

PURDUE & AeroGRAM Astro



A newsletter for alumni & friends of the School of Aeronautics & Astronautics • Winter 1997

School Awarded \$3 Million Dollar Research Grant

A major research project, funded by the U.S. Army, will involve five faculty members from the School of Aeronautics and Astronautics and the School of Materials Engineering, and three researchers from the University of Dayton Research Institute (UDRI). The multidisciplinary research initiative, which will continue the School's long standing tradition of advanced structure research started by our founder, Elmer Bruhn, will investigate lightweight layered materials and structures for damage tolerant armor.

The three million dollar project is headed by Principal Investigator C.T. Sun. Professor Sun is a professor in the School of Aeronautics and Astronautics and the Neil A. Armstrong Distinguished Professor of Aeronautics and Astronautics. Other investigators include: Professors J.F. Doyle and H. Espinosa from the School; Professors K.J. Bowman and K.P. Trumble from the School of Materials Engineering; and Researchers N.S. Brar, R.J. Hoffman, and H.F. Swift from the


University of Dayton Research Institute.

"Future US Army combat vehicles must be lightweight, versatile, survivable, and readily deployable. The use of lightweight and damage tolerant materials/structures is essential for achieving such goals. Ballistic impact of armor is an extremely complicated event from the viewpoint of materials, mechanics, and testing. Developing an armor that is lightweight and tolerant of ballistic impact damage is a grand challenge," stated Professor Sun.

"Within the time and financial constraints of the project, a successful research endeavor must identify the most crucial issues on which the research effort can be concentrated. Therefore the research team identified four main

areas in which to concentrate," Dr. Sun stated.

"These areas include manufacturing, processing and characterization of a class of innovative layered material and structure systems which have promising ballistic performance. Additionally, a rigorous investigation of the dynamic constitutive and failure behaviors of the proposed materials and structures will lead to a thorough understanding of the materials and their ballistic performance characteristics.

"Lastly, the development of advanced computational and experimental tools to support our research as well as the testing and evaluations of prototype material and structure systems for their ballistic performance will be done," stated Sun. 

Background on the "Lightweight Layered Materials/Structures for Damage Tolerant Armor" Project

By Professor C.T. Sun

The major function of an armor is to provide protection of a target from penetration by projectiles. The physics and engineering involved in armor design problems are very complicated. There are several modes of failure for an armor target depending on projectile velocities. For low projectile velocities, structural failure results from bending and in-plane stretching of the armor plate. At high velocities, the penetration time of the projectile is small preventing the bending wave to propagate over a large area. Consequently, failure is localized and structural effects are not critical. For intermediate projectile velocities, both local and structural responses are important.

Spalling is an important mode of failure which is

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Research Team (left to right): O. Sawas (Research Assistant), H. Espinosa, H. Swift, C.T. Sun, R. Hoffman, J. Doyle, K. Bowman, and K. Trumble. (N. Brar not pictured).

AAE Briefing



More than a dozen industry representatives, many whom are alumni from our School, gave presentations during

the Fall 1996 Semester. By sharing their industrial experiences with our students, our alumni bring industry into the academic setting. Our guest speakers' unique perspectives of the aerospace industry help students make the connection between theory and practical application. Additionally, it helps students learn about meeting the needs of the customers and the numerous issues that surround the design and manufacturing of aircraft, spacecraft, and or satellites. This blend of theory and application better prepares our students to enter the work force.

Our faculty also venture out into industry either through summer faculty consulting opportunities or through sabbaticals offered by a sponsoring corporation, research facility, or university. Professors Mario Rotea and Terrence Weisshaar were involved in such initiatives this past year. Their experiences are highlighted on page 5. And, Professor Dominick Andrisani has just returned from a sabbatical at Wright Patterson Air Force Base in Dayton, Ohio. Numerous faculty have made the connection

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Background on the "Lightweight Layered Materials/Structures for Damage Tolerant Armor" Project • Continued

mainly associated with shock waves produced by explosive or high velocity projectile impact. An ideal armor should possess the capabilities to resist all these failure modes.

Ceramics have been considered a major candidate for advanced armors. If the theoretical strength of ceramics were to be manifested during impact by long rod penetrators, the ceramics could provide an impenetrable barrier to almost all gun launched projectiles. Unfortunately, the actual strength exhibited by ceramics is typically one third the theoretical strength. The reason for the degradation in performance is believed to be the formation of surface spall, which starts the penetration process by creating an unsupported conical column in front of the penetrator, and the tensile failure on the back surface due to flexing, impedance mismatch and lack of shear coupling with back plates. Therefore, suppression of the tensile failure is the key issue.



Professor C.T. Sun presents at the December U.S. Army MURI Inaugural Meeting held at Purdue.


Two-component layered constructions with a ceramic face backed by a metallic or fiber composite layer have been found to be quite effective in improving ballistic performance. The actual penetration process depends on the material systems; however, a general scenario is depicted as follows. Upon impact, a conical crack initiates at the point of contact. This fracture conoid spreads toward the interface of the ceramic-backup plate interface. Additionally, due to weak tensile strength in ceramics, the reflected tensile wave results in axial cracks in the ceramic face plate. Subsequently, the fracture process encompasses the entire fracture conoid causing the reduction of local effective compression rigidity and enabling the penetration to proceed. Even after the fracture conoid is completely fractured, the erosion of the projectile would continue.

The backup plate in the two-component layered plate performs two functions that are beneficial to the ceramic face plate. First, it provides a constraining effect on the ceramic layer through the interface bond. Second, it allows part of the impact energy to transmit from the ceramic layer to the backup plate thus reducing the strong tensile reflected wave that would have resulted from a free ceramic back surface. Because of a smaller impedance mismatch between the ceramic and backup plate, the tensile wave resulting from partial reflection is not detrimental.

In this layered configuration, the interface property is crucial. Results from preliminary experiments show

that an interface bond with strong shear strength improves the ballistic performance dramatically.

Past experience has convinced us that, to develop a much improved lightweight armor material/structure system, we must find a way to provide effective confinements to the ceramic in order to compensate for its low tensile strength, and to utilize the layered configuration at the microstructural level as well as at the meso-macro level to tailor toughness and wave transmission and reflection at the interfaces to allow energy dissipation and consequently minimize damage to the ceramic. These two insights form the basis of this research.

In the heart of this research are two techniques to be used for achieving the aforementioned objectives. A centrifugal processing technique will be used to manufacture anisotropic layered ceramic materials which will exhibit anisotropic toughness. In conjunction with this technique, a pressureless infiltration method developed at Purdue University will be used to make the ceramic with gradient properties. This will facilitate superior bonding between the face ceramic plate and the backing plate. Another novel technique to be adopted for this research is using advanced composite materials to confine ceramic disks which are then used as core materials in multi-core laminate constructions. 

Fall Space Day

Fall Space Day was a rousing success with more than 175, 3rd-12th graders and 30 plus teacher and parent chaperones participating in interactive workshops all with a space related theme. The all day science and engineering event, held on November 9, 1996, was sponsored by Students for the Exploration and Development of Space (SEDS), AIAA, and Purdue Student Engineering Council (PESC).

