



newsletter

Ray W. Herrick Laboratories

Purdue University, West Lafayette, IN 47907-2031

<http://www.engineering.purdue.edu/Herrick>

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A Moment for Reflection

—Judy Hanks

Recently a photo of the original barn, which later became Herrick Laboratories, was discovered in an agricultural publication. It shows how the structure looked around 1942. It's the earliest photo found so far of the building. Special thanks to Archives and Special Collections at Purdue for allowing us to reproduce it.



From the J.C. Allen collection, courtesy of Purdue University Libraries, Archives and Special Collections

After seeing this photo, perhaps this is an ideal time to reflect on the past and how far the laboratories have come since the beginning, a little more than 50 years ago.

You can see the white sheep barn in the background. Unfortunately, it's been lost to progress; however, the old horse barn and the round exhibition facilities still remain. The round barn is currently used by Grounds, which is scheduled to relocate to new facilities sometime in the future. Greenhouses for Grounds stand where the sheep barn once was.

As most of you know, in 1957 the horse barn was remodeled and the two existing wings were added on each side of the Herrick Laboratories. Shortly afterward in 1958, offices were added on the north side of the barn. The director's office is where it was when our first director, William Fontaine, began the laboratories. Patricia sits in Bill's old chair.

In 1971-72, the hay loft in the horse barn was remodeled for graduate students' office space, and it is still used for that today. On rainy, damp

days, it's easy to reminisce and imagine the smell of hay in the building.

The grassy area in front of the building remains, but is much smaller than when sheep grazed years ago. Today, the campus has grown around our facility bringing new people and new buildings to the area. Discovery Park is across the street and is a focal point of the University. In the future plans for the Purdue campus, the current location of the Herrick Labs is close to center of the University (http://www.purdue.edu/architect/campus_planning/master_plans.htm).



Side view of the original barn in 1957 before the wings were added, and the Herrick Laboratories began.

After 50 years, the activities at the laboratories have simply outgrown the research facilities. Doug Adams has had to move his operations across town (<https://engineering.purdue.edu/PCSI/>). As you know from previous letters, we are working to build the new labs. We completed Phase I of fund raising in the fall and have a couple of initiatives in the works for the funding of the remaining phases.



Early photo of Herrick with the east and west wings. Notice the lack of landscaping. Do you know when this photo was taken? Ray Cohen thinks it is circa 1960 after the wings were added, and David Tree thinks it's after the tile roof was removed which would make it circa 1980.

Upcoming Events

Thursday, October 15 through Saturday, October 17, 2009:
Industrial Advisory Committee Meeting (Ohio State game)

Saturday, October 3, 2009,
Homecoming (Purdue vs. Northwestern)



Wednesday, July 12 and Thursday, July 13, 2010:
Compressor and Refrigeration Short Courses

Friday, July 14 through Monday, July 17, 2010: 19th
International Compressor Engineering Conference

Friday through Monday, July 14-17, 2010: 12th
International Refrigeration and Air Conditioning Conference

Herrick Alums at the Baltimore Aircoil Company

—by Steve Marshall

When Steve Marshall (Purdue MSME 1984) joined the Baltimore Aircoil Company (BAC) a couple years ago, he was welcomed into the R and D Group by three Purdue ME graduates, including two other Herrick Lab alumni. This Purdue/Herrick Labs satellite group now consists of Steve, Rich Harrison (Purdue MSME, 1970), Tom Carter (Purdue BSME, 1977), and Branko Korenic (Purdue MSME 1977 and Ph.D. 1980). Reminiscing on Purdue and Herrick Labs experiences is a popular pastime in this group at the BAC Headquarters Building in Jessup, Maryland. Was it coincidence or destiny that everyone in the group found their way from West Lafayette to Baltimore?

Rich Harrison grew up in the Northern Virginia area. He received a BS degree in Mechanical Engineering from Virginia Polytechnic Institute. He then went to Purdue where he did compressor motion modeling at Herrick Labs and received a MS degree in Mechanical Engineering in 1970. After Purdue, he spent two years as an Ordnance Officer in the Army in Germany. Next, he went to work at Ford in Dearborn, MI doing computer crash simulations of airbag and seatbelt equipped cars and comparing that data to actual controlled crashes.

Rich left the Detroit area and began his career with BAC in 1974. Over his 35 years with BAC, he has progressed from Product Engineer to his current position of Director of Research and Development. He has been most intimately involved in heat and mass transfer development and fan performance. A key part of his job over these years was the development of thermal performance ratings for BAC products. He led this industry to adopt a program of third-party independently certified thermal performance ratings under the Cooling Technology Institute. BAC was the first manufacturer to participate in this program in 1983 and now 24 other worldwide manufacturers have joined the program.

During his time with BAC, the computer modeling experience that started at Purdue helped Rich to develop many more computer models of various different processes and innovative components in BAC's products. Those innovative products or components resulted in nine US patents and numerous foreign patents for Rich.

Rich has participated in Cooling Technology Institute for over 20 years. He was the Chairman of the Performance and Tech-

nology Committee for four years and just recently completed three years as a member of the Board of Directors for the organization.

Tom Carter, a native of the Washington, DC area, graduated from Purdue University in May, 1977 with a BS in Mechanical Engineering. During his undergraduate studies he benefited from co-op experiences with both the Bechtel Power Corporation and the Naval Surface Weapons Center. Later in 1983 he went on to earn an MS in Computer Science from Johns Hopkins University and became a registered Professional Engineer in the state of Maryland.



