Stock Nanofibers in a Plastic Matrix, B. Wang, M. Sain, University of Toronto, Canada

10:10 - 10:25 **BREAK**

10:25 – 12:05 **NATURAL FIBER AND NANOCOMPOSITES**

CO-CHAIRS: S. Caufield (Pratt & Whitney Canada)

A. Nakai (Kyoto Institute of Technology)

Effect of the Preparation Method on the Electrical Properties of Carbon Nanofibre/Epoxy Nanocomposites, A. Allaoui, S. V. Hoa, M. D. Pugh, Concordia University, Canada

Interfacial Adhesion in Bamboo Fiber/ Biodegradable Polymer Composites, M. Nakamura, S. Sahoo, K. Kitagawa, U. S. Ishiaku, M. Kotaki, A. Nakai, H. Hamada, Kyoto Institute of Technology, Japan

Epoxy/Clay Nanocomposites: Model to Calculate Diffusion Coefficient Due to Water Absorption, W. Liu, S. V. Hoa, M. Pugh, Concordia University, Canada

Expansion in the Use of Natural Fibres for Composite Applications, S. McKay, M. Alcock, J. Laxdal, Composites Innovation Centre, Canada

Materials and Practices of the North American Aboriginal People, B. Turner, Two Row Architect, Canada

12:05 – 14:00 LUNCH

14:00 – 15:40 **NANOCOMPOSITES & STRUCTURES**

CO-CHAIRS: M. Kotaki (Kyoto Institute of Technology)

R. Ganesan (Concordia University)

Improvement of Flammability Resistance of Epoxy Using Nanocomposites, L. Wu, S. V. Hoa, H. Wang, Concordia University, Canada

Electrically Conductive VGCF- Based Nanocomposites, M. Kotaki, K. Wang, C. He, Kyoto Institute of Technology, Japan

Rubbery and Glassy Epoxy-Clay Nanocomposites, T.-D. Ngo, M.-T. Ton-That, S. V. Hoa, K. C. Cole, Concordia University, Canada

Development of a Structural Composite Bypass Duct for Small Turbofan Engines and Future Composite Applications at Pratt & Whitney Canada, S. Caufeild, Pratt & Whitney, Canada

Debonding Detection in CFRP Bonded Structures Using Ultrasonic Waves Received by Optical Fiber Sensors, Y. Okabe, J. Kuwahara, N. Takeda, T. Ogisu, S. Kojima, University of Tokyo, Japan

15:40 – 15:55 BREAK

15:55 – 17:35 **MANUFACTURING**

CO-CHAIRS: A. Ngo (Ecole de Technologie Superieure)

H. Hatta (JAXA)

Fiber Architecture and Mechanical Properties of Braided Composite Tubes, A. Ohtani, A. Nakai, Kyoto Institute of Technology, Japan

Integral Heating for Composite Tooling, D. Raizenne, S. Hind, J. Poupore, Institute for Aerospace Research, National Research Council of Canada

Development of High Temperature Bonding Techniques Applied to Carbon Fiber Reinforced Carbon Composites (Heat Resistant Bonding Between C/C Composite), K. Goto, H. Hatta, M. Koyama, I. Shiota, JAXA, Japan

Optimization of Liquid Composite Molding Based on a Mold Coefficient Concept, V. Achim, S. Soukane, R. Gauvin, F. Trochu, Ecole Polytechnique de l'Université de Montréal, Canada

Mechanical Properties of CF/GF Hybrid Multi-axial Warp Knitted Fabric Epoxy Composite Materials, T. Sugie, A. Kasuya, A. Nakai, H. Hamada, Kyoto Institute of Technology, Japan

Friday, August 25th

8:30 – 10:10 **MECHANICS I**

CO-CHAIRS: Y. Nakanishi (Mie University)

J. Denault (National Research Council Canada)

Fatigue Damage Analysis Based on Stiffness Drop in Unidirectional GRP Composites, A. Shirazi, A. Varvani-Farahani, Ryerson University, Canada

