ChEmical Engineering

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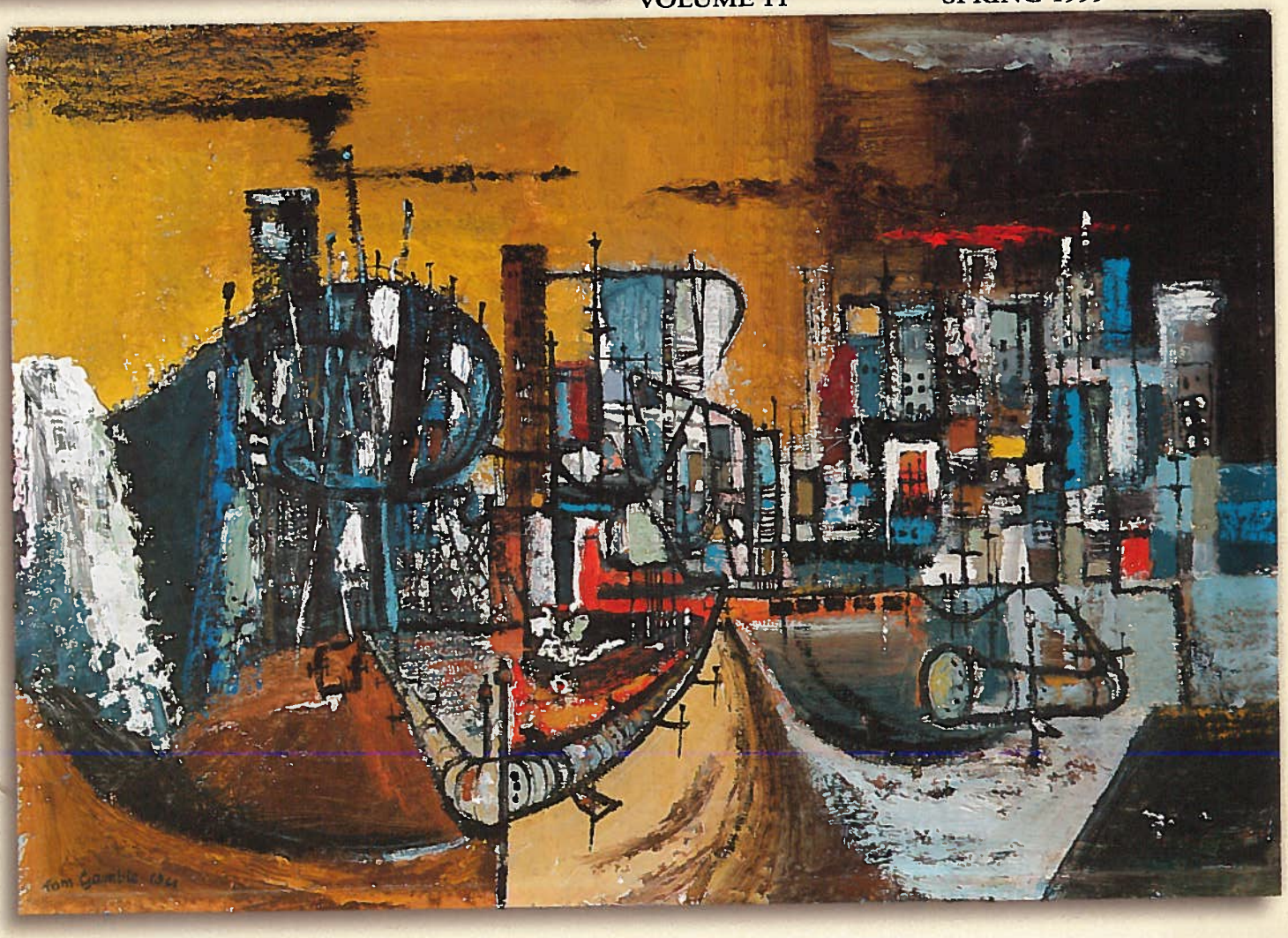

GORDON A. AND MARY CAIN
DEPARTMENT OF CHEMICAL ENGINEERING

Alumni Newsletter

LOUISIANA STATE UNIVERSITY

Letter from the Chairman

Dear Alumni and Friends,

This has been an excellent year for our department, our faculty, and our students. A great deal has happened since the fall 1998 newsletter, with the most significant being the impact of the $10 million donation by alumnus Gordon Cain and his wife Mary.

CARL KNOPF AND GORDON CAIN OUTSIDE THE NEWLY RENAMED GORDON A. & MARY CAIN DEPARTMENT OF CHEMICAL ENGINEERING.

Universities and engineering departments nationwide are undergoing a change in direction and philosophy. In the past, our mission has been directed primarily toward undergraduate education and research. It is now increasingly important for universities to be responsive to the needs and directions of the state and its industries. States are expecting universities to help lead the way to new technologies and to help generate interest in companies expanding or coming to the state.

Louisiana is a leader in this concept with the Louisiana Education Quality Support Fund, which helps fund joint University-industry projects and provides matching funds for chaired and titled professorships throughout the University. As detailed in this newsletter, the $10 million donation from Gordon and Mary Cain will be matched with $5 million from the state; the majority of this money will be used to create five new chaired professor positions and provide start-up funds for new assistant professors.

In order to meet these new challenges and still provide a quality education to students, universities and engineering departments nationwide have become more active in external fundraising and in the establishment of foundation accounts. This is a necessity because basic funding for university operations has remained flat while costs have soared for modernization of equipment and infrastructure.

Our goal for the LSU Department of Chemical Engineering is to raise $25 million. This goal is in line with current fundraising drives at Georgia Tech and Texas A&M. With the Gordon and Mary Cain donation, the expected state match, and past donations, we have currently secured approximately $20 million. This money is being used for student scholarships, undergraduate lab improvements, modernizing our physical plant, and titled professorships to help retain existing faculty. But we still need your help in reaching our goals.

As for our standing in relation to the programs of other universities, the most recent National Science Foundation Survey of Research Spending shows our department ranked 24th out of more than 160 chemical engineering departments. Recently, Dean Ted Bourgoyne moved the Hazardous Substance Research Center (HSRC) into chemical engineering. Danny Reible is currently director of this center, and a large percentage of the research is conducted in our building. The expected funding associated with the HSRC, along with the benefits gained from the Gordon and Mary Cain endowment, will improve our ranking.

The Cain and other endowments have affected many ongoing improvements. First, we awarded about 30 $1,000 scholarships to third- and fourth-year students last year. Chemical engineering traditionally has the best students in the University, and we could have easily awarded additional scholarships if the funds were available. Secondly, if you visit the department, you will see an amazing transformation in the external appearance of our building. Dead trees have been replaced by new flower gardens, and we now have a pleasant walkway for our visitors.

The inside of our building has experienced improvements as well. We have converted a small classroom to an additional computer lab, and we are in the process of upgrading all of our undergraduate student computers to at least 133 MHz with 17-inch monitors. We are also in the process of turning another room into a common area for both graduate students and faculty. It will contain computational facilities as well as a small library complete with current books and journals. These steps help our department remain a friendly team of professionals and future leaders.

Although these improvements are important, the training of chemical engineers at the baccalaureate level remains our paramount mission. To keep our chemical engineers in high demand, we have revamped our senior design and process control courses with the inclusion of Hyprotech software. This has allowed us to provide both steady state design and dynamics using the same software package. Dynamic simulation is an area of growing importance for our students and our state–especially with the increasing importance of on-line optimization and new control strategies.

In addition to these efforts, Kerry Dooley has centered much of his time and attention on the modernization of the undergraduate laboratories. Dooley will complete the interfacing of three new experiments, which are described in detail in this newsletter, this summer.

With the improvements and new positions brought about by the Gordon and Mary Cain endowment and the continual upgrades in our classrooms and laboratories, the outlook for the future of our department is extremely promising. If you would like to learn more about the program, our past accomplishments, and our future ambitions, please don't hesitate to stop by the department–the faculty and I would love to hear from you.

Sincerely,

F. Carl Knopf

F. Carl Knopf
Anding Professor and Chair

If you would like to know more about contributing, please contact Carl Knopf at 225/388-1426 or angie@che.lsu.edu

A Word of Thanks to Our Spring 1999 Contributors

Although financial support has been impressive, departmental expenses continue to escalate, and further renovations are essential in remaining parallel with our competitive counterparts. We would like to thank the following corporations and individuals for their role in maintaining the outstanding reputation that LSU has achieved throughout the years.

PRIVATE SUPPORTERS

Henry and Mary Abbott
Teresa Atkins
Minnie Bennett
Joseph Butterworth, Jr.
Gordon and Mary Cain
John and Billie Collier
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IN MEMORY

Arthur Pressburg, a former professor in the department, passed away in February 1999. He is remembered for his persistent interest in education that lasted long after his retirement. Cherished by both faculty and students, his memory and inspiration will endure.

Prompted by family members, attendants at the funeral made contributions to the department in lieu of flowers. On behalf of Dr. Pressburg, we would like to thank the following for their kind support:

Insa and Leo Abraham
Mr. and Mrs. Carroll F. Gueho
Maury and Jane Strauss
Jean S. Stockner

On Our Cover

The department would especially like to thank Professor Don Freshwater for his suggestion for the cover painting *ICI Wilton Works* by Tom Gamble. We would also like to thank Professor M. Streat of Loughborough University in Leicestershire, United Kingdom, for allowing our use of it along with Betty Brammer of the Institution of Chemical Engineers for providing the negative.

CHEMICAL ENGINEERING is published for the benefit of its alumni and students. Comments and suggestions should be directed to:

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Details on the Cain Endowment

AS YOU MAY RECALL from the previous newsletter, members of the chemical engineering community at LSU have been the fortunate recipients of the third-largest private donation in campus history–a $10 million gift from Gordon A. and Mary Cain.

In recognition of the couple's generosity, the LSU Board of Supervisors agreed to change the name of the department to the Gordon A. and Mary Cain Department of Chemical Engineering.

"This is only a mark on the blueprint of making the Cains synonymous with chemical engineering at LSU," said Department Chair F. Carl Knopf after the panel announced the name change on December 16, 1998.

Our department currently has about 360 undergraduate students and 60 graduate students–a vast majority of which are Louisiana residents who tend to work in their native state. It is estimated that Louisiana chemical industries represent 40 percent of the total income generated in the state.

The state of Louisiana agreed to match the Cain donation with an additional $5 million. LSU has begun formulating extensive research plans aimed at enhancing and improving programs dealing with materials research, process control, design and optimization, environmental research, chemical plant safety procedures, and other technologies relative to Louisiana's immense industrial economy.

The endowment will assist in the hiring of new faculty to help materialize these research plans. Specifically, it will finance five $2 million Gordon and Mary Cain titled professorships, and a half million in start-up packages for new assistant professors, an endowed graduate fellowship, and renovations in the undergraduate laboratory.

GORDON CAIN SPEAKS WITH BILL HANSEL, A FORMER CAIN CHAIR IN AGRICULTURE.