Two Purdue University alumni, former astronauts Gary Payton, MSAE '72 and Don Williams, BSME '64, helped make the event a success. Payton, currently the Director of Space Transportation Division and the Reusable Launch Vehicle Program for NASA, was a Defense Payload Specialist on STS 51-C (Discovery) in 1985. Williams, Assistant Vice President and Division Manager for Science Applications International Corporation, was Pilot of STS 51-D (Discovery) in 1985 and Commander of STS 34 (Atlantis) in 1989.

According to Cindy Mahler, President of SEDS and creator of Fall Space Day, "The day was designed to provide students in 3rd through 12th grade the opportunity to learn about aeronautical engineering and space exploration. We were so grateful and so excited to have Astronauts Gary Payton and Don Williams on hand during the morning session. You could touch the excitement in the auditorium. It was fun to have them talk with the kids and give them first hand knowledge of what it is like in space."

Fall Space Day Workshops included:

3rd through 5th Grades:

- Learn How the Space Shuttle Works
- Travel through the Solar System with Your Imagination
- Grow Your Own Hydroponics

6th through 8th Grades:

- Develop Your Own Space Station
- Learn About Rocket Design
- Use KIDSAT on the WWW to Look at Earth from Space

9th through 12th Grades:

- Learn about Gravity Probe B Satellite
- Hypersonic Propulsion and Aerodynamics Introduction
- Orbital Mechanics Simulations

Purdue engineering students, along with Professors Collicott and Heister, taught the different workshops. According to Mahler, "The day was such a success for both the participants and volunteers, we definitely plan on doing it again next year."

Professors Williams (AIAA), and Longuski (SEDS) are advisors to the student groups. 🌐

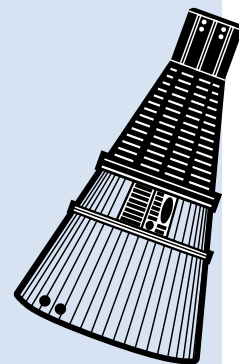
Former Astronaut Don Williams talks to the group about his mission experience. Williams is the Assistant Vice President and Division Manager for Science Applications International Corporation.



Students were eager to learn at Fall Space Day.



Don Williams, left, and Gary Payton, far right with his daughter Courtney, talk with participants.



Faculty UPDATE

Espinosa Awarded NSF CAREER Grant

Professor Horacio Espinosa was recently awarded a "Faculty Early Career Development" (CAREER) Grant. Formerly named the Young Investigator Award Program, the Program was renamed in 1995 by the National Science Foundation. \$210,000, over the next five years, will support Professor Espinosa's "Tribo-Mechanics of Nanostructured Materials" project.

"Nanostructured ceramics and cermets are emerging materials with a great potential in a variety of applications such as thermal spray coatings, turbine blade coatings, cutting tools, drill bits, wear parts, sensors, magnetic recording media, structural and electronic components, and pharmaceutical/medical systems," stated Professor Espinosa.

"We need to develop numerical models to address important issues related to the manufacturing of brittle materials. The development of cost effective methods for machining ceramics requires a fundamental investigation of ceramic tribology, especially the effect of material microstructure on friction and wear at moving interfaces," said Espinosa.


Pressure-shear soft recovery friction experiments and numerical simulations of random microstructures will be conducted to investi-



Award Recipients (top row, left to right): Horacio Espinosa, Kathleen Howell, and Mario Rotea. (Bottom row, left to right): Thomas Farris, Martin Corless, and Steven Collicott.

gate several problems including: materials properties most relevant to friction and wear in ceramic nanocomposites and nano-cermets; the stress and deformation conditions for crack initiation, propagation and coalescence; the mechanism of fracture in shear when compression is superimposed; the role of grain size and grain boundary structure; the effect of short and long range defect interactions in the observed mechanisms; and, the role of surface roughness in the mechanical response of interfaces.

"The results of this research will be quite valuable to industry and may be utilized to optimize cutting and grinding operations, and to minimize abrasive wear of coatings," said Professor Espinosa.

Espinosa is the sixth faculty member at the School to receive the award. Past award recipients include: Professors Steven Collicott, Martin Corless, Thomas Farris, Kathleen Howell, and Mario Rotea. Of the eligible faculty members, nearly 50% have received this prestigious award. 

- **Professor Dominick Andrisani** was on sabbatical at Wright Patterson Air Force Base, Dayton, Ohio, during the Fall 1996 semester.
- **Professor Anastasios Lyrintzis** was admitted to the grade of Associate Fellow of AIAA in September 1996.

Faculty Roster

Professors

M. J. Corless
J. F. Doyle
T. N. Farris
A. E. Frazho
W. A. Gustafson, Associate Head
A. F. Grandt
R. E. Skelton
J. P. Sullivan, Head
C. T. Sun
T. A. Weisshaar
M. H. Williams

Associate Professors

D. Andrisani
S. H. Collicott
S. D. Heister
K. C. Howell
J. M. Longuski
A. S. Lyrintzis
M. A. Rotea
S. P. Schneider

Assistant Professors

G. A. Blaisdell
W. A. Crossley
H. D. Espinosa
N. L. Messersmith



Above: Professor Mario Rotea. Below: Professor Terrence Weisshaar.



Professors Return With Added Insight

Professors Mario Rotea and Terrence Weisshaar gained insight into their professions through recent interactions with industry and university professionals.

Professor Mario Rotea spent part of his summer at the United Technologies Research Center, based in East Hartford, Connecticut. Professor Rotea was an independent contractor for eight weeks at the center. His major focus during his stay was to provide active control solutions for compression systems and machine tools.


In commenting about his experience, Professor Rotea stated, "I learned about problems that are of interest to industry—my students may have the opportunity to work with similar problems and will go into industry well prepared. Whenever I can better prepare myself as a

teacher and researcher, and contribute to the knowledge of my students, I am grateful."

Professor Terrence Weisshaar was the Jerome C. Hunsaker Visiting Professor of Aeronautics at the Massachusetts Institute of Technology during the 1995-96 academic year. Jerome Hunsaker was an early aircraft designer and an influential member of the National Advisory Committee on Aeronautics, the forerunner of NASA. He also founded and served as the first head of the Department of Aeronautics at MIT.

According to Professor Weisshaar his sabbatical included teaching a course in Aeroelasticity with Professors Crawley and van Schoor, serving on two doctoral advisory committees, writing a proposal with the MIT Gas Turbine Labora-

tory, and being the featured speaker for the 25th Annual Minta Martin Lecture. His presentation was titled, "Aircraft Structural Design—Finding New Horizons." He was also involved with four industry and government panels. One of his efforts was with the Air Force and was recently published named, "New World Vistas," which is a part of the Air Force planning process to restructure its science and technology funding.

"The MIT experience gave me the opportunity to observe another first class educational and research facility and to think about how some of these observations could be applied at Purdue. It also reaffirmed my belief that our School and MIT have exemplary programs and can learn from each other," stated Dr. Weisshaar. 

Tragedy Strikes Faculty Member's Family

Our heartfelt sympathy is extended to Professor Anastasios Lyrintzis and his family on the death of his brother Professor Constantinos Lyrintzis, an Associate Professor of Aerospace Engineering and Engineering Mechanics at San Diego State University. On August 15, 1996, Professors Lyrintzis, Liang, and Lowrey were fatally shot while participating in a MS thesis defense.

