National Educators’ Workshop: Update 97

Standard Experiments in Engineering Materials, Science, and Technology

Compiled by
James E. Gardner and Ginger L. Freeman
Langley Research Center, Hampton, Virginia

James A. Jacobs
Norfolk State University, Norfolk, Virginia

Alan G. Miller and Brian W. Smith
Boeing Commercial Airplane Company, Seattle, Washington

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PREFACE

NEW:Update 97, hosted by Boeing Commercial Airplane Company in Seattle, Washington, on November 2 - 5, 1997, marked our second workshop west of the Mississippi. Seattle took a break from heavy rains and provided beautiful weather.

We built on past themes, activities, and presentations based on extensive evaluations from participants of previous workshops. This 12th annual NEW:Update continued to the work of strengthening materials education. About 120 participants witnessed demonstrations of experiments, discussed issues of materials science and engineering (MSE) with people from education, industry, government, and technical societies; heard about new MSE developments; and chose from nine, three-hour mini workshops in state-of-the-art Boeing production facilities and R&D laboratories to attend. Faculty in attendance represented high schools, community colleges, smaller colleges, and major universities. Undergraduate and graduate students also attended and presented.

The generous fashion in which Alan Miller and Brian Smith, and the many scientist, engineers, and other staff of Boeing, provided funding, opened their facilities, developed presentations and activities, and acted as all around gracious hosts insured the on-going quality of this important educational series of workshops. With the very demanding production schedule Boeing faces, we are indebted for their sacrifices in hosting this workshop.

NEW:Update 97 participants saw the demonstration of about forty experiments and aided in evaluating them. We also heard updating information relating to materials science, engineering and technology presented at mini plenary sessions that focused on technology from aircraft and automotive technology, and materials research at Brookhaven National Lab. Through the considerable efforts of Kris Kern at LANL, Raj Chaudhury of NSU, and Roger Marshall and William Gerds of Boeing, most of the workshop was broadcast over the Internet.

The experiments in this publication can serve as a valuable guide to faculty who are interested in useful activities for their students. The material was the result of years of research aimed at better methods of teaching materials science, engineering and technology. The experiments were developed by faculty, scientists, and engineers throughout the United States. There is a blend of experiments on new materials and traditional materials. Uses of computers in MSE, designing experiments, and a variety of low-cost experiments were among the demonstrations presented.

Experiments underwent an extensive peer review process. After submission of abstracts, selected authors were notified of their acceptance and given the format for submission of experiments. Experiments were reviewed by a panel of specialists through the cooperation of the Materials Education Council. Most authors received comments from the panel prior to NEW:Update 97, allowing them to make necessary adjustments prior to demonstrating their experiments. Comments from workshop participants provided additional feedback which authors used to make final revisions which were submitted for the NASA editorial group for this publication.
The Materials Education Council of the United States publishes selected experiments in the *Journal of Materials Education (JME)*. The international *JME* offers valuable teaching and curriculum aids including instructional modules on emerging materials technology, experiments, book reviews, and editorials to materials educators. On a personal note, MEC honored Jim Jacobs as "1996 Materials Educator of the Year" at the December MRS meeting in Boston. This award must be shared with all the people who have contributed to the NEW:Update series, our textbooks, and the many activities of our national materials education network.

Videotapes were made of the workshop by Boeing. Transparency masters for the mini plenary sessions are included in this publication. As with previous NEW:Updates, critiques were made of the workshop to provide continuing improvement of this activity. The evaluations and recommendations made by participants provide valuable feedback for the planning of subsequent NEW:Updates.

**NEW:Update 97** and the series of workshops that go back to 1986 are, to our knowledge, the only national workshops or gatherings for materials educators that have a focus on the full range of issues and strategies for better teaching about the entire complement of materials. **NEW:Update 97**, with its diversity of faculty, industry, and government MSE participants, served as a forum for both formal and informal issues facing MSE education that ranged from the challenges of keeping faculty and students abreast of new technology to ideas to ensure that materials scientists, engineers, and technicians maintain the proper respect for the environment and human safety in the pursuit of their objectives.

We demonstrated the *Experiments in Materials Science, Engineering & Technology (EMSET)* CD-ROM with all 213 experiments from the first decade of NEW:Updates. This CD ROM is another example of cooperative efforts to support materials education. The primary contributions came from the many authors of the demo and experiments for NEW:Updates. Funding for the CD came from both private industry and federal agencies. Please see the attached information for obtaining the CD set.

