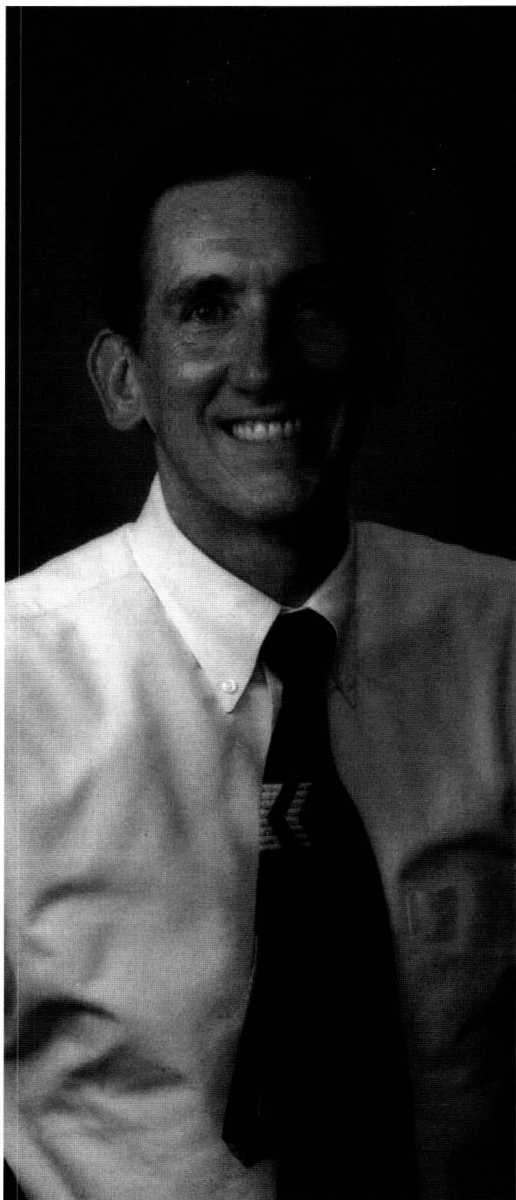


# *R. Russell Rhinehart*

*of Oklahoma State University*



A message written by the federal government at Fort McHenry has more than ordinary meaning for Russ Rhinehart. In the War of 1812, when the British Navy attempted to capture the Fort and to control the Baltimore harbor, Francis Scott Key was aboard a U.S. flag-of-truce ship as a negotiator for the States. As the 25-hour siege ended, he saw that “in the dawn’s early light, our flag was still there,” and, inspired by his countrymen’s bravery, he wrote a poem—the *Star-Spangled Banner*. Consequently, Fort McHenry is a National Historic Shrine. When the government posts a sign that says “Stay off [the] Wall” at such a memorial, Russ feels that people should respect the request. He describes himself as an obedient respecter of authority.

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*We were implementing Internal Model Control on a heat exchanger. Suddenly Russ asked whether we were ready for a disturbance, ran to the restroom, and rapidly flushed several toilets, which created a cooling water flowrate disturbance. Fortunately, the controller worked, because the last thing we wanted to include in the manual was a line which said, “Please do not flush toilets during experiment.”*

*Hoshang Subawalla, PhD, (MS ChE 1993)*

*GE Infrastructure*

*Water and Process Technologies*

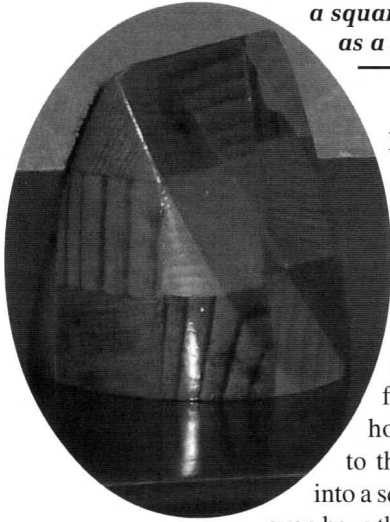
*The Woodlands, TX*

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Russ was raised in Baltimore, Maryland, and whenever he visited his farm cousins in Bucks County, Pennsylvania, or his coastal cousins in Point Pleasant Beach, New Jersey, they labeled him as a “Southerner” because he had a different accent. So although he was raised in an industrial town with Union allegiance and Yankee heritage, he was perceived as a Southerner within the family confines. But language and customs were never barriers to his playing with his Yankee friends, and some of his favorite childhood memories include making forts from bales of hay in the barn loft, saving a breached calf in birth one memorable day, crabbing in the coastal rivers, building castles in the Atlantic sand, and savoring the best submarine sandwiches on earth.