Gordon Cain Visits his Namesake Department

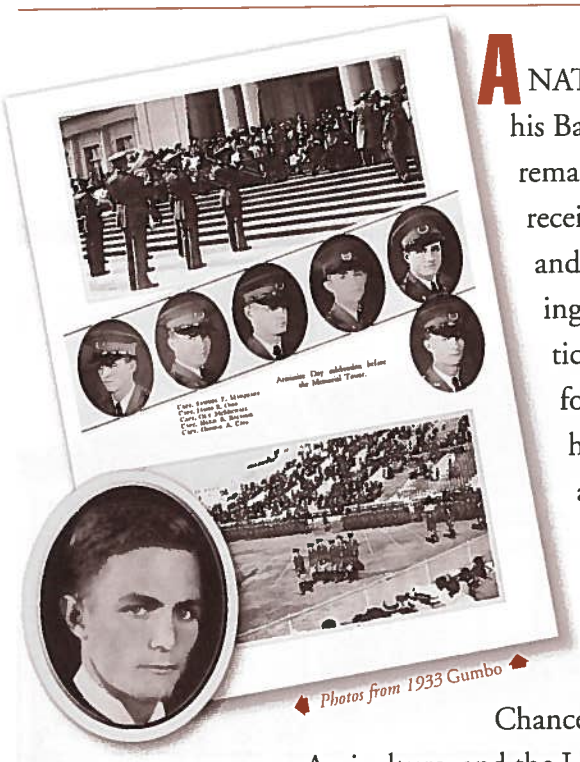
LSU administration and faculty were overjoyed on May 11 when Gordon Cain arrived on campus for a visit to the chemical engineering building and an honorary luncheon hosted by his namesake department at the Lod Cook Alumni Center.

Among the 50 attendees of the luncheon were President William Jenkins of the LSU System, Dean Kenneth Koonce of the College of Agriculture, Dean Adam Bourgoyne of the College of Engineering, and F. Carl Knopf along with the entire chemical engineering faculty. Several outstanding graduate and undergraduate students also joined in the celebration of the couple's generosity.

(L TO R) F. CARL KNOPF, GORDON CAIN, PRESIDENT JENKINS, AND DEAN BOURGOYNE PRESENT THE RESOLUTION BY THE LSU SYSTEM AND BOARD OF SUPERVISORS RECOMMENDING THE NAME CHANGE OF THE DEPARTMENT.

SEVERAL OF OUR OUTSTANDING STUDENTS ATTENDING THE LUNCHEON AND PROFESSOR MICHAEL HENSON POSE FOR A QUICK PHOTO (L TO R): BENJAMIN BOUSSERT, HENSON, ALAN CHAN, AND ROBIN MCNEELEY.

DEAN KENNETH KOONCE, ONE OF FOUR SPEAKERS AT THE LUNCHEON, THANKS CAIN FOR ALL THAT HE HAS MADE POSSIBLE. BEFORE BEING PROMOTED TO DEAN, KOONCE SERVED AS THE GORDON D. CAIN ENDOWED CHAIR IN THE COLLEGE OF AGRICULTURE.



Photos from 1933 Gumbo

A NATIVE OF RAYVILLE, LOUISIANA, GORDON A. CAIN received his Bachelor of Science in Chemical Engineering in 1933 from LSU and has remained dedicated to his alma mater ever since. In World War II, he received a Purple Heart and two Bronze Stars for combat in the Philippines and Okinawa. For 35 years, Cain cultivated a number of businesses, bringing each to fruition. He served as vice president of the Chemical and Plastics Division of Conoco, president of Petro-Tex Chemical Company, and founder of the Sterling Group. The LSU Alumni Association designated him Alumnus of the Year in 1989, and his immense success landed him a spot in the Texas Business Hall of Fame in 1990. All of this led to his receiving an honorary Doctor of Science degree in 1993 from LSU. His wife Mary was director of the Houston Museum of Fine Arts and a graduate from the University of Wisconsin. In addition to their recent endowment, together the couple has aided in the funding of Chancellor's Scholars, a chair and several research grants in the College of Agriculture, and the Lod Cook Center.■

SPRING 1999 DISTINGUISHED SEMINAR SERIES

KEITH E. GUBBINS—"PHASE SEPARATION IN NANO-POROUS MATERIALS"

December 4, 1998

Hosted by Maciej Radosz, Keith E. Gubbins is the W. H. Clark Distinguished Professor of Chemical Engineering at North Carolina State University. His lecture addressed the strong influences of finite size effects, changing dimensionality, and strong solid-fluid forces on the phase transitions and phase separations of micro- and meso-porous materials. With examples drawn from experimental results, the emphasis was on molecular simulation of gas-liquid, liquid-liquid, and narrow-pore freezing systems.

THOMAS MCAVOY—"PLANTWIDE PROCESS CONTROL: AN OPTIMIZATION-BASED APPROACH"

February 5, 1999

Thomas McAvoy, from the University of Maryland, was hosted by Armando Corripio. He discussed systematic analysis procedures applicable to design controllers for plantwide multiloop systems, advising algorithms and tuning be properly selected to achieve the best performance possible for a selected structure. McAvoy highlighted approaches based on optimization with the use of practical examples.

KISHORE K. MOHANTY—"PORE-LEVEL MODELING OF TRANSPORT IN POROUS MEDIA"

March 19, 1999

Associate professor and head of the Petroleum Engineering Program at the University of Houston, Kishore K. Mohanty presented a three-dimensional network model for gas-condensate flows. He also addressed how pore-scale models try to capture the fluid-distribution-dependence on boundary conditions, on the structure and wetability of porous media, and on the interfacial properties of the fluids. He was hosted by Karsten Thompson.

DANIEL T. SCHWARTZ—"ELECTROCHEMICAL MATERIALS SCIENCE AND ENGINEERING: ENABLING NEW ENVIRONMENTAL, MICROMECHANICAL, AND ELECTROOPTIC TECHNOLOGIES"

April 9, 1999

Daniel T. Schwartz, an assistant professor of chemical engineering at the University of Washington, was hosted by Elizabeth Podlaha. The intention of his seminar was to show that electrochemical materials science and engineering has a broad-based impact across a spectrum of technological endeavors. To illustrate this, he combined imaging Raman and X-ray spectroscopies with electrochemical methods to characterize the selectivity, ion-exchange capacity, and cycle life degradation mechanisms in electrodeposited NiHCF materials.

KISHORE K. MOHANTY MAKES HIS PRESENTATION.

THE ANNUAL SEMINAR SERIES, ATTENDED BY PROFESSORS AS WELL AS GRADUATE STUDENTS, BROUGHT MANY OUTSTANDING SPEAKERS TO THE DEPARTMENT.

Historical Impact of the Rotary Kiln Incinerator

ARTHUR STERLING first entertained the notion of a pilot-scale Rotary Kiln Incinerator (RKI) situated on the grounds of LSU many years ago. His long-awaited aspiration finally began to materialize after the Industrial Ties division of the Louisiana Education Quality Support Fund agreed to funding in 1992. Many additional corporations aided in the procurement of the RKI, which originally grew from a proposed 6" x 6" model. One of the most notable aspects of the kiln is its enduring influence on undergraduate students, graduate students, and the department.

It was too expensive to build a RKI from scratch on a university budget, and there were no other prospects to fund its costly construction; however, LSU had a stroke of good fortune when another university appeared disinterested in a major industrial donation.

Consertherm, a waste disposal equipment manufacturer in Ohio, was willing to donate a pilot-scale kiln to LSU. David Hoecke, president of Consertherm, called Sterling and informed him of the remarkable news. Sterling was delighted and immediately sent John Earle to Connecticut to inspect the condition of the kiln. Soon arrangements were being made to transport the two large truckloads of equipment to Louisiana.

Fortunately, Rollins Environmental Services volunteered to provide transportation and the LSU College of Engineering agreed to finance expenses for the foundation and cover.

STERLING OBSERVES OPERATIONS.

Because potentially hazardous waste materials are associated with an RKI, the University had to receive an executive order from the Louisiana Department of Environmental Quality (LADEQ) before the appropriate air and water permits could be obtained. These were finally issued in 1998; it has been a vital addition to the research laboratories of our department ever since.

In addition to the two Ph.D. dissertations and one master's thesis currently underway, five graduate students have written their theses on kiln subjects ranging from procedures to safety. In fact, several of these students were instrumental in acquiring further technology to expand the research capabilities of the RKI.

CHAD THOMAS

EMMANUEL WADA

Lawrence Mercier, Jr., was a significant player in the initial start-up of the entire kiln. His thesis, "Rotary Kiln Incineration: Establishing a Pilot-Scale Facility in a University Setting" (1995), covered topics such as location, financing, how to obtain permits, and what issues and attitudes to expect at public hearings.

Nicholas Vassiliou directed his thesis towards the development of a control scheme for the kiln in 1996. Derek Rester established a basic envelope of operating conditions and devised safety procedures for start-up and shut-down in 1997, and in 1998 Franciscus Prawiro aided in obtaining and implementing the Data Acquisition System, which stores values of process parameters and variables.

Indhu Muthukrishnan wrote the procedures for the continuous analysis of the stack gases in her thesis "Design, Installation, and Testing of a Continuous Emissions Monitoring System (CEMS) for LSU's RKI."

"I had to run three 24-hour continuous experiments to collect data for my thesis," said Muthukrishnan. "It would not have been successful without the cooperation of Dr. Sterling, my fellow graduate students, and the undergraduate student workers. I was really surprised to have Dr. Sterling on an eight-hour night shift!"

Emmanuel Wada, working full-time at LADEQ and part-time on his Ph.D., was concerned with finding a more accurate means of identifying and quantifying the different gases emitting from the stacks after treatment. (The RKI was originally equipped with read-only, analyze-later dials.) Wada worked with a Process Mass Spectrometer, which could identify and continually measure

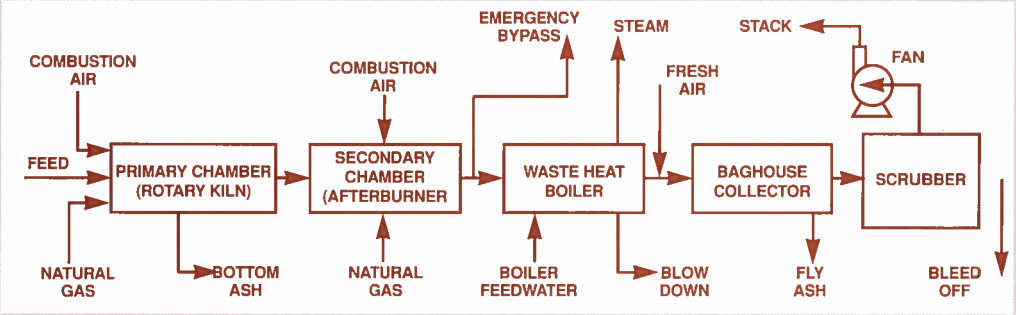
(Continued on pg. 8)

What is it?

The 1,800 square foot, pilot-scale Rotary Kiln Incinerator (RKI) is designed to study how hazardous materials can be treated and destroyed in an environmentally sound and cost-effective manner. The RKI is operated as a treatability facility under an Administrative Order and a Small Source Permit from the Louisiana Department of Environmental Quality.

How does it work?

The process flow has received ample student and departmental attention. The first furnace, called the primary oxidation chamber, is a rotary kiln. Exhaust gases from the kiln flow into the second furnace, called the secondary oxidation chamber or afterburner. From there, the combustion products are cooled in a waste-heat boiler, then passed through air pollution control equipment–a baghouse to remove particles and a gas scrubber to remove acid gases.