Pictured left to right are Rich Harrison, Steve Marshall, Branko Korenic, and Tom Carter.

After receiving several offers for employment from various companies around the country, Tom chose to begin his career as a design engineer with the BAC in July, 1977. He recalls he was initially attracted to BAC for a number of reasons. Among them were the quality of the people he met, their enthusiasm for the work they were doing, the ability to put his engineering skills to the test in BAC's large industrial laboratories, the openness and respect between the employees in various departments and the production personnel, the relatively small size, yet global footprint of the company, and the important work the company's products played in saving water and energy. He continues to find all these qualities existing at BAC today.

Over the ensuing 32 years, Tom has spent most of his career in the Engineering Department. Later in his career, he also accepted assignments in both the Manufacturing and Customer Service groups which greatly helped in his understanding and appreciation for the other facets of BAC's business. However, over the years he recognized that he continues to have a true passion for engineering and is thrilled to be in his current position as Director, Research and Development.

Tom credits Purdue's strong emphasis on the engineering fundamentals for providing him with the necessary technical skills to guide him along his career path and in helping him discover his passion for the engineering profession. It still amazes him how frequently he continues to return to his original and well worn Thermodynamics, Fluids and Heat Transfer text books to go back to the basic principles. While at BAC his work has focused primarily in the areas of evaporative heat transfer and thermal storage and has resulted in 17 US Patents.

Herrick Alums at the Baltimore Aircoil Company

Looking back over his career, Tom is thankful for the foundation the quality of the Purdue education provided. He also feels very fortunate to work with such a number of exceptional colleagues and is excited about the discoveries and advances they will continue to make.

Branko Korenic arrived at Purdue from the former Yugoslavia in June 1975. After interviewing several professors in the ME Building, he visited and became so impressed with the faculty and staff at Herrick Labs that he agreed to work for the professors Leidenfrost and Goldschmidt. Professor Leidenfrost's interest in evaporative cooling, theory and applications of lowering condensing temperatures of power producing and consuming cycles, by spraying water on condenser coils, triggered Branko's research.

Branko became a close friend with several Herrick professors and especially with their director Dr. Ray Cohen, whom he remains friends with to this day. Late Professors Leidenfrost and Bill Fontaine, Director Emeritus of Herrick Labs at the time, were also good friends. Branko enjoyed a history of participation with Professors David Tree and Dr. Schoenhals in early ASHRAE meetings.

Branko's first contact with BAC was established in the spring 1980, with a telephone call from Mr. Robert Cates. In summer 1980, Bob Cates visited Purdue, and became very interested in Prof. Leidenfrost's research related to evaporative condensers. He observed Branko's tests while being conducted. Later that fall, Branko visited BAC for the first time. There, he had a presentation about his research for the BAC Engineering Staff. As a result of this visit, Branko joined BAC on January 5, 1981 as an Assistant Research Engineer.

Branko made a home in the Baltimore area. He met his wife, Lauren, and had a daughter, Stephanie, who is now a second-year undergraduate student at UMBC in Baltimore. Currently, Branko attends ASHRAE meetings, often meeting with Dr. Eckhard Groll. Branko and Prof. Groll serve on the same technical committees, and often talk about new things. Prof. Groll also knew Dr. Wolfgang Leidenfrost, Branko's major professor.

Steve Marshall attended Purdue and resided at Herrick Labs for the school years 1982-84. He was one of Bob Bernhard's first two graduate students. With support from NASA, Steve studied low-frequency sound propagation in spacecraft. He was awarded an MSME in 1984.

While at Herrick Labs, Steve served as the President of the Student Syndicate. At the time, the Student Syndicate governed student affairs and represented the students in Laboratory staff meetings. As Student Syndicate President, Steve participated in arranging the Herrick Labs 25th anniversary activities. Steve also met his wife, Marcia, while at Herrick Labs. Marcia was serving as the Associate Editor of the Noise Control Engineering Journal under the direction of Prof. Malcolm Crocker.

Previous to attending Purdue, Steve had graduated with a BSME from the University of Cincinnati in 1979. He accepted a position with the Delco Products Division of GMC back in his hometown of Dayton, Ohio. After graduating from Purdue, Steve returned to Delco for a year. In 1985, Steve and Marcia relocated to Seattle, Washington where Steve worked at the Boeing Commercial Airplane Company for 14 years.

In 1999, Steve and Marcia, and their two children, Danielle and Weston, relocated to the sleepy Appalachian town of Abingdon, Virginia, where Steve accepted a position at Bristol Compressors International. While at Bristol Compressors, Steve reconnected with Herrick Labs via the International Compressor Engineering Conference. Over six years, Steve presented papers at the conference and served as a Session Chairman.

In 2006, Steve and Marcia relocated to Columbia, Maryland where Steve joined BAC as the Manager of Performance Optimization. Currently, Steve continues a connection with Herrick Labs, its Director and staff through his work with the Institute of Noise Control Engineering (INCE). Steve has twice served on the Board of Directors of INCE and is currently serving as an officer.

