newsletter

Ray W. Herrick Laboratories

Purdue University, West Lafayette, IN 47907-2031

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

Spring 2008
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Celebrate the Ray W. Herrick Laboratories' 50th Birthday

https://engineering.purdue.edu/Herrick/Events/Other/birthday.html/

—Patricia Davies

You are invited to the 50th birthday celebrations which will start on the afternoon of Friday, July 18th, 2008 and will culminate with a birthday banquet on Saturday, July 19th, 2008. Details and sign-up instructions are given on pages 5 and 6 of this Spring 2008 Newsletter. This follows the *Purdue International Compressor and Refrigeration Conferences* (page 4). As part of the celebrations, we are also organizing tours of Herrick Labs, a Boilermaker Express tour of downtown Lafayette, tours of some of the more recently built research labs at Purdue, as well of tours of Ross-Ade Stadium for you die-hard football fans. Late afternoon on Friday, there will be a barbeque at the Labs, with volleyball and other games. We look forward to seeing you.

It is always difficult to put a start date on an enterprise such as the Ray W. Herrick Laboratories. The idea germinated in the early 1950s, and the site selection took place sometime between 1954 and 1955 when Dr. R. B. Steward, University vice president and treasurer, phoned to ask Bill Fontaine, the first Herrick Labs. Director, to ride around campus to discuss several possible locations. *…he stopped his car on State Street directly in front of the horse barn, saying "You can start from here, and we can build from that."* [*Comets Amongst the Stars,* by William "Bill" E. Fontaine, 1990, Purdue Research Foundation].

Bill also writes earlier in his book, *…Interdisciplinary research was another idea that developed about the same time* [1953]. *In particular, one of the first interdisciplinary research programs at Purdue University was conducted by the School of Mechanical Engineering and the Department of Animal Sciences.* At the end of the summer of 1953, Bill described their ideas to the president of Tecumseh Products. ……

Mr. Herrick became quite interested in our ideas and decided they were so novel, that he promised to make a grant of $300,000 for the construction of the necessary laboratory facility. The East and West wing and additions to the barn were built in the period 1957-1960, and Bob Bernhard and Ray Cohen, during the run-up to the 40th Birthday Celebration, put 1958 as their best guess of an official start date for the Laboratories. We have many pictures of the Labs throughout the 50 years, and Ginny Freeman, our conference secretary, has put together a very nice poster (*see page 4 and back cover*).

The laboratories have continued to expand and the plans are now to expand the laboratories further. We have been cramped for space for quite some time and this inhibits the scope of the research and our ability to recruit new professors and students to the laboratories. Not only will the new space be more energy efficient and environmentally friendly, the offices, kitchen and conference rooms will be in a building that is itself a research lab. It will be reconfigurable to test out new concepts in building controls, conditioning, lighting and envelopes, making technological advances in the research more robust and industry-ready (*see page 7 for news on the fundraising campaign*).

We can pass on your contact information to your former Herrick colleagues, if you would like to organize a table at the banquet and don't have an up-to-date address, etc. E-mail Donna (cackley@purdue.edu) or phone her (+1 765 494-2132).

2008 DATES
CONFERENCES AND SHORT COURSES

Saturday & Sunday, July 12-13

Compressor and Refrigeration Short courses (*page 4*)

Monday to Thursday, July 14-17

19th International Compressor Engineering Conference (*page 4*)

12th International Refrigeration and Air Conditioning Conference (*page 4*)

HERRICK LABS 50th BIRTHDAY

Friday, July 18
1-5pm Tours
5-7pm BBQ
(*pages 5&6*)

Saturday, July 19
8am Golf
1-4pm Tours
5:30pm Appetizers
6:45pm Dinner
(*pages 5&6*)

A Virtual Refrigerant Charge Sensor

—Jim Braun

Studies have shown that approximately 50 to 67 percent of all air conditioners suffer from improper charge or air flow problems causing them to operate 10 to 20 percent less efficiently than if they were properly installed or maintained. Recently, utilities in California have developed incentive programs to encourage HVAC service contractors to tune up residential and small commercial air conditioners. A significant aspect of these programs involves refrigerant charge verification. In addition, Title 24 of the California code requires refrigerant charge verification for new installations and retrofits.

The typical approach used to verify refrigerant charge in the field involves the use of either superheat at the evaporator outlet when the expansion device is a fixed orifice or capillary tube and subcooling at the condenser outlet for systems that use thermal expansion valves. Manufacturers typically provide specifications for superheat or subcooling. However, these specifications are typically not applicable over a wide range of operating conditions (e.g., low or high ambient and high or low mixed air wet bulb temperatures) and when faults are present (e.g., low indoor air flow). In addition, the current charge verification protocols utilize compressor suction and discharge pressures to determine refrigerant saturation temperatures that are used in determining evaporator superheat and condenser subcooling. However, the measurement of pressures requires the installation of gauges or transducers that can lead to refrigerant leakage. As a result of these limitations, the current protocols for checking refrigerant charge may be doing more harm than good in many situations.