We express our appreciation to all those who helped to keep this series of workshops viable. Special thanks goes to those on the planning committee, management team, hosts, sponsors, and especially those of you have developed and shared your ideas for experiments, demonstrations, and novel approaches to learning. All of us who participated in the workshop appreciated the excellent coordination of activities by Diana LaClaire, Kirsten Maassen, and Ginger Freeman.

We hope that the experiments presented in this publication will assist you in teaching about materials science, engineering and technology. We would like to have your comments on their value and means of improving them. Please send comments to Jim Jacobs, School of Technology, Norfolk State University, Norfolk, Virginia 23504.

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Update 97: Standard Experiments in Engineering Materials, Science, and Technology

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PARTICIPANTS
Kyo D. Song
Norfolk State University
School of Technology
2401 Corprew Avenue
Norfolk, VA 23504
757-864-8105
kdsong(vger.nsu.edu

F. Xavier Spiegel
Spiegel Designs
3122 Parktowne Road
Baltimore, MD 21234
410-661-2192

Kathleen Stair
Northwestern University
2225 N. Campus Drive
Evanston, IL 60208

Robert G. Stang
Department of Materials Science & Engineering
University of Washington
Roberts Hall
Box 352120
Seattle, WA 98195-2120
206-543-2623

Thomas G. Stoebe
Materials Science and Engineering
University of Washington
302 Roberts Hall 352120
Seattle, WA 98195-2120
206-543-2600
stoeb(e@uw.washington.edu

Eric F. Suhr
New York State Education Department
674 Education Building Annex
Albany, NY 12234
518-486-3659

Laura L. Sullivan
Associate Professor
Manufacturing Systems Engineering
Kettering University
1700 W. Third Avenue
Flint, MI 48504
810-762-7950
lsulliva(a@nova.gmi.edu

Torkel Svanes
Stark Design
P. O. Box 429
Morristown, NJ 07963
973-734-9911
svanes(a)starkdesign.com

Karl J. Swyler
Office of Educational Programs
Science Education Center
Brookhaven National Laboratory
Associated Universities, Inc.
P. O. Box 5000
Upton, NY 11973-5000
516-344-7171
swyler(a@bnli.gov

Katie Thorp
University of Dayton Research Institute
300 College Park
Dayton, OH 45469-0168
937-255-1138
thorpke(a@mil.wpafb.af.mil

Carlos F. Umana
Director Department of Materials
School of Mechanical Engineering
University of Costa Rica
San Pedro, Costa Rica
506-235-6350
carumaz@terraha.fing.ucr.ac.cr

Linda Vanasupa
Materials Engineering Department
California Polytechnic State University
San Luis Obispo, CA 93407
805-756-1537
lvanasupa@tuba.calpoly.edu

Toby Ward
College of Lake County
19351 W. Washington Street
Grayslake, IL 60030
847-356-7918
tward(a@clc.cc.il.us

xxxix
John Marshall  
University of Southern Maine  
John Mitchell Center  
Gorham, ME 04038  
207-780-5447  
marshall(at)usm.maine.edu

James V. Masi  
Western New England College  
Department of E.E., M/S 2168  
Springfield, MA 01119  
413-731-3155  
jmasi(at)wnce.cdu

Darlene Mathias  
Cosumnes River College  
8401 Center Parkway  
Sacramento, CA 95823-5799  
916-688-7394

Robert A. McCoy  
Mechanical Engineering Department  
Youngstown State University  
Youngstown, OH 44555  
330-742-1736  
ramccoy(at)cc.ysu.edu

Andrew McGeorge  
Arizona State University  
Box 876006  
Tempe, AZ 85287-6006  
amcgeorg(at)asu.edu

Alfred E. McKenney  
516 Fairfax Way  
Williamsburg, VA 23185  
757-221-0476  
hdj41a(at)prodigy.com

Seaton McLennan  
Linn Benton Community College  
6500 SW Pacific Blvd.  
Albany, OR 97321  
541-917-4630  
mclennan(at)lbcc.cc.or.us

Kathi Medcalf-Flaker  
Mt. Rainier High School  
22450 19th Avenue S  
Des Moines, WA 98198  
253-838-6508

Mike Mcier  
University of California Davis  
Department of Chemical Engineering and Materials Science  
Davis, CA 95616  
916-752-5166  
mlmcier(at)ucdavis.edu

Jane M. Mengel  
Modesto Junior College  
435 College Avenue  
Modesto, CA 95350  
209-575-6929  
jane.mergel(at)ccc.infonet.edu