After college, Celanese hired Russ to work in the Carolinas, and without any overt or intentional changes in accent or style, he suddenly became a Yankee! The company promoted him through several engineering levels to supervise engineers, and during his years there he enjoyed teaching gymnastics to children at the YMCA and teaching values to them in Youth Fellowship. The Yankee persona, it seems, did not make him ineffective.

*The 2-D photo of this 3-D object mimics an isometric drawing: from the front-left view, its projection is a triangle; from the top view, its projection is a circle; from the front-right view, its projection is a square. Russ hand-made this peg that fits into square, round, and triangular holes, as a metaphor for human possibility.*



Russ is fond of metaphors; he insists a square peg *can* fit in a round hole, and he proceeded to prove it. Consider a right circular cylinder with height equal to diameter. Along the cylinder axis, the “peg” will fit perfectly into a round hole—and perpendicular to that axis, it fits perfectly into a square hole. Shapes, however, have three orthogonal axes, and

if the projection on the third is a triangle, the unusual appearing “peg” will fit perfectly into a round, a square, and a triangular “whole.” He enjoys woodworking and made a multifunctional peg that sits on the office mantle, with the legend “You can be effective, even if you are not the expected solution.” He teaches this view of flexibility to his students.

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*Dr. Rhinehart has a way of making engineering a philosophical art, and challenges students to look beyond the numbers and equations for a deeper meaning. His special ability to relate engineering to life, metaphorically, gives students a fresh and creative outlook on problem solving, one that better prepares them for industry and research.*

*Cassie S. Mitchell, BS ChE 2004  
Graduate Student  
Georgia Tech*

Russ’s first summer job after high school taught him a valuable life lesson. He was a helper for carpet installers and quickly learned how to sew invisible seams and cut the reverse wall pattern on the back of a folded carpet edge so it unfolds nicely against a wall. Proud of the technical ability he had learned, at summer’s end he asked his boss for a letter of recommendation, expecting to be acknowledged for his expertise and productivity. But instead, he got a very disappointing (to him) three-sentence letter describing him with phrases that included “loyal,” “dependable,” and “good with customers.” His Dad saw his disappointment and explained that quite often, those who are in charge think soft skills are more important than technical skills.

After years of managing people in both industry and academe, Russ now concurs with that viewpoint. Technical skill is important, and he stresses that to his students. But he also tells them that working in a manner that makes the enterprise

successful is of even greater importance. Team effectiveness and understanding the context of the engineering work are really the critical attributes of success.

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*He made it clear to pursue an all-around development, not just focus on school.*

*Mahesh Iyer, Ph.D. ChE 1997  
Shell Global Solutions (US) Inc.*

Russ graduated from Baltimore Polytechnic High School—due, in part, (he says) to the kindness of three teachers. When he showed no initiative to progress to the next step, however, his Dad took matters in hand and gave him an alternative: if he paid room and board, he could continue to live at home, or he could go to college and the family would continue to support him. He chose college. State legislation required the University of Maryland to accept all in-State high school graduates, so that was his next destination. When asked to choose a major, however, he was at a loss to pick a subject area, and since he liked math and science, they eventually categorized him as “A&S Undecided.” Shortly after that, however, he learned that engineering majors did not have to take a foreign language, so he switched to chemical engineering (because it paid the highest). He made the Dean’s list in the first semester, and now claims that he graduated in the upper 99% of his class.

Russ ponders an analogy with nature when meeting new students—he hopes to see larva become butterflies as the year progresses. Unfortunately, he also sees the opposite, where the most promising of matriculates do not survive in a college environment. So his annual welcome letter to new chemical engineering matriculates warns them that the college environment and cognitive expectations level the playing field, and that the “best” from high school should come ready to play harder than they ever expected, because the dark horses have a strong chance of overtaking them.

Just as Russ learned that academic credentials from high school do not predict college performance, he later learned that academic credentials from college do not predict industry performance. The academic and industrial environments are so different that fitness in one has little relevance to fitness in the other. This observation is the root of Russ’s teaching philosophy that past academic credentials should never be used to judge the future—what appears as a root in one environment may provide wonderful fruit in another season. Life, passion, and a willingness to grow should be the traits we look for in others.

