

The World of Materials

News from the Department of Materials Science and Engineering
Virginia Polytechnic Institute and State University

Vol. 1, No. 2, Fall 1996

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Greetings From the Department Head Ronald S. Gordon

The Materials Science and Engineering Department (MSE) completed another eventful and successful year. Our undergraduate B.S. program received a positive evaluation from the Accreditation Board for Engineering and Technology (ABET), while our masters and doctoral degree programs received a very favorable report from a distinguished external review panel. In addition to these reviews, the MSE Department began work on an outcomes assessment (mandated by the Commonwealth) of all its degree programs and completed an academic program review this spring of its undergraduate and graduate degree programs which was mandated by the Provost. For the 95/96 year, the Department granted 17 B.S., 12 M.S. and 7 doctoral degrees, respectively. In this newsletter a listing of all of these graduates is presented along with the graduates of the Department at all degree levels since 1990. Research funding and overhead earned for the University by the MSE Department in the 94/95 fiscal year totaled \$2.5 million and \$374 thousand, respectively.

At the time of the last newsletter, the Dean of Engineering, Dr. F. William Stephenson, and the MSE Department were giving serious consideration to a merger with the Electrical Engineering Department in the College of Engineering. After extensive discussions with the faculty of both departments, various review panels, and concerned alumni, Dean Stephenson has decided that the MSE Department will continue as a separate academic unit in the College of Engineering. Quoting from his April 30 memorandum to the MSE faculty,

...I believe it critical that MSE continue as an identifiable unit which confers degrees at the undergraduate and graduate levels. The MSE Department must continue in the direction of

MSE Alumni Survey Results

Last summer, for the purpose of assessing the quality of undergraduate education within the department and the university, the Materials Science and Engineering Department conducted a survey of its alumni who received a B.S. between 1989 and 1995. The response rate of 35% was very good.

Demographics

Among respondents, 82% were male, 18% were female, 60% graduated between 1989 and 1992 and 40% graduated between 1993 and 1995. The majority of respondents are currently specializing in some area of materials, with 32% in metals, 21% in polymers/plastics, 18% in electronic/optical materials, 16% in ceramics, 8% in composites, and 13% in other areas such as computer programming.

Half of the respondents are employed by private industry, while a third are pursuing graduate studies. A small group are either serving in the military or are working for a government agency or laboratory, and one respondent is self employed.

"[Materials Engineers] work with every other type of engineer in the workplace, why not at school also?"

Employment

In terms of current occupations, of those pursuing graduate studies, all are studying in an engineering/science field. Current occupations in order of the most responses were manufacturing, quality assurance/control, research, product development, and technical management. Other occupations included oil and gas production, network administration, equipment design, military service (pilot and Army Intelligence), and pharmaceutical-related work. Engineering was listed as the primary occupation for almost half of the respondents, while 8% are metallurgists and 12% are in other areas. Starting salaries range from \$22,000 to \$42,000.

generic materials science and engineering education at both the undergraduate and graduate levels covering all classes of materials and materials science. However, I believe the role of the department as an interdisciplinary unit is one that must be extended. Therefore, I will actively encourage links with other departments that have substantial materials

Department should extend interdisciplinary role

applications. In the future, new appointments to MSE will primarily be made on a joint basis. In this way, we can build upon the model established with ESM (as well as with Chemistry and Geological Sciences) while forging new links with other units. I will also expect to see some existing MSE faculty seek joint appointments with other departments, and I will encourage joint appointments of faculty in other engineering departments with MSE....[S]ignificant opportunities exist for joint appointments between MSE and EE faculty in the areas of electronic materials, fiber optics, and computers....[D]iscussions are already underway to extend this model to include joint appointments with ME in such areas as turbo machinery, combustion systems, and design and manufacturing.”

Along these lines, MSE and EE expect to consummate up to five joint faculty appointments during the forthcoming academic year. Faculty in these appointments will play a key role in Virginia Tech's participation in the new Virginia Microelectronics Consortium (VMEC) as it serves the emerging microelectronics industry in the Commonwealth. Discussion will begin in earnest this fall exploring the possibilities of joint faculty appointments between MSE and the Mechanical Engineering Department.

Last fall, all undergraduate degree programs in the College of Engineering were reviewed by ABET. As in 1992, MSE received a very favorable report. Quoting from the final report of this year's review,

“The faculty of the program in Materials Science and Engineering reflects the balance and breadth of the department and its curriculum. The faculty is highly motivated, and possesses the skills to effectively present the five areas of concentration. Its continued efforts to improve the curriculum demonstrate its commitment to the undergraduate engineering experience. The design content of the curriculum assures a meaningful, major engineering design experience. Matrixed education courses, such as the Writing through

the Curriculum course, are notable in their effectiveness. Students interviewed were very enthusiastic about the Department, its courses and faculty. All complimented the openness and accessibility of the faculty. All would recommend the program and felt that greater awareness of the program to the incoming freshman would increase department enrollment. The department functions as a cohesive unit and possesses able and active leadership. Both the faculty and department chair are actively addressing the pressing issues of increasing enrollment and improving facilities. While adequate, the classroom facilities and laboratory space issues cited in previous ABET evaluations need addressing. Facilities in Holden Hall are in urgent need of refurbishing. The department also has additional needs for expanded undergraduate teaching laboratories.”