So, four Purdue/Herrick Labs alumni can share experiences from a common stomping ground, albeit at different times, and then come together at a different location several years later. No two of the four alumni had even met previous to arriving at BAC. Is this a chance meeting or some kind of twisted fate? Probably not; this is probably a common example of the how much Herrick Labs and Purdue alumni contribute in many technical and industrial locations.



Spring returns to campus. The trees and flowers are blooming and on days with beautiful weather, it seems as if everyone is outside enjoying the weather as much as possible. Here's a favorite photo spot for visitors and alumni with the Union Building in the background.

Dynamic Micro/Nanoelectromechanical Systems Research

—Jeff Rhoads



Pictured above is Jeffrey Rhoads, Assistant Professor of Mechanical Engineering.

We are pleased to announce that Jeff Rhoads, Assistant Professor of Mechanical Engineering, joined the faculty of Herrick Laboratories in the Spring Semester of 2008. Jeff arrived at Purdue fresh from Michigan State University, where he received his B.S. (2002), M.S. (2004), and Ph.D. (2007) degrees in mechanical engineering.

Though Jeff's background is in classical dynamics and vibration, his current research focus is on dynamic

micro/nanoelectromechanical systems (MEMS and NEMS) and vibration amplification/attenuation. Outside of the laboratory, Jeff is an active member of the American Society of Mechanical Engineers (ASME), where he serves on both the Student Design Committee and the Micro/Nanosystems Technical Committee, and the American Society for Engineering Education (ASEE). Please join us in welcoming Jeff to the Laboratories.

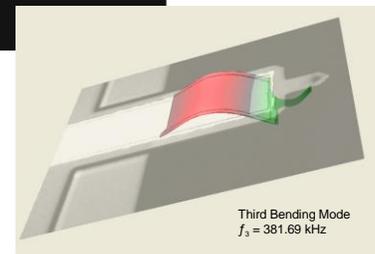
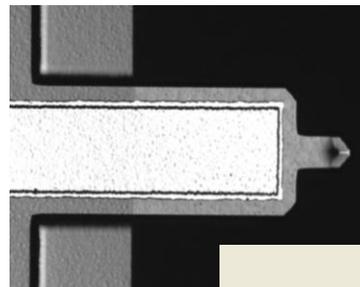
Connecting Research at the Macro-, Micro-, and Nanoscales

As briefly noted above, Jeff Rhoads recently joined the faculty of Herrick Laboratories. This addition to our faculty highlights the continued maturation of Purdue's interdisciplinary research endeavors, as Jeff is the first faculty member to formally split time between Herrick Laboratories and Purdue's Birck Nanotechnology Center. Jeff's research background combines expertise in classical dynamics, vibrations, and control, with a fundamental understanding of micro- and nanoelectromechanical systems (MEMS and NEMS). His distinct research perspective paves the way for direct science and technology transfer between the macro-, micro-, nanoscales, and should help strengthen the bond between Herrick Laboratories and Purdue's Discovery Park Centers.

Currently, Jeff's principal research focus is on the holistic development (modeling, analysis, predictive design, and experimental validation) of novel, micro/nanoscale chemical and biological sensors. These devices, often measuring less than $250 \mu\text{m}^2$, exploit qualitative and quantitative changes in a vibratory structure's resonant behavior to signal the detection of sub-picogram ($<10^{-12}$ g) amounts of a given target analyte (e.g. a volatile organic compound). Though, in recent years, such sensors have received appreciable attention throughout the international research community, the approach adopted by Jeff's research group is unique in that it seeks to actively exploit nonlinear system behaviors to assist with mass detection and analyte identification. This, counterintuitive

approach, has been shown to compare advantageously to traditional sensing techniques, and is uniquely suited for the noisy, uncertain environments inherent to nanoscale devices.

Apart from the sensor research efforts detailed above, Jeff's group has initiated a series of projects aimed at replacing conventional, macroscale electronics components, such as signal filters and amplifiers, with micro- or nanoscale mechanical analogs. Amongst the various devices under development in Jeff's group are electromechanical signal filters based upon coupled arrays of micromechanical resonators, electromechanical amplifiers based upon micromechanical resonators with time-varying stiffness characteristics, and electromechanical switches based upon resonant carbon nanotubes. These efforts are currently supported by the National Science Foundation (NSF), and are addressed, in part, by Jeff's recent NSF CAREER Award.



(Top) A representative, piezoelectrically-actuated sensor—a selectively-functionalized, microscale scanning probe. (Bottom) A representative mode shape of the sensor, recovered experimentally using scanning laser Doppler vibrometry.

At Herrick Laboratories, the focus of Jeff's group is on the development of new structural vibration control strategies based upon time-varying system behaviors. Interestingly, the research approach adopted in this work originated in microscale mechanical systems and is now being transitioned to macroscale application. Over time, Jeff hopes to extend these novel vibration control techniques to large, flexible structures (panels, trusses, etc.), whose behavior can be controlled, in a predictable manner, by localized actuators.