Alan G. Miller  
Chief Engineering for Structures  
Boeing Materials Technology  
Boeing Commercial Airplane Co.  
P. O. Box 3707, MS 73-03  
Seattle, WA 98124-2207  
425-237-3516

Jeff Morrow  
6610 Tanglewood Lane  
Lincoln, NE 68516

Andrew Nydam  
Olympia High School  
1304 North Street  
Olympia, WA 98501  
360-753-8958  
anydam(at)osd.wednet.edu

Richard Ortega  
New Mexico Inst. of Mining & Technology  
801 Le Roy Place  
Acoma, NM 87801  
505-835-5525

James Ortman  
Energy Concepts, Inc.  
595 Bond Street  
Lincolnshire, IL 60069  
800-621-1247 ext 319

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James W. Johansson  
Moraine Park Technical College  
235 N. National Avenue  
Fond du Lac, WI 54935  
920-922-1204  
disbayas@vbe.com

Alan K. Karplus  
Department of Mechanical Engineering  
Western New England College  
1215 Wilbraham Road  
Springfield, MS 01119-2684  
413-782-1220/1272 message  
akarplus@wnee.edu

Diana P. LaClaire  
Norfolk State University  
2401 Corprew Avenue  
Norfolk, VA 23504  
804-683-9072  
d_laclaire@vger.nsu.edu

Alan K. Karplus  
Department of Mechanical Engineering  
Western New England College  
1215 Wilbraham Road  
Springfield, MS 01119-2684  
413-782-1220/1272 message  
akarplus@wnee.edu

Francis S. Lai  
University of Massachusetts - Lowell  
1 University Avenue  
Lowell, MA 01854  
508-934-3434  
lai@cae.uml.edu

Ping Liu  
Eastern Illinois University  
101 Klehm Hall  
Charleston, IL 61920  
217-581-6267  
cfpl@aieiu.edu

Mark H. Long  
Spanaway Lake High School  
1305 168th Street E  
Spanaway, WA 98387  
353-539-6200  
FAX 253-539-6259  
markl@bethel.wednet.edu

George Loutts  
Center for Materials Research  
Norfolk State University  
2401 Corprew Avenue  
Norfolk, VA 23504  
757-683-2031  
g louhts@vger.nsu.edu

David W. Lund  
Boeing High Speed Civil Transport  
Aero Dynamics  
MS 6H-FIC  
Seattle, WA 98129  
david.w.lund@boeing.com

Kirsten Maassen  
Boeing Commercial Airplane Group  
P. O. Box 3707, 73-47  
Seattle, WA 98124-2207  
425-234-5128
Tracy Furutani  
North Seattle Community College  
9600 College Way North  
Seattle, WA 98103  
206-528-4501

Luis Gardea  
University of the Pacific  
M.E. Department  
Khoury Hall  
3601 Pacific Avenue  
Stockton, CA 95211  
209-339-7200

James E. Gardner  
Technical Staff Assistant  
NASA Langley Research Center  
Building 1219, Room 217  
MS 118  
Hampton, VA 23681-0001  
757-864-6003  
j.e.gardner@larc.nasa.gov

David Garza  
Prentice-Hall  
One Lake Street  
Upper Saddle River, NJ 07458  
201-236-7774  
dave_garza@prenhall.com

Richard Gibbons  
President  
Energy Concepts, Inc.  
595 Bond Street  
Lincolnshire, IL 60069

Deborah Ann Goodwin  
Chillicothe High School  
1535 Calhoun  
Chillicothe, MO 64601  
816-646-0700  
awa025@mail.connect.more.net

Ulf G. Goranson  
Chief Engineer, Structures  
Laboratories & Technology Standards  
Boeing Commercial Airplane Group  
P. O. Box 3707, MS 45-10  
Seattle, WA 98124-2207  
206-665-9922  
ulf.g.goranson@boeing.com

Thomas Gorman  
Department of Forest Products  
University of Idaho  
Moscow, ID 83844-1132  
208-885-7402

Linda S. Griggs  
Western Wisconsin Tech. College  
304 N. 6th Street  
LaCrosse, WI 54601  
608-789-4798  
griggs@al.western.tec.wi.us

Charles W. Haines  
Rochester Institute of Technology  
76 Lomb Memorial Drive  
Rochester, NY 14623-5604  
716-475-2029  
cwhemc@rit.edu

Matthew Hsu  
Materials World Modules  
Northwestern University  
2115 North Campus Drive  
Evanston, IL 60208-2610  
847-491-3734  
mhsu@nwu.edu