The College of Engineering was recently informed by ABET that all 13 of its EAC ABET accredited programs (including MSE) have received an outcome of NGR (accredited until the Next General Review, expected in the year 2001). The co-op option of all undergraduate programs in the College also received the same accreditation status.

In April, the graduate programs (masters and doctoral) of the MSE Department and the interdisciplinary Materials Engineering Science (MESc) doctoral program were reviewed by an external review committee chaired by Professor Gregory C. Farrington, Dean of Engineering at the University of Pennsylvania. Other members of this review committee included Professor A.T. Dibenedetto (Chemical Engineering and Institute of Materials Science, University of Connecticut), Dr. Norman Gjostein (Director, Materials Research Laboratory, Ford Motor Company), Dr. Gordon Pike (Senior Manager, Electronic Materials, Sandia National Laboratory), and Professor Richard Wool (Center for Composite Materials, University of Delaware). Both the MSE Department and the MESc doctoral program received favorable and constructive reviews from this committee. Quoting from the Review Committee's final report with respect to MSE,

MSE has made dramatic progress over the past several years in modernizing its areas of research and curriculum, as well as in attracting a strong new faculty whose research and teaching are helping to poise the department for leadership in the future. This process is not yet over, but it is well underway and generally on course. MSE has undergone impressive growth in research income, overhead generation, publications and presentations, and patents. MSE has a fine Ph.D. program, one that is stronger for being under the MESc umbrella....

MESc should be seen as a creative confederation that is pointing to the future and a genuine asset to MSE. Other departments should envy MSE its opportunities through the MESc connection rather than consider it to be somehow less than whole. MSE is academically a strong program that has developed quickly and well over the past 6-8 years. It is truly interdisciplinary and is on an excellent trajectory. Virginia Tech is genuinely fortunate to have a department of this level of achievement and quality of leadership.”

***Cooperation, mutual commitment,
and creativity are essential for
achieving the promise of materials
research and education at
Virginia Tech***

Quoting from the report with respect to the MESc Doctoral program,

“MESc appears to be a very successful program, one that would be admired by many other universities working to create more effective integration of their programs of materials research and education. Given the difficulty of creating multidisciplinary programs of this sort, Virginia Tech should be proud and pleased that MESc exists and works so well. The breadth of materials research and education at Virginia Tech, as reflected in the MESc program, is remarkable and a real competitive advantage for the university. MESc is an excellent program and a true asset to Virginia Tech. The program gives real cache to the university and appears to attract a strong cadre of students who are proud to be members of it.”

Overall recommendations and conclusions of the Graduate Review Committee are summarized here:

“The committee strongly endorses the continued existence of an independent, though strongly interactive, MSE department. MSE faculty and leadership should focus on achieving genuine excellence and balance in departmental appointments, research and education; balancing its departmental economy through the growth of teaching programs as well as research; and leading in the creation of new collaborative ventures with other departments. Doubling its number of undergraduate majors would be a good start, but one that should be accompanied by increased teaching of materials courses for students in other majors and the development of a strong and innovative

program of masters level education to serve the growing needs of industry in Virginia and the region. MESc and MSE leadership should clearly understand that each is an asset to the other, and that the success of one cannot be achieved without the success of the other. The leadership of MESc should keep in mind that approximately half of the MESc students do theses in the MSE department. MESc participants should understand that the program has a vested interest in creating and maintaining an outstanding MSE department. It does not appear obvious that MESc would be able to thrive in the absence of a strong and independent MSE department. Cooperation, mutual commitment, and creativity are essential for achieving the promise of materials research and education at Virginia Tech.”

Taking both the external undergraduate and graduate program reviews into consideration and reflecting on the extensive discussions related to the proposed merger of MSE with EE, the major issues facing the MSE Department in the near term include: (1) increasing undergraduate enrollments, (2) expanding masters level programs which serve Virginia industry, (3) increasing collaborative teaching and research interactions with the mainline departments in the College of Engineering such as Electrical and Mechanical Engineering, (4) expanding course offerings in materials to other engineering departments, and (5) improving and expanding (as enrollments justify) undergraduate teaching laboratories particularly in cooperation with EE and ME.

Periodically, all academic departments in the University, under guidelines from the State Council of Higher Education in Virginia (SCHEV), are required to conduct an outcomes assessment of their degree programs. As part of this effort, MSE has conducted a survey of its B.S. graduates since 1990. The results of this survey are presented in this newsletter. At this time, let me express my sincere appreciation to all alumni of our undergraduate program who took the time to respond to the survey.

In this issue of *The World of Materials*, we profile one of our distinguished faculty members, Dr. Jesse J. Brown, Jr., and one of our very accomplished graduating seniors, Jeff Glenning. I would like to thank all alumni who wrote me letters related to the proposed merger with the Electrical Engineering Department. All of your letters were forwarded to Dean Stephenson for his review and evaluation. The MSE Department has successfully come through a stressful period in its history. The Department has a promising future. I look forward to sharing our progress with you in future newsletters. In the next issue we will profile MSE's participation in undergraduate cooperative (CO-OP) education and in the new Practice Oriented Master's Degree Program.