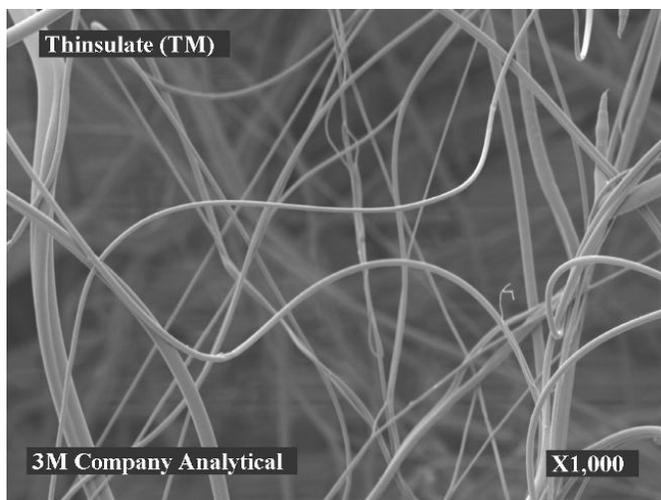
Jeff truly enjoys working with his colleagues at Herrick Laboratories, and Purdue University as a whole, and is always interested in forging further connections with industry, government, and academia. If you are interested in talking to Jeff about his research, please do not hesitate to contact him at jfrhoads@purdue.edu

Noise Control Materials at the Herrick Labs

—J. Stuart Bolton

We have been performing research focused on noise control materials at the Herrick Labs for many years now, beginning with the work of Ed Green (now at Roush Anatrol) in 1984. Ed's work, and the subsequent work of Nae-Ming Shiau (now at Ford) was devoted to modeling and characterizing the properties of elastic porous materials such as foams, and in particular, looking at their application to barrier systems such as aircraft fuselage. That work ultimately led to Yeonjune Kang's development of poroelastic finite element models that now allow us to model three-dimensional noise control treatments with good accuracy (Yeonjune is at Seoul National University).

In 1994, we began a long association with Jon Alexander and his colleagues at 3M. The first major work with 3M was devoted to the conversion of the 3M thermal insulation product Thinsulate into an acoustical material. Heng-Yi Lai (now at Boeing) performed a detailed analysis of this so-called bi-component fibrous material, and ultimately developed models that allowed the fiber size distribution in the material to be optimized for acoustical applications. Thanks in part to those developments, Thinsulate has now become a well-regarded acoustical product that is widely used in the automotive industry.



Scanning electron micrograph of 3M noise control material Thinsulate.

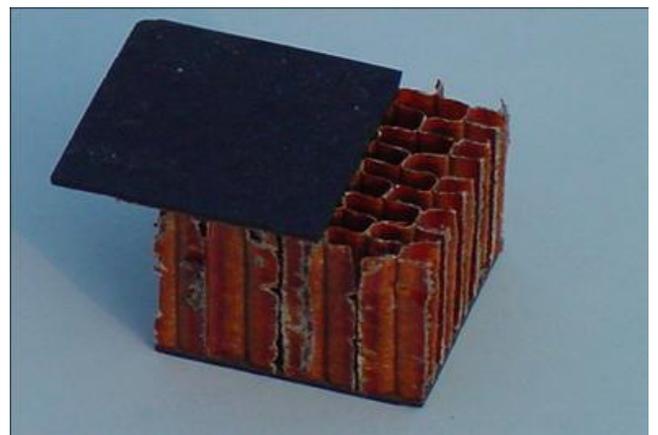
At the same time we were developing new methods for measuring the acoustical performance of noise control materials; in particular, the four-microphone standing wave tube. That device was first studied by Richard Yun, and then became the primary subject of Bryan (Heukjin) Song's Ph.D. work (Richard now works for Toyota and Bryan works for NASA at the Kennedy Space Center). Courtesy of cooperation with Bruel and Kjaer, the four microphone tube is now in commercial production, and an ASTM standard has been developed to standardize transmission loss measurements with this device. We have used the tube to make measurements on

many types of materials, but perhaps most successfully, with aviation-grade glass fibers of the type used to line aircraft fuselages.



Bryan Song (Ph.D. 2001) setting up a random incidence transmission loss test.

At the same time, Jeong-Woo Kim (now at UTRC) created a new theory for carbon fiber honeycomb materials with support from Raytheon Aircraft (now Hawker-Beechcraft). He was able to model the material as an anisotropic poroelastic material, and to successfully incorporate that theory into complete multi-layer models of real aircraft sidewall treatments. The result of this work was the specification of a lightweight treatment that made a significant impact on the interior noise levels of the Premier business jet (the first all composite business jet).



Section of a carbon fiber, honeycomb composite fuselage.

More recently we have begun work with a new class of materials, micro-perforated panels (MPP's), again courtesy of support from 3M. Although MPP's have been with us for about thirty years, they have never been competitive from a

