
WEST VIRGINIA UNIVERSITY

MECHANICAL AND AEROSPACE ENGINEERING

An occasional newsletter for the alumni and friends of the Department of Mechanical and Aerospace Engineering (MAE) at West Virginia University.

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Fall, 1987

From the Chairman

Dear Alumni:

To remain viable, a living thing must be able both to maintain a certain continuity of basic functions and to adapt to changing conditions. Very much alive, the Department of Mechanical and Aerospace Engineering has demonstrated over the years its ability to do both. In this issue of the Newsletter, you will find up-dates concerning such well-established programs as the Baja/Formula Car Projects as well as information about the newly-founded Manufacturing Systems Engineering Program and the exciting news about our new Engineering Research Building. Also included are acknowledgements of some of the important contributions of money, equipment, or time that several companies and individuals have made. No organism can grow and develop without being fed, and the vitality of our department is due in large measure to these kinds of contributions.



The following statistics may help give you an idea how the MAE Department has (or hasn't) changed since your graduation: The department now offers undergraduate programs leading to a B.S. in Aerospace Engineering and a B.S. in Mechanical Engineering. Major teaching areas of aerospace engineering include aerodynamics, propulsion, structures, flight mechanics, and flight testing. Major teaching areas of mechanical engineering include engineering mechanics, fluid mechanics, thermodynamics, heat transfer, mechanical design, automatic controls, and instrumentation. Presently 200 undergraduates are enrolled in mechanical engineering and 100 in aerospace. Last year 90 undergraduates earned their B.S. degrees.

Current graduate degrees offered by the department are MSME, MSAE, MS Engr and PhD. Major areas of graduate study consist of aerodynamics and fluid mechanics, thermal sciences, solid mechanics, materials and structures, mechanical design and automated manufacturing. The department's graduate program has 60 Masters students and 20 PhD candidates, and graduated 24 graduate students last year.

The department's faculty and staff currently number 25 tenure track faculty positions, 6 research and visiting faculty, 12 adjunct and emeritus faculty, 3 research associates, 30 graduate research assistants, 4 technicians, and 7 secretaries.

Research has become an important activity of the faculty of the department. The typical faculty member spends half time on teaching and half time working on research projects. The faculty are presently conducting over 55 different research projects. The majority of these projects are funded by organizations outside WVU, primarily the federal government and industrial companies. The budget of the department from state funds and tuition/fees is approximately \$1,100,000. Approximately \$320,000 of the state funds are spent in the support of research conducted by the faculty, graduate students and undergraduate students. Research funds from outside organizations totaled over \$1,200,000 last year and has been increasing each year.

The department is continuing to change to keep pace with the trends in engineering education. The focus of attention on the undergraduate program is not on increasing the numbers of students in the program but rather on increasing the quality of the educational experience. For instance, we are expanding the number of laboratory credit hours and greatly increasing the scope of the senior design courses in an effort to assure that today's graduates have more than "book learning." In addition, students are required to make frequent written and oral presentations in the laboratory and design courses in order to develop communications skills. With these kinds of changes we intend to continue to provide solid and practical engineering education.

Don Lyons
Department Chairman

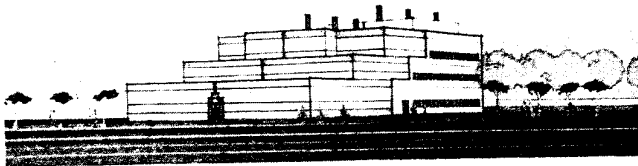
CONSTRUCTION OF NEW ENGINEERING RESEARCH FACILITY BEGUN

On June 26, 1987, the College of Engineering held a groundbreaking ceremony to begin construction on Phase I of the Engineering Research Building. Phase I of the 175,000 square foot engineering research complex will contain 65,000 square feet and cost \$7.9 million. The three-story structure located between the Engineering Sciences Building and the Evansdale Library will be completed by 1989. The flexible space incorporated in the new building's design will allow the WVU faculty to build on areas of current strength and develop new strengths that can help West Virginia and the nation address their economic goals.

There is a critical link between the ability to conduct engineering research and the growth of these new technology industries. This new research facility, dedicated solely to engineering research, will help propel the College into its second century as a leader in the rebuilding of West Virginia's economy, as well as a contributor to the economic competitiveness of the nation as a whole.

Some of the valuable research labs included in the new building are:

FLUID MECHANICS LAB
COMPUTER AIDED DESIGN LAB
MANUFACTURING SYSTEMS LAB
ROBOTICS LAB
COMPUTER AND ELECTRONICS LAB
COMBUSTION LAB
MULTI-PHASE FLOW LAB
LASER ANEMOMETRY LAB



The New Engineering Research Building

MAE ADVISORY COMMITTEE MAKES HOMECOMING VISIT

The Advisory Committee for Mechanical and Aerospace Engineering (ACMAE) held its sixth biannual meeting on October 16, 1987, at WVU in connection with homecoming activities of the COE. The Committee was founded in 1982 to provide advice and assistance regarding the activities of the MAE Department.