PROCESS FLOW DIAGRAM

Teaching Capabilities

The RKI allows both mechanical and chemical engineering students to perform experiments essential to a competent and fundamental understanding of engineering concepts such as incineration, heat transfer, thermodynamics, fluid mechanics, machine design, process control, and process safety. It also gives students practice with the operation of industrial equipment and complements system design concepts taught in the classroom.

The RKI also will allow environmental engineering students to become familiar with commonly used air pollution control processes, and it may be used as a teaching tool for industrial short courses. Such courses teach industrial operators basic incinerator operations and how to respond to adverse conditions.

UNDERGRADUATES KELLY BABIN AND FLORENCE ORJI SPENT MANY HOURS AT THE RKI THIS SEMESTER.

MEASUREMENTS TAKEN AT DOW IN 1988.

Opportunities

Because of the extensive costs associated with plant-scale research dealing with the formation of products of incomplete combustion (PICs), pilot-scale RKIs, such as the one at LSU, can compile this type of data much more cost-effectively. Once data is collected on a smaller level, then calculations can be made between the relationship of pilot- and full-scale kilns.

PIC research is one of the currently funded RKI projects. Louisiana industrial plants were truly cooperative in allowing LSU to compare relative PIC behavior. Dow Chemical in Plaquemine has shut down on numerous occasions to allow measurements on the full-scale level. This has aided considerably in the validation of scale models confirming detailed measurements such as velocity and pressure.

What students have to say about it

"Because students are usually confined to things at the lab scale, working on a research project in a pilot scale facility is a unique opportunity. The RKI is one-tenth of a commercial scale incinerator; it's almost like the real world!"

–Indhu Muthukrishnan

"The RKI gave me excellent experience with high temperature reactions for future work in the chemical industry."

–Robert C. Wight, Jr.

"Working at the kiln helped to refine my critical problem-solving skills and to develop the inter-personal skills needed to work with the various teams and roles on large-scale projects."

–Derek Rester

(Continued from pg. 7)

concentrations of oxygen, carbon monoxide, carbon dioxide, hydrochloric acid, and other specific hydrocarbons. Once collected, this data is recorded in the RKI for research in a more easily accessible, electronic form.

John Earle is yet another example of the enduring influence the RKI has had on students. Earle, now 74, received his M.S. in chemical engineering from LSU in 1971 then worked for many years in industry. After retirement, Earle returned to LSU to conduct RKI research dealing with the evolution of hazardous waste gases from solid adsorbents and their partial or complete oxidation in the kiln and secondary combustion chamber.

With all of the improvements made by students, additional housing and equipment were needed for the sensitive electronic equipment, such as the mass spectrometer. Rollins Environmental Services provided a set of gas analyzers, the Allen Bradley control computer system, and a building to house all of the new equipment. Rollins also funded months of technical support necessary for complex operations. Novartis, formerly known as Ciba-Geigy, aided with electrical engineering consulting, and Albermarle Corporation, formerly known as Ethyl, contributed instrumentation engineering.

Considering all of these improvements, materials, and services, the estimated value of the kiln is approximately one million dollars. However, when one appraises the time, the learning, and the experience it has contributed to so many students, the real value of the rotary kiln is, undeniably, a great deal more. ■

Re-Engineering Chemical Engineering Laboratories

FOR SEVERAL YEARS, much departmental attention has been geared towards establishing a PC-based LAN, upgrading design software, and equipping a mechanical and electrical shop. The department now is aiming its faculty, funding, and industrial support towards the modernization of undergraduate laboratories.

Kerry Dooley has been the forerunner for this operation with the help of two companies. DOW donated $40,000 to the cause and Mobil gave $10,000. As a result of the recent Student Technology Fee, $60,000 was also made available for departmental use to revamp the undergraduate laboratory.

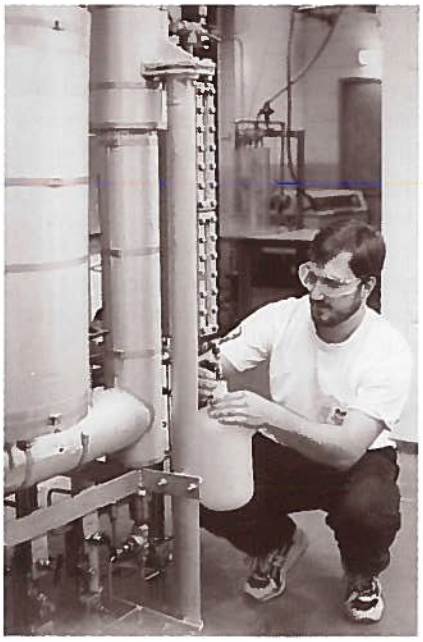
"Our students need to become more cognizant in an experimental setting, with real-time computer control of pilot-scale chemical processes and how to integrate steady-state analysis of process control," said Dooley.

> "Our students need to become more cognizant in an experimental setting, with real-time computer control of pilot-scale chemical processes and how to integrate steady-state analysis of process control."

Dooley also wants to expand the traditional breadth of experiments to integrate polymer science, environmental remediation, and biochemical engineering into the curriculum. There will be three new experiments and five re-designed experiments, which will be computer-interfaced this summer and which will require a great deal of faculty involvement and attention.

The lab-wide data acquisition (DAQ) and control will be primarily analog-based using state of the art hardware and software from National Instruments. The software, known as LABVIEW, allows the importation and development of dynamic simulation modules into the control environment using an add-on toolkit. LABVIEW is already used in many academic and industrial research laboratories and incorporates the multithreading and multiprocessor capabilities associated with Windows NT. It also can autogenerate documentation in HTML or RTF formats for user manuals and on-line help screens.

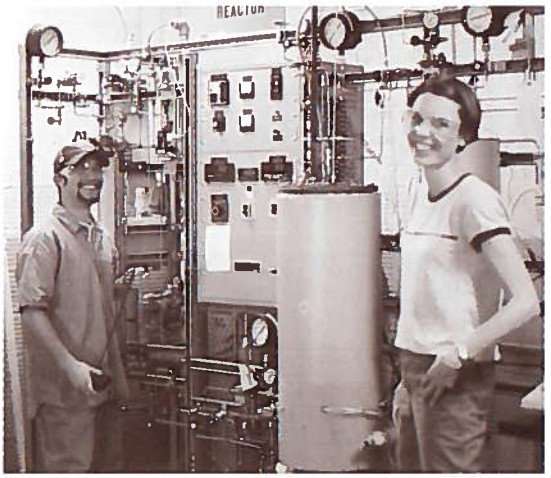
The eight new or refurbished experiments will help ensure demand for LSU chemical engineering graduates, and the ameliorated curriculum and implementation of the new DAQ system and control will parallel modern industrial practice, easing the sometimes difficult student transition into the workforce.

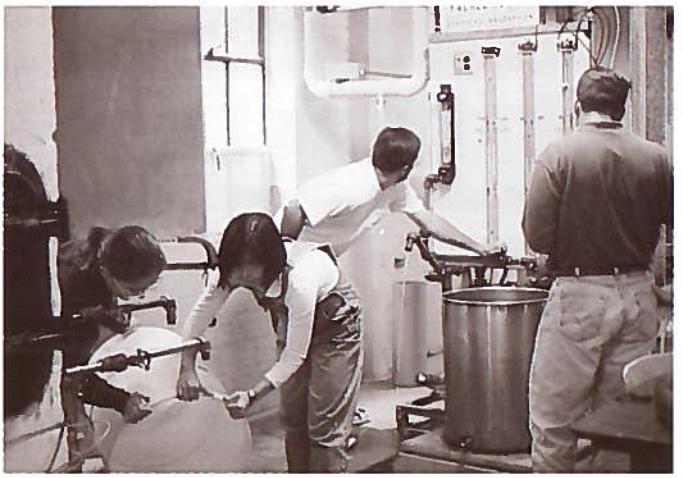


KERR WALL COLLECTS A DISTILLED SAMPLE.

(L TO R) TRENT GUIDRY INSTRUCTS STUDENTS TRUMAN BREITHAUPT AND ANHTHT DO.

INSTRUCTOR EUGENE HADLOCK AND JEREMY BALDRIDGE.





STUDENTS EDGAR GUILLOT AND TEGAN BLADES ANALYZE RESULTS FROM THE FLUIDIZED BED REACTOR.

(FAR RIGHT) STUDENTS WORK ON THE PACKED-TOWER SEGMENT OF EXPERIMENTATION

New Lab Experiments

Distributed Control, pH Neutralization System—Michael Henson

Students unfamiliar with modern Distributed Control Systems (DCS) can be at a distinct disadvantage as they begin their industrial careers. The department previously had one DCS-automated lab; however, it was primitive by current standards.

With the help of donations, the department is constructing a state-of-the-art $30,000 DCS for the Unit Operations Lab and for Process Dynamics and Control. The new DCS will allow students to monitor and control the flow rates of an acid, base, and buffer stream mixed in a continuous stirred tank reactor. It also will allow on-line measurement and real-time adjustments of the manipulated inputs for this highly non-linear process.

Biotechnology Laboratory—Martin Hjortsø

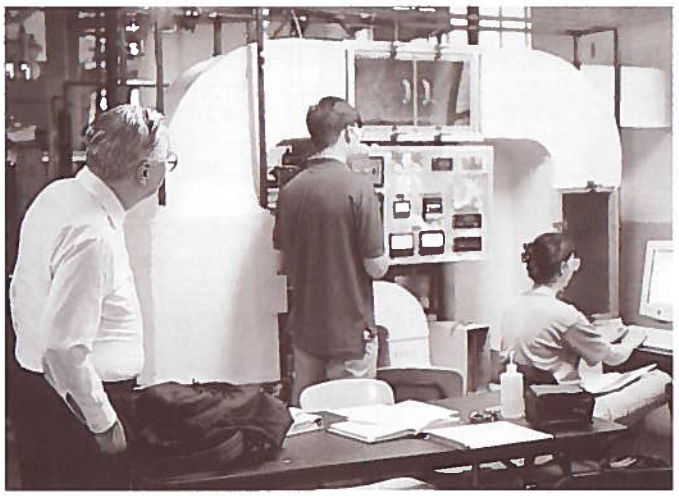
This fall students will be able to do simple growth experiments in a stirred vessel of Baker's yeast, enabling them to fit growth curve data to models of microbial growth with varying conditions such as temperature and stirring rate. Oxygen limitation, oxygen transfer, and mixing in microbial cultures will be several concepts discovered in the experiment.

Shake-flask and stirred-fermentor cultures with organisms such as *Bacillus subtilis* or *Escherichia coli* are possible later expansions of this experiment to give students experience dealing with the concepts of growth phases and culture states through varying amounts and types of inoculum. Experiments like these will form a foundation for problem-solving skills dealing with the processes of both sequential batch optimization and large-scale, continuous microbial growth design.

Microcatlytic Reactor/ Nonideal Flow Experiments—Karsten Thompson

The department formerly used a large packed bed reactor for gas phase kinetics studies; however, a smaller packed or fluidized bed is more beneficial because residence time distribution can be determined by injecting a pulse into gas, liquid, and two-phase streams. Students can then examine the effects of particle size and shape or baffles on the dispersion coefficient. Results from the dispersion analysis then can be used to examine the effects of non-ideal flow on a simple reaction, ultimately leading to the extraction of a constant rate reaction.