Damping Behavior of Woven Fabric Composites, Y. Nakanishi, K. Matsumoto, Y. Yamada, M. Zako, Mie University, Japan

Design Process of a Composite Part for a Helicopter, F. Thériault, L. Lessard, McGill University, Montreal, Canada

Effect of Resins on Crack Propagation of Long-Fiber Reinforced Thermoplastic Composites, Y. Takai, N. Kawai, A. Nakai, H. Hamada, Kyoto Institute of Technology, Kyoto, Japan

On the Prediction of Bearing Failure in Fiber Metal Laminates, P. P. Krimbalis, C. Poon, Z. Fawaz, K. Behdinan, Ryerson University, Toronto, Canada

10:10 - 10:25 BREAK

10:25 – 12:05 **MECHANICS II**

CO-CHAIRS: S. McKay (Composites Innovation Center)

H. Suemasu (Sophia University)

Buckling Analysis of Variable-thickness Composite Beams Using a Higher-order Finite Element, A. Zabihollah, R. Ganesan, Concordia University, Montreal, Canada

On a Failure of a Solid Rocket Motor Case from Thick Filament Wound Hoop Layer, H. Suemasu, K. Sakajiri, Sophia University, Japan

Prediction of Flexural Strength of RC Beams Strengthened with Carbon Fibre Reinforced Polymer, S. Lee, S. Moy, M. Munro, University of Ottawa, Canada

Optimal Design of CFRP Pressure Vessels Reinforced by SMA Wires, G. Ben, M. Toyoda, Nihon University, Japan

Free Vibration Analysis of a Cracked Composite Cantilever Beam Using Dynamic Finite Elements, S. R. Borneman, S. M. Hashemi, H. Alighanbari, Ryerson University, Canada

12:05 – 14:00 LUNCH

14:00 – 15:40 **PHYSICAL AND MECHANICAL PROPERTIES**

CO-CHAIRS: N. Ikuta (Shonan Institute of Technology)

A. Varvani (Ryerson University)

CTBN/ Epoxy Polymer Alloys as Damping Adhesives and Energy Absorbable Resins, H. Kishi, A. Nagao, Y. Kobayashi, S. Matsuda, T. Asami, A. Murakami, University of Hyogo, Japan

Fixation of Silane and Film Former to p-Aramid Fiber with Nano-controlled Slits for Interfacial Reinforcement, N. Ikuta, F. Funami, A. Ohnishi, T. Kikutani, K. Kosuge, Shonan Institute of Technology, Japan

Evaluation of Bending Properties of Sandwich Beam Using Phenolic Foam Core Reinforced with Glass Fiber, A. Shoji, G. Ben, Nihon University, Japan

X-Ray Microdiffraction Analysis for the Interfacial Structure of Polymer Laminate, M. Kotera, T. Nishino, T. Taura, M. Saito, A. Nakai, T. Koyama, Y. Kagoshima, Kobe University, Japan

Mechanical Performance of Composite with L-Joint, H. Mizuno, K. Sugimoto, A. Nakai, H. Hamada, Kyoto Institute of Technology, Kyoto, Japan

15:40 – 15:55 BREAK

15:55 – 17:35 **POSTER & NETWORKING SESSION**

19:00 – 22:00 *er* **BANQUET** *er*

Saturday, August 26th

8:30 – 10:10 **APPLICATIONS**

CO-CHAIRS: J. Lo (Natural Resources Canada)

T. Morii (Shonan Institute of Technology)

Behaviour of Concrete Beam Reinforced with Hybrid FRP Composite Rebars, T. K. C. Tsang, M. Cheung, University of Ottawa, Canada

Textile Inserted One Unity Composites – Application to Car Construction, N. Kajjoka, M. Okamura, A. Nakai, H. Hamada, GP Daikyo, Japan

Structural Performance of Carbon Nanotube-reinforced Composites for Electrostatic Microactuators, B. Ashrafi, S. Vengallatore, P. Hubert, McGill University, Canada