A current project at Herrick is to develop a robust method for determining refrigerant charge in the field for packaged air conditioning equipment using low-cost, non-invasive measurements (i.e., surface mounted temperature measurements). The method could be used as part of a protocol for verified service providers (VSPs) in California residential and commercial AC diagnostic tune-up or refrigerant charge, air flow (RCA) verification programs. Ultimately, the method could be embedded within a portable virtual refrigerant charge gauge for a technician's use or permanently installed on the AC unit.

Initial work on this topic was performed by Haorong Li, who graduated from our program a few years ago and is now an assistant Professor at the University of Nebraska. This work demonstrated that refrigerant charge can be correlated in terms of evaporator superheat and condenser subcooling determined with surface mounted temperature sensors. The goal of the current work is to validate this approach for additional systems, over a wide range of ambients and other conditions, and in the presence of other faults such as low air flow. In addition, it is important to evaluate the benefits of an improved charge verification method as compared with the existing protocol.

Generator Noise Control

—Peter Meckl

Many types of machines create audible noise. Sometimes, this noise is acceptable, or even desirable, as with performance automobiles. Other times it can be a nuisance. Generator sets can be particularly bothersome, because they are usually located in close proximity to people and they run at a fairly steady frequency, which can make them all the more annoying. The Army uses a fair number of small generator sets to power computers and other equipment out in the field. Their 3 kW generator is deemed "quiet" since it has a special enclosure with sound padding. But it uses a single-cylinder diesel engine that makes it still quite noisy. That is why the U.S. Army Power Generation Branch enlisted the help of researchers at Herrick Laboratories to explore ways to reduce this noise. In response to this request, we assembled a multidisciplinary team of engineers to tackle this problem.

The basic approach being studied is to change the way that fuel is injected into the cylinder. It has been demonstrated on larger, multi-cylinder engines that adding a small pilot injection pulse of fuel to the main fuel injection pulse can flatten the resulting combustion pressure profile and thereby reduce the noise signature. However, this idea has not been tried on a small single-cylinder engine before. Thus, a research team was assembled to explore whether this can be done on a small engine, and to find out just how effective it is. The team consists of Peter Meckl (Controls), John Abraham (Combustion), Stuart Bolton (Acoustics), Moohyung Lee (Acoustics), Patricia Davies (Sound Quality), Steve Pekarek (Electric Power), and Fritz Peacock (Engines).

A 3 kW Tactical Quiet Generator (from U.S. Army Mobile Electric Power Handbook).

A major challenge in accomplishing this objective was to convert the existing mechanical injection system to an electronic injection system with a common rail. The purpose of the common rail is to achieve a steady supply of pressurized fuel at a rather constant pressure. This way, fuel can be metered to the cylinder multiple times with well-understood flow characteristics. An electronic injector is necessary to provide computer control of the injection timing.

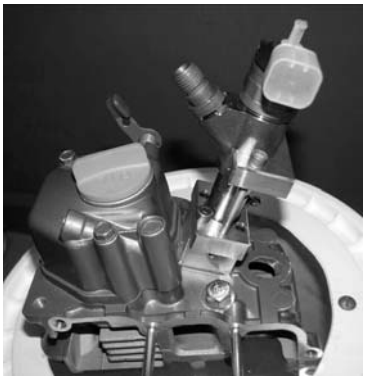
The graduate student on this project, Premjee Sasidharan, was tasked with adapting an existing electronic injector to the genset engine. This proved to be easier said than done. First of all, no electronic injectors are currently available in the flow range appropriate for such a small engine. We therefore

had to adapt an existing Bosch injector that is actually used on the Duramax diesel engines used on GM pickup trucks. Since the flow rate is much higher than what we needed, we had to scale back the rail pressure to close to its minimum to reduce the quantity of fuel injected at each pulse.

Another problem is that the existing injector is angled into the cylinder head. This means that the hole pattern must be asymmetric so that fuel is evenly sprayed into the piston bowl. But the hole pattern on the Bosch injector is symmetric, since these injectors are designed to fit vertically into the cylinder head. We struggled with ways to address this problem. We first tried to fit the original mechanical injector nozzle into the electronic injector body. This required some very precise adaptor pieces to be made, which were machined by Bob Willis in the Mechanical Engineering machine shop. After testing at Bosch, we discovered that the intricate balance of forces inside the injector could not be maintained with this arrangement, and the injector was unable to provide reliable multiple injections. Our fall-back option was to weld several of the Bosch injector nozzle holes shut so that it would not spray fuel up onto the cylinder walls. This arrangement ended up working.

Premjee Sasidharan received his MSME and accepted an position with Cummins in Columbus, IN.