With an intentional maldistribution of flow introduced by non-uniform catalyst packing, students can analyze the effects and results and incorporate them into a non-ideal reactor model to predict the reactant conversion.■



INSTRUCTOR FRANK GROVES OVERSEES THE WORK OF STUDENTS CORT ARCENEAUX AND HEATHER SAMROW NEAR THE TRAY DRYER.

Computer-Interfaced, Revamped Experiments

Level Control, Continuous Distillation, Batch Distillation
Kerry Dooley

Heat Exchanger
Armando Corripio

Tray Dryer
Eugene Hadlock

HSRC/South and Southwest

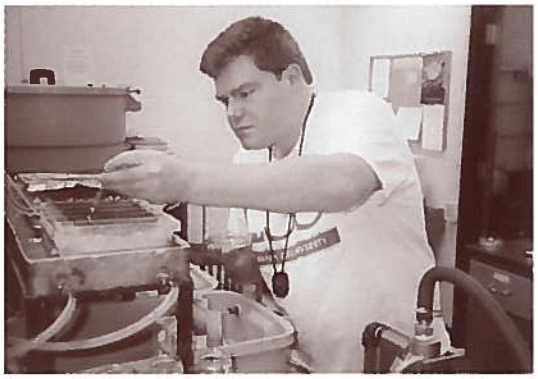
SINCE ITS ESTABLISHMENT in 1991, the Hazardous Substance Research Center (HSRC) has been devoted to addressing complex environmental problems through research, education, and the transfer of technology. The HSRC has the ability to confront tough environmental issues through researchers, universities, and research groups.

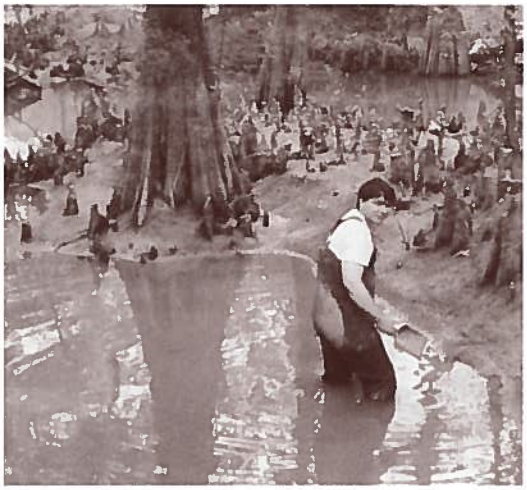
LSU leads the South and Southwest consortium of the HSRC with cooperation from the Georgia Institute of Technology and Rice University. This division attacks problems unique to EPA regions four and six encompassing the states of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, New Mexico, North Carolina, Oklahoma, Tennessee, and Texas.

The HSRC encourages the harmony of industry, government, academic institutions, and the public sector and is quite beneficial to students, giving them a broad level of work and people experience. The HSRC has supported the academic endeavors of over 121 students, 32 of which have completed higher level degrees.

The HSRC also devotes a substantial amount of time and effort to providing technical guidance to local communities experiencing contamination problems through its Technical Outreach Services for Communities (TOSC).

The TOSC program enabled the HSRC to launch a similar program in the summer of 1998 to address the problems of urban brownfields. Technical Assistance to Brownfields communities (TAB) addresses the environmental concerns associated with derelict and abandoned sites. These sites have become an increasing problem, plaguing both urban and rural areas in our nation. TAB facilitates community improvement through assisting in the clean-up and re-development of properties afflicted by environmental contamination.





GRADUATE STUDENT BRIAN CUNNINGHAM (ABOVE) WORKS IN THE LAB WHILE UNDERGRADUATE RAYMOND HUSSER (RIGHT) SEARCHES FOR WORMS IN THE SWAMPS OF BOGALUSA.

The HSRC uses its unique multi-disciplinary and multi-institutional group to conduct comprehensive research. At the HSRC, there are currently four projects underway addressing issues dealing with contaminated sediments and dredged materials.

These materials contain organics, metals, or other conventional pollutants and are either suspended in the water column or found on the bottom of rivers, bayous, lakes, harbors, estuaries, or fresh-water wetlands. These pollutants pose a serious environmental threat, and the HSRC has aided considerably in understanding and public awareness of them.

HSRC Current Project

Danny Reible has been director of the S/SW division of the HSRC since July 1995. Last year, he was named Chevron Endowed Professor of Chemical Engineering at LSU. The Defense Threat Reduction Agency recently agreed to two years of funding at $1.377 million for "Assessment of the Bioavailability of Irreversibly Sorbed PAH Contaminants in Sediments," an HSRC-related proposal. This will add to the already substantial support attracted to the research and outreach programs of the HSRC.

DANNY REIBLE is the principal investigator for the grant. Co-investigators include K. T. Valsaraj and Louis Thibodeaux from chemical engineering and John Fleeger from the Department of Zoology and Physiology. Visit the HSRC website for more information: www.hsrc-crss.org

The remediation of irreversibly sorbed PAH contaminants (ISCs) on sediments may be slow or impossible; however, desorption of ISCs could be enhanced by biological processes. This grant will evaluate the influence of biological processes on the mobility and fate of ISCs.

Bioturbation, one of the biological processes under study, occurs during the sediment-mixing process associated with the normal life-cycle activities of benthic organisms such as oligochaete worms. For example, ISCs pass through the intestines of the deposit-feeding worms, are disrupted by grinding structures and muscular contractions, and are exposed to a variety of digestive enzymes, bacteria, and chemical conditions that are quite different from the surrounding sediments.

If ISCs are not available, there is no risk of exposure, and research attention can be devoted to those issues with a higher risk-factor. It is still quite possible, however, that the bioavailability, toxicity, or desorption of ISCs could be altered by animal processing.■

Faculty News

Activity Bulletin

GREGORY GRIFFIN presented "Comparison of Copper CVD using $Cu(fod)_2$ and $Cu(hfac)_2$ Reduction" at the Advanced Metalization Conference held in Colorado Springs, Colorado, in October 1998. He also attended the 1998 AIChE Annual Meeting in Miami, Florida, and delivered a paper on the solution delivery of copper CVD. Griffin is the advising director for undergraduate students and provides counseling on course selections and scheduling.

DOUGLAS HARRISON received the Masuda Research Fellowship for Study and Consultation, which was held this May in Japan. In January, he will serve as a peer review panelist for the DOE University Coal Research program in Pittsburgh. He attended the AIChE Annual Meeting in Miami Beach, Florida, and presented two papers at the International Symposium of Chemical Reaction Engineering in Newport Beach, California. Both papers will soon be published in *Chemical Engineering Science.*

MICHAEL HENSON has been consulting for Exxon Company in Baton Rouge since 1997; he also is a consultant for Chevron Chemical Company in St. James, Louisiana. He will be a member of the International Program Committee at the IFAC Symposium on Advanced Control of Chemical Processes to be held in Pisa, Italy, in June of 2000. Since August 1989, he has made 58 presentations. Henson is coordinator for the Departmental Seminar Series and actively recruits graduate students.

ELIZABETH PODLAHA was recently awarded a Shell Foundation Faculty Career Initiation and an LSU Council on Research summer grant. At the Electrochemical Society Meeting held in Seattle, Washington, on May 3, Podlaha sponsored graduate student Amy Breaux's exhibit in the Research Student Poster Presentation. Serving as designated chairwoman, Podlaha will also be organizing a session at the Electrochemical Society meeting in Toronto, Canada, in May of 2000. Indicative of her preparation and dedication to teaching, Podlaha received an outstanding level student evaluation this past fall.

GEOFFREY PRICE is a pioneer in the complex terrain of gallium loaded zeolites, and his article that appeared in the 1990 *Journal of Catalysis* (V126, 267-278) has topped 100 citations since its publication. This in-depth study announced the discovery that solid-state ion-exchange of gallium cation occurs under reaction conditions or under hydrogen reduction and replaces protons in the zeolite. Check out his virtual reality zeolite page at www.che.lsu.edu/docs/faculty/price/zeolite.htm. LSU recently honored Price for thirty years of outstanding service.

MACIEJ RADOSZ has served as the M. F. Gautreaux/Ethyl Chair since March 1995. In May, he presented a seminar at the University of Southern Mississippi entitled "Phase Behavior of Metallocene-Catalyzed Ethylene Copolymer Solutions in Suband Supercritical Fluid Solutions." He is editor of *Fluid Phase Equilibria* and a member of the editorial board for the *Journal of Chemical and Engineering Data.* He has also served as a member of the Science Review Panel for the National Science Foundation. Radosz has also procured two U.S. patents: (1) *Supercritical Mixed-Solvent Separation of Polymer Mixtures* and (2) *Low-Emission, Ester-Based Stocks for Low-Emission Lubricants.*

DANNY REIBLE was named to the National Research Council Committee on Assessment of Risks from Remediation of PCB-Contaminated Sediments. He was also elected vice chair of the Baton Rouge section of the American Institute of Chemical Engineers. His book *Fundamentals of Environmental Engineering* was published last year by CRC/Lewis publishers.

KALLIAT VALSARAJ has had over ten journal articles published or in press over the last year. He received a new research grant from the U.S. Army Corps of Engineers to work on air emissions of toxic compounds from contaminated, dredged sediments, and Valsaraj contributes immeasurably to the newsletter through innovative ideas and outstanding editorial review. Valsaraj along with several other department members attended the Hazardous Waste Research Conference in St. Louis, Missouri.

DAVID WETZEL currently holds the F. J. Haydel, Jr./Kaiser Aluminum Professorship, first awarded to him in 1997. He is a member of the American Institute of Chemical Engineers, American Society for Engineering Education, and the Louisiana Calligraphers Guild. Since the beginning of his career at LSU in 1979, he has won numerous awards for his sincere dedication in teaching and advising.

Milk Jugs and Yo-Yos:

ARMANDO CORRIPIO VISITS EAST IBERVILLE HIGH

ARMANDO CORRIPIO

When the science scores of public school children began to drop compared to previous years, educators across the state united and launched a series of programs to rekindle scholastic enthusiasm in science-related subjects. In collaboration with local schools, LSU participated in the University Outreach Program. Joining the volunteers, Armando Corripio visited East Iberville High on February 12 in hopes of igniting interest in engineering.

Corripio first explained the different types of engineers and then discussed the important role of chemicals and other engineering products in daily life.

"I wanted to use things that they could relate to, like roads, or exciting things that kids enjoy, like cars," said Corripio.

He then examined employment opportunities, salary possibilities, and important engineering issues, such as economics, safety, and environmental protection. The final aspect of his presentation, "What does it take to become an engineer?" emphasized mathematics, physics, chemistry, thermodynamics, and computer science.

The highlight of his talk, however, was his demonstrations, which involved a milk jug and a yo-yo. Serving as a pendulum, the yo-yo illustrated how mathematical models can reveal the time it takes a pendulum to swing.

CORRIPIO PERFORMS HIS DEMONSTRATION FOR CHEMICAL ENGINEERING STUDENTS.

In his second demonstration, Corripio used an espresso coffee maker to produce steam in a milk jug. As the steam cooled and condensed, the container collapsed in front of their eyes.

"Lucky for us, this wasn't a chemical tank," Corripio said illustrating the significance of an engineer to his or her job.