MEET PROFESSOR JESSE J. BROWN

Professor Jesse Brown is a man of diverse talents. He is equally at home in a laboratory, behind a desk, in front of a classroom, driving a tractor, or on a golf course. Since joining the Materials Science and Engineering Department at Virginia Tech in 1967, Dr. Brown has built an impressive record of research, teaching, consulting, publishing, and administrative work. Research funding under his supervision over the years totals in the millions of dollars, and he holds 13 patents. He has advised over 50 graduate students, given innumerable presentations, and authored or co-authored over 70 articles. From 1989 to 1993 he served as the director of the Center for Advanced Ceramic Materials. In 1992, Dr. Brown was awarded the prestigious Newport News Shipbuilding/Tenneco Endowed Professorship of Engineering in recognition of long and honorable service to the University.

The product of a farm community near Harrisburg, Pennsylvania, and amidst a family that included many teachers, Brown seriously considered becoming a dairy farmer until Pennsylvania State University offered him a scholarship. Although the scholarship was for ceramic technology, an area unfamiliar to him, it meant he would be able to attend college. Thus, with the encouragement of his high school advisor, he entered Penn State to find out what ceramic technology was all about.

After completing his doctorate, Dr. Brown accepted a position as an advanced research and development engineer with GTE Sylvania, where he directed research involving luminescent materials. This work included pilot plant and production scale-up of new products developed in the laboratory.

A highlight and major accomplishment for Dr. Brown at this point in his career was his involvement with Xerox technology, his first assignment at GTE, which also resulted in his first patent. This work focused on the fluorescent lamp in Xerox machines and was one of the significant advancements necessary to complete the development of xerography.

“The best teachers and the best advisors are people who have been in industry”

While Dr. Brown found his industrial experience rewarding, he was discouraged by how little of his college training he actually used on the job. He made the decision to seek a teaching position in hopes of using more of his academic training and hence joined the Virginia Tech faculty.

As a professor, rather than teaching straight from the textbook, he strives to present to his students information relevant to their future industrial careers. He believes industrial experience enhances one's teaching skills. “The best teachers and the best advisors are people who have been in industry and know what's important and what's not important.” This basically summarizes Professor Brown's personal philosophy of education. “Teach people what they need to know” rather than teaching a subject based on what someone else thinks is important. He expresses concern that students today are not receiving enough instruction in the technical areas necessary for a successful career in the materials science and engineering field. He also feels too much emphasis is placed on some unimportant humanities and social sciences courses. Dr. Brown can recount many success stories in the shape of former graduate students scattered across the country and around the world, many in high-ranking positions. In a recent MSE survey, several alumni expressed appreciation and praise for Dr. Brown's advice and assistance in helping them find employment after graduation.

Another aspect of his career that he feels has been beneficial to his teaching is his work as a consultant to numerous companies and law firms as well as to government agencies. Dr. Brown suggests that consulting contributes tremendously to teaching effectiveness by helping the instructor relate to students' problems in the “here and now.” His industrial consulting involves evaluating raw materials, new products, and markets, while government consulting centers mainly around proposal reviews.

One fascinating area of consulting involves failure analysis for lawyers representing clients who have been injured in accidents involving breaking glass or ceramics. Dr. Brown evaluates how the failure occurred; in other words, why did this particular piece of glass or ceramic break, be it a casserole dish, a soda bottle, or other consumer product? By analyzing the fracture surface, he is able to determine whether breakage occurred because of a manufacturing imperfection, a high stress in the material, or a crack. Quite often the consumer causes the glass failure through carelessness and a lack of respect for the brittle material.

Dr. Brown has always been committed to helping the MSE Department maintain a strong materials program. This commitment resulted, in part, in his involvement with Virginia Tech's Center for Advanced Ceramic Materials (CACM), which he founded and directed from its inception in 1989 until 1993. CACM came about after Dr. Brown had been directing the High Temperature Materials

Laboratory (HTML) in Holden Hall for several years. When the Virginia Center for Innovative Technology (CIT) began funding technology centers, Dr. Chester Spencer, who was the MSE department head at the time, suggested that Dr. Brown seek funding for a center that would combine the efforts of the HTML with laboratories from Chemical Engineering and Electrical Engineering, headed by Mark Davis and Larry Burton, respectively. This combination became the Center for Advanced Ceramic Materials.

CACM achieved a high level of productivity, generating numerous intellectual properties and hundreds of papers and presentations. The Center was successful in attracting millions of dollars in industrial and government funding. Dr. Brown believes the birth of this technology center facilitated growth in the MSE Department, and that, in fact, the presence of CACM was an important factor in convincing Professor Ronald Gordon to join the department as head in 1989. As the director of CACM, Dr. Brown initiated the first department-related newsletter, *Ceramic News*. While the main purpose of the newsletter was to disseminate news and information concerning CACM research, it also served as a vehicle for department news and alumni updates and received much positive feedback from alumni as well as people in industry. Dr. Brown expresses high praise for the staff who supported CACM over the years.

Dr. Brown remains active in research and teaching and has accelerated his consulting activities. He has also started a small company, Materials Technologies of Virginia, Inc. (MATVA), which has licensed some of the technologies developed at CACM. A few of these look promising and are still in the testing stages. Should these technologies

prove useful for industry, in diesel engines, for example, MATVA could expand into an important company.

This fall, Prof. Brown is beginning an exciting research venture with Telegen Display Laboratories, Inc., located in Redwood City, California. He will be working with Dr. P. Victor Kelsey, 1969 MSE alumnus, who is the Manager of Materials Development at TDL. This research will involve investigation and development of new luminescent materials to be incorporated into future TDL products.