Professor Lyrintzis earned a degree in Civil Engineering from the National Technical University of Athens in 1983, and an MS and Ph.D. in en-

gineering mechanics from Columbia University in 1984 and 1987, respectively. Dr. Lyrintzis was an active member of AIAA and a member of ASME. He was also involved with the ASCE, the Technical Chamber of Greece, and The Greek Society of Civil Engineers.

Colleague Dr. Allen Plotkin said in a recent edition of *AIAA Aerospace America*, "Costas was an exemplary member of the aerospace community and the community at large. He was successful in his career, but, more than that, he lived his life in such a way as


to make him an ideal representative of our profession to the outside world.

"Students felt that he cared about them, not only how they were doing in his class, but how they were doing in general. Although he was quiet and mild mannered, he was also courageous, highly principled, and willing to stand up for his convictions if the need arose," stated Dr. Plotkin.

Along with his brother Professor Anastasios Lyrintzis, he is survived by his wife Deana, his one year old daughter Sofia, and his parents

Angeliki and Sotirios Lyrintzis from Greece.

The *Lyrintzis Family Education Fund* has been set-up by the Lyrintzis' family for Professor Lyrintzis' daughter. If you wish to donate, please make your check payable and mail it to:

USE Credit Union/Account
Number 80026980
SDSU Aztec Center
5500 Campanile Drive
San Diego, CA 92115-9965
619-594-6061 



ON BOARD

Outreach Activities Impact Community

The commitment and energy our undergraduate and graduate students demonstrate and the impact their studies and outreach activities have on our School, the University, the State, and the nation is amazing. Fall Space Day is a recent example of such commitment (see page 3).

One of our students had a vision—offer a workshop for elementary and high school students to teach them about aeronautical and astronautical engineering. Six months later the result was Fall Space Day; a student to student interaction with more than 170 students, and 30 parents and educators from around the State of Indiana attending an all day event which focused on space related topics.

In other events, Students for the Exploration and Development of Space (SEDS) made history by participating in NASA's SEM project (page 10). Four of their space experiments flew on a recent Space Shuttle (STS80) flight. And, AIAA students were awarded first prize in the 1995/96 Air Breathing Propulsion Technical Committee Undergraduate Team Engine Design Competition.

Kudos to all participating students and their faculty advisors!

Speaking of our students, our alumni are pretty special too. Thanks to each of you who completed the survey in the last edition of **AeroGRAM**. We received 146 surveys back and shared the detailed results with our Industrial Advisory Council members, who

made the original request for a survey, at our October, 1996, meeting.

Highlights of the survey, as promised, are located on page 9. Those of you who did not get a chance to respond, still may do so. Either complete a survey form that you received in your last **AeroGRAM**, or jot down your thoughts and ideas about your experience at the School and what we can do better, or use our e-mail address: aae-alumni@ecn.purdue.edu. Whatever way you choose to communicate with us, we do want to hear from you.

The large *Class Notes* section in this edition of **AeroGRAM** was compiled from information received in the surveys. Each **AeroGRAM** will have a form you can complete and forward to us when you want to let us and your former classmates

know about news in your life. To that extent, in many ways we are only as informed as our alumni allow us to be. So, I encourage you to share with us the important changes in your life.

Finally, Gala Weekend is just around the corner—April 26th and 27th. The classes of 1947 and 1972 will be celebrating their golden and silver anniversaries. Please stop by the School, Grissom Hall 390, on Saturday, April 26th, from 9-10:30 a.m., to say hello to your returning classmates!

See you in April!

Nan Claire Ross,
Director, Communications and
Development

Gala Weekend 1997

Saturday, April 26

AAE Alumni & Friends are Invited

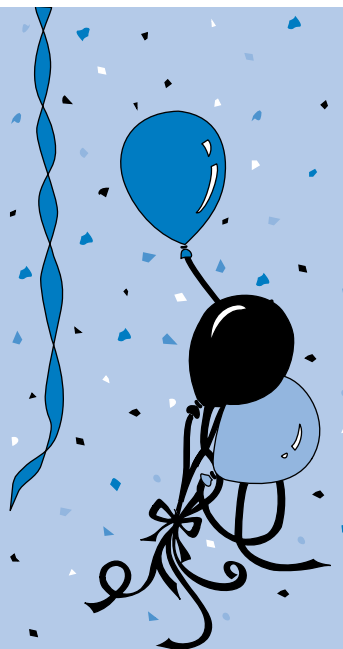
to

Breakfast with the Professors & Tours of Laboratory Facilities

9 to 10:30 a.m.

Grissom Hall, Room 390

Congratulations to the Classes of 1972 and 1947
Celebrating the 25th and 50th Anniversaries of their Graduation!



CLASS NOTES



Listed below in our *Class Notes* section are updates about your fellow alumni and friends. If space permits, we will try our best to publish almost any short update you send to us. (However, we will not include engagements and divorces and possibly other miscellaneous tidbits.) To submit information for the Summer 1997 edition of **AeroGRAM**, please complete a *Class Notes* information update form, located on page 8, and send it to the school address, attention: **AeroGRAM**.

1940's

Vernon L. Arne, BS '47 - Retired from Thiokol.
Thomas D. Boyle, BS '49 - Retired United Airlines Pilot, now is a farm operator and manager.
Jerome M. Goldman, BS '47, MS '65 - Retired, December '90 from USDOT, FAA.

E. Scott Hanson, BS '48 - Retired from General Electric Co., served as Program Manager at General Electric Management Institute.

Lynn R. Ikerd, BS '49 - Retired Engineering Test Pilot, Cessna Aircraft Co.

George S. Johnston, BS '48, MSE '50 - Retired. **Armand Kamp**, BS, BSME '47 - Professor Emeritus, President Retirees Association, State University of New York at Farmingdale.

Donald J. Nellis, BSAT '48 - Retired as President from Coastal Oil Co. Inc.

Richard P. Petcolas, BS '49 - Retired from Rockwell International as a Program Manager for Training Aircraft.

John M. Phipps, BS '49 - Retired from Quantum Group Inc., now serves on Board of Directors.

Doris Hurt Powers, BS '49 - Retired as President/Owner, Test & Evaluation International Services and Shielding Technologies, Inc.; serves on the Board of the NE Maryland Technology Council. Recipient of '96 Local Soroptimist Club Who's Who in Science and Engineering and acknowledged as a Purdue "Old Master" in 1995.

Wilbur A. Spraker, Jr., BS '46, BSME '47, MS '48 - Retired as Chief Engineer Turbochargers from Schweizer.

George W. Strack, BSATE '49 - Retired Vice President Contracts AOD- Dyn Corporation.

Donald Herbert Strodel, BS '49 - Retired from Boeing Airplane Company.

Philip E. Wagner, BS '48 - Retired from Wagner Aviation.

Donald M. Waltz, BSAE, '49 - Retired from Aerospace Engineering Management TRW Space & Electronics Group. Member of Distinguished Flying Cross Society.

1950's

Robert H. Andresen, ATE '52 - Retired President, Willis Insurance Agency, Inc.

Jackie L. Ashley, BS '52 - Retired from United States Air Force.