JASON DRODDY, coordinator of the University Outreach Program, reported that over 11 members of LSU faculty and staff in addition to two graduate students participated in the program. Corripio served as the engineering representative. Educators are hopeful that this scholastic crusade will result in a science revival, and from local news reports, the future looks promising.■

Research Announcements

ON-LINE OPTIMIZATION: A STEADFAST FRIEND OF LOUISIANA INDUSTRY

RALPH PIKE

Ralph Pike leads LSU efforts to develop the technique of On-Line Optimization (OLO), and he holds grants from EPA, DOE, and PVE to carry on this work. OLO determines the actual operating conditions of a plant and then makes small changes in those conditions to maximize profits. OLO requires the existing plant-wide control system to be interfaced to a computer program that determines if the plant is near steady state condition. It then guides the movement of the controllers to near optimal settings. This is done in a virtually continuous fashion and typically results in a 3 to 4 percent improvement in profitability with a concurrent reduction in plant emissions.

The most profitable plants are those where expansions occur. It is estimated that Louisiana plants contribute 40 percent to the state economy; progress in OLO research could easily translate into millions of dollars as well as new jobs. Pike's research bridges the realm between theory and application and has the potential to help Louisiana industries remain competitive with newer facilities built around the globe.

OLO has been put into practice at Motiva Refinery (formerly known as Star Enterprise) in Convent, Louisiana. Pike teaches OLO short courses throughout the state free of charge to industrial participants, and he is currently making the software available on his web site www.leeric.lsu.edu/mpri/.

RALPH PIKE first joined LSU in 1964. Since then, he has served as director of the Louisiana Mining and Mineral Resource Institute for 19 years and held numerous other positions such as interim department chair and both assistant and associate vice chancellor for research coordination.

BIOSYNTHETIC STUDIES
MARTIN HJORTSØ

Martin Hjortsø concentrates his research in the fields of biotechnology, bio-reactor engineering, and biokinetic studies. An area that steals much of his attention, however, is Hairy Root Culture (HRC).

HRC can be defined as a culture process in which genetically engineered, fast-growing roots are grown independent of the plant in a bioreactor instead of traditional "field" farms. HRC allows year-round production, and it is faster and requires less labor than traditional field farming.

The driving force behind HRC research lies in the possibility of an increased production of secondary metabolites. When the roots are stressed with various compounds (such as extracts of fungi or heavy metals), there is a significant increase in secondary metabolites.

Secondary metabolites can be used as pharmaceuticals, pesticides, fragrances and other commercially valuable compounds. Plant secondary metabolites are also being investigated as a potential weapon to combat tuberculosis, HIV, cancer, and migraines.

Along with Nikolaus Fischer of the LSU Department of Chemistry, Hjortsø is working on a sub-project using hairy roots for biosynthetic studies. The pathway of a secondary metabolite must be known in order to maximize production, however, most are not. Hjortsø's method uses household vinegar to detect the unknown pathway.

A 46-DAY-OLD CULTURE OF HAIRY ROOTS OF *TAGEAS PATULA*, A SPECIES OF MARIGOLD. THE REACTOR IS 20 LITERS AND THE ROOT WEIGHS APPROXIMATELY 4 KG.

Vinegar labeled with the isotope ^{13}C can be detected in the metabolite using Nuclear Magnetic Resonance spectroscopy (NMR). After the carbons from the vinegar molecule are incorporated into the secondary metabolite, an NMR spectra can precisely reveal where the incorporation took place.

Previously researchers used radioactive isotopes, which involved extensive additional work and could not be done by taking a spectrum of the compound, to gain this type of information. Hjortsø is hopeful that his non-radioactive ^{13}C isotope method will not only prove safer but also will constitute a far more expedient way of tracing the complex paths of secondary metabolites.

In 1998, MARTIN HJORTSØ was honored with the first George H. Nusloch II Endowed Professorship. Also serving as one of the graduate advisers, he is instrumental in recruiting and maintaining our outstanding graduate students.

RESPONDING TO POLLUTANTS
LOUIS THIBODEAUX

Louis Thibodeaux has been on a 30-year mission to protect the environment from careless, unnecessary pollution and to educate future engineers about their responsibility to do the same. While his field is environmental chemodynamics, his calling is to understand the obscure fate of long-range pollutants. Included in this category are Persistent Organic Pollutants (POPs). Because most POPs have a half-life of several years, their affect on the environment is of monumental concern.

These persistent organic pests have been detected in areas that should be uncontaminated, such as Alpine lakes and Arctic regions of Scandinavia, Canada, and the United States, because of the absence of people, plants, and cities. This startling paradox sparked global attention, and Thibodeaux was included among leading authorities from almost every nation in the world to participate in a limited-attendance workshop addressing POP issues.

> "WE MUST TURN OUR HIGH TECHNOLOGICAL SKILLS WITH THEIR SOPHISTICATED DEVICES AND PROCEDURES TOWARD UNRAVELING NATURE'S SECRETS AND LIMITATIONS IN PROCESSING, TRANSPORTING, AND REACTING TO HAZARDOUS SUBSTANCES."

LOUIS THIBODEAUX's undergraduate labs address contaminant transport and remediation across river bed sediment. This lab demonstrates how bed sediment and soil continue to exhibit residual concentrations for long time-periods after the contaminant discharge source is eliminated. The structure is an artificial river bed complete with sand, simulated water flow, and contaminant.

ADAM PEARSON AND EDWARD TATUM RUN A SIMULATION.

IMPROVED OIL RECOVERY
KARSTEN THOMPSON

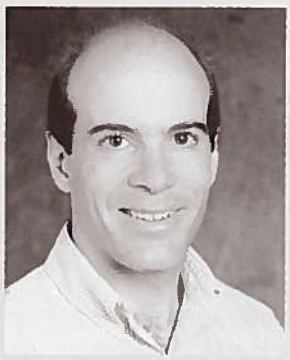
Karsten Thompson is studying flow and reaction in porous media as it applies to petroleum production and subsurface contaminant transport. He has four projects currently underway, one of which incorporates polymers for improved oil recovery.

The current and most popular method of oil recovery taps into shallow reservoirs and allows the oil to surface naturally through gravity. This is an efficient process if there is an abundance of shallow reservoir oil, as in much of the Middle East. Sometimes, though, beneath this rich, easily extracted blanket, there is an additional supply of oil that becomes stuck in the stratification of heterogeneous reservoirs.

Stratified reservoirs are customary in the United States, and they are estimated to retain 113 billion barrels of oil. In 1993, Adam T. Bourgoyne, LSU dean of engineering, calculated that in Louisiana alone there are ten billion barrels of oil waiting to be siphoned. Thompson's research on this process could eventually free the trapped oil.

The process begins by injecting polymers such as polyacrylaride and guar into the soil and allowing them to seep into the emptied cavern of the shallow reservoir. Once enough time has passed, a cross-linker solution is injected into the reservoir in a similar fashion. The syrupy texture of the polymers is partially solidified by the cross-linker, making the whole combination transform into a huge, interconnected network. This sponge-like barricade forces the water into the stratified reservoir and thrusts the oil through voids in the porous media, allowing it to be siphoned.

Because of the perpetually shifting situation in the Middle East, the increased efficiency of this process could be beneficial to both business and government alike. The government is still subsidizing related research, although polymer-improved oil recovery gleaned more notoriety in the 1980s than it does today. In addition to discovering which polymers and cross-linkers work best and are environmentally compatible, there is still much research to be conducted to determine the rate at which these chemicals are injected into the soil.



KARSTEN THOMPSON joined the department as an assistant professor in 1996; he is also faculty adviser for the LSU student chapter of the American Institute of Chemical Engineers. In December 1998, Karsten, Lisa, and Erik Thompson were happy to welcome Emily as a new addition to their family.

INTRODUCTION TO COMPUTER TECHNOLOGIES
MARGARET CYGAN

CYGAN AND HER HUSBAND JACEK ENJOYING LOUISIANA'S NATURAL BEAUTY AT CHICOT STATE PARK.

In 1974 Margaret Cygan received her B.S. in computer science from the University of Silesia at Katowice, Poland. She has been an instructor for over 15 years; has maintained the department web pages; and is now teaching Introduction to Computer Technologies (ICT), a course on dealing with a variety of computer applications for scientific computations.

Because all fields of engineering necessitate proficiency with computers, ICT offers a friendly, hands-on, no-textbook approach to using these sometimes intimidating machines. One-hour help sessions are held twice a week to resolve any additional concerns.

"I want to instill a confidence in my students to teach themselves, as this is usually the case in keeping up with the ever-changing world of computers and technology," said Cygan of her course, which also gears students toward the use of online tutorials.

Still, many former ICT students have been spotted in our halls on their way to receive Cygan's guidance on frustrating computer issues. When asked how she felt about this, Cygan replied, "It's just nice to see that we can really help students; those are definitely the most rewarding moments."■

John Collier Embarks on a New Career

Members of the LSU community were saddened to hear of Professor John Collier's departure. Collier has been chosen as head of the Department of Chemical Engineering at the University of Tennessee at Knoxville. His wife Billie will also be leaving her position as director of the LSU Department of Human Ecology to become dean of human ecology at Knoxville.

Collier first came to LSU in 1988 as chairman of the department. His involvement with University programs and committees, however, did not end there. He has been a member of the Faculty Senate for over eight years. Collier has also served as chairman of the Materials Science and Engineering Committee, president of the Faculty Club, and president and vice president of the Faculty Senate. In addition, he has been a member of the Fiscal Exigency Committee, the Evening School Advisory Committee, the Alumni & Faculty Relations Subcommittee, and the Public Service and Continuing Education Subcommittee.

Although his presence and dedication will be missed, the department would like to wish happiness and success for the Colliers. The University of Tennessee is fortunate to gain these two influential academic leaders.■

Community Service Leaders

ONE OF THE GOALS OF OUR DEPARTMENT IS TO INSTILL IN OUR STUDENTS THE IDEAL OF SERVICE AND THE NOTION OF MAKING LONG-TERM CONTRIBUTIONS TO THEIR EMPLOYER, THEIR PROFESSION, AND SOCIETY.

GEOFFREY PRICE AND HIS WIFE JUDY.

IT WAS SMOOTH SAILING FOR THE *SEA HAWK* IN LAST YEAR'S REGATTA.

HARD-WORKING CREW MEMBERS OF THE *CORONA*.

THIBODEAUX (RIGHT) SPORTS HIS *SEA HAWK* T-SHIRT.

GEOFFREY PRICE is president of Recycled Computers for Kids, Inc. This non-profit organization introduces children across the state to using computers by revamping older models and offering friendly, expert instruction in their use. Since 1994, Price has also served on the Advisory Committee for Scotlandville's High School for the Engineering Professions. Extremely involved with the First Christian Church of Baton Rouge, Price has served as deacon, board member, and Overseer for Education. WAFB and Freeport/McMoran recognized his outstanding record, and in 1996 he won the Community Service Award.

ARMANDO CORRIPIO, DANNY REIBLE, and LOUIS THIBODEAUX have been avid sailors for over 20 years. Corripio and Reible raced the *Corona* while Thibodeaux sailed the *Sea Hawk* in the 1999 Louisiana Leukemia Cup Regatta. Staff members Paul Rodriquez and Fred McKenzie along with students Beth Pederson, Billie Schexnaydre, Karl Duckworth, and Alan Chan joined the professors in the fundraising event.