When asked for his thoughts on the future of MSE at Virginia Tech, Dr. Brown expressed some concern. The department will always have to fight to survive, he believes. Concern over teaching loads, number of students, research funding, and public surveys will be ongoing. He cites a national trend away from MSE as a separate discipline and feels this is unfortunate. "Virginia Tech has a history of being a strong materials school."

Aside from his university activities, Dr. Brown pursues many interests. Over the years he has been actively involved in buying and selling property in the New River Valley and has developed several housing subdivisions in the area. He enjoys buying older homes and remodeling them himself. He enjoys working in his vegetable garden at his home in Christiansburg and camping, trout fishing, and occasionally hunting on his Floyd County farm. In the wee hours of the morning, he can often be found on a golf course, either in the New River Valley or at his future retirement home in South Carolina. For the present, he will stay active in research, teaching, consulting, and golfing.



MSE ALUMNI, 1990-1995

After many months of working to update our alumni lists, we are including the following partial list of MSE graduates dating back to 1990. We continue to update and correct our records dating back to the 1930s, and we appreciate hearing from all of our alumni concerning your whereabouts and current activities. Please take a minute to check over these names and let us know of any mistakes or omissions. (96 grads appear on page 9.) E-mail us at MSE@vt.edu or fax us at 540-231-3028 with corrections. Thanks!

Bachelors**1989/90**

Stephanie N. Chanat
William D. Collins
Donald L. Dobbs, Jr.
James A. Eaton
Eric M. Focht
Robert H. Howell, Jr.
Diane E. Hoyns
Jeffrey A. Jansen
John L. Johnson
Christine A. Kent Bowles
Kevin M. Kit
Mary Dalton Lewis
Diane M. Raque
Susan L. Reitz
Todd E. Serafin
Carol L. Shelor

1990/91

Karen Aguilar
James Campbell
David P. Cann
Charlie Collins
Kathryn P. Conner
Scott Courtney
David R. Cunningham

Victor B. Dangerfield
Mary Ann Drumwright
Percy N. Funchess, III
Christopher Haggerty
Warren C. Hendricks
Valerie A. January
Sean W. King
Kelly Koziol
Patrick J. Marstall
Kirsten McGrath
Steven H. McKnight
Kevin Neale
William Parrish
Matthew P. Quinley
Travis Smith
Gary R. Sundquist
Greg Super
Dennis Wang
George T. Zabijaka
Jennifer Zins

1991/92

Matthew Adomaitis
Jesse Arnold
Richard P. Baxter
Paul Brestel
Richard L. Clark
Marc E. Ekstrand

Mike Farrell
David Graham
Larry Hahn
Dana Hamly
Jennifer Handforth
Rebecca Herrmann
Kelle Houser
Chris C. Jones
Julie Runyan Kokan
Eric Lin
Sherry L. Mings
Elizabeth Myers-Vailhe
Douglas R. Nelson
John Renzo
Kouroush Salehi
Michael T. Stawovy
David Tu
A. Glen VanLandingham
Richard M. Weber

1992/93

David B. Betts
Christopher Brodrick
Tricia Fuentes
Elizabeth Guynn
Jerome M. Hromiak
Andrea B. Kay
Lee-Chuang Lau

Kevin Linthicum
Angela M. Lutz
Daniel Metrey
Timothy J. Mitchell
Tommy Ng
Fabienne J. Nichols
Lee K. Rice
Michael Samblanet
C. Gregory Scott
Bradford Shelton
David M. Teter
Troy Thomas
Scott Tschetter
Kimberly Walton

1993/94

Heidi D. Allison
Dale E. Barnes
Michael Bremser
Jennifer P. Brooks
Lowekamp
Robert Carter
Christopher Digiacomo
B. Davis Eichelberger, III
Jose Escobar
Jonathan Flagg
Nathan McAdams

Michael McCormick
Jon Medding
John F. Pataki
Jonathan Rowley
Jeffrey Sachs
Mindi (Smith) Seaman
Michael D. Smith
Michael Wheeler
Scott Zentack

1994/95

Jason C. Allen
Brian Biggi
Roxanne Cox
Steve Cronin
Bryan Dickerson
Doug Fleming
Jeanne Hampton
Andrea Hivner
David Johnson
Thomas Kuhr
Julie Prince
Jennifer Roeder
Scott Wurzbürger
Charles B. Young

**Masters****1989/90**

Nancy Morgan Bagnoli
Christophe Dehan
Pascal Guerin
Kenneth J. Imrich
Laura Smith
Regina Hye Won Kim
Robert H. Woodman

1990/91

Laurent P. Battu
Michael Brady

Chienchia Chiu
Sandra Gonzalez
William G. Halley
Venkatramani Iyer
Lim Poh Leng
Jeanne P. Miller
Guy J. Petton
Frederick Rivet
Stephen Van Aken
Jeff Vass

1991/92

Kazushi Amanamu
Antonio F. Cardozo
Jhewn-Kuang Chen

William D. Collins
Eric M. Focht
Robert H. Howell, Jr.
Dean-Mo Liu
Diane M. Raque
Marc J. Tricard
Benoit Vandenbossche

1992/93

Jhing Fang Chang
Jhewn-Kuang Chen
James A. Eaton
May Nyman
Tweed Ross, III

Christophe N. Vailhe
Karen Valentino
Ravi K. Verma
Allan Ward

1993/94

Susan Butsch
Scott Courtney
David R. Cunningham
David Graham
Warren C. Hendricks
Min Kang
Lauren Shea
Ji Sie
Jimmy Xing
Shubing Zou