Noise Control Materials at the Herrick Labs

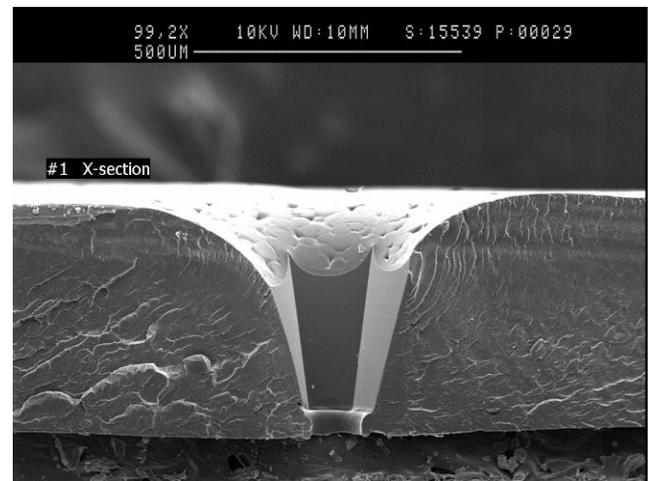
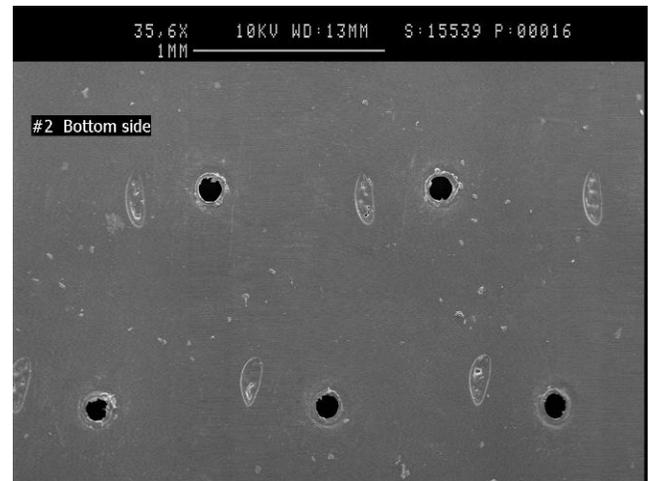
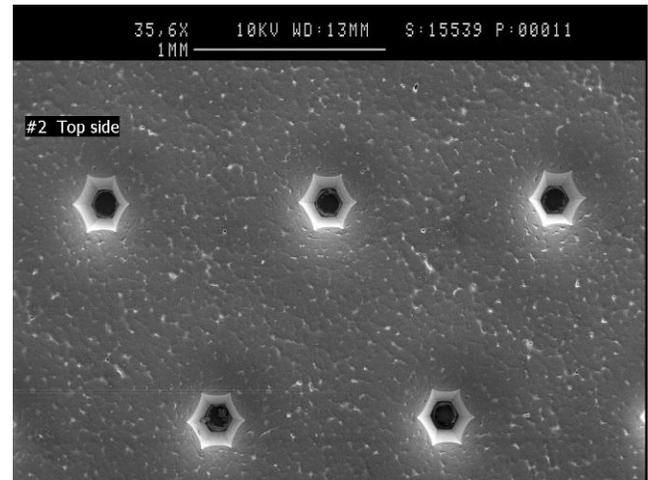
cost viewpoint with conventional fibrous materials even though they offer numerous functional benefits (fiber free, cleanable, self-supporting, etc.). However, 3M have invented procedures for making these materials at an economical scale.



Taewook Yoo (MSME 2003; Ph.D. 2008) and Stuart Bolton set up a normal incidence transmission loss measurement using the four-microphone standing wave tube.

Our first work on lightweight, tensioned perforated membranes was actually performed by Jinho Song (now at Otis Elevators) with the support of Dow Chemical in support of their large cell foam product, Quash. Then subsequently, Taewook Yoo's Ph.D. work, supported by 3M, concerned detailed modeling of very lightweight and flexible MPP's: he developed the first theories capable of predicting the performance of finite, flexible MPP's at random incidence angles (Taewook is now at EAR in Indianapolis). We are continuing to support 3M in various aspects of this material development as they move towards full-scale commercialization.

Last but not least, we are working with NASA Langley, Boeing, Gulfstream and Polyumac in a joint project to improve the performance of polyimide foams, first studied by



Top, bottom and cross-sectional view of a thin film micro-perforated material.

Ben Tsoi (now at the Jet Propulsion Lab at Caltech) almost fifteen years ago. These foams have wonderful safety properties (they are very resistant to fire) and so are attractive to airframe manufacturers, but their acoustical performance has never been on a par with glass fiber. Our current student

Noise Control Materials at the Herrick Labs

Kwanwoo Hong (soon to join Samsung in Korea) has helped develop a process for treating the material that results in dramatically improved acoustical performance, and we hope that, before too long, these materials will find their way into commercial aircraft.

In all of this work, we owe a great debt to the students who have worked on these projects, and of course to the sponsors who have made the work possible. And many thanks as well to Ravi Raveendra of Comet Technology who has supported us for many years by providing up-to-date poroelastic material modeling and inverse characterization software

2010 Compressor Conference and Short Courses

The International Compressor Engineering Conference has been held bi-annually at Purdue University since 1970, and it will be held here again next year. As in the past, it will be held in conjunction with short courses prior to the conference.

The 20th International Compressor Engineering Conference and the 13th International Refrigeration and Air Conditioning Conference will take place on **July 12-15, 2010**, and the short courses will precede the conferences on **July 10-11, 2010**.

Abstracts for the 2010 conferences will be due in early December 2009. Please visit the Web site and watch the newsletter for updates. We will again have online registration, group discounts and preregistration discounts for the conferences.

At the 2008 meeting, event sponsors were Shanghai Hitachi Electrical Appliance Co., Ltd.; LG Electronics, Inc.; The Trane Company; Danfoss, Inc.; and Emerson Climate Technologies. If your organization is interested in sponsoring an event, there are opportunities available.



Dr. S. Forbes Pearson, President of Star Refrigeration Ltd. and UK Institute of Refrigeration Fellow, gives the Keynote address at the conferences.

Eckhard Groll will serve as the General Chairperson, and James Braun, Doug Adams, and Travis Horton will be chairing these conferences.