Paul Athanasulis, ATE '52 - Retired from various positions - Vice President of Industrial Engineering and Operations, Pan Am Airways/TWA.

Roy F. Austin, ATE, '56—Associate Manager SSME Project Office, Rocketdyne.

Joel A. Benson, BS '50 - Retired.

Robert T. Boll, BS '50 - Retired Supervisor of Structures Technology, The Boeing Co.

William W. Brant, BS '55, MSE '56 - Retired Vice President & General Manager of Strategic Operations Division, Thiokol Corporation. 1991 DEA Award Recipient.

Robert K. Burgess, BS '51 - Engineering Project Manager for Foreign Military Sales, McDonnell Douglas Helicopter Systems.

John C. Burritt, BS '56 - Field Service Engineer for Boeing Defense & Space Group.

John S. Castell, ATE '56 - President and CEO, Lafayette Wire Products, Inc.

Maurice R. Dora, BS '52 - Retired from Double-A-Products in 1980; returned to Indiana to take over family farm operation.

Franklin Fass, ATE '51 - Retired Colonel, U.S. Air Force.

Albert J. Fleig, BS '58 - Senior Research Scientist, University of Maryland. Retired from NASA in 1992.

Richard D. Freeman, ATE '50, NS&T '50, MS '54 - President, International Pacific Corporation. Co-founder of the Amelia Earhart Society. Recipient of Schools of Engineering Distinguished Engineering Alumnus Award.

Lyle E. Genens, BS '55 - Retired from Argonne National Laboratories after 33 years of service. Recipient of two pace setter awards from Argonne.

Jack R. Hahn, BS '51 - Retired Section Chief & Chief Project Engineer, Rockwell International. Member of Certified Professional Managers.

G. Wayne Hawk, BS '51 - Chairman, Falconaire; retired Chairman & C.E.O., ACME Electric Corp. Inducted into the Niagara Frontier Aviation Hall of Fame.

Leslie Hromas, MS '53, PhD '57 - Retired from TRW, now working as a consultant. Received retirement letter from Neil Armstrong. Nobel Prize recipient Edward Teller, and the then four living Presidents of U.S.A.

Jack Keller, BS '56, MS '57 - Retired Executive Vice President for Programs, Kaiser Electronics.

Graham M. Kelly, BS '52 - Retired.

Billy Lee Kinneer, BS '56 - Retired.

Donald W. Lodge, BS '54 - Retired from Lockheed, flight test group engineer.

Kenneth L. Mantz, BS '59 - Retired from Boeing.

John Martindale, BS '50 - Retired after 25 years from owner operated construction company.

Ralph A. McElheny, ATE '52 - Retired.

Robert J. McElvain, BS '59 - Retired from Hughes Aircraft Company.

Desco E. McKay, ATE '50 - Retired from AT&T.

Garner W. Miller, BS '50 - Retired and is now a consultant. Recipient of 1986 Purdue Schools of Engineering Distinguished Engineering Alumnus Award.

William F. Moses, Jr., ATE '52 - Retired Colonel, United States Air Force.

Frederick M. Norton, BS '54 - Retired from Hercules Aerospace.

Henry Plouse, BS '50 - Retired.

William H. Ricke, Sr., BS '51 - Retired, Advance Quality Engineer, General Electric Co.

Charles W. Riffe, ATE '50 - Retired - self employed.

Robert R. Rodgers, Jr., BS '50 - Retired; spent 25 years at Naval Air Warfare Center.

Jim Rossetto, BS '51 - Retired from Lockheed Martin.

Peter W. Schaper, BS '51, MS '53 - Retired '95 from Jet Propulsion Laboratory.

Charles J. Schneider, Sr., BS '50 - Retired from Boeing.

Alfred Keith Smith, BS '50 - Retired.

Robert E. Smith, BS '52 - President, R.E. Smith & Associates. Listed in Who's Who in the West and America.

Robert L. Swaim, BS '57, MS '59 - President, RLS Products & Services, Inc. ABET EAC evaluator in Aerospace Engineering. Faculty member in Aeronautics and Astronautics 1967-1978. Recipient of the School's Elmer Bruhn Outstanding Teaching Award.

Gary L. Walters, BS '54 - Retired Commercial Manager - Chemical Division, Westvaco Corp.

1960's

Robert B. Beveridge, MS '61 - Retired from United States Air Force, volunteering at Nellis AFB Hospital Pharmacy.

John Blair, BS '60 - Management Consultant, self employed.

Donald S. Campbell, BS '66 - Manager, Aircraft Loads for The Boeing Company.

James A. Eastwood, BS '63 - Retired from United States Army Logistics Support Activity; consulting in logistics supports, planning, industrial engineering planning & quality. Earned Army Material Command Awards for performance and accomplishments in reliability centered maintenance and implementation.

Ronald J. Ehmsen, MS '67 - President, Health Care International Associates.

Robert J. Flemming Jr., BS '67 - Chief Experimental Aeromechanics, Sikorsky Aircraft.

John Gleiter, BS '60 - Consulting Engineer for Southern California Edison. Former V.P. of Engineering for an oil and gas corporation.

Theodore C. Haven, BS '64 - Purchasing Engineer, Submicron Systems, Inc.

Douglas A. Joyce, BS '67, MS '68, -

Independent Consultant. Retired Col. USAF.

John T. La Duc, BS, '65 - V.P. & Chief Financial Officer, Kaiser Aluminum & Chemical Corp.

Jerry Laskody, BS '65 - Chief Engineer for Airplane Propulsion-Technology & Product Development, Boeing Commercial Airplane Group.

Jerry Lockenour, BS '67 - Manager Engineering, Joint Strike Fighter, Northrop Grumman. Member of NASA Aeronautical Research and Technology Subcommittee, X-29 Advisory Committee. Member of School of AAE Industrial Advisory Council.

James I. Marrone, BS '61 - Project Manager, Large Utilities Projects for Abbott Laboratories.

H. F. (Fred) Nelson, MS '63, PhD '68 - Professor of Aerospace Engineering at University of Missouri - Rolla.

Albert G. Nemes, BS '65 - Program Manager, Subcontract Management, Lockheed Martin Astronautics.

Robert S. Russo, BS '65 - President & CEO, American Technical Services Group.

Ronald L. Schwiesow, BS '62 - Principal Electro-Optical Engineer, Remote Sensing Concept Development at Ball Aerospace and Technologies Corporation.

John C. Seymour, BS '65 - Captain B747, Tower Air Flight Standards, Tower Air.

Lee T. Smith, MS '67 - Senior Systems Engineer, Hughes Aircraft Company; retired from United States Air Force as a Colonel after 26 years of duty in flying positions.

Kenneth J. Stuckas, BS '69 - Forensic Engineer - self employed.

Daniel J. Vasicsek, BS '64, MS '65 - Senior Research Associate, AMOCO Production Company.

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We Need Your Help!

As an alumna or alumnus of our School, you are our best ambassador.

If you know of someone interested in earning an undergraduate or graduate degree in aeronautical and astronautical engineering, we want to know!

Please encourage them to contact us at:

Counseling Office
 School of Aeronautics & Astronautics
 Purdue University
 1282 Grissom Hall
 West Lafayette, IN 47907-1282

(765) 494-5152

CLASS NOTES • Continued

Nellore S. Venkataraman, MS '66, PhD '70 - Professor, Department of Mechanical Engineering, University of Puerto Rico. Honored as the Distinguished Professor in Mechanical Engineering.