Premjee also had to develop a control scheme for regulating the timing of the injection pulses, using crank angle information from an optical encoder mounted on the crankshaft. We used a dSpace platform, which consists of a dedicated DSP processor as well as analog and digital input/output boards. Gil Gordon made the power amplifier that we needed to generate the current signals for the injector solenoid. And Fritz Peacock prepared a separate motor drive for the fuel pump so that we could regulate the rail pressure independent of engine speed.



The Bosch electronic fuel injector mounted on the cylinder head.

We tested Premjee's algorithms by running the engine with the mechanical injector still in place, having the electronic injector simply injecting fuel into a bucket. Once everything checked out, we were ready to try running the engine with the electronic injector mounted in it. Premjee first tried to start the engine with the new electronic fuel injection system on a Friday morning. He and Fritz were able to get it to turn, but they had trouble maintaining a steady speed. Premjee had built a computer-based speed control system, but had not yet tuned the gains. After only a few hours of tweaking, he and Fritz had the engine running successfully that afternoon.

Now that the engine is running, we are busy getting ready for the next phase of the project. With help from Bosch, we hope to get a new nozzle machined with the right hole pattern for proper fuel distribution. Once we have that in place, we will begin an extensive optimization study to see how different timings for pilot injection can help with combustion noise. We will be looking at the heat release rate to help us pinpoint the exact timing of combustion. And we will be looking at the pressure pulse inside the cylinder with a pressure transducer that we also installed. More gradual heat release rate should result in a flatter cylinder pressure profile and reduced noise. We will also be putting the entire setup in the hemi-anechoic chamber so that we can do a sound power measurement and verify whether the reduced noise signature has actually been achieved.

Ultimately, we hope to demonstrate that multiple fuel injection pulses will lead to reduced engine noise without a corresponding increase in fuel consumption. Since we plan to use higher injection pressures than are currently used on this engine, we should be able to reduce fuel consumption, although the flattening of the pressure profile does mean that combustion is less efficient. Thus, we will be looking at a trade-off between noise and fuel economy. Since the Army must transport fuel to the field, they are very concerned about fuel consumption, and will be very eager to see if we can achieve both reduced noise and reduced fuel consumption.

The control development setup, showing the electronic injector sitting over a bucket to catch fuel while the engine is being run with the mechanical injector.

This project has been very interesting because of the need to integrate aspects of combustion, control, and acoustics into a single project. Now that we have overcome some of the technical challenges, we hope to be able to show that we can reduce noise on a small genset diesel engine using advanced electronic fuel injection.

How the Poster Came to Be

—Ginny Freeman

About a year ago, Dr. Davies approached Linda Tutin and myself to see if we could find some Herrick pictures that she could use in her Herrick Laboratories presentations and for artwork in the Labs. Linda and I searched through hundreds of slides, brochures, negatives and boxes of pictures stored in file cabinets and left behind by Werner Soedel, Ray Cohen and Dave Tree.

After hours of sorting through these pictures, we discovered that there were definite subject themes. There were pictures of the research conducted here at the Labs during the past 50 years. They highlighted the experiments with chain saws, rifles, dogs, pigs, chickens, tires, air conditioners and washing machines, sound and vibration experiments, dummies, wind tunnels, compressors, helicopters and automobiles. Among those pictures were several of the Herrick Laboratories' dedication celebration complete with pictures of the Fontaines, Stuarts and Herricks, the 40th Anniversary celebration ceremonies and events, many IAC meetings and the bi-annual compressor engineering and refrigeration conferences. We were thrilled when we found a picture of one of the original experiments—Bill Fontaine holding up the pigs with chickens in the background.

As many of you know, the faculty, staff and students are proud of the feeling of "family" found and nurtured here at the Herrick Laboratories. We found pictures of many parties complete with bands, picnics, bowling parties, Christmas parties, chili cook-offs, carry-in dinners emphasizing the myriad of cultures represented at the Herrick Laboratories, and volleyball and touch football games that have taken place throughout the history of the Labs. It is really amazing to discover that there has always been food and music at most of the Herrick events. We also found pictures that were thoughtfully sent to us from past students, faculty and staff with their families so we could all "catch up". It was impossible to include the hundreds of pictures that would bring back memories to many of you.

We were all so enthused after looking through the pictures that one thing lead to another. Patricia suggested compiling 7 or 8 large picture collages that could be hung in the renovated Hudelson conference room. In addition, we have had many requests to produce some type of product so that everyone could have these historical pictures. It was suggested that we produce a Herrick CD-Rom or a book. I came up with the idea of a poster similar to the United Way posters that are given out each year here at Purdue. We have compiled a standard-sized 11"×14" poster that can be framed with a frame from any hobby store. The poster (see back cover) contains a 1988 "family" picture in which all 4 Herrick directors appear and a picture of the original barn from 1912, pictures of research (past and present) and the social events over the past 50 years.