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*Dr. Rhinehart is graceful and humble, and in spite of*

*being the school Head, he was always available to me. He listens hard, provides support and encouragement, and respects and encourages intellectual independence.*

*Jing Ou, PhD ChE 2001  
Senior Control Engineer  
PlugPower*

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*He has been the greatest coach that I have met.*

*Vikas Shukla, MS ChE 1996  
Senior Control Engineer  
B. D. Payne Co.*

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Early in his junior year at college, Russ was actively progressing in gymnastic skills, but was beginning to be afraid of physical injury. The fear made him hold back on the skill. If the “trick” is performed with proper timing, body position, and use of momentum, it is both safe and awesome to watch...and to feel. But when protecting yourself from injury, the flip isn’t as high in the air above the bars...it’s kept lower, which means there is less time and space to reach for the bars properly, which, conversely, increases the chance of hurting yourself. Russ found that the fear was causing him to cut back on the level of difficulty in his routines. By the end of his junior year, however, he wanted to regain a sense of pride and excitement in his routines, so made the conscious decision to concentrate on technique and to ignore fear. The lesson learned: gymnastics is like life, as is every sport. Understanding and working with the laws of nature, and focusing on the details of performance, not failure, can be a successful approach to life. He likes the logo “No Fear,” and teaches it, along with the other fundamentals.

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*He has a talent for using analogies and stories in lectures. One memorable example included showing us a picture of himself doing a handstand on a stack of chairs to illustrate risk management.*

*Jennie Weber-Fine, BS ChE, 2003*

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*As Editor-in-Chief of ISA Transactions, Russ quickly redefined the aim and scope, recruited a talented pool of associate editors, established a strong editorial advisory board, and set forth to recruit the best experts in the world as article contributors. His success in building the strength of the journal is reflected by an almost 100% growth in subscriptions over his tenure. Russ fulfills his obligations unflaggingly and with verve.*

*T. S. “Chip” Lee, Director  
ISA*

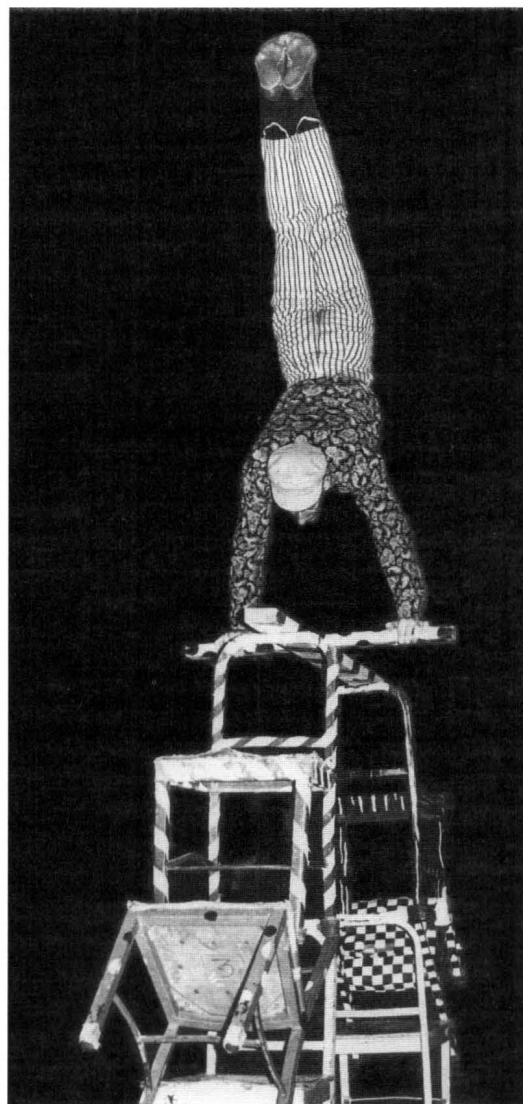
*The Instrumentation, Systems, and Automation  
Society*

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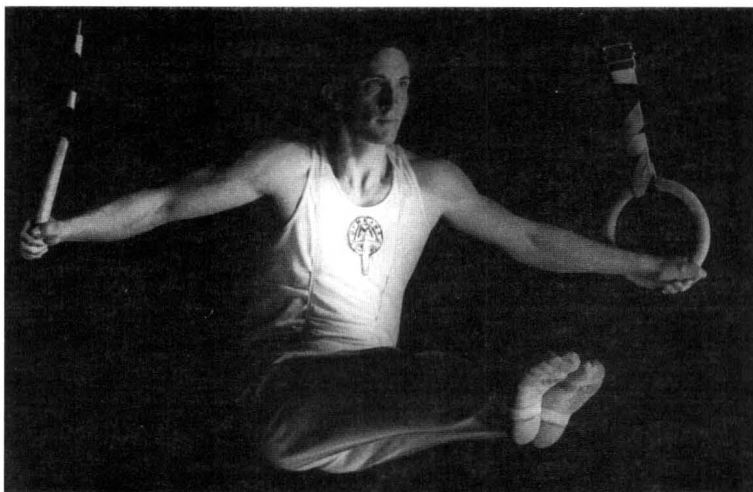
Removing fear requires partially eliminating the power relationship that separates a professor from his students. When students feel safe in personally extending their ideas, if imperfection does not automatically mean failure, they can be free to do amazing “tricks.”