Neil R. Walker, BS '69, MS '70 - Member of Sensor Technical Staff, Nichols Research Corporation.

Roland West, BS '61 - Retired Sr. Propulsion Engineer, Federal Aviation Administration.

1970's

Wayne M. Bartlett, BS '76 - Deputy Chief for Aircraft Operations, NASA Lewis Research Center.

Edward M. Bielski, BS '74, MS '76 - Controller, Chief Accounting Officer, DBA Systems, Inc.

Douglas L. Bowers, BS '72 - Supervisor, Aerospace Engineering, Aeromechanics Division, Wright Laboratory.

Charlotte (Charlene) Helene Edinboro nee Fajardo, BS '75, MS '76 - Systems Engineer Multimedia Training Development, Scitor Corporation.

Charles W. Haupt, BS '75 - Senior Staff Engineer, Stress Analyst/Structural Testing, Lockheed Martin Astronautics. AIAA paper on "Residual Stress Measurements of Titanium Weld Certification Rings".

Edward W. (Bucky) Hildebeitel, BS '70, MS '77 - President, R&C Engineering, Inc.

David Kelpe, BS '77 - Sr. Staff Engineer Large Military Engine Stress Analysis, General Electric Aircraft Engines.

John M. Koke, BS '74, MS '77 - Science Education 5th grade teacher, Smoky Row Elementary School, Carmel, IN.

Stephen S. Kress, BS '75 - Program Manager, Advanced Concepts (Missile Weapon Systems), Lockheed Martin Yough Systems. Recipient of the 1996 Lockheed Martin Yough Systems President's Award.

Fred C. Kurth, BS '73 - Airline Captain, American Airlines, O'Hare Airport. Retired Lieutenant Colonel, United States Air Force Reserves.

Jerry M. Lake, BS '73 - Leader, Government Antenna Systems Activity - spacecraft antenna design, Hughes Space and Communications.

Ronald J. Lash, BS '71 - Flight Test Engineer for Allison Engine Company.

Joe W. Meredith, MS '70 - President, Virginia Tech Corporate Research Center.

Michael P. Pumilia, BS '72 - Senior Product Support Engineer, Lead Engineer PQA Group, Lockheed Martin Aeronautical Systems.

Steven E. Springer, BS '71 - Attorney, Kightlinger and Gray. Member of the Federation of Insurance and Corporate Counsel.

Albert V. Suppinger, BS '70 - Manager, Quality Assurance, Temporarily Product Manager, Microwave Products - Coors Electronic Package Company.

Steve Watson, BS '71 - Owner/Partner - Product Design & Development, StreetWorks LLC. First runner-up of National Street Rod Association Best New Product (1996) and Best Black and White Catalog (1996).

Richard J. Weber, BS '70 - Systems Engineer, Rohm and Haas Company.

1980's

Kenneth A. Baird, BS '88 - Aerospace Engineer, National Missile Defense Flight Test Planning & Execution, ANSER.

Gary Curtis Barrett, BS '86 - Manager, Deloitte & Touche Consulting Group.

Jeffrey Ervin Bauer, BS '81, MS '88 - Chief Engineer for the Environmental Research Aircraft & Sensor Tech. Program, NASA Dryden Flight Research Center.

Garrett A. Brucker, BS '87 - Manager, Management Consulting Services, Ernst & Young Consulting.

Melinda Kay Burnett (Gatewood), AAE '86 - Research Data Analyst, Illinois Institute of Technology.

John William Cooley, BS '89, MS '90 - Staff Engineer-Mechanical Design, Metal Container Corporation (Anheuser-Busch subsidiary).

Francis E. Davis, BS '82 - Senior Engineer/Design and Analysis of Rocket Motors and Ballistic Devices, Talley Defense Systems.

Gregg E. Davis, BS '85 - Senior Aircraft Structures Engineer, Delta Air Lines.

Laurence DeQuay, BS '80 - Project Engineer responsible for design of E-1 Turbopump Ground Test Facility at NASA Stennis Space Center. U.S. Patent No. 4,921,212 for Hybrid

Butterfly Valve; Outstanding and Superior Performance Awards, 1994. Runner-up for 1991 NASA Inventor of the Year.

Michael K. Farrell, BS '81 - Engineer Specialist Aerodynamics; Lead Engineer on V-22 Aerodynamics, Bell Helicopter Textron.

Mark Flora, BS '84 - Rotorcraft Certification Propulsion Engineer, Federal Aviation Administration.

James Fong, BS '88 - Program Manager, Taiwan F-16 Program, United States Air Force.

Ann Kathleen Hanson Brunner, BS '80 - USAF Launch and Orbital Operations Director.

Theron J. Henry, BS '82 - Lieutenant Commander, United States Navy; Deputy Director of New Joint Aviation Electronic Warfare School, Naval Technical Training Center.

Joseph P. Hess, BS '80, MS '81 - Director, Technology and Product Development, Bentley-Harris.

Keith Frederick Hoffman, BS '87 - Spacecraft Systems Engineer in Attitude Control, Hughes Space & Communications.

Daniel Mark, BS '85 - Instrument Manager, Swales Aerospace, Inc.

John Matson, BS '82, MSE '84 - Management Consulting Partner, Ernst & Young, LLP Aerospace and Defense.

Gregory J. McNew, BS '88 - Captain, United States Air Force; Program Integrator for Joint Strike Fighter Program, DCMC - Boeing Seattle.

Kyle Mullen, BS '89 - Captain, United States Air Force; AWACS Senior Director.

Brian Polasek, BS '85 - Sr. Liaison Engineer - Design and Approve Structural Repairs to Commercial Aircraft, Northwest Airlines.

Christopher Pericak, BS '85 - Aerospace Engineer, United States Army.

Suvendoo K. Ray, BS '83, MS '84, PhD '87 - Sales Program Manager, Boeing Company.

Steve Rogers, BSAE '83 - Production Coordinator, arrange external and internal manufacture, test, and package, AbleNet Inc.

John A. Stark, BS '82, MS '84 - Software Development Manager, Develop simulations for Tomahawk Cruise Missile, Science Applications International Corp.

Rhonda Thornton, BS '86 - Senior Engineer - Engine Condition Monitoring, Northwest Airlines.

Eric Tomasson, BS '80 - Captain, MD-80, American Airlines.

Steven M. Trujillo, BSAE '88 - PhD Candidate, University of Texas at Austin.

Joseph C. Tyler, BS '89 - Vice President, Project Manager Developing Software for Remote Telecom. Satellite Control, Exploration Enterprises, Inc. Daughter Melissa born, July 31st, 1996.

Brent Waggoner, BS '89 - Electronics Engineer, United States Navy.

Gregory P. Walker, BS '83 - Lead Flight Controls Engineer on Joint Strike Fighter Program, Lockheed Martin.

Thomas E. Williams, BS '88 - Design Engineer, Rockwell/Rocketdyne.

Maryann Zelenak, BS '89 - Project Manager Signature Technology Office, United States Air Force.

1990's

Jerry Andrews II, BSAE '93 - Transportation Specialist, Omni Source Corp. Coordinate pick up of CU cable across the USA.