1994/95

Jon Woon Choe
Richard L. Clark
Ashraf Khan
Raphael Martin
Thobeka Pete
William Russ
Michael Stawovy
Kevin Ternes
Ken Venzant
Anne Villette

**Doctorates****1989/90**

Jinmyun Jo
Tawei Sun

1990/91

Ho Jang

1991/92

Hemanshu D. Bhatt
Baoping He

1992/93

Chi Kong Kwok
Kyoungho Lee
Chieng-Hsiung Peng
Chang-Hong Wu

1993/94

Chienchia Chiu
Kevin J. Ely
Chen Chung Li
Shannon Namboodri
Yaping Yang
Zhaoyang Xie

1994/95

Gang Chen
Helene Cornelis
William G. Halley
Gary Pickrell
Ravi K. Verma

Meet Jeff Glenning

Jeff Glenning is one of many Virginia Tech graduates launching a career in engineering. With his firm grasp on the importance of hard work, Jeff is on the right track for success. A May 1996 graduate in Materials Science and Engineering, Glenning leaves Virginia Tech with a long list of scholarships behind his name and an impressive résumé. In the past year, he has received scholarships from ASM International, ASM National, the Iron and Steel Society, and the Foundry Education Foundation.

In June, Glenning joined the growing number of MSE alumni at Howmet Corp. in Hampton, Virginia

Glenning grew up in Northern Virginia, where his mother teaches sixth grade and his father works in residential construction. Hence, he understands the value of education and diligence. He spent many summers working with his father and feels construction is a good line of work for a teenager.

No overall plan lead him into engineering, Jeff says. He excelled in math and science in high school, graduating first in his class of 480, and decided to give engineering a try. He entered Virginia Tech in 1991 and chose Materials Science and Engineering during a College of Engineering open house. He liked what he saw and heard about the department, particularly the faculty/student ratio. "The whole idea of being able to talk to your professor is, I think, a great idea."

Glenning sees one strength of the MSE department being its smaller size in relation to other engineering programs on campus. For Jeff, this meant more one-on-one attention with the faculty. "That's when I learn the best, when I can go in, sit down, and talk with the professor about something I don't quite understand....it really builds a lot of depth to the quality of education." Glenning praised the staff of the MSE department as well, particularly the main office staff. "Jan [Doran] and Amy [Hill] do everything but hold your hand and get you through school."

While attending Tech, Jeff found various ways to fund his education. In addition to his summer work in construction, he spent several weekends during the school year traveling to Northern Virginia to work for a computer software company where he did everything from moving equipment to hardware support and troubleshooting. He acquired important computer skills with the added bonus of a paycheck for his efforts.

In 1993 Glenning accepted a co-op position with Reynolds Metals Company, where he worked for two six-month terms plus one summer. He gained a wide range of engineering experience with Reynolds and enjoyed a fair amount of travel to different plants throughout the U.S. and Canada. His responsibilities included standardizing physical testing of aluminum foil, surface analysis of laminar composites, and physical property measurement of aluminum foil and plastic.

Since graduating, Glenning has moved to Hampton, Virginia, where he is employed as a process engineer with Howmet Corporation. He is enthusiastic about this new venture, a materials-intensive job working with investment casting of nickel-based alloys.

Jeff has not made any major plans for the future. For the present, he hopes to broaden his experience by seeking opportunities to move around within the company. In a few years, he may consider an advanced degree, probably in the area of engineering management. However, he does

Glenning gained a wide range of engineering experience in his co-op position with Reynolds Metals

not see himself going back to school full time.

Outside of engineering, he enjoys weight lifting, keeping in shape, and playing soccer and racquetball. He hopes to maintain these interests as he settles into his new responsibilities.

When asked what he'll miss about Virginia Tech and the college atmosphere, Jeff mentioned the advantage of being around so many people his age and the ease of getting together with a few friends on any given day. "I doubt that will develop, the depth and breadth [of friendships]." Thus, like many students, Jeff Glenning bids farewell to Virginia Tech to begin a new adventure.

Congratulations and best wishes from the Materials Science and Engineering Department!

❖ DEPARTMENT NEWS ❖

**VIRGINIA TECH MATERIALS ENGINEER
DEVELOPS 'RIGHT STUFF' FOR AEROSPACE,
AUTO INDUSTRIES**

by Susan Trulove

For many years, the aerospace industry has been looking for the 'right stuff' from which to build airplanes—a material that is both light and strong, such as a metal-ceramic composite. Now, Virginia Tech materials engineer Stephen L. Kampe has created a new family of composites that combines the low weight of titanium with the high strength and temperature capability of ceramics. Kampe's technology has been licensed for further development by University Partners, a technology development organization based in Virginia Tech's Corporate Research Center.

A roadblock to forming the needed composite has been that the temperatures and techniques required for processing metals are damaging to traditional ceramic reinforcement when incorporated within metals. Kampe, an assistant professor, overcame the hurdle by creating certain intermetallic matrix composites (IMC's) that act as reinforcements within conventional metal alloy matrices—creating a composite inside a composite, so to speak. "The IMC's are unique because they can be produced to exhibit ceramic-like strengths and properties, but are surprisingly able to retain an ability to be processed like a conventional metal," Kampe explained. The technique can be applied to many metal/IMC combinations.