Powder Metallurgy Processing of Ni-ZrO₂ MMC, L. Yao, H. Henein, P. Apté, L. Collins, University of Alberta, Canada

Investigation of Fly Ash-Aluminum Alloy Reaction Using XRD and XFS, E. Gikunoo, I. N. A. Oguocha, University of Saskatoon, Canada

10:10 – 10:25 BREAK

10:25 – 12:05 **NON-DESTRUCTIVE EVALUATION**

CO-CHAIRS: Y. Okabe (University of Tokyo)

C. Poon (Ryerson University)

Thermography for Non-Destructive Evaluation of Composite Structure, M. Genest, A. Fahr, Institute for Aerospace Research, National Research Council of Canada

Electromagnetic Interference Shielding Effect on Nanocomposites with Carbon Nanotube and Shape Memory Polymer, Q.-Q. Ni, C.-S. Zhang, Y. Zhao, G. Dai, Shinshu University, Japan

Acoustic Emission Characteristics of Damaged Glass Fiber Reinforced Plastics, T. Morii, Shonan Institute of Technology, Japan

Nondestructive Inspection Using Ultrasonic of Degraded GFRP, K. Sugimoto, Y. Fujii, A. Nakai, H. Hamada, Seikow Chemical Engineering & Machinery Ltd., Japan

Prediction of the Effective Transverse Thermal Conductivity of Carbon Based Textile Composites with Varying Constituent Properties and Reinforcement Geometry, S. Hind, D. Raizenne, F. Robitaille, IAR, National Research Council, University of Ottawa, Canada

12:05 – 14:00 CLOSURE OF WORKSHOP AND LUNCH

POSTER SESSION

Friday, August 25th

1. Future-Applied Conventional Technology, Engineering and Science, H. Hamada, A. Nakai, N. Miyamoto, Kyoto Institute of Technology, Japan
2. Degradation Behaviour of Natural Fiber Filled Composites, S. Toyoyama, S. Sahoo, M. Kotaki, A. Nakai, U. S. Ishiaku, H. Hamada, Japan
3. Identification of Equivalent Elastic Parameters for Roll Core of Sandwich Panels, K. Hosokawa, T. Sakata, Chubu University, Japan
4. Polymer Composite with High Strength and Low Modulus Using Braided Fibers, T. Nishino, S. Ohtsubo, Kobe University, Japan
5. Polymer Composites with Reduced Thermal Expansion, T. Nishino, M. Kotera, Y. Nishiguchi, Y. Sugiura, Kobe University, Japan
6. Preparation and Mechanical Properties of Fluorinated-mica Modified with Dialkyl Dimethyl Ammonium Cation/ Poly(styrene-ethelenebutylene-stylene) Copolymer(SEBS) Nanocomposites, K. Nagata, S. Hikasa, S. Yahiro, K. Katoh, E. Yamada, Industrial Technology Center of Okayama Prefecture, Japan
7. Proposal of Design Method for GFRP Pipe using SMC, E. Kitagawa, A. Nakai, H. Hamada, Ashimori Industry CO. Ltd., Japan
8. Shape Effect of Bamboo Fiber on Mechanical Properties of Eco-composites, K. Kitagawa, H. Okumura, H. Hamada, Kyoto Municipal Industrial Research Institute, Japan
9. Study on Mechanical Properties of PET/ Textile Insert Injection Moldings, H. Hamada, T. Ohta, H. Inoya, A. Nakai, M. Kotaki, Kyoto Institute of Technology, Japan
10. Surface Treatment of Inorganic Particles with Silane Coupling Agent Having Mercapto Group and Interfacial Structure of Filled Elastomer, Y. Nakamura, T. Gotoh, A. Harada, T. Iida, K. Nagata, Osaka Institute of Technology, Japan
11. Wood and Flax Fiber Polyolefin Composites, J. Denault, M. T. Ton-That, J. Bloch, Industrial Materials Institute, National Research Council of Canada