Artagnan Ayala, BS '95 - Engineering Associate, Allied Signal Aerospace - Engines.

Robert Bayt, BS '93, MS '95 - Pursuing PhD at MIT, Department of Aeronautics & Astronautics. Research Associate. Research Fellowship from Goddard Spaceflight Center.

Julia Bell, MS '91, PhD '96 - Galileo Navigator Team, Jet Propulsion Lab.

Eric Richard Bretthauer, BS '92 - Planner - Inventory Management, United Airlines.

Steven M. Buzon, BS '90 - Missile Warning Crew Commander, United States Air Force.

Mark S. Carmel, MS '96 - LCDR, USCG, HH-60J Engineer, United States Coast Guard.

Eric Davids, BS '95 - Recreational Vehicle Engineer, Skyline.

James Gaynor, BS '91 - Design Engineer, Hamilton Beach/Proctor Silex.

Gregory M. Hall, AAE '92 - Sales Engineer, The BOC Group.

Brett A. Hoffstadt, BS '93 - Staff Scientist, Science Applications International Corporation.

Stephen N. Hurst, BS '94 - Structures Engineer, Naval Air Systems Team, United States Navy.

Claude Kam, BS '94 - Associate Engineer, Senior, Lockheed Martin Missiles & Space. Received letter of recognition for work on the Gravity Probe-B.

Jimmy Krozal, AS '84, BS '85, MS '88, PhD '92 - Senior Engineer, Seagull Technology, Inc. Earned 1996 Best-of-Show in the Pacific Art League Art Show.

Peter Chang-Ching Lai, MS '93 - Senior Project Engineer Sound and Vibration, Copeland Corporation.

Travis B. Langster, BS '94 - Systems Engineer, Analytical Graphics.

Barbara Tomlinson Lee, BSAE '90 - Senior Staff Engineer, Hughes Space & Communications.

Amy Lucas, BS '95 - Systems Engineer, NCI Information Systems, Inc.

Charissa McDonald (Cosky), BS '90, MS '93 - United Airline Pilot; Air Force Reserves. Company Grade Officer of the Year for California Air Force Reserves.

David McDonald, BS '95 - Field Support Engineer, Rockwell Automation, Allen-Bradley.

Eric Meiring, BS '95 - Associate Engineer, Iridium Flight Software, OCS Analyst, Lockheed Martin Missiles & Space. Will travel to Arizona for launch rehearsal of friction satellites.

Bradley Merrill, BS '90, MS '95 - Design Engineer, Ag Tractor Engineering - John Deere.

Kevin Metrocavage, BS '96 - Flight Controller for ISS (in training); working for Johnson Space Center on the Space Station (mission control), United Space Alliance. Worked at the Summer Olympics with the U.S.A. Men's Basketball Team.

Brian Bevan Ostlund, BS '95 - Liaison Engineer, S. B. Power Tool Company. Earned private pilot's license in 1995.

John Rumble, BS '95 - Missile Combat Crew Member, United States Air Force. Distinguished graduate of USAF IQT at Vandenberg AFB.

Brian Shannon, BS '91, MS '94 - Captain, United States Air Force C-130 Pilot. Stationed in Saudi Arabia in January '96 to fly C-130's.

Christopher Spangler, BS '92, MS '94 - Project Engineer, Powertrain System Analysis, General Motors.

David L. Stone, MS '95 - Aerospace Engineer, National Air Warfare Center Aircraft Division.

Jessie Temores, BS '92, MS '94 - Design Engineer, Whiting Corporation.

Paul "Rusty" Thomas, BSAE '91 - Self-employed, Spacecraft Conceptual Design, Astro Systems Design.

Scott Vanderwest, BS '90 - Manufacturing Engineer for Cellular RF Amplifiers, Motorola.

Timothy Vendrely, BS '90 - Project Engineer, MED Institute. Three patent applications in total knee replacement.

Justin Verville, BS '95 - United States Navy Student Naval Flight Officer.

Zaidi Zakaria, BS '93, MS '95 - Production Engineer, W.H. Brady.

Class Notes Information Update Form


Your friends and former classmates want to know what is happening in your life! Please jot down personal news that you want to appear in the next edition of AeroGRAM and forward it to: School of Aeronautics and Astronautics, Purdue University, 1282 Grissom Hall, West Lafayette, IN 47907-1282, or send us e-mail at: aae-alumni@ecn.purdue.edu.

Thanks for Remembering!

Last year the School received more than \$23,000 in matching gift dollars from employers. A big thanks to each of you who turned in your matching gift form!


Unfortunately, last year more than \$12,000 in matching gifts went unclaimed because alumni who work for matching gift companies did not turn in their matching gift forms.

Your matching gift does make a difference and on an accumulative basis can determine whether we purchase additional computer hardware and software, provide further support to student organizations, or purchase equipment for our faculty and their research.

So please remember: turn in your matching gift form and double, triple, and in some cases quadruple your donation to the School! Thank You! 

Dean's Club Luncheon

The Annual Dean's Club Luncheon, held for alumni and friends who donate more than \$500 to the Schools of Engineering, was held on November 8, 1996. Former

Astronaut Gary Payton, MSAE '72, was the guest speaker. Payton is the Director of Space Transportation and the Reusable Launch Vehicle Program for NASA. 



Left to right: Professors Schneider, Collicott, Gary Payton, Professors Williams, Gustafson, and Sullivan at the Dean's Club Luncheon.

Deaths

Since the last publication of **AeroGRAM**, the following AAE alumni have been reported as deceased.

Our sympathy and prayers are extended to their family and friends.

George Berryman, BS '46

Ronald Bunyak, '56

Jeffrey Crutchfield, BS '79

Ross Goebel, BSAAE '93

Jack Hartman, BS '49

William Holmes, BS '53

Norwin Ingersoll, BS '54

William Kauchak, BS '55

Harry Lange, BS '52

Richard Marquardt, BS '54

James Povalski, MS '47

John Stidham, BS '51

Arthur Talmage, BS '50

George Telle, BS '45

Wallace Velie, BS '52



AAE Survey Results

A big thanks to all of you who completed the alumni survey and forwarded it to the School. Out of 4,988 deliverable addresses, 146 alumni returned completed surveys. This represents a 3% return rate, which for direct mail is considered good.

Surveys completed by graduation decades were as follows: 1940's graduates completed 13 surveys; 1950's completed 35 and 1960's alumni completed 21. We received 18 surveys from the 1970's graduating classes, 29 from the 1980's, and 30 from the 1990's.

On the question, "Do you feel your education at the School of Aeronautics

and Astronautics prepared you to enter the workforce?," 143 answered "Yes" and 3 "No."


Alumni comments included:

"My degree helped establish my career....Upon graduation I went directly into a aerodynamics group at North American Aviation in a lean year for engineers....At the time of graduation, women were not hired however it was helpful many years later....It provided me with excellent preparation in the basics....I needed more business training in accounting, marketing, etc....Education was broad enough to allow me to adapt to changing needs in the industry... World class faculty....I was well

prepared in the workforce and better than my peers....Combined education courses and co-op experience was ideal....Demand for excellent and quality work helped me prepare for the real world."