Until our supplies run out, anytime you donate to the Herrick Laboratories, we will send you one of these beautiful posters.

Conferences and Short Courses

—Ginny Freeman

July 12-17, 2008 will find the faculty, staff and students of Herrick Labs involved with the bi-annual Compressor Engineering Conference and the Refrigeration and Air Conditioning Conference and short courses. Approximately 338 abstracts have been submitted to the conferences.

The Preliminary Program Book, a chart containing a condensed schedule for the short courses and conferences, the Technical Sessions, Registration Form and housing forms are now available on the conference website (see below).

There you will also find information about travel, visa invitation information, author instructions and short course information.

There will be several social events sponsored by companies from around the world and tours of the Herrick Laboratories on Sunday and Tuesday afternoons. Attendees are being encouraged to extend their stay to include the Herrick Laboratories' 50th Anniversary celebration on July 18th & 19th.

These conferences are attended by over 500 attendees from approximately 30 different countries. This is a great time to learn about cutting edge research in compressors and refrigeration. The Organizing Committee would like to extend an invitation to you to join us at these short courses and conferences.

Please check *https://engineering.purdue.edu/Herrick/Events/index.html* for more information.

Eckhard Groll and Ginny Freeman study the program for the upcoming Conferences and Short Courses in July. The Short Courses will be from July 12-13, the Conferences from July 14-17, and the Herrick Laboratories' Birthday Celebration from July 18-19. See you then!

50TH BIRTHDAY CELEBRATION OF THE RAY W. HERRICK LABORATORIES

The Ray W. Herrick Laboratories will be celebrating its 50th birthday on July 18-19, 2008. To celebrate this occasion, on Friday, July 18, there will be tours of various campus buildings and a barbeque at 5:00 pm, which will be held on Herrick Labs' front lawn. On Saturday, July 19, there will be a golf scramble at 8:00 am at the Elks Country Club; more campus tours; free rides on the Boilermaker Special; and an informal dinner at the Elks Country Club. Please see the following pages for more details. Make plans now to bring the family for this fun-filled weekend and reminisce with your former lab colleagues. **In order for us to know how many people to accommodate, please complete both sides of this form, return it to us along with your check payable to Purdue Foundation. Mail to Donna Cackley, 140 S. Martin Jischke Dr., West Lafayette, IN 47907-2031.** (You can also download the form from *https://engineering.purdue.edu/Herrick/Events/Other/birthday.html/).*

CONTACT INFORMATION: *PLEASE COMPLETE BOTH SIDES OF THIS FORM*

Primary Contact Name _____

Mailing Address _____

_____

_____

Email _____

Daytime Phone Number _____

Names of family members, guests, and friends accompanying you:

_____

_____

_____

Names of Children under 12: _____

_____

_____

GOLFERS! Professors Jim Braun and Eckhard Groll are organizing a golf scramble at the Elks Country Club, which is located at 3224 52 W, West Lafayette, IN. It will start at 8:00 am on Saturday, July 19. The cost will be approximately $40 per person, which includes 18 holes of golf, a cart, a boxed lunch, and prizes. We might have you pay this at the Elks when you arrive to play golf, but we'll send you more information about the golf outing later. Please include an e-mail address above so that we may contact you. In order for us to organize foursomes, we need to know the level of play for each golfer, so **check one of the following for each golfer accompanying you and return this form:**

Name	Email	Beginner	Intermediate	Advanced
1.		☐	☐	☐
2.		☐	☐	☐
3.		☐	☐	☐
4.		☐	☐	☐

(See over to sign up for meals and other events)

PLEASE COME AND CELEBRATE WITH US

THE 50TH BIRTHDAY OF THE RAY W. HERRICK LABORATORIES

JULY 18-19, 2008

In order for us to know how many people to accommodate, please complete both sides of this form and return it along with your check, if needed, payable to Purdue Foundation and mail to Donna Cackley, 140 S. Martin Jischke Dr., West Lafayette, IN 47907-2031. The cost for Friday's Pre-Birthday celebration is for the meal (under 12 is free). The Saturday Birthday celebration is free for everyone (excludes the cash bar at the dinner).