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*I say, Good morning Dr. Rhinehart.” He responds,  
“Good morning Ms. Krueger.” He always wanted to*



**Russ participated on an exhibition gymnastics troupe at the U. of MD, 1963-1969, and was president in 1967. Gymkana shows traveled throughout the region to support High School fundraising.**



1946	January, 19, born, Neptune, NJ
1963	Graduated, Baltimore Polytechnic Institute, Baltimore, MD
1968	BS ChE, University of Maryland, College Park, MD
1969	MS Nuclear Engr, University of Maryland, College Park, MD
1969-73	Process Development Engineer, Celanese Fibers Co., Rock Hill, SC
1973-80	Senior Product Development Engineer, Celanese Fibers Co., Charlotte, NC
1980-82	Area Supervisor, Technical Department, Celanese Fibers Co., Rock Hill, SC
1985	PhD ChE, North Carolina State University, Raleigh, NC
1985-89	Assistant Professor, Texas Tech University, Lubbock, TX
1988	President's Award for Teaching Excellence, Texas Tech University
1989-94	Associate Professor, Texas Tech University, Lubbock, TX
1991-94	Director, ISA Automatic Control Systems Division
1992-....	Member, Editorial Advisory Board, <u>Control</u> magazine
1994-97	Professor, Texas Tech University, Lubbock, TX
1995	ISA Automatic Control Systems Division, Man-of-the-Year
1996-97	Graduate Administrator, Texas Tech University, Lubbock, TX
1997-....	Bartlett Chair & School Head, Oklahoma State University, Stillwater, OK
1998-....	Editor-in-Chief, <u>ISA Transactions</u>
1999	Established the MS Control Systems Engineering program at OSU
2001	Inducted as Fellow to ISA – the Instrument, Systems, and Automation society
2002	General Chair, American Control Conference
2004	Listed in InTECH's 50 most influential industry innovators in the past 50 years
2004-....	Treasurer, American Automatic Control Council

*the teacher-student level, and encouraged us to call him Russ or coach.*

*Katie Krueger, BS ChE  
December, 2004*

Russ feels strongly that lifelong learning is fundamentally important for achieving success in life. His first industrial assignment was on a fully-automated pilot plant, but since he had not had any process control courses, he had to learn feedback control and statistical process control through industrial practice, short courses, and product bulletins. Modeling and decision making are important tools for process management, but he had not had a course in statistics or optimization, so he learned them as he went along. Effectively working on teams and managing others is critical in a competitive environment (whether in business or coaching at the “Y”), so he read self-help books on coaching winning teams and took training courses on personal understanding and interpersonal effectiveness. He had to learn the sciences of adhesion, adsorption, and polymers, and the technologies of pneumatic conveying, drying, and milling. He says that while nearly everything that he learned in school was useful, perhaps 90% of what he actually needed had to be learned out of school.

With that thought in mind, Russ strives to prepare students to direct their own education and to be able to self-validate what they think they learned. He teaches a computer programming class where 20% of the credit for each exercise requires the students to demonstrate validation of their program. Russ says that if the professor always structures the course, prescribes assignments and tests, and grades the student, then school is not imparting the critical ability that will enable students to manage their own learning. Engineers should not be trained to submit work and hope that it is right.

*He always tries to create a comfortable learning environment for his students. Whenever he explains something to a student he makes them feel as if they already knew what they came to ask about, and the students come out feeling confident about themselves.*

*Samir Alam, MS ChE, 2004*

Russ supervised a group of engineers in the technical support department of a manufacturing plant that hired eight fresh graduates to fill engineering positions. While these new hires had the intelligence and fundamental base to learn the specific science and technology for the job, they retained some student-oriented perspectives that prevented them from being true business participants. So he decided to hold Friday afternoon “industrialization” sessions to help accelerate their path toward team productivity. Session topics included “Doing, bringing to fruition, is valued—not the learning,” “People effectiveness is more important than technical or economic proficiency,” “Sufficiency is a greater value than excellence,” and “Work in a parallel, not sequential manner.”