University Partners will fund further IMC development work and trials by Kampe and his graduate students, working at Virginia Tech and using metal processing facilities at Oak Ridge National Lab. The first intermetallic composites will be designed to strengthen conventional titanium and aluminum alloys. In airplanes, the material could replace nickel and iron components in turbine engines. These materials are strong but heavy, Kampe said. University Partners also will market the technology to major automotive corporations and parts producers.

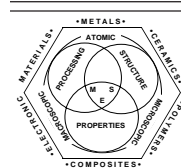
Reprinted from *Engineering News*, Spring 1996, published by Virginia Tech's College of Engineering.

John H. Kroehling (CERE 46) has established the John H. Kroehling Materials Science and Engineering Scholarship Fund. Income from this endowment will be used to help support one student each year in the department. MSE is very grateful to Mr. Kroehling for his generous contribution this past year. The MSE Department currently has an undergraduate scholarship endowment which is sufficient to generate approximately \$2500 annually in awards to our students. In addition to these funds, the Department provides \$500 to \$1000 annually for undergraduate scholarships through the Foundry Education Foundation. For MSE to effectively compete for outstanding students in the freshman class, the Department needs to be able to offer at least five scholarship awards per year per class or approximately \$15,000 annually. Outstanding students in MSE also qualify for additional scholarship aid from the College of Engineering and from national competitions. ❖

Prof. Robert Hendricks received a Dean's Award of Excellence in Public Service this Spring. Hendricks has devoted many hours and much effort to improving MSE's undergraduate curriculum, including the founding of the widely acclaimed writing-across-the-curriculum program. Hendricks has been involved with many department and university activities during the past few years, including preparations for two ABET reviews, creation of the current Electrical and Optical Instruction Laboratory course, as well as serving on the College and University curriculum committees. He is also involved with the continuing development and revision of MSE's Web pages. ❖

Congratulations to **Dr. William Curtin** and **Dr. Ronald Kriz**, who were awarded tenure this Spring. Both Curtin and Kriz serve jointly in Materials Science and Engineering and in Engineering Science and Mechanics. ❖

The University Core Curriculum Committee has approved MSE's Writing Program for two writing intensive (WI) credits effective Fall 1996. This means MSE is the first department at Virginia Tech to achieve full compliance with the core curriculum requirement of two 3-credit WI courses. ❖



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An American in...Lyon!

Professor Brian Love needed little coaxing to pack his bags and head to France for five weeks this summer. With his natural interest in things French plus five years of language study, Dr. Love was an obvious candidate when an opportunity arose through an exchange program. Love traveled to southern France to *Le Université Claude Bernard* (UCB) in Lyon, a town dating back to biblical times. UCB maintains a large adhesion focus and identified

Virginia Tech as a school where they could send students for a second perspective on adhesion education.

Dr. John Dillard, director of the Center for Adhesive and Sealant Science, contacted Dr. Love with an invitation, knowing of Love's interest in maintaining materials-related connections with French universities and businesses.

Dr. Love is interested in gaining an understanding of surfaces and interfaces relating to microelectronic and biomaterial applications. In Lyon, Love worked with a team of professors and scientists to study copper-based,

polymer-metal interfaces (PMI). They performed a variety of surface chemical treatments to copper and studied the formation of copper oxides. These oxides are considered to be adhesion promoters for many PMI's. In theory, if a more adherent surface coating is applied to a base metal, a reliable, long lasting polymer-metal bond is more likely to form that will withstand aggressive exposure conditions such as temperature cycling or high humidity.

The lab work involved preparing adhesion specimens and subjecting them to temperature and time conditions. Dr. Love was pleased with the progress made during his time in France. He enjoyed working with the team at UCB and appreciated the opportunity to work in their well-equipped laboratory.

Aside from his research, Dr. Love did manage to fit in a little sight-seeing and lots of excellent French cooking. Lyonnais cuisine is known worldwide, and in fact, Lyon is referred to as the *Capitale Gastronomique* of France, "the stomach of France."

Bachelor's

Jeff Glenning
Ian Haggerty
Matthew J. Hallihan
Jason Hansen
Ronald L. Hayes
Allen W. Matthys, Jr.
Matt Matzek
Paul Myslinski
Jeffrey P. Nash
Howard Nordby
Mukund I. Patel
Steven D. Rosine
Brent Slaughter
Martin R. Swan
Jason E. Taylor
Eric L. Wilkins
Bryan Zimmerman

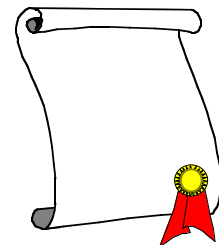
Master's

Tsunou Chang
Robert Demaree
Mike Farrell
Rola Hamandi
Rebecca Herrmann
Chris Jones
Joy C. Longhenry
Jeff May
Liz Myers-Vailhe
Wei Tao
Kevin Ternes
Nikhil Verghese
Kimberly Walton

Doctorates

Claire Chen
Jhewn-Kuang Chen
Justin F. Gaynor
Wei Pan
Christophe Vailhe
Dilip Vijay
Eric J. Wuchina

Congratulations 95/96 MSE Graduates!



Among those whose present occupation is not in a materials field, the reasons given ranged from accepting the first job offered (which did not happen to be materials related), to a lack of available materials jobs, to the materials position offered was not appealing.