This year, all boats raced in honor of Thomas Henson, a 12-year-old leukemia victim. Sailing communities raised over $600,000 last year to fund research and treatment against the terrible disease and other related cancers; the Louisiana Chapter was able to provide financial assistance to over 1,800 leukemia victims throughout the state.■

Areas of Concentration

ARMANDO B. CORRIPIO
Automatic Process Control Theory

KERRY M. DOOLEY
Heterogeneous Catalysis
High-Pressure Extraction

GREGORY L. GRIFFIN
Materials Processing
Chemical Vapor Deposition
Catalysis

DOUGLAS P. HARRISON
Kinetics of Gas-Solid Reactions

MICHAEL A. HENSON
Nonlinear Process Control
Neural Networks

MARTIN A. HJORTSØ
Biochemical Reaction Engineering

F. CARL KNOPF
Supercritical Fluid Extraction
Ultrafast Kinetics

RALPH W. PIKE
Fluid Dynamics with Chemical Reactions
Optimization Theory

ELIZABETH J. PODLAHA
Electrochemical Engineering

GEOFFREY L. PRICE
Heterogeneous Catalysis
Zeolites

MACIEJ RADOSZ
Thermodynamics
Polymer Physical Chemistry

DANNY D. REIBLE
Environmental Transport
Turbulence

ARTHUR M. STERLING
Fluid Mechanics
Combustion

LOUIS J. THIBODEAUX
Transport of Chemicals near Natural Interfaces

KARSTEN E. THOMPSON
Transport and Reaction in Porous Media

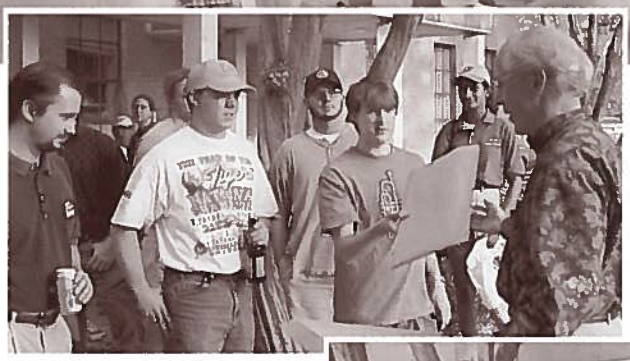
KALLIAT VALSARAJ
Environmental Transport
Separations

DAVID M. WETZEL
Wet-Air Oxidation
Cross-Flow Stripping

Student News

Undergraduate Students

Dow Crawfish Boil and Awards Ceremony



University Medal

Highest GPA in the University.

May 1999
Benjamin Boussert
Lanny Smith

McLaughlin Medal

Awarded each semester to graduating seniors with the highest grade-point average in the College of Engineering.

December 1997
Christopher Agostinelli (first recipient)

May 1998
Melissa McCutcheon,
Chad Thomas,
Allain White

May 1999
Benjamin Boussert,
Lanny Smith

Dow Outstanding Junior Award

Initiated in 1984 and awarded in the fall semester of the junior year to a student with an outstanding record of scholastic performance, leadership in campus activities, and placement within the top 20 percent of the junior class.

1998
Woodrow Roberts III

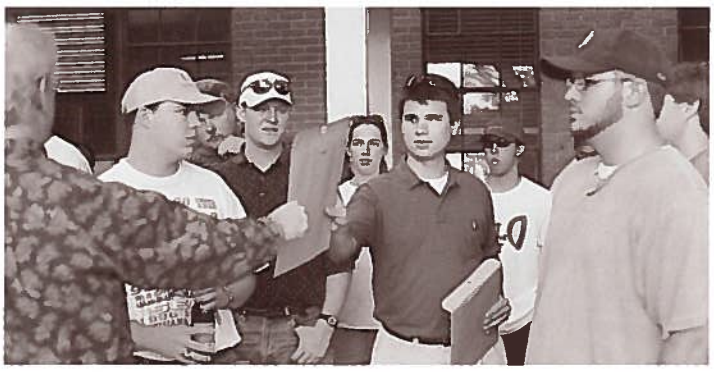
1999
Louis Chemin

Jesse Coates Award

1998
Melissa McCutcheon

1999
Woodrow Roberts III

THE COATES FAMILY



WILLIAM BRIDGES RECEIVES THE AMERICAN INSTITUTE OF CHEMISTS AWARD FROM PROFESSOR DAVID WETZEL.

American Institute of Chemists Award

Requires the vote of department faculty and is given to a student with proven scholastic achievement, leadership ability, and admirable character.

1998
Allain White

1999
William Bridges

High GPA Senior

Started in 1937 and awarded to the senior with the highest gpa at graduation.

May 1999
Benjamin Boussert, Lanny Smith

High GPA Junior

1998
Jess Frey, Melissa McCutcheon, Allain White, Chad Thomas

1999
Benjamin Boussert, Lisa Lambert, Lanny Smith

High GPA Sophomore

1997
Melissa McCutcheon, Katherine Toney, Jess Frey

1998
Ali Haider Abidi, Benjamin Boussert, David Farritor, Lisa Lambert, Chad Thomas, Lanny Smith

1999
Louis Chemin III, Meghan Dumas

Undergraduate Updates

Department of Defense Fellowship

Benjamin Boussert was awarded a fellowship from the U.S. Department of Defense to attend the graduate university of his choice. This fellowship will pay all tuition and fees in addition to a monthly stipend. Broussert was one of many who applied for this outstanding award, and the department would like to congratulate him on his outstanding accomplishment and wish him success in his studies at Berkley.

Brian M. Daire

co-authored "$CaCl_2$/polymer drilling mud helps control deepwater GOM gumbo" in the February 1999 issue of *World Oil*. Brian received his B.S. this semester and is currently working for BP/Amoco.

1998-99 Scholarship Recipients

Halliburton Scholarship
William Bridges

I.H. Gottlieb Memorial
Raymond Husser

Texaco Scholarship
Jeremy Cyr and Kimberly Fugler

Marathon Ashland Scholarship
David McGraw, Shannon Frith, and Barry Rogge

Gerard Family Scholarship
Burl Duffie, Carolyn Melton, and Lanny Smith

Amoco Corp. Scholarship
Mary McMyne

Star Enterprises Scholarship through the Dean
Ian Quinn

Frank & Clara Groves Scholarship
Katherine Toney

Chevron USA Scholarship
Phillip Wall

Chevron Chemical Scholarship
David Stafford

Paul M. Horton Memorial
Jennifer Wang

Vulcan Chemical Scholarship
Christopher Yandell

Alcoa Scholarship
Katherine Zorzi

American Institute of Chemical Engineers (AIChE)

NEWS NOTES

by Scott Strikmiller, president
Baton Rouge student chapter

Our newly elected officers are looking forward to a great year for AIChE. We have made an agenda that enables students to enhance their corporate relations and that includes many social activities. Some upcoming events and activities include the Union Carbide Seafest, DOW and Vulcan Crawfish Boils, and hopefully a Game Day Barbecue. We are excited about the company support that we have received in the past and plan to continue our strong relations with our sponsors in the future.

1999-2000 OFFICERS

President
Scott Strikmiller

Vice-President
Robert Durst

Treasurer
Oscar Flores

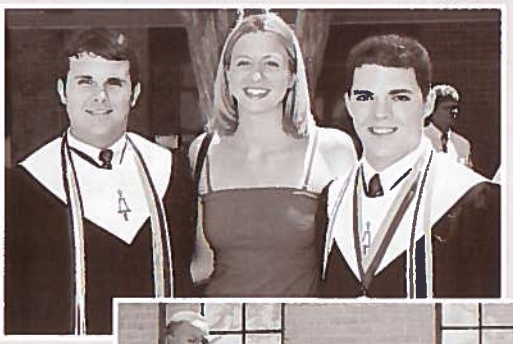
Secretary
Andrea Mattson

Social Director
Louis Chemin

Publicity
Becky Lorenz

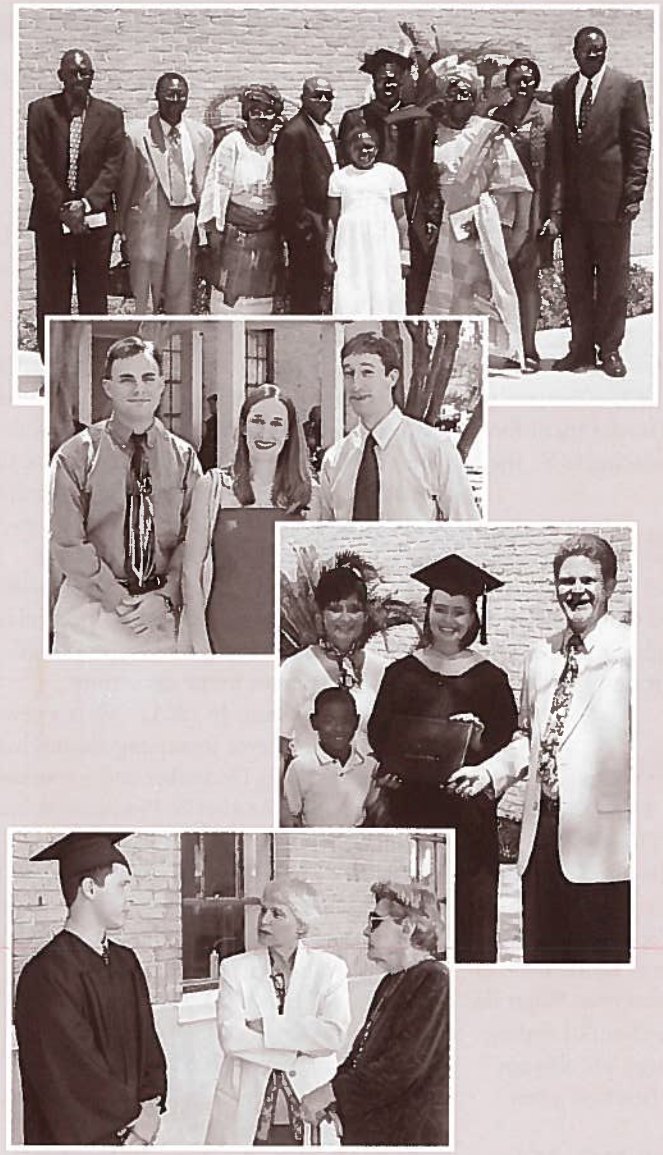
May 1999 Commencement

SCENES FROM THE CHEMICAL ENGINEERING DEPARTMENTAL COMMENCEMENT CEREMONY.



Bachelor of Science in Chemical Engineering

Patrick T. Alderman
Jeremy P. Baldridge
Keith L. Ball
Tegan M. Blades
Benjamin P. Broussert
Curtis R. Breutzmann
William T. Bridges
Charles R. Brumfield
Rebecca L. Bryant
Dennis P. Bueche, Jr.
Alicia C. Butler
Jane M. Byerly
Daniel C. Clark
Bryan M. Daire
Michael E. Dean
Timothy M. Desselles
Anhthy Do
Rosa H. Dunkelberg
Emily D. Ellison
Kimberly Fugler
Clarence E. Garlepied
Mark H. Graham
Edgar R. Guillot
Shannon Hoesing
Raymon A. Husser
Christina Jarrell
William H.H. Jeffcoat
Priti J. Joshi
Lisa A. Lambert
Matthew R. McIntosh
John T. McKay
Lindsey L. McMorris
Shannon L. Miller
Brandon M. Monistere
Patrick M. Passantino
Douglas Picou
Paul B. Raybon
Steven P. Reynolds
Woodrow T. Roberts III
Heather A. Samrow
Lanny M. Smith
David S. Stafford
Tracee W. Thomas
Phillip Wall
Jennifer A. Wang
Shin Y. Wong
Sook W. Yei



GRADUATE STUDENTS

Master of Science in Chemical Engineering

Yu-Chiung Kuo
Robert J. Osterhold
Beth M. Pederson
Franciscus X. Prawiro
Liangfeng Sun
Julie D. White
Robert C. Wight, Jr.