You had suggestions on how we could have improved your educational experience. Suggestions included: "More systems study (radar, IR, display technology)....Personal finance and management courses.... Stress verbal and written communication courses....Would have helped if I had a mentor....More multidisciplinary programs...More non-textbook activities and include industry trips....Have more presen-

tations by industry professionals."

The completed survey results were presented to our Industrial Advisory Council during the October 4, 1996 meeting. Although some of the suggestions have already been incorporated into the School curriculum, such as emphasis on verbal and written communication skills and the addition of a sophomore design course, others will be considered and if appropriate incorporated into the School's strategic plan. The strategic plan will be introduced in the Summer **AeroGRAM**. 

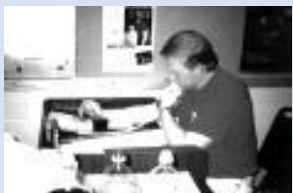
AAE Students Recognized!

Congratulations to the following students who earned special awards this year!

- **Shawn Grobe, Dan Harris, Mukul Kundu, Dave McKinley, and Bryan Mutchler**—AAE 251 Thiokol Space Award for Spring Semester 1996
- **Nicole Driscoll (Group Leader), John Bleil, Anthony Foti, Daniel Smiczek, and Klaasjan Van Gelder**—AAE 451 Lockheed Design Award
- **Jon Sims**—\$1600 Space Shuttle Memorial Scholarship for Fall 1996.
- **Jon Sims and Matt Szolwinski**—Purdue Forever Club Fellowships.

The fellowships were established in 1989 by Colonel C.D. McAllister and Mr. and Mrs. Robert H. Elrod to support one or more annual fellowships for PhD students in our School.

First Thank-a-Thon Held



AIAA President Greg Roth dials-up a Dean's Club member during the Thank-a-thon. Students from AIAA, SEDS, AHS, and Sigma Gamma Tau participated in this annual Fall event.

Students Fly Experiments on Space Shuttle

More than a dozen students in the Students for the Exploration and Development of Space (SEDS) were involved in NASA's Space Experiment Module (SEM) project, which made its first flight on Columbia STS-80 in November 1996. Professor James Longuski is their advisor.

According to NASA, SEM is an education initiative which provides "nationwide educational access to space for kindergarten through university level students." Within the program, NASA provides small containers or modules to students to fly zerogravity and microgravity experiments on the Space Shuttle.

"The experiments are created, designed, built, and implemented by students with teacher and/or mentor guidance. Student experiment modules are flown in a "carrier" which resides in the cargo bay of the Space Shuttle. The carrier supplies power to, and the means to control and collect data from each experiment."

SEDS experiments in SEM1 included:

Thermal Convection Experiment—In space, since there is no gravity allowing fluids to separate, so hot and cool fluids should stay in one place. Due to this phenomena, the effects of microgravity on a heated fluid were studied. The experiment consisted of a fluid contained in a cylinder and heated from the bottom. The fluid temperatures were measured at different locations in space to identify if a buoyancy effect is present or if the fluid remained stationary. Advising

the students was Professor Steven Collicott.

Particle Detector Experiment—Cosmic rays leave traces as they travel through certain materials. Unfortunately, materials that give good results are expensive and difficult to manufacture.


Lexan

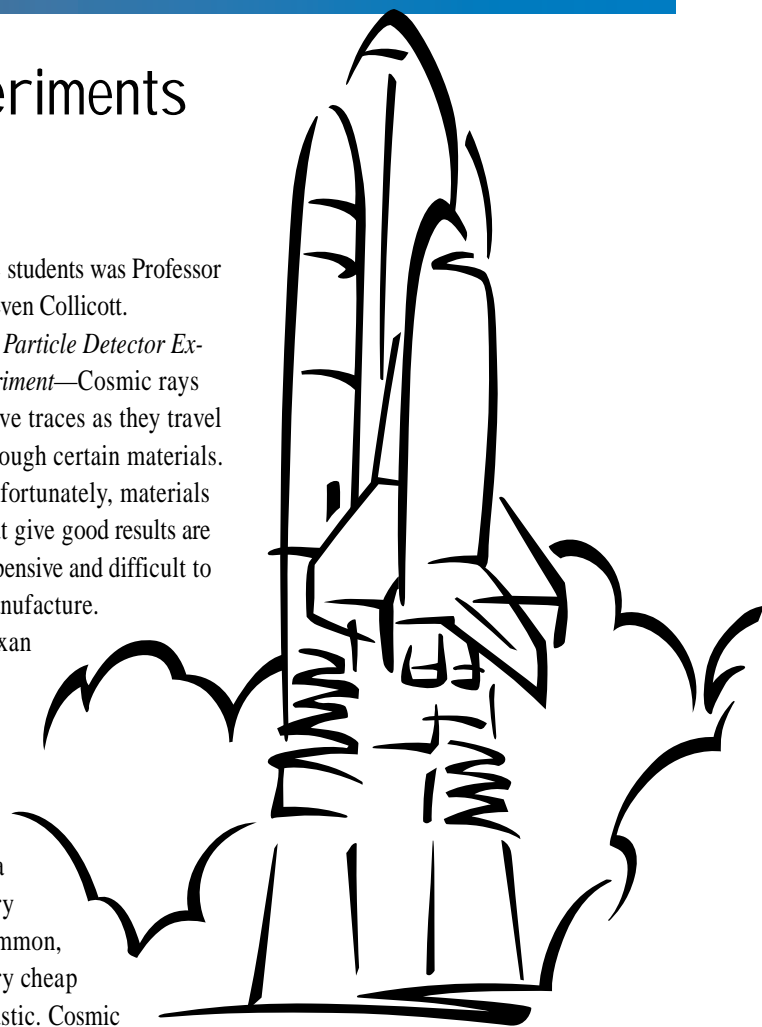
is a very common, very cheap

plastic. Cosmic rays will pit the surface of the Lexan when the Space Shuttle payload bay doors are opened and the experiment container is exposed to unobstructed cosmic rays. The rays will leave microscopic traces on the Lexan so when the experiment returns to Earth, the material will be etched with an acid. The etching will tend to increase the size of any pits present. The size of the pits caused by cosmic rays should be different than the size of the pits caused by radiation on earth.

Seed Experiment—Approximately 2000 seeds were temporarily stopped in different stages of germination. After the seeds were germinated to their proper stages, they were split into two groups, one for flight and one for control. The seeds, now returned to Earth, are being grown with the control group to determine

if there are any differences in growth of the seeds and or any differences in cellular structure.

Shrimp Experiment—This experiment's goal was to analyze the activity of a plasma membrane from brine shrimp. For two days in space, hundreds of shrimp eggs were immersed in salt water, where they hatched and grew. After the two day period they were exposed to a growth stimulating chemical and an ultraviolet light for forty minutes. During this forty minutes, the amount of light absorbed by the shrimp eggs was measured. Better understanding of the effects of microgravity on the shrimp growth was gained by comparing the amount of the growth stimulating chemical absorbed during ground tests with the amount absorbed in space. 




AIAA Students Win First Place

The Purdue University AIAA Chapter was awarded first place for their design in the Air Breathing Propulsion Team Engine Design Competition, which called for a Dual Mode (Ramjet/Scramjet) Propulsion System. Their design was appropriately named the *Boiler-maker Special 2000*.