Russ says that if a school’s intention is to take the high school students and prepare them to be engineers, then the school needs to teach the aspects that will help them realize their objective, but then adds that the word “teach” is the wrong word—teaching is a professor’s activity. A school should provide experiences from which students comprehend and integrate those viewpoints as their own. Engineering is a “way,” an approach to working, not simply a collection of technical skills or a memorized set of adages. The “way” must be internalized, not memorized.

*In his graduate-level Fluid Dynamics class, he included a personal story from his first job. They had a “sticky fiber” problem. Russ was keen to impress everybody with his technical abilities, went off to his office, developed models and analysis, and came back with a solution a week or two later. Meanwhile, the operator solved the problem by turning the temperature up a notch to dry out the solvent from the polymer fiber. This story, this one nugget that he gave me, has been vital to my success as an engineer and*

*a technology leader.*

*Soundar Ramchandran, PhD ChE, 1994  
Group Leader, Solutia.*

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Russ feels that industrial experience need not be a required qualification of a professor. He sees no difference in the teaching, research, or service effectiveness of professors who have had, or have not had, industrial experience, and strongly feels that success is not predicated on employment history. Acknowledging that the environment and values of industry are substantially different from those in academe, he says the difference is not about technical substance and is not related to the use of profitability indices in making decisions. It is a difference in the work environment that makes the “way” of success in one career inappropriate to fitness in the other. Unless professors understand the difference and include an industrial perspective in their curriculum, a school’s program cannot fully prepare graduates for fitness of use.

Roughly 5000 BS chemical engineering students graduate every year in the US, and eventually about 100 of them end up in academe. Russ feels that it is most important that the undergraduate experience should focus on preparing the 98% for successful futures.

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*Every year, Dr. Rhinehart invites professionals from industry to evaluate our curriculum. Changes are made accordingly to ensure that we learn the viable tools to be successful in industry and life.*

*Myszka (Karina) Paprocki, BE ChE 2003  
Graduate Student U of IL*

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Russ enjoyed his years in industry, but it was not a perfect fit. He had always been fascinated by the “why” of things and spent hours at home secretly deriving equations as a way to understand processes. At home in the late ‘70s, playing with his TRS80 color computer (a 32k RAM, no hard drive, computer connected to the TV), he realized that the games he was programming in BASIC for his children were more advanced than the control algorithms that were being used in industry. That revelation made him decide to explore the possibility of better methods of automating process management.

Since in his spare time he had also always enjoyed coaching gymnasts, leading youth ministry, and developing engineers from fresh graduates, he felt that the job of being a professor might be a good place to pursue both human resource development and discovery in process management automation. He returned to school to get his PhD, choosing North Carolina State University for that endeavor.

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*When Russ came to N.C. State for his doctorate he joined a large research group working on a coal gasification pilot plant. We quickly recognized and admired his maturity, wisdom, common sense, and invariable warmth and cheerfulness, and he may still have been in his first year*

*when we asked him to take the position of plant supervisor, a position he held until he finished his graduate program. His skill as a leader in the deepest sense of the word was transparently clear. Russ also had a strong interest in teaching then. At his request we put him in charge of a recitation section of the material and energy balance course, and almost immediately he became recognized as one of the strongest teachers in the department. I was pleased but not surprised at his post-graduation successes on the faculty at Texas Tech and as department head at Oklahoma State. Even when I was his doctoral advisor at N.C. State I viewed him as more of a colleague and a friend than an advisee, and he remains one of my very favorite people in our profession.*

*Richard M. Felder, Emeritus  
North Carolina State University*

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“Take your passion, and make it happen” is a line from a popular song of the ‘70s that has special meaning for Russ. He enjoyed working in industry, but has always been glad that he had the nerve to make his passion a reality and to start a second career, although it was a difficult decision. Several co-workers have expressed envy at his flexibility and determination in breaking out of the situational entrapment of a comfortable life.

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*Dr. Rhinehart’s animated teaching style incorporates humorous anecdotes that integrate the course material.*

*Jerimiah Cox, BS ChE 2000  
Staff Product Support Engineer  
National Instruments*

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*His approach has the students grasp the fundamental concepts and the more delicate intricacies. In addition, his enthusiasm engenders students to the material.*

*Jacob Dearmon, BS ChE, 2000  
PhD Candidate, Economics  
University of Oklahoma*

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Russ has retained the industrial values of practicality, which means that he is not exactly the round peg one expects to find in academe. While accepting that theoretical analysis and proofs are important