Doctor of Philosophy in Chemical Engineering

Olufemi Adeniyi Adebiyi
"Decomposition Strategies for Process Identification and Control Using Neural Networks"
Adviser: Armando Corripio

Guilhem de Seze
"Sediment-Air Partitioning of Hydrophobic Organic Chemicals"
Advisers: K. T. Valsaraj and Danny Reible

Graduate Student Updates

AMY BREAUX was recently awarded a travel grant from the Electrodeposition Division of the Electrochemical Society for her presentation of a poster at the May conference in Seattle, Washington. Breaux was recently hired by TRW for a civilian position at Hill Air Force Base in Utah, and in January she and William Vidrine will be united in marriage.

GUILHEM DE SEZE received his Ph.D. in Chemical Engineering this May and moved to Belgium to work for Proctor & Gamble as a research scientist.

BRIAN CUNNINGHAM presented "Assessment of the Effects of Bioturbation in Sediments" at the 1999 Conference on Hazardous Waste Research in St. Louis. Brian is a Ph.D. candidate advised by Danny Reible.

Last year, **GANG GUO** presented papers with Karsten Thompson at both the AIChE Annual Meeting and at the American Geophysical Union held in San Francisco, California. At the AIChE Spring National Meeting held in Houston, Texas, Guo presented "Toward Better Prediction of Mass Transfer during Subsurface Remediation," also in collaboration with Thompson.

GUANGLI LIU presented "Detailed Calculation of Stokes Flow in a Nonuniform 2-D Porous Material" at the AIChE Annual Meeting in Miami, Florida, November 1998.

RAMAN THIRUVENKATACHARI, a graduate student since the fall of 1998, attended "Golden Jubilee Celebrations," the 1997 Indian Institute of Chemical Engineers conference held in New Delhi. Thiruvenkatachari is currently working on "Chemical Vapor Deposition of Copper Thin Films" under Gregory Griffin.

ROBERT WIGHT, JR., received his M.S. in Chemical Engineering this May. On March 11, Wight and his wife Andrea were proud to welcome Robert III to their family.

DEPARTMENT STATISTICS

298 Undergraduate Students

36% Female

64% Male

44 Graduate Students

M.S.

31% Female

69% Male

Ph.D.

3% Female

97% Male

Alumni Updates

If you would like for us to print news of your latest achievements, please complete the enclosed postage-paid card and return it to us—we'd love to hear what you've been doing!
If you prefer, this information can also be submitted electronically to angie@che.lsu.edu

1940s

William R. Axtell *(B.S., '48; M.S., '49)* was employed by Ethyl Corporation after receiving both of his degrees from LSU. He lives in Baker, Louisiana, and retired from Ethyl in 1985 after 32 years of service.

Earnest Dare Campbell *(B.S., '49)* retired his position as plant superintendent at the Dow Chemical Company and is now living in Baton Rouge.

Fred G. Thatcher *(B.S., '42)* lives in New Lenox, Illinois.

1950s

Jules Emile Arbour, III *(B.S., '50)* retired from the Dow Chemical Company in 1991 and resides in Houston, Texas.

Eric Powell Breidenbach *(M.S., '51)* is enjoying his retirement from Ethyl Corporation. He helps his neighbors with jobs around the house in addition to making clocks for friends. Eric resides in Baton Rouge and continues to perfect his golf swing.

Nai Yuen Chen *(B.S., '59)* now works as a technical consultant in Titusville, New Jersey, after retiring from Mobil Technology Company in 1994.

James C. Nutter *(B.S., '50)*, formerly employed by Cities Service Oil Company, spends his retirement traveling and enjoying time with his family and friends in Lake Charles, Louisiana.

1960s

Kenneth J. Adams *(B.S., '66)* lives in Baton Rouge and works at Albemarle Corporation as a contract engineer.

Raul Valdes Fonte *(B.S., '67)* is currently employed by Crescent Technology, Inc., in New Orleans as patent counsel and senior engineer. Fonte received a law degree from Loyola University in 1996 and provides intellectual property and environmental consulting.

H. M. "Mack" Ingle *(M.S., '61)* retired from Albemarle in January of 1994 after 37 years of service. He enjoys his retirement traveling and happily watching his grandchildren grow and mature.

Kwok-Fu Lee *(B.S., '66)* later received his Ph.D. and is currently employed by Amoco Corporation as the technology licensing manager for the Asia Pacific region.

Nolan M. Rome *(B.S., '62)* is director of Gas Processing Business Development for Mobil Exploration & Producing U.S., Inc., in The Woodlands, Texas.

1970s

Patricia Brignac Roussel *(B.S., '76)* works for Exxon Chemical Company in Baton Rouge as a staff engineer in the Intermediates Technology Division of Basic Chemicals.

1980s

Martin Q. Dale *(B.S., '84)* is the manager of Feedstocks and Fuels for the U.S. Chemicals Division of Chevron Chemical Company in Houston, Texas.

Dennis Gilbert *(B.S., '83)* works as a PVC production engineer at Borden Chemicals and Plastics and operates For What It's Worth Records in the Merchant's Landing Flea Market of Baton Rouge. He also has three wonderful children from his seven-year marriage.

James Maness *(B.S., '84; M.S., '86)*, a former graduate student of Kerry Dooley, now works for Georgia Pacific as a paper machine superintendent.

1990s

Clyde "Chip" Alcon, Jr. *(B.S., '97)* is currently working on projects for Union Carbide on behalf of Jacobs Engineering in Houston, Texas.

Johnny Boey *(B.S., 96; M.S., '98)* works for General Electric Research Labs in Schenectady, New York.

Narendrah Borgharkar *(Ph.D., '97)* is employed by Essilor of America. The company is an optical coatings manufacturer, and Borgharkar works with the research labs located in St. Petersberg, Florida.

Christina LeBlanc Cedotal *(B.S., '94)* lives in White Castle, Louisiana, and works for the Convent Refinery of Motiva Enterprises as a process engineer.

Jason Gardner *(B.S., '91)* followed his LSU education with a Ph.D. in Biomedical Engineering from Louisiana Tech University, where he researched the mathematical modeling of oxygen transport in cardiac tissue. Two years after their marriage, Gardner and his wife Hope welcomed Sarah Elizabeth to the family in June of 1998. He recently accepted a post doctoral fellowship at the University of South Alabama College of Medicine in Mobile and likes to build computer systems in his spare time.

George A. Grau, Jr. *(B.S., '98)* is a new addition to our ever-increasing alumni list; he graduated last December and is working for Texaco Exploration & Production, Inc., in New Orleans.

Bianaca McWilliams Jackson *(B.S., '96)* is a process engineer responsible for the production areas of brine and chlorine at Occidental Chemical Corporation in Baton Rouge.

Preeti M. Jain *(M.S. '98)* is employed with Jacobs Engineering in Baton Rouge.

Stephen Lassard *(B.S., '92)* now works for DSM Copolymer in Addis, Louisiana, as a senior process engineer.

Todd P. Marcello *(B.S., '93)* has been with Vulcan Chemicals since June of 1993 and currently works as an operational excellence engineer.

Christopher Porter *(B.S., '92; M.S., '97)* recently left Baton Rouge and is now residing in Baltimore, Maryland, working as a simulation engineer with GSE Systems. Porter assists in the production of control systems and simulation software for chemical, power, oil, and gas industries.

Derek Rester *(M.S., '97)* works as a process control engineer for Dow Chemical in Freeport, Texas.

Jeff Smith *(Ph.D., '96)* is working as a research engineer for Exxon Chemicals in Freeport, Texas.

Ronald L. Snell *(B.S., '94)* lives in Baton Rouge and works for Allied Signal as a production engineer.

We Need Your Help

Lost Alumni

We would like to thank the treasured alumni who forwarded up-to-date information and current addresses for both themselves and others. Although many of our past graduates can be located easily thanks to the Internet, there remains a surprisingly large number of alumni who cannot be found.

Even though chemical engineering employment opportunities sometimes require an extremely volatile lifestyle, many of our graduates keep in touch years after the excitement of the diploma ceremony has passed. If you have any information regarding the following alumni, please contact us. We would like to send a newsletter to as many of our graduates as possible.

1931

Robert E. Schexnaider

1933

Russell N. Lay
Lawrence O. Lord

1934

Phillip J. Bertin
Reginald N. Blaize
Samuel R. Fitzgerald
James E. Lindsay
Ellsworth N. Smith

1935

Henry P. Broussard
Mary L. Digirolamo
Charles E. Gill
Hamilton M. Johnson
Richard A. Pratt
M. R. S. Rao
Frank W. Valls
Guy G. Vanderpool

1936

Lealand A. Enberg
Louise T. Kennedy
James Hardie McGee
Francisco Pepito Pilapil
Alvin D. Rolufs

1937

John L. Burt
Delma McCabe Cointment
Angel A. Colon
Richard L. Hodges
Edwin Liebert
Morris L. Perlman
William E. Rowbotham
Robert B. Stewart
M. R. Subra
William O. Switzer

1938

James C. Aucoin
William Y. Gissel
Charles E. Going
Walter H. Johnson
Gangadhar D. Kane
Otis B. Rowland
Herman Siegel

1939

George T. Mercier
Sidney Schulder
David C. Walsh

1940

Henry Blanchet
James W. Bridges
Edward S. Johnson
Y. E. Jose
James V. Senese

1941

Harry C. Cole
Charles A. Overstreet, Jr.
Willis W. Williams

1942

William F. Daniels
Gilbert F. Moore
James S. Patterson
James D. Wall

1943

Robert Emmett O'Connor
George A. Speir, Jr.