The competition, administered by the AIAA Student Programs Department, is part of a wide-reaching program that recognizes excellence in aerospace engineering study at both the undergraduate and graduate level.

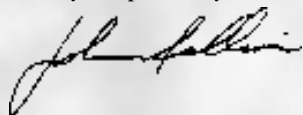
According to AIAA, the competition is judged by members of the AIAA Technical Committees and representatives from the sponsoring company. The purpose of the design competitions is to increase practical skills of aerospace engineering both in undergraduate as well as graduate students in both individual and team competitions.

Students who worked on the winning vehicle design in the Spring 1996 semester included Brian R. Jones, John E. Funk, Michael A. Buttacoli, and Jason Jacobs. Professor Nathan L. Messersmith was their advisor. 

AAE Briefing • Continued

between industry and academe and believe it to be a win-win situation where both learn and grow from the experience.

Reaching out to industry and gaining insight into their world helps them gain insight into ours and strengthens us both professionally and personally.



John P. Sullivan,
Professor and Head

Industrial Advisory Council Members

Nancy L.B. Anderson, Hughes Space and Communications Company

Brad Belcher, Allison Advanced Development Company

Dr. Paul Bevilaqua, Lockheed Martin Skunk Works

Tom Bruce, AlliedSignal Aerospace Incorporated

Joe Gernand, Rockwell International

Hans Karrenberg, The Aerospace Corporation


Dr. Donald L. Lamberson, Major General, USAF (Retired)

Jerry Lockenour, Northrop Grumman Corporation

Scott Stein, Thiokol Corporation, Space Operations

Dr. Robert Strickler, TRW Environmental Safety Systems, Incorporated

David Swain, McDonnell Douglas Aerospace


Hank Queen, Boeing Commercial Airplane Group 

Have You Seen These Alumni?

Please help us locate our "lost" alumni. We have no active address or phone number for the following alumni. (*Names prior to 1960 appeared in the Summer 1996 AeroGRAM. Names after 1978 will be included in the next newsletter.*) If you know of their whereabouts, call, write, or e-mail us the information. Thank You!

BS '60 Gerald Asley Allen Frank M. Czumak Sherwin Dubren Guy Bennett Everett Joseph A. Fromme Raymond R. Roberts	Richard A. Labash Panda Jerry A. Wrucha MS '67 Charles M. Sarff Robert A. Walker David A. Willett PhD '67 Claire E. Chapin Ronald John MacGregor	Douglas H. Kirkpatrick Leon Y L Lui Paul Rossetti BS '72 Robert Kenyon Buell William George Corey Edwin Warren Davis John Kenneth Lovison David Michael Stanfield Stephen Roger Warner Phillip Darrell Wright
BS '61 Jeffrey L. Bowers Dominic F. Gerardo John Syenghee Huh Bruce Alan Miller Paul Mamoru Tanimoto Jerry L. Willman	BS '68 Dennis Jay Anderson Solomon O. Ekhuagure Stephen B. Hall Howard M. Rush MS '68 Ronald Gay Bradley Philippe R. Challe John H. Fuller Robert K. Selke	MS '72 Somen Chowdhury Mark A. McKenzie Sunil Mehrotra Subramaniam Parameshwaran BS '73 Larry Edwin Edwards Lawrence Earnest Epley Gary Howard Short Stephen Keith Workman
MS '61 H. Dieter Middendorf BS '62 Burnette Carlson James B. Coffman Gordon L. Crouse Philip Irwin Moynihan Franklin D. Roberts	BS '69 Gary B. Joy Bryan D. Leyda Pei Chuan Lu Spencer W. McKellip James A. Miller George A. Stauffer Dick G. Svendsen Huba Zoltan Topai David M. Troyer Faust H. Wertz	BS '74 Danny Keith Barkman MS '74 Weir Peake Thurman PhD '74 Nai Chung Cheng Naiim Abdel-Hady Shafey BS '75 Adi Rahman Adiwoso David Philip Lux Stephen J. Messerschmidt Robert Ray Meyer William Michael Scanlon Gary Wayne Singleton
BS '63 James E. Kalan John King Meier BS '64 Joseph G. Barr William E. Dunn Richard N. Krieps Paul W. Moffett Roger Selig Schlueter Joseph P. Vogt Jack G. Weber	MS '69 Gordon D. Bredvik Donald Edward Schenk Edwin A. Thomas BS '70 Gholamali Hedayat William L. Jones Ronald E. Luther Alfred F. Quarto Kenneth Schoonover Gregory J. Sterns	MS '75 Allan Robert Cohen BS '76 Wesley Richard Bruner James Paul Konzak Jeffrey Alan Lamparter Mylen James Mundt BS '77 Soud Abdulla Al-Mukhaizim Michael Harry Bohun Michael Richard Brinson Craig Allen Davis Stephen D. Forness Seth Craig Whitman Hill Ahmad Farid Khorrami Keith Alan Riesner
MS '64 Francis L. Barrett Vincent C. J. Eckelkamp Dick S. Oberg John G. Pieri Kai Pang Wong BS '65 Mohammad Hossein Bani-Asadi Richard O. Bruno Robert E. De Kuiper Lee R. Lehmann Arley C. Marley Gerald L. Niksch Peter Skele Thomas R. Swift Randy B. Werhane	MS '70 Max Reeves Barron Roc Bottomly Donald E. Eagles Craig S. Golart Roger C. Head Terry Boyd Hodges William Michael Marvel James A. Terhune PhD '70 Thomas Calvin Cannon BS '71 Richard R. Adams Jeffrey Lewis Alger Clifton Wynn Ehlen Raymond Frederick Haseltine Colin C. Irvine David Berry Merriman Duke Alan Smith William John Thome	MS '78 Douglas Scott Apter Estelle Mathilda Coker Mario Antonio Feliciano Joseph Walter Flint Kerry Dale Masher William Raymond Richards Gary Gerard Rickershauser Howard Clarkson Whitcomb MS '78 Kozo Doman Amando Francisco Rois Mendez Shi-Min Tan PhD '78 Le-Chung Shiau
MS '65 Jerome J. Butler Lucien Lapine Robert A. Lodge Larry Niles Lydick Gary W. Matthes BS '66 Elweyn C. Blodgett Richard D. Cook Harold L. Libster Gerald C. Marshall C. James M. Okaro Richard A. Wantuch	BS '67 John A. Bird Stanislaus N. Evbuoma Harry LeRoy Hinzman	

Please Be Specific

We realize that you may have varied philanthropic interests at Purdue. However, please remember, if you want your donation to benefit the School of Aeronautics and Astronautics, *you must be specific*. If you donate via the Phone-a-thon, simply state this to the student caller. Or, if you donate through direct mail, check the appropriate box on the reply card or write in the School's name. If you specify the School of Aeronautics and Astronautics, you insure that your donation will benefit your School. Thank you! 

As of February 1, 1997,
our new area code is 765.

Be sure to visit the Aero & Astro
website: <http://aae.www.ecn.purdue.edu>



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(â€œa gram/),
n. an airmail letter.

A newsletter published twice a year for the alumni and friends of the School of Aeronautics & Astronautics. Please send inquiries to Nan Ross at:

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