 # Adults Attending _____ # Children Attending (under 12) _____

Pre-Birthday Activities

July 18:		**Participate:**	**Cost:**
Tours:	Envision Center (1-2 pm)	Yes ☐ No ☐	$0.00
	Ross-Ade Stadium (2-3 pm)	Yes ☐ No ☐	$0.00
	Herrick Laboratories tours (3-5 pm)	Yes ☐ No ☐	$0.00
Dinner:	Barbecue at Herrick Labs (5 pm)	#____ Shredded Pulled Pork BBQ	$_____
	$35.00 per person. (Children under 12 free).	#____ Beef Hot Dogs	$_____
		#____ Veggie Burger	$_____
		Total Cost:	$_____

50th Birthday Celebration Activities and Banquet

(Registration Required—complete both sides of form)

July 19:		**Participate:**
Tours:	Herrick Laboratories tours (1-3 pm)	Yes ☐ No ☐
	Birck Nanotechnology (3-4 pm)	Yes ☐ No ☐
	Boilermaker Special train rides (1-4 pm)	Yes ☐ No ☐
Activities:	Golf Scramble at the Elks Country Club (8:00 am)	Yes ☐ No ☐
	Numerous Fun Activities in the Area	(see details on page 8)
Dinner:	Elks Country Club - Appetizers served at 5:30 pm followed by dinner at 6:45. There will be a cash bar.	
	#_____Regular coffee #_____Decaf coffee	#____ Marinated London Broil #____ Marinated Grilled Chicken Breast #____ Vegan Spicy Basil Tofu

(Did you complete the other side?)

Breaking Ground for a New Ray W. Herrick Laboratories

Yes, you read that correctly. We are planning to break ground on Phase I of the new Herrick Laboratories later this year. Tentative plans are to hold the event September 18th or 19th.

There is one caveat, however. We have $9 million in cash and pledges but need to raise the remaining $2 million of the project cost by the end of August.

To do this, we need your help NOW so we can demonstrate your support during the Compressor Conference and our 50th Birthday Celebration.

In addition to being a LEED Certified "Green" building to replace the existing facilities, 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.

We will be making personal calls on as many of you as possible, but with more than 700 Herrick alumni located all around the world, we cannot visit with all of you between now and our August deadline. Please let us know if you want an early visit and we'll put you at the top of the list.

You can honor a business or person with a Naming Opportunity that include:

Thermal Sciences Wing - $3,000,000
Acoustics Wing - $2,500,000
Semi-Anechoic Suite - $1,500,000
A Living Laboratory Pod - $1,000,000
Staff and Student Commons - $250,000
Computer Laboratory - $125,000
Reception Area - $50,000
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. Help us make our 50th Birthday a Campaign Victory Celebration by completing and 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

ACCOMODATION INFORMATION:

For traveling information, driving directions and campus maps, visit the Herrick Laboratories' Web site at:
https://engineering.purdue.edu/Herrick/InfoFor/Travel/index.html
or call (765) 494-2132 and we will be glad to mail the information to you.

Nearby Hotels:

The Union Club Hotel at Purdue University-Purdue Memorial Union, 101 North Grant Street, West Lafayette, IN
Telephone: (765) 494-8900 or (800) 320-6291 **Website:** www.union.purdue.edu **(located on campus)**

University Plaza Hotel, 3001 Northwestern Avenue, West Lafayette, IN 47906
Telephone: (765) 463-5511 or (800) 777-9808 **Website:** www.uiccwl.com **(1.5 miles by car from campus)**

Holiday Inn Select—Lafayette City Center, 515 South Street, Lafayette, IN 47901
Telephone: (765) 423-1000 or (800) 465-4329 **Website:** www.hiscc.com
(downtown Lafayette, 10 minutes by car or 30 minutes walking to campus

Hilton Garden Inn—West Lafayette Wabash Landing, 356 East State Street, West Lafayette, IN
Telephone: (765) 743-2100 **Website:** www.hiltongardeninn.com
(on the Levee, 5 minutes by car or 20 minutes walking to campus)

Bed and Breakfasts:

Commandant's Home Bed & Breakfast, 3843 SR 43 N., West Lafayette, IN 47906
Website: www.commhomeb-b.com, **Telephone:** (765) 463-5980; **Toll Free** (877) 319-2783

Harmony Farm Bed & Breakfast, 3930 S. 950 E., Lafayette, IN 47905, **Telephone:** (765) 296-3853

Loeb House Inn, 708 Cincinnati St., Lafayette, IN 47901
Website: www.loebhouseinn.com, **Telephone:** (765) 420-7737

Perrin House Bed & Breakfast, 1219 Main St., Downtown, Lafayette, IN 47901
Website: www.perrrinhouse.net, **Telephone:** (765) 420-7628

Restaurants (partial list) :

Maize & American Grill, 112 N. 3rd St., Lafayette, IN, **Telephone:** (765) 429-6125
McGraw's Steak House (formerly Stiney's), 2707 S. River Rd., West Lafayette, IN, **Telephone:** (765) 743-3932
Bistro 501 (where the Downtowner used to be), 501 Main St., Lafayette, IN, **Telephone:** (765) 423-4501
Bruno's, 212 Brown, West Lafayette, IN, **Telephone:** (765) 743-1668
O'Bryans Nine Irish Brothers, 119 Howard Ave., West Lafayette, IN, **Telephone:** (765) 746-4782
Scotty's Brew House, 352 E. State St., West Lafayette, IN, **Telephone:** (765) 746-1137
Lafayette Brewing Company, 622 Main St., Lafayette, IN, **Telephone:** (765) 742-2591
Black Sparrow, 223 Main St., Lafayette, IN, **Telephone:** (765) 429-0405