1944

Manuel Mestre
Jack W. Racine

1945

Armando Alonso
Juan Castresana
Karl A. Muller
Charles B. Richard

1947

George C. Conrad
Thomas H. Goodgame

1948

William B. Chandler
Guillermo A. Dominguez
Harold L. Keaton
Edward O'Donnell
Charles J. Perilloux
Dwaraknath Reddy
Richard W. Waldsmith
Stephen A. Winborn

1949

Maurice G. Baxter
Richard C. Berry
Thomas F. Burke
Edmund P. Davis
Billy Joe Grady
Thomas M. Logan
John R. Major
Pablo N. Vaillant
Bruce E. White
Ben A. Willard

1950

Harish Chandra Anand
Earl P. Babin
Raul V. Capote
Vincente C. de la Mora
Albert L. Fourmy
Gene A. Freiss
Juan Ignacio Gabilondo
Prasanna C. Goswami
Boyce Nunnally
Clarence E. Phillips
Robert D. Platt
Wilson C. Pullig
Theodore R. Ray
Osvaldo R. Rodriguez
Jose Sales
Claude Joe Stiles
Manuel F. Villapol

1951

Basil W. Andrews
Martinez R. Felix
Ruble L. Huff
Lonnie Z. Mallory
Jimmy E. Middleton
Pramod L. Sarma
Arthur W. Sellers
Elvin A. Stafford

1952

Omar Arape
Fernando H. Bergonzoli
Frank B. Clary
Eugene E. Ellis, Jr.
Raymond Raffray
Andre E. Rouillard
John D. Stokes

1953

Mansour Ghadar
Riyad Abdallah Khalaf

1954

Philip E. Brubaker
Robert W. Duhl
John B. Fontenot
Kenneth O. Halbrook
Gene A. Johnson
Humberto P. Machado
Jose A. Moncada
Freeman L. Morgan
Mario Posada
Kenneth L. White

1955

Zevada M. Avalos
Albert K. DeFrance, Jr.
Wiley B. Fisackerly
George M. Guidroz
Stanley D. Hanesworth
Raymond C. Hatfield
Guy C. McCombs, II
Wilhelmus Melis
Patrick G. Simms
Ezra J. Westbrook, Jr.
George W. Wright

1956

Thomas W. Howard
Kenneth Hoy
Robert Pole

1957

Philip D. Accardo
Yeganeh A. Amir
Jose A. Chapman
Rafael J. Garcia
Norwood W. Matherne
John W. Maurin
Felix F. Planche
Walter J. Porter
Silva J. Sanchez
Regulo A. Sardi

Harold A. Simms, III
Luis A. Wallis
Ignacio Warner

1958

Joseph M. P. H. Adam
Augustine J. Corona
Harry A. Edwards
Robert L. Evans
Bernard J. Goussault
Paul J. Gravel
Franklin M. Ingram
Mohan S. Kothari
Ferdinand L. Larue, Jr.
Euclide H. Leleux
Jean Pierre Mariani
William C. Meek
Bobby M. Miller
Maurice K. Nasser
Joseph M. Pierre
Joseph T. Regard

1959

Charles E. Adams
James K. Crochet
Jai N. Goel
Willard M. Hanks
Thomas C. James
Paul R. James
Harold D. Jelks
Robert H. Jines
Gerald W. Kattong
Habib Labbauv
Freddy W. Landae
John M. Webre

1960

Charles E. Beckler
Ronald G. Corley
Ronald A. DeJean
George P. Distefano
Jose L. Fuertes
Sebert A. Haynes
Charles E. Knight
Robert W. Lacour
William F. Lanigan
Michael J. Maurin
Jose L. Mendez
John L. Morrison
Larry J. Remont
Calvin A. Rousse
Cacques L. Saudy
Raphael T. Smayra
Shwen Ih Wang
John W. Wheeler
Hugh G. Wilson
Don W. Wolsefer

1961

Heraldo A. Agreda
Hector J. Corella
Robert A. Davis
Jimmy McMath Givens
Ernest W. Harrison
James C. Holland
Y. Pino Jorge
Boyd Y. LeBlanc
Humberto E. Lopez
Sanchez Humberto Lopez
Jose G. Lopez-Barreda
Lewis J. Mayard
Jorge A. Pino
Fernando X. W. Pires
Victor Plas
Emilio R. Rivera
Konchady N. Shenoy
Agreda H. Sifontes
William D. Taylor
Vincent S. Verneuil
Glenn L. Wise
Gary H. Young

1962

Jeff W. Baird
Leonard M. Boudreaux
Fred E. Causey
Edward L. Glass
Charles R. Guerin
Jack W. Harris
Clovis P. Legleu
Walter H. Plain
James M. Shipp
Carlos A. M. Troncoso
Henry M. Troth
James V. Valliant

1963

Jose F. Agreda
Maria Z. Aguilar
Gerald E. Butler
James L. Case
Francisco C. Eala
Robert Guerra
Billy W. MaGee
Frank N. Newchurch
Jimmie D. Pottorff
Maria Aguilar Rodriguez
Leo S. Sues

1964

David G. Caddy
Ronald Calvin
Ivan E. Caro
Danilo P. Castillo
Omar J. Esmal
Herbert J. Louque
James M. McCormick
Gary M. Montgomery
John L. Murray
Motiram K. Patil
Pietro K. Piralla
Denarakonda H. Rao
Juan Ramon Santa-Coloma
Robert G. Tripp
Jose Tito Villa

1965

Nolan J. Adams
James H. Brooks
Malcolm L. Dove
Mauricio A. Lopez
Madhigiri S. R. Ramesh
Richard C. Robinson
Nora Antonia Sanchez
Antonio Velidanes

1966

Gerardo T. Brink
Richard F. Buckley
Orlando F. Cardoso
Harold L. Hebert
James E. Horn
David W. Miner
Pedro J. Nogueira
Bueno J. Porres
Sims L. Roy
Mario M. Salinas
Richard J. St. Pierre

1967

Richard G. Beecher
Raul Cardenas
James H. Doub
Joseph L. Edmonson
Howard M. Elder
Gilbert S. Fox
Ronald E. Jones
Wilbert S. Mackay
Hooshang S. Moghani

1968

Michael T. Edgerton
Jerry W. Fisher
Ricardo J. Gomez
Guy J. Harel
Randall J. Indovina
Ronnie D. Jackson
Julio C. Padilla
Kenneth J. Parent
Robert D. Schultz

1969

Antonio D-Aurrecoh
Jose J. Aquirre
Yu-Chin Liu Chen
Alvin A. Fairburn
John R. Langley
Yu-Chin Liu
James R. McClelland
Ivan A. Navarro
Juan C. Salazar

1970

Alvaro Campuzano

1971

Sain D. Anand
Michael J. Atchetee
Jose F. Azouth
Leroy J. Cavaliere
Richard E. Dorris
Carl D. Engel
Segundo Fernandez
Charles G. Guffey
Simon Hacker
Mark A. Jeffers
James V. Jurasinski
Ronald D. Miles
Danny J. Perrer
Glen D. Savoy
William A. Settoon
Vinodchandra R. Shah
Marlin R. Vernon

1972

Juan F. Ardila
Robert J. Camacho
Bernad C. Chan
Frank R. Cusimano
T. Augustin David
Michael Michaud
Robert W. Moore
Jose Rafael Morao
Marshall B. Nelson
Richard W. Nill
Sanford J. Stinnett
Wing Yan Woo

1973

Denzel A. Brown
Justin D. Edwards
Olivier D. Habibe
Hsiao-Nan Huang
Mohammad R. Karbassian
Ronald J. Manuel
Richard L. McGlamery
Madhusudan Nathany
Mehmet O. Ozelsel
Lokesh H. Parikh
Anan Siripong
Roger E. Waguespack
Emilio R. Zarruk

1974

Jamal Al-Din Barzinji
Mohamad B. Behbehani
Galen M. Dino
Frank D. Duringer
Aurelio B. Dutary
Hafez Hafezzadeh
Sohan L. Khungar
Mostafa Mina
Lowery W. Paxton

Oscar I. Pinilla
Najmeh Sadighi-Nouri
Suresh M. Vora

1975

Carlos M. Acevedo
Rabie Ahdoot
John A. Alexander
Mohammad A. Movahed
Ahmad Sharonizade
Paul T. Siegmund

1976

Armand S. Abay
Stephen W. Krajicek
Frederick H. Pitts
McClellan M. Walther

1977

Patrick J. O'Neill
Owaraknath Reddy

1979

Manuel A. Arguello
Ender J. Ferrer
Daniel E. Fields
Steven P. Haynie
Le N. Hue
Jamaleddin Madjdpour
Carl E. Sladek
Tuan A. Tang
Beth Maria Troxler

1980

Mary E. Ahner
Villa D. Holland
Duc M. Pho
F. R. Roberts
Edward A. Thistlethwaite
Labrador Angela Vitelli
Martin K. Wiewiorowski

1981

James A. Devereux
Larry M. Hall
Edgar Hernandez
Joel H. Keiffer
Gwendelyen A. Mayeux
Andrew C. Mok

1982

Patrick B. Broderick
Jean E. Carvajal
Janet E. Cox
Richard D. Jordan
Joseph K. Koro
Narinder B. Lakhani
Roger A. Miller
Jaime A. Pineda
Thomas A. Stroud

1983

Daniel M. Brignac
Lawrence T. Faucheux
Lily Gunawan
Julie Ann Niermann
Randall D. Roddivek
Matthew L. Schuette
Sharron R. Woodall

1984

Neftaly E. Rodriguez
Susan K. Snodgrass
Paul E. Yonts

1985

Mohamad K. S. Habbal
Corey A. Hay
Robert D. Moore

1986

Kigham S. Yeretzian

1988

Yangtzu Chao
James W. Gilliland
David E. Cockrill

1989

Troy E. DeSoto
Michael R. Landry
Jacob Thomas

1990

Dhananjay B. Ghonasgi
Mark E. McDaniels

1991

Sriram Gangadharan

1993

Seungdo Kim

1994

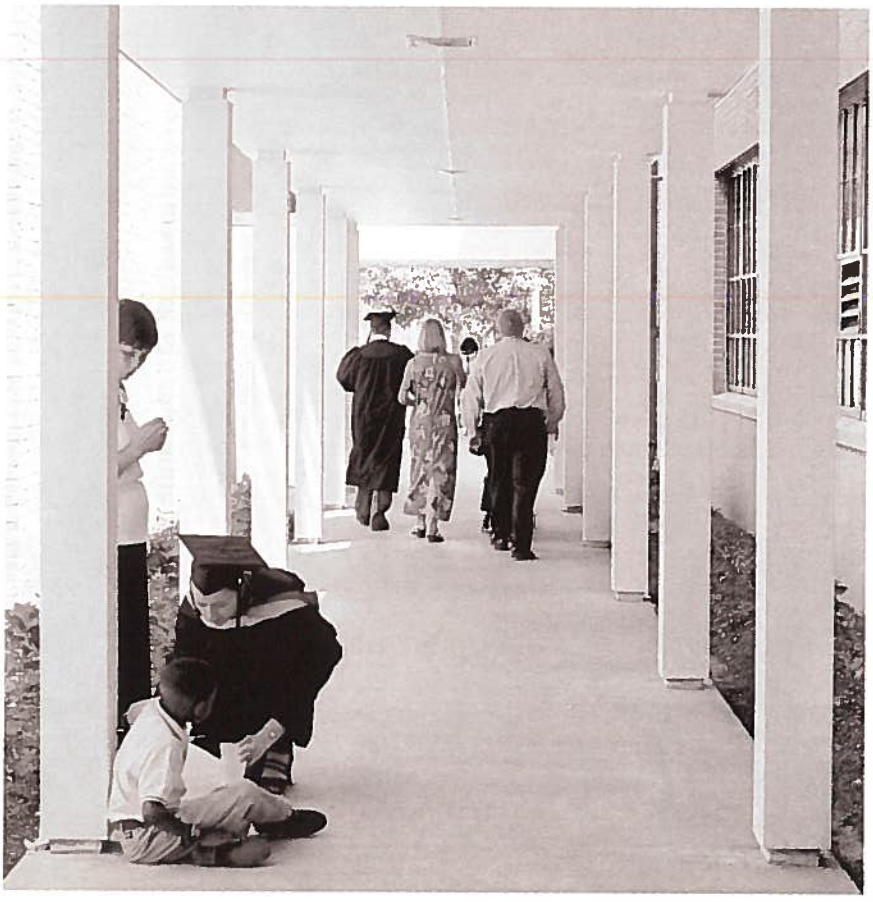
Jianxin Hu

1995

Sherri Bass Harlan
Christian N. Heausler
Xuxian Niu

1997

Wu-Ning Huang



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