Led by chairman John Richard, the ACMAE's current activities focus on advising the department on enhancing the teaching and research programs, and promoting the department's public relations. The committee is also participating in the review and updating of the MAE long-range planning process. A major activity at the next meeting will be a detailed review of the undergraduate programs' goals and objectives and a review of the courses which comprise these programs.

The ACMAE presently consists of 12 practicing engineers, and is seeking to expand its membership. Anyone who would be interested in assisting the department by serving on the committee should contact Dick Walters, Associate Chairman of the department who serves as secretary of the committee, at (304) 293-3111.

Current members of the Advisory Committee are:

Mr. Darlus Brant, Manager—Aerothermophysics
General Electric, Philadelphia, PA

Mr. Charles Ebeling, Manager of Development Programs
Allegany Ballistics Laboratory, Hercules, Inc., Rocket Center, WV

Dr. Lawrence P. Golan, Director
South Carolina Energy Research & Dev. Center, Clemson, SC

Dr. Charles E. (Chuck) Jamison, Group Leader
Celanese Industrial Fibers, Charlotte, NC

Mr. Neil Jubeck, NATC Staff (CT-24X)
Naval Air Test Center, Patuxent River, MD

Dr. W. S. Lewellen, Senior Vice President
Aeronautical Research Associates of Princeton, Inc., Princeton, NJ

Dr. David E. McKee, Manager
E.I. DuPont de Nemours & Co., Wilmington, DE

Mr. George K. Oss, Senior V. Pres. & Gen. Manager
Atlantic Research Corporation, Springfield, VA

Mr. Harley J. Pyles, Retired—Vice President
Consolidation Coal Company, Fairmont, WV

Mr. John J. Richard, Manager
Westinghouse Electric Corp., Monroeville, PA

Dr. G. Keith Richey, Chief Scientist
USAF Wright Aeronautical Lab., Wright-Patterson WFB, OH

Mr. Donald Wiebe, Consultant
A. Stucki Company, Pittsburgh, PA

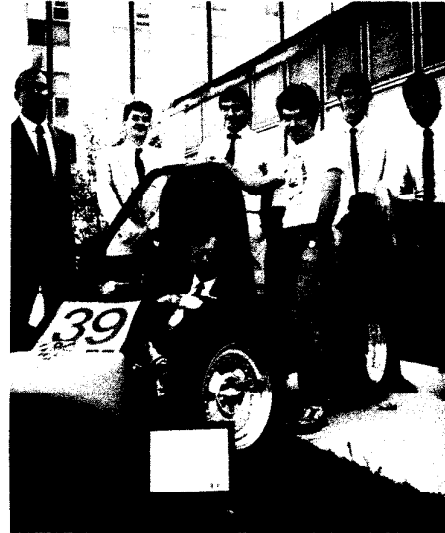
1986-87 MINI-BAJA AND FORMULA CAR COMPETITIONS

For several years, students in the MAE Department have participated actively in the activities of The Society of Automotive Engineers with some very satisfying results.

Most impressive has been their success in designing and constructing mini-baja cars and formula cars for national competitions. In the mini-baja competitions, these all-terrain vehicles are judged and tested in a number of different areas including acceleration time, top speed, breaking time, consumer appeal, design originality, maneuverability, chain pull time, water time, stability, and endurance.

In 1987, WVU's vehicle placed seventh in a field of 34 cars at the Mini-Baja East Competition sponsored by SAE in Orlando, Florida, and it placed fourth out of 36 at the Midwest Mini-Baja Competition near Columbus, Ohio. This vehicle was especially successful at acceleration (first place), top speed (second place), the hill climb (second), maneuverability (second), and the endurance race (fourth). The team, consisting of seven students, a department technician, and their advisor Dr. Ken Means, credits this success to several aspects of the vehicle's design including its unique tire and tread design, its independent suspension, and its wide wheel base.

In addition to WVU's success in the Mini-Baja competitions, the department's formula car, designed by a student team supervised by Dr. Tom Long, placed seventh in a field of 30 cars at the competition in Austin, Texas, and the SAE Club received two important honors: third place in the Student Booth Competition in Detroit, Michigan, and the 1987 Bendix Award as Outstanding SAE Student Branch.



The 1987 Mini-Baja Car Team with SAE President George Aravosis

WESTINGHOUSE BOOSTS MINI-BAJA/FORMULA CAR PROGRAM



Standing near the 1987 Formula Car, John Richard (left) of Westinghouse Electric presents student A.D. McKleis with a \$2000 donation from Westinghouse for the WVU car programs.