The compressor conferences are an opportunity for Herrick

graduates specializing in HVAC&R to return to campus. If you'll be able to attend, please stop by and say, "Hello." It's always good to see our alums.



Of course, socializing, networking, and eating are important social aspects of the conferences and short courses.

For information, please contact Ginny Freeman, Conference Secretary, at herlconf@ecn.purdue.edu or telephone 1 + (765) 494-6078 or check the website www.engineering.purdue.edu/Herrick/events/ for important announcements and updates concerning these short courses and conferences. You can also send information by the U.S. Postal Service using the address on the back cover of this newsletter.



The cookout is a fun event held on Wednesday evening at the Trails where people can relax, enjoy good company and have plenty to eat.

An Unusual Reply for the Herrick Newsletter

—by *Ray Cohen*

From time to time I have written about one of the Herrick Alums who I have had contact with. Often this contact is associated with an unusual event. When it happens I usually ask for something written that I can use for a news column in the Herrick Newsletter. That was the case when Rafi Gluck (Ph.D. 1963) showed up for the Herrick Labs' 50th Anniversary celebration last year.

Rafi was one of my early students when we started to do research on refrigerant compressors at the Herrick Labs. He had an unusually interesting background having fought in the Israel War of Independence. His parents had immigrated to Israel from Berlin before WWII. When he was discharged from the Israeli Army in August, 1950, there was nothing equivalent to the US GI Bill for veterans, especially because Israel's economy was in dire straits exacerbated by the hundreds of thousands of very poor Jewish emigrants who had been thrown out of the Arab States. So he decided to do his undergraduate studies at the University of California at Berkeley partially financed by his parents and supplemented by working during summers and with part time work during the regular semesters.

After several fellowships and assistantships at other universities he eventually wound up as a research assistant working for his Ph.D. at the Herrick Labs. He was one of the students who I had assigned the task of determining an appropriate analysis for predicting compressor valve stresses following Dick Lowery's successful but largely experimental thesis on the same topic. Another interesting note about Rafi is that after a rather serious automobile accident, Rafi wound up marrying his nurse, Gini. I became well acquainted with Gini when she gave me treatments as therapy for a sciatica problem while she worked at Purdue's Student Health Service. Anyway, I was delighted to hear from them when they decided to attend the Herrick Anniversary weekend.

I asked Rafi to write something that I could use for the Herrick Newsletter and he asked what he should write about. Among the topics suggested, he decided to write about one of his projects while working for TRW in California. It was a project during the 1980s that he proposed and managed for nearly a decade. The application of the analytical tools he developed was to be used in the design of manned spacecraft to Mars. Subsequently, he sent me an eight page paper that required some knowledge of system dynamics and graduate level mathematics in order to be understood. This paper was not what I normally would receive when I asked other Herrick graduates for something for the Herrick Newsletter—but I should have known that would be the case. Rafi did not

conform to the norm of our usual students, and I believe that the Space Program benefitted from that. Rafi is retired now, and he and Gini have enjoyed playing tennis and enjoying their three daughters, and their families.

If you'd like to read the entire letter, it's available on the Herrick Laboratories' Web at: <https://engineering.purdue.edu/Herrick/Publications/Newsletter/RafiLetter.pdf/>

Where Are They Now?

Jeremiah Brown (MSME 2002) defended his dissertation at Florida State University in December of 2008. The title was "Wavelets-Based Analysis of Variability in the Air-Sea Fluxes." He works as a postdoc for Colorado Research Associates in Boulder, which is a division of Northwest Research Associates in Seattle, Washington. His work focuses on statistical analysis and modeling of the atmosphere and the ocean, and particularly the interaction between the two. His wife, Sarah, is an assistant professor in the history department at Ball State University, and they live in Fishers, Indiana.

Peter Laux (MS 1992, Ph.D. 1998) accepted an offer from Acoustics By Design, Inc. as Chief Scientist and Senior Consultant for its Grand Rapids, Michigan, office. As Chief Scientist, he will spearhead research and development consulting for ABD, and offer advanced analysis capabilities for predictive sound modeling, subjective assessment and sound quality development. As a Senior Consultant, he will oversee projects in architectural acoustics, noise and vibration isolation, and building systems noise control.



Peter Laux

Acoustics By Design was founded by one of our graduates, Kenric Van Wyk, and it is one of the leading independent acoustical engineering and audio-visual design firms in the Midwest. They provide consulting services to architects, engineers, facility directors, municipalities, and building owners. Their team of eleven full-time employees includes five acoustical engineers, two audio-visual design consultants, one CAD staff, and three administrative personnel. They design audio-visual and technical systems and integrate them with the native acoustical environment for the purpose of enhancing aural and visual communication. Headquartered in Grand Rapids, Michigan, and serving clients in Michigan, Illinois, Indiana, and Ohio, Acoustics By Design also has offices in Ann Arbor, Michigan, and Valparaiso, Indiana. For more information, visit www.acousticsbydesign.com.

Moohyung Lee (Ph.D. 2004) has been a postdoctoral researcher at Herrick until recently when he accepted a position as Principal Investigator with Samsung Electronics

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Co., Digital Media and Communications Business, Digital Appliance Division, Advanced R and D team in Suwon, Korea. He left Herrick on Monday, April 20 and returned to his home country on Wednesday, April 22.