While attending Virginia Tech, 42% of the respondents held part-time jobs, working between 8 and 35 hours per week. Only two graduates said they participated in Virginia Tech's co-op program, and these two felt that co-op work was an invaluable experience, commenting that it enhanced starting salary, directed career decisions, even impacted a career move five years after graduation. One alumnus stated that co-op experience "should be mandatory for engineers planning on a manufacturing career."

Since graduating from Virginia Tech, 58% of the respondents reported enrolling in a graduate program, and of this number, 82% enrolled in a Materials Science and Engineering program at either the Master's or Doctoral level. Other areas of study included macromolecular science, metallurgical engineering, engineering science and mechanics, management, business administration, and Defense Language Institute.

When asked if they had a particular occupation in mind when they initially enrolled in MSE, 25% said yes. Of this group, their career choices included materials degradation research, polymer recycling, polymer product development, materials and polymers research and development, academics, and the Air Force.

Department

Many respondents reported that either the MSE Department or its faculty were helpful in securing a first job or attending graduate school. Assistance came in the form of advice and recommendations regarding graduate school options, offers of assistantships, referrals, letters of reference, information about job opportunities, classroom discussions, and help in scheduling co-op work.

Three-fourths of the respondents said they would choose MSE again if they were starting over as freshmen at Virginia Tech. Reasons given for choosing otherwise included decisions to move away from engineering as a career altogether or to move into a different type of engineering that capitalized on skills realized since graduating.

How can the MSE Department better serve you ?

This question received many helpful suggestions and comments. Alumni expressed a desire to keep up with the department and fellow alumni, and we hope to fulfill these concerns through this newsletter. Many expressed an interest in receiving department information via the Internet, and this is an area that has been addressed during

the past year. Professor Robert Hendricks has been involved with the development of a department website. The MSE Department homepage may be found at:

<http://www.eng.vt.edu/eng/materials/mse.html>

The first department newsletter may be found from the home page, or may be read directly at:

http://www.eng.vt.edu/eng/materials/newsletters/wom_v1n1.pdf

Curriculum Survey

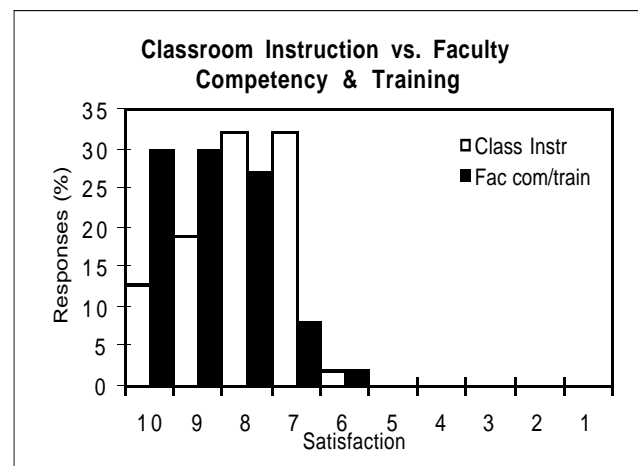
The curriculum survey revealed a few major issues that need to be addressed. For example, respondents felt that emphasis should be placed on manufacturing related experiences. More attention needs to be given to courses in ceramics, composites, and biomaterials, and a corrosion course needs to be developed. In addition, the labs need some improvement, particularly in materials processing.

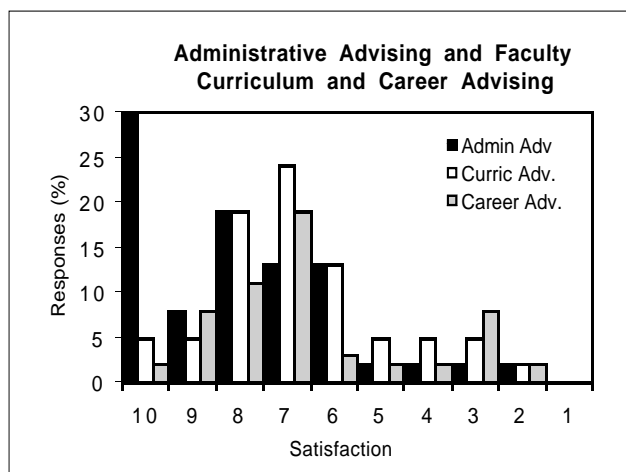
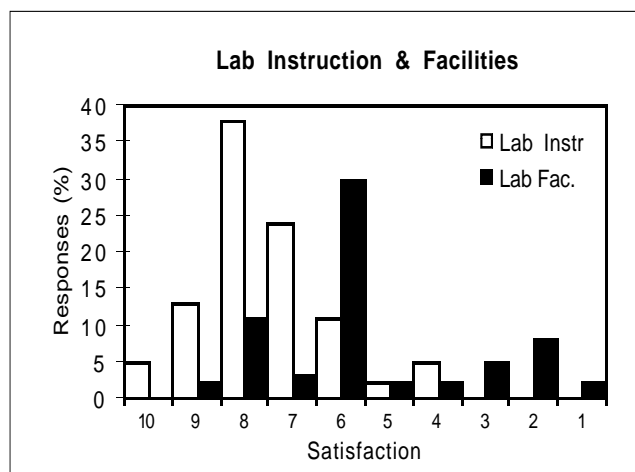
"Laboratories should include 'hands-on' design work. Engineers need to be creative as well as analytical."