John B. Hudson  
Materials Science & Engineering Department  
Rensselaer Polytechnic Institute  
Troy, NY 12180  
518-276-6447  
hudsoj@rpi.edu

James A. Jacobs  
Norfolk State University  
School of Technology  
2401 Cople Avenue  
Norfolk, VA 23504  
804-683-8109  
j Jacobs@vger.nsu.edu

Kenneth L. Jewett  
National Institute of Standards and Technology  
U. S. Department of Commerce  
Materials Science and Engineering Laboratory  
1 Bureau Drive  
Gaithersburg, MD 20899  
301-975-2608  
kjewet@nist.gov
NATIONAL EDUCATORS' WORKSHOP 1997
PARTICIPANTS LIST

Cheryl S. Alderman
NCSU Engineering Programs at UNCA
UNCA 303 RBH
One University Heights
Ashville, NC 28804
704-251-6640
alderman@eos.ncsu.edu

Roger M. Baltrusch
Walla Walla College
204 South College Avenue
College Place, WA 99324
508-527-2765
baltro@wwc.edu.

Michael P. Berg
Southeast Community College
600 State Street
Milford, NE 60845
402-761-8207
mpberg@scen.cc.ne.us

Robert Berrettini
1019 Amelia Avenue
St. College, PA 16802-4242
814-237-0301
rbb3@apsu.edu

Ronald R. Biederman
Worcester Polytechnic Institute
100 Institute Road, Washburn 307
Worcester, MA 01609
508-831-5453
rrba@wpi.edu

Chester D. Blake
Walla Walla College
204 South College Avenue
College Place, WA 99324
509-527-2713
FAX 509-527-2253
blakeh@wwc.edu

Roy Bunnell
6119 W. Willamette
Kennewick, WA 99336
509-783-3567
buntno@kso.org

Eric M. Cadwell
Richland High School
950 Long Avenue
Richland, WA 99352

John A. Cadwell
Richland High School
930 Long Avenue
Richland, WA 99352

William D. Callister
2419 East 3510 South
Salt Lake City, UT 84109
801-278-8611
bill.callister@am.cc.utah.edu

Margaret Chadwick
Ford Motor Company
2000 Rotunda Drive
P. O. Box 2053, MD 3182
SRL
Dearborn, MI 48121-2053
313-594 4634

S. Raj Chaudhury
Center for Materials
Norfolk State University
Norfolk, VA 23504
804-683 2381
raj@vigyan.nsu.edu

Eleanor Christensen
Shoreline Community College
16101 Greenwood Avenue N
Seattle, WA 98133
206-546 4504
echristens@etc.edu

Richard Chung
Professor of Division of Technology
San Jose State University
College of Applied Sciences and Arts
One Washington Square
San Jose, CA 95192-0061
408-924-3195
wrchung@sjsvm1.sjsu.edu
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Paul W. Brown  
Professor of Materials Science  
The Pennsylvania State University  

Else Breval  
Senior Research Associate  
Materials Research Laboratory  
The Pennsylvania State University  

Witold Brostow  
Professor of Materials Science  
Center for Materials Characterization  
University of North Texas  

William Callister  
Adjunct Professor of Metallurgy  
University of Utah  

Michael Grutzeck  
Associate Professor  
Materials Research Laboratory  
The Pennsylvania State University  

Rafat Malek  
Senior Research Associate  
The Pennsylvania State University  

Howard Pickering  
Distinguished Professor of Metallurgy  
The Pennsylvania State University  

Clive Randell  
Associate Professor of Materials Science  
The Pennsylvania State University  

Rustum Roy  
Evan Pugh Professor of the Solid State  
The Pennsylvania State University  

Darrell Schlom  
Associate Professor of Materials Science  
The Pennsylvania State University  

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## MANAGEMENT TEAM

### Workshop Co-Directors

Alan G. Miller and  
Brian W. Smith  
Boeing Materials Technology  
Boeing Commercial Airplane Company  

James A. Jacobs  
Professor of Engineering Technology  
Norfolk State University  

### NASA LaRC Coordinators

James E. Gardner and Ginger Freeman  
National Aeronautics and Space Administration  
Langley Research Center  

### Director's Assistant

Diana P. LaClaire  
Norfolk State University  

### Committee Members

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9. Pitch core (BMS 8-339)
10. ATL CFRP tape (BMS 8-256)
11. AL Mesh (BMS 8-336)

Note: 7050-T76 (BMS 7-325), 6013-T6, and GLARE (BMS 7-326) sheet not shown