Arvind Raman (MSME 1993) is a faculty member in the School of Mechanical Engineering here at Purdue University in West Lafayette. At the April 10 meeting of the Board of Trustees, he was promoted from Associate Professor to Professor. The promotion is effective at the beginning of the 2009-2010 academic year.

Faculty Honors

Two Herrick Laboratories' faculty members received awards at the College of Engineering Faculty Excellence Awards on April 25. The Engineering Faculty Recognition Banquet was held at the Shively Club at Ross-Ade Stadium.



Anil Bajaj received two awards. One was the mentoring award, and the other was as a member of the Center for Prediction of Reliability, Integrity and Survivability of Microsystems (PRISM) team. **Eckhard Groll** was also honored with the Advising Award. He was nominated by E. Daniel Hirleman.

Doug Adams won the Society of Experimental Mechanics D. J. DeMichele Award. It was presented to him at the 27th International Modal Analysis Conference on February 11 in Orlando, Florida. The commendation on his plaque was for service and support in promoting science and educational aspects of modal analysis technology. Doug had his photo taken with D. J. DeMichele's son and is now listed among a group of international leaders in the field of modal analysis.

Doug was also promoted to full professor at Purdue University's Board of Trustees meeting on Friday, April 10. His promotion is effective at the beginning of the 2009-10 academic year.

Jeff Rhoads received an NSF CAREER Award, which is a quite competitive award. His project is on Exploiting Collective Behaviors in Coupled Micro- and Nanosystems. It involves studying the unique properties of large arrays of micro- and nano-mechanical resonators for use as filters for electrical signals, ultra-sensitive mass and force detectors, and mechanical electrometers and magnetometers. Specifically Jeff studies the propagation of vibration across such arrays, and the coupled interaction of substructures that are nominally, but not exactly, identical. The experimental portion of the work will take place at the Birck Nanotechnology Center using micro-LDV (Laser-Doppler Vibrometry). Understanding the mechanics of such arrays is vital to developing systems with very large potential impact on wireless communications, chemical and biological weapon

detection, and fundamental physics. The educational component of this project involves studying the effect of longitudinal projects (through the undergraduate years) that integrate lab experiments and course materials on the dynamics of micromechanical and nanomechanical systems.

Student Honors

Janette Jaques Meyer (current Ph.D. student) received a letter from the Associate Dean of Engineering stating that Janette has won the 2009 Outstanding Service Scholarship for her commitment and effort in enhancing the Graduate Student community within the School of Mechanical Engineering and the College of Engineering at Purdue. She received \$2,000 from the Vincent P. Reilly Scholarship fund in recognition of her accomplishment. She was honored with others at a luncheon held on April 22.

Wangda Zuo (current Ph.D. student) applied for and received an ASHRAE Graduate Student Grant-In-Aid Award in March. As part of the award, he received \$10,000 for his research. He also received the Best Poster Award from the United States branch of the International Building Performance Simulation Association (IBPSA) and \$2,000 to cover his expenses to the international IBPSA conference in Glasgow, UK. The award was presented at the Winter Conference held in Chicago, IL in January.

Staff Honors

January 22 was a special day for **Gil Gordon**, **Bob Brown** and **Judy Hanks** because they were honored by the University for their years of service. The three were treated to a lunch in the Purdue Ballrooms in the Union Building followed by a presentation of gifts and a photo with Provost Randy Woodson.



Gil was recognized for 10 years of service and received a pair of binoculars. Bob received a silver watch with gold trim and the official Purdue logo on the face of the watch. Bob was recognized for 20 years of service to Purdue. Judy selected a similar watch in gold for 25 years of service.

Also recognized for 25 years of service was Ron Evans. He was unable to attend the celebration and made arrangements to receive his gift at a later date.

Engagements

Jeremy Koehler (current project student) and **Bridget Wiersema** are planning a June 6 wedding. The happy couple met in high school and were engaged last summer. In May Jeremy graduated from Purdue and Bridget received her degree from the University of Illinois. Jeremy is going to the University of Michigan for his graduate degree, and Bridget plans to teach Spanish.



Herrick Laboratories' News

James Mynderse (current Ph.D. student) and Michelle Maynor plan to marry on August 2, 2009 at Lake Tahoe in Nevada. Michelle is a Ph.D. student in Pharmacy at Purdue. James gave her the ring at the end of December before she returned for the spring semester of classes.

Dan Van Alstine (current Ph.D. student) presented Cassie Bishop with an engagement ring at midnight on New Year's Eve. She was expecting the ring on December 25 so she was really surprised when the ring came a week later than anticipated. She received her MBA from Southern Illinois University and is a sales representative for Eli Lilly. The happy couple is planning a summer wedding, probably in early July, in Mount Carmel, IL.



Above Cassie Bishop and Dan Van Alstine pose for a photo of Cassie's new engagement ring.

Births



Jeremiah Brown (MSME 2002) and his wife, Sarah, welcomed their second child, Nathan James Brown, on March 8. Nathan was 20 inches long and weighed 7 pounds 12 ounces. He was welcomed by his family and his big sister, Hannah.

This just in. **Andrew Marshall** (current Ph.D. student) and his wife, Jeanine, had a daughter born on May 21 around 7:00 a.m. The new arrival is named Aislinn and weighed in at 9 pounds. She was 22 inches long. Dad was so excited; he couldn't remember the exact time of birth or if there were any ounces. He thought she was 9 pounds even.