There are many nearby attractions to enjoy in the community, such as the Tropicanoe Cove Family Aquatic Center, Silent Thunder Indoor Go-Kart track, and Columbian Park & Zoo. Other activities include: tennis, bowling, shopping, movie theatres, lazer tag, and roller skating. **For a complete list of hotels, restaurants, and other places of interest in the area, visit the Lafayette-West Lafayette Convention & Visitors Bureau at: *www.HomeofPurdue.com* or call them at 1-800-872-6648.**

Herrick Family News

Faculty Awards

Bin Yao, Professor of Mechanical Engineering, has been chosen as the recipient of the 2007 DSCD Outstanding Young Investigator Award, given biannually by the Dynamic Systems and Control Division of ASME. His award, received at the banquet of the ASME Dynamic Systems and Control Division (DSCD)-IMECE07, is "for fundamental contribution to the adaptive robust control theory and its application to the integrated design of intelligent and precision mechatronic systems".

Graduate Student Awards

Sarah McGuire, a graduate student working with Patricia Davies, was selected as a U.S. Department of transportation, Federal Aircraft Administration Centers of Excellence Outstanding Student of the Year in recognition of her work to develop metrics that quantify response to aircraft noise. The honor comes with a $1000 award.

Service Anniversary Awards

On Monday, December 10, **Donna Cackley** was recognized for 15 years of service to Purdue University. As a gift, she received a beautiful gold watch with a gold Purdue griffin on the face and a black leather wrist band. Purdue President France Córdova participated in the awards ceremony. She and the Dean of the honoree's school posed for photos with those who had served a minimum of 25 years.

Judy Hanks was recognized for 20 years of service on January 16. She received a suitcase and accessory bag in recognition of her service. Vic Lechtenberg, Vice Provost for Engagement, presented her with her award.

Service anniversaries are recognized when employees have completed 10 continuous years of service and every 5 years thereafter. Lunches for honorees are held in the Purdue Memorial Union Ballrooms.

Where are they now?

Jason Hugenroth (Ph.D. 2006) has his own consulting business, InvenTherm, in Baton Rouge, LA. If you'd like to see more about his company, please visit his Web site: *www.inventherm.com*.

Faye C. McQuiston (Ph.D., 1970) wrote a delightful note after the last newsletter. It's reproduced below with his permission.

"I too, was saddened to hear of the death of Wolf Leidenfrost in your latest newsletter. I was privileged to have him as a member of my doctoral committee during my stay at the Herrick Laboratories in 1967-69. He was truly one of a kind! I was honored when he allowed me to use some of his equipment in that wonderful laboratory of his, probably on the recommendation of Professor Tree. He made a great impression on me.

In the way of news, my wife Helen and I are retired from Oklahoma State University, 17 years now. Our children who were 2, 5 and 8 when we were at Purdue are now married and gone from home. I am in full volunteer status with minimal connection with the university. Amazingly my book is still popular after 30 years.

Please give my regards to anyone there that may remember me."

Daniel Robinson (MSME, 2007) visited family in Iowa after graduation. He accepted a position with Wyle Laboratories in Arlington, Virginia and began work there on February 5, 2007.

Graduations

Alok A. Joshi (Ph.D., December 2007), *Strategies for Data-Based Diesel Engine Fault Diagnostics.* Alok accepted a position at Cummins, Inc. in Columbus, IN.

Premjee Sasidharan, (Ph.D., May 2008), *Development of an Electronic Fuel Injection System for a Small Electric Power Unit*. Premjee also accepted a position with Cummins, Inc. in Columbus, IN.

Anthony (Tony) Wright (MSME, December 2007), Non-thesis: *Rapid-fire Combustion Engine*. Tony is working for Halliburton in Alaska.

Zhao Zhang (Ph.D., December 2007), *Modeling of Airflow and Contaminant Transport in Enclosed Environments*. Zhao accepted an appointment with the Hatch Mott MacDonald group in New York City. He is working on fire and life safety modeling and analysis in various structures.

Engagements

Jim Braun (current faculty member) announced that his daughter, Liz, met a Civil Engineer, Juan Jose, while in the Peace Corp in Bolivia, and the two are planning to marry.

Janene Christensen (current student) and David Silvers had an exciting Spring Break. David proposed to Janene with a ring on March 10. Their nuptials are planned on May 8 in Bountiful, Utah.

Cathy Jones (current staff member) and Dean Edging announced their engagement. They are planning a June 28 wed-

More Family News

ding at the Cornerstone Baptist Church in Lafayette, Indiana. Dean is a Purdue employee, and they plan to continue their current employment after the wedding.