This fall, the Westinghouse Electric Corporation made a significant contribution to the Mini-Baja and the Formula Car Programs. Each year, different teams of students design and build new mini-baja and formula cars. Each car costs about \$7000 in parts and materials, and this funding must be raised almost entirely from outside sources by the students and faculty who participate in the program. The \$2000 donated by Westinghouse will allow the teams to spend much more time designing and building their cars and is greatly appreciated.

Westinghouse has hired many WVU graduates. In fact, the ties between West Virginia University and Westinghouse Electric Corporation have grown over the past few years and have always proved to be mutually beneficial.

In presenting the check to the university, John J. Richard, the Manager of Westinghouse's Technical Operations Activity, stated, "I know from my own involvement, in recruiting WVU engineering students, that the designing and building of these cars has been and should continue to be an excellent learning experience for your engineering students." The contribution Westinghouse has made to the program will certainly help continue this tradition.

IMPROVING CRUISE PERFORMANCE WITH NEW WINGLET DESIGN



A model of Kuhlman's winglet design.

Improving the cruise performance of airplanes is a major concern of aerospace engineers. Under a grant from NASA, Dr. John Kuhlman of our department is investigating the use and design of winglets to reduce the aerodynamic drag of highly swept-back wings. Winglets--small, vertical, wing-like structures at the wingtips--have already proven effective in reducing drag on transport and passenger type planes. So far, however, researchers have not been able to show that winglets on the swept-back, low-aspect-ratio wings of fighter-type planes will have the desired result.

Kuhlman has devised a computer program to provide a preliminary geometric design of both a wing and winglet for low-aspect-ratio wings. To determine the efficiency of the design, he then transports his data to a more powerful

program which analyzes air pressure distributions on the surfaces involved and gives a more accurate prediction of drag for a given lift force. He can then tell where to alter the geometry.

The results to date are promising. The numerical models of Kuhlman's design predict the same percentage of induced drag coefficient reduction for low-aspect-ratio wings as for high-aspect-ratio wings. This is significant because low-aspect-ratio wings have higher induced drag to begin with for the same aircraft weight, and the same percentage reduction means a higher absolute reduction of drag. The twelve percent drag reduction predicted by Kuhlman's program would allow a significant increase in the range and/or the carrying capacity of the aircraft.

Now that he has shown theoretically that winglets can produce increased efficiency for low-aspect-ratio wings, he plans to construct a model and test it in a wind tunnel. The next step will be to study the effects of winglets on stability, control and maneuverability at supersonic speeds.

NUMERICAL MODELING OF VIBRATION IN HELICOPTER BLADES

In designing a helicopter, discovering a way to dampen vibrations in the rotor blades is an important phase of the project. The numerical modeling work Dr. Nithi Sivaneri is presently conducting will provide designers with data on the critical parameters they need to consider to avoid aeroelastic problems. Using finite element analysis on a model of a new blade configuration, Dr. Sivaneri is studying the interaction of the fluid flow of air over the structure of the blades. Sponsored jointly through the National Science Foundation and matching funds from West Virginia, this research should contribute to the understanding of both aeroelastic behavior and further the ability to create accurate numerical models.

DATA PAGE

Please take a minute to fill out some of the data we need to bring our records up to date. Then simply detach, fold, tape, and mail. Also, sometimes the Department and the College need to identify graduates who have occupations in various career sectors. Often, awards or honorary designations are being considered. It would be helpful to us if those of you who have prepared recent resumes could send copies in addition to this data page. Thanks!

Today's Date: _____

Name: _____ W.V.U. Degree(s): _____

W. V. U. Graduation (Mo., Yr.): _____

Present Home Address: _____

Work Address: _____ (Firm Name)

Date Started: _____

Phone(s): Home _____ Work _____

Position Title : _____

Advanced Schooling: School Dept. Dates Degree?

News of Family, Hobbies, Work, Etc.:

HELP! we have lost some of our alumni. Please list below other W.V.U. A.E. and M.E.

Graduates whose whereabouts you know:

NAME

COMPANY

COMPANY OR HOME ADDRESS

FOLD AND MAIL TO RICHARD WALTERS AT THE ADDRESS ON THE BACK OF THIS PAGE

Dept. of Mechanical and Aerospace Engineering
West Virginia University
P.O. Box 6101
Morgantown, WV 26506-6101

29014018
FIRST CLASS MAIL

PLEASE FORWARD

FOLD

FOLD

FROM:

TO: Dr. Richard E. Walters, Associate Chairman
Dept. of Mechanical and Aerospace Engineering
West Virginia University
P. O. Box 6101
Morgantown, WV 26506-6101