Greg Shaver (current faculty member) and his wife, Erica, are the proud parents of a new baby girl, Katherine. She was born on Sunday, November 23 around 5:00 p.m. Like mom, Katie was petite (6 pounds, 7 ounces and 19.5 inches long) and like dad, has a lot of hair! Erica and Katie are doing great. Katie has an older brother, Billy.

Shuo Wang (Ph.D. 2000) has a little Boilermaker, a daughter, Lilliana W. Wang, who was born on January 14, 2009 at night. She weighed 8 pounds 4 ounces. Both Mom and baby are doing well.



Matias Zanartu (current student) and his wife, Sandra, welcomed a beautiful daughter, Julieta, at 7:37 on Sunday night, March 8. She weighed 7 pounds 4 ounces, and was 19

inches long. Everyone is fine, and you can see how proud Daddy is.

Graduations

Feng Liu (Ph.D. May 2009), *Modeling and Control of a Two Component Development Process for Xerography*. Feng accepted a position with Cummins Engine Co. in Columbus, IN.

Chintan Shah (Ph.D. December 2008), *Particulate Matter Load Estimation in Diesel Particulate Filters*. Chintan will be working with Caterpillar in Peoria, IL.

Just for Fun

Andrew Marshall (current Ph.D. student) and **Neal Evans** (current undergraduate) competed in Purdue's first World's Strongest Boilermaker contest on Sunday, April 19 at noon. The event was held at the Recreational Sports Center. Both Andrew and Neal competed in the 181 pound and under weight class. Neal tied for first place in the tire flip contest, and Andrew was second with individual wins in the farmer walk and Boilermaker Special pull.

The Purdue strongman competition is similar to the Met-Rx World's Strongest Man that is sometimes shown on ESPN. The preliminary events were farmer's walk, tire flip, and hammer hold. The top competitor from each weight class went on to do the motion P carry (concrete block letter P) and the Boilermaker Special pull.



Pictured top is Neal Evans doing the farmer's walk, and below is Andrew Marshall doing the Boilermaker Special pull. Andrew pulled it 65 feet, and was the first to succeed in moving the engine.

Building Fund Update

The fundraising for the new building is going well. Enough money has been raised to fund the first phase of construction \$11 million, and a proposal was written to fund the second phase. We are eagerly waiting to hear if we will receive the requested funds for Phase II. While we are waiting for a response on the proposal, we are collecting funds for Phase III.

The tentative plans for the new building will incorporate a Living Laboratory for Advanced Building Research. Here, we will test the efficiency and sustainability of new building technologies and evaluate the impact of these technologies on human factors such as comfort and productivity.

You can honor a business or person (including yourself) with a Naming Opportunity. Some of the options include:

- | | |
|---------------------------------------|---------------------------------------|
| Thermal Sciences Wing - \$3,000,000 | Staff and Student Commons - \$250,000 |
| Acoustics Wing - \$2,500,000 | Computer Laboratory - \$125,000 |
| Semi-Anechoic Suite - \$1,500,000 | Reception Area - \$50,000 |
| A Living Laboratory Pod - \$1,000,000 | Offices - \$30,000 and \$40,000 |

If you are not in a position to name an area, you can honor your major professor or favorite staff member (current or former) with a pledge of \$5,000. For each faculty or staff member recognized with a gift of this amount, we will have a plaque honoring him/her in the reception area and will list the name of the donor(s) on the plaque. If total gifts recognizing a faculty member reach enough to name an area, then that area will be named in honor of the faculty member.

Pledges are payable over a period of 3-5 years, but if circumstances prevent you from doing any of the above, then your help in any amount will be appreciated. Please help us reach our building goal by returning the pledge form below today!

Ray W. Herrick Laboratories Building Fund Pledge Form

I pledge to give \$_____ to the Herrick Laboratories Building Fund

Purdue Foundation will mail payment notices based on the schedule you determine is best for you. You will be able to pay with check or credit card.

Frequency of Payments: ___ Annually; ___ Semi-Annually; ___ Quarterly; ___ Monthly

Duration of Payments (years): _____ Beginning Date: _____

Optional Payment: Enclosed is the first payment of \$_____ (payable to Purdue Foundation)

Name: _____

Street: _____ City: _____ State: ___ Zip code: _____

Telephone: _____ E-mail: _____

Signature: _____ Date: _____

For more information contact:

John Sanderson
Director of Development
Phone: (765) 494-9769
E-mail: sanderjd@purdue.edu

Patricia Davies
Director, Ray W. Herrick Laboratories
Phone: (765) 494-9274
daviesp@purdue.edu



Ray W. Herrick Laboratories
140 S. Martin Jischke Drive
West Lafayette, IN 47907-2031

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News about You and Address Changes

We are always interested in hearing your news, and we want to be kept up-to-date on current addresses. Please send notes to Judy Hanks or to the e-mail address below. Don't hesitate to let us know of other alums that have moved. Photos are always welcome.

Ray W. Herrick Laboratories
School of Mechanical Engineering
Purdue University
140 S. Martin Jischke Drive
West Lafayette, IN 47907-2031
1 (765) 494-2132 (phone)
1 (765) 494-0787 (fax)
e-mail: rhlab@ecn.purdue.edu
<http://www.engineering.purdue.edu/Herrick/>