Greg Shaver (current faculty member) and Erica Henson announced their engagement. The two have not set a date or location.

Weddings

Josh Cummins (current Herrick student) and Jenn Stewart were married on June 23 in Franklin, Indiana at the Second Mount Pleasant Baptist Church. Jenn graduated from Purdue in May 2006 with her BS from the Agricultural Communications department and currently works there as a news writer.

Jennifer Gosslin (MSME 2006) was married this summer to Brian Paige. She's working for R. G. Vanderweil Engineers, LLP in Boston, MA. Below are some of her comments about the wedding and a photo of the happy couple.

"We were originally supposed to get married in Amherst (we both went to UMass) in June but ended up changing the plans because of hotel availability and got married on July 28th in Boston.

The wedding was so much fun! It was like one big party, and we enjoyed the whole time. It was nice when the wedding was over, though, too, because we got to go to Napa Valley and San Francisco for our honeymoon. It was a much needed relaxing break!"

Births

Beat Hubacher (MSME 2003) and his wife, Yvonne, welcomed a new arrival, Lars, at 1:08 p.m. on January 22. Lars weighed 5 pounds 8 ounces and was 18 inches long. Beat is living and working in Switzerland.

Ki Sup Lee (current Herrick student) and his wife, Sun Kyung Kim, welcomed a new baby girl to the family on November 3. Yuna Lee weighed 6 pounds. Everyone is doing well.

Zhipeng Zhong (current Herrick student) announced the arrival of his baby boy Jerry (JieRui) W. Zhong. JieRui was born on December 21, 2007. He weighed 8 pounds 4 ounces and measured 21 inches long.

In Memoriam

Gale Cutler

Warren Gale Cutler, a long-time supporter of the laboratories, passed away in St. Joseph, Michigan on November 27, 2007. He was 85. He is survived by his wife of 57 years, Irene, his 4 children, and 6 grandchildren. His three sons are Alan of Murfreesboro, Tennessee; Brian of Media, Ohio; Larry of Stillwater, Minnesota; and one daughter, Melanie Lavery, of Lancaster, England.

Gale was a physicist and served in several different capacities over 31 years at Whirlpool Corporation, including director of Corporate Research from 1960-1984 and retired in 1988 as Vice President of University Relations. He was made an Honorary Fellow of the Industrial Research Institute in 1996 in recognition of his outstanding contributions in the field of industrial research and for his exceptional and meritorious service to the Industrial Research Institute. Gale edited two textbooks on Detergency—Theory and Technology.

He was a decorated veteran who rose to the rank of Captain. He received the Bronze Star Medal for heroic actions n Luxembourg and Germany, the Army Commendation Ribbon for outstanding performance of duty, the American Theater Ribbon, the European Theater Ribbon with three battle stars, and the World War II Victory Medal.

Gale was co-instructing a class at Lake Michigan College and was scheduled to give a presentation on the Battle of the Bulge. He died just before he was able to give the presentation.

If you would like to send a card or note, please send it to the Herrick Laboratories, and we will forward it.

Memories of Gale

—Ed Eisele

Many people lost a good friend and a greatly admired person with the death of Dr. Gale Cutler. Gale was a frequent visitor to Purdue University and the Herrick Labs when he was director of Corporate Research for Whirlpool Corporation and later when he was vice president of University Relations. Gale was a firm believer in corporate sponsored university research not only because of the research results derived but for the connections with the faculty and the ability to hire future Whirlpool employees. In many ways Gale was a pioneer in the area of university relations and had programs in place that other companies adopted much later.

Gale also was a proponent of continuing education and professional development. He demonstrated this by having some of his key employees take "sabbatical leaves" to get further education to help them in their careers. Gale also brought in faculty from universities to work for a period of time in Whirlpool. Gale was a strong supporter of the Whirlpool Sigma Xi chapter

and the Industrial Research Institute, two organizations that facilitate the exchange of ideas and scientific achievement.

As an individual I often thought that if you could find a picture in a dictionary to define the word "avuncular" it would be a picture of Gale. He had a great sense of humor and warmth that was a wonderful compliment to his intellect and competence. I remember one time at Whirlpool when I was working for Gale when he had to make the financial presentation at the Research Quarterly Meeting because of the absence of the controller. As he stepped up to the podium he explained the situation gravely, then donned his green eye shade and arm garters and made the presentation in full uniform. I might add that his presentation was clearer and more enlightening than those usually given by the controller!

Gale was a Penn State graduate and proud of it, particularly during the fall of the year. Purdue rarely beat Penn State (some things never change) and when I was working for, or with Gale, he never let an opportunity pass to send a little note or e-mail after the latest whipping. Thank heavens he was not a betting man!