Concerning the quality of instruction and advising received from MSE, most respondents gave very favorable ratings. Using a 10-0 scale with 10 representing very high quality and 0 being poor, 100% rated classroom instruction above average, with 65% of those scores falling between 8 and 10. The following charts summarize these ratings.

Final Remarks

The narrative comments received in the survey were gratifying and constructive. Many respondents expressed concern over the suggestion that credit hour requirements be reduced. The overriding opinion was that a reduction in credit hours would degrade the quality of a degree from the Virginia Tech Engineering program. Such action "would be a crime against the students and the engineering profession." More than one respondent suggested that students would benefit from a more rigorous program. The opinions of many alumni are summarized by one





respondent's comment that he "gained self esteem [and] competence in the broad field of materials and work ethic."

Respondents offered helpful suggestions for improving the program. The need for more hands-on experience surfaced more than once among the final comments. Alumni who participated in the co-op program praised the experience and both participants and non-participants suggested that the co-op program should receive more attention. Many felt the laboratory courses needed

reworking to incorporate "analytical/testing methods with manufacturing/processing practices." Other suggestions involved incorporating management instruction for engineers in the curriculum since many engineers "manage people, not just processes." In terms of classroom instruction, respondents felt that professors who had industrial experience were the most effective in helping students prepare for careers in industry.

Overall, respondents spoke warmly about the education they received at Virginia Tech, describing their experiences as invaluable and first rate.

❖ Alumni Notes ❖

Kimberly Walton (MSE 93) is working at General Electric's X-Ray Tube Target plant in Warrensville, Ohio. She completed her Master's degree in MSE in '95.

Steve Cronin (MSE 95) is a Graduate Research Assistant at the University of Akron in Ohio.

Shoakai Yang recently completed his Master's degree in MSE. He is working as a research and development chemist for USR Optonix, Inc. in Hackettstown, New Jersey.

Brent Slaughter and Matt Hallihan (MSE 96) are entering the MSE Master's program at Virginia Tech this fall. They will be working with Prof. J.J. Brown.

Alan Ward (MSE 90) successfully defended his dissertation in June. He has accepted a post-doctoral position with Prof. R. Hendricks.

Charles P. Blankenship, Jr. (MATE '88) recently transferred to GE Aircraft Engines in Cincinnati, Ohio. He is a Product Line Manager in the Marine and Industrial Engines Division.

P. Vic Kelsey (CERE 69) is the Manager of Materials Development at Telegen Display Labs, Inc. in Redwood City, California.

Joy Longhenry completed her Master's degree in December 1995 and is employed at Xerox in Rochester, New York.

Jeff May completed his Master's in May and is working for Hollingsworth and Voss in Floyd, Virginia.

Jeff Nash (MSE 96) has accepted a job with National Starch and Chemical Co. in Bridgewater, New Jersey.

Doug Fleming (MSE 95) is working for American Research Corporation in Radford, Virginia.

Tim Reed (CERE 73) has been promoted to Director of Statistics Programs for ITT Industries, Defense and Electronics, McLean, Virginia. Reed maintains an office at ITT Night Vision in Roanoke, Virginia.

Jenni M. Elion (MSE 87) worked at General Dynamics Space Systems from 1987-93, then moved to the Composites Lab at Research Triangle Institute in North Carolina. She works with EPA and commercial industry to find solvent replacements.

Scott Zentack (MSE 94) is planning to pursue an MBA at William and Mary this fall.

Alumni Notes Continued

Judson Marte successfully defended his thesis in April. He plans to pursue a Ph.D. at Virginia Tech this fall working with Prof. Steve Kampe.

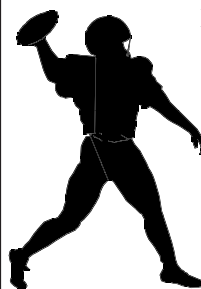
Three MSE graduate students received the Paul E. Torgerson Research Excellence Award last spring. This award is presented in recognition of distinguished research in graduate engineering studies at Virginia Tech. Finalists are selected based on originality and relevance of their research, writing ability, and advisor recommendation. The finalists then give an oral presentation to a panel of deans, professors, and students. Monetary awards are presented to 3 Master's and 3 doctoral students based on the quality of their presentation, the depth and content on their research, and the students' ability to address a diverse audience. James Clark has been testing a new material for use in future diesel engines. James completed his research this summer and is working for Corning Glass Works in Blacksburg. Virginie Vaubert's research involves evaluating the physical properties of dental sealant resins under aging conditions to determine the critical factors that control the loss of functional properties with time. She will defend her thesis in the near future and has recently begun research on sol-gel processing of CMZP coatings. Helene Cornelis studied the effects of solvents on poly (ether ether) ketone. She completed her Ph.D. in '95 and is employed as a Research Engineer at Acadia Polymers in Iron City, Virginia.

**GET READY FOR
VIRGINIA TECH
FOOTBALL!**



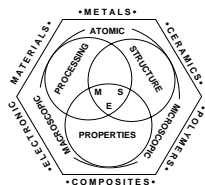
The College of Engineering will sponsor an Open House tent at the stadium during the following games. Will you be there? The MSE Dept. hopes to connect with its alumni this fall. Call or e-mail us if you'll be at any of these games so that we can hook up. We look forward to seeing you!

October 12 Temple (Homecoming)
October 26 Pittsburgh
November 23 WVU



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Please address information requests and alumni updates to LeeAnn Ellis, 301 Holden Hall, Blacksburg, VA 24061-0256.
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