Gale frequently told a story about me that he delighted in telling, often to my great embarrassment. When I was getting ready to graduate from Purdue with my doctorate I thought that Whirlpool was interested in hiring me. Not being into networking in those days I just sent my resume to Whirlpool's corporate human resources department figuring (incorrectly) that they would pass it on to the technical side of the business. I was surprised to get a reply saying they had no current opening for someone with my training.

I accepted the fact and moved on. As I was interviewing for jobs I ran across Bill Fontaine in the hall one day. Bill put his arm around my shoulders as we walked along and asked how the job hunt was going. I said "fine" and then he said "You should be interested in this small company in Benton Harbor that makes appliances. It is small today but growing rapidly". I said, "You must mean Whirlpool". "It is!" exclaimed Bill. I then told him that I had sent a resume to Whirlpool only to be told there was no interest.

Our little stroll halted abruptly and Bill stormed off to his office. Gale loved to then tell others that "When Bill Fontaine called I didn't even need a telephone to hear him, I could hear him yelling all the way from West Lafayette!!"

To this day I am not sure whether Gale found a job at me for Whirlpool because he needed me or because he was afraid Bill Fontaine would melt his phone lines again. Whatever the case, I am glad it worked out so that I could spend much of my career as an associate of someone as fine as Gale Cutler. I am certain that even today Gale is busy somewhere above reviewing projects, expressing incredible interest and putting people at ease!

Ray Remembers Gale

—Ray Cohen

I've just read Ed Eisele's comments about Gale Cutler, and agree "100%" with all of them including the story about Gale and Bill Fontaine when Gale did not need a phone line between them. I've heard that story about them repeated many, many times in West Lafayette and elsewhere.

I met Gale on one of the many trips that Bill Fontaine and I took to Whirlpool's offices in St. Joseph/Benton Harbor when we were trying to sell sponsored research at the Herrick Labs to Whirlpool. It is my opinion that our success through the years depended on Gale's many attributes that Ed wrote about. I can honestly say that in my four decades of association with Whirlpool, of which many were with Gale, there was never a better company contact—never one who became a better friend. He will continue to be greatly missed by the many students, staff and faculty of the Herrick Labs who he touched in our years of association.

Kenny McGlothlin

Some of you may remember **Kenny McGlothlin**. Bob Brown, whom more recent members of the Laboratory know well, accepted the position Kenny vacated when Kenny left the Herrick Laboratories. We received word that Kenny passed away at St. Elizabeth Hospital here in Lafayette on Monday, March 3, 2008 after a long battle with cancer. He was 73.

The following are excerpts from his obituary posted on the Hippensteel Web site. Kenny was a 1953 graduate of Jefferson High School. He married E. Joan VanHorn on March 26, 1954 in Green Hill, and she survives. He worked as a Technician for Purdue University for 25 years in Mechanical and Chemical Engineering and Duncan Electric for 20 years. He was a mem-

Continued on next page.

An early photo of the people in the Shop. From left to right are: Leonard "Bud" Cooper, Kenny McGlothlin, Wayne "Archie" Archibald, Avery Norfleet, and Jim Baer.

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(Continuation of Kenny McGlothlin … on page 11)

ber of Congress Street United Methodist Church, Masonic Lodge #561 in Otterbein, Hope Chapter #5 Order of the Eastern Star, High 12, and Moose Lodge. He enjoyed his family, helping other people, life, old cars, and golf. Surviving with his wife are two sons, Kenneth L. McGlothlin, Jr. (wife, Janey) and Rick L. McGlothlin (wife, Debbie) both of Lafayette, a daughter, Rebecca J. Flessner (husband, Bob) of Roberts, IL, two sisters, Lucille Pelfree of Lafayette and Patricia Smith of Naples, FL. and a sister-in-law, Mavis McGlothlin of Reynolds, IN. Nine grandchildren and four great grandchildren also survive. He was preceded in death by a sister, Maxine Reynolds, and a brother, Donald McGlothlin.

Visitation was from 4-8 p.m. Thursday, March 6 at Hippensteel Funeral Home with a Masonic service at 7 p.m. The funeral service was at the funeral home at 10 a.m. on Friday, March 7 with the Rev. Jean Brindel officiating. Interment was at Tippecanoe Memory Gardens. Memorial contributions may be made to Cancer Research Clinical Partnership at Purdue University.

Memories of Kenny

—Ray Cohen

I remember meeting Kenny McGlothlin when Art Smith proposed that he join the Herrick Labs shop personnel. Art had a knack for picking the right people to join his shop staff and Kenny was certainly one of his very good choices. I cannot even try to remember all of the graduate students whose thesis apparatus was built by Kenny. All I can say is "it is a bunch"! And Kenny's work for them was always of the highest caliber—and he did it while at the same time becoming friends with those he helped. He joined several students in organizing lunches together with a religious flavor. Much of the success of the Herrick Labs can be traced to the apparatus that the Herrick shop built. It had a reputation that went far beyond the walls of the Labs. Kenny was a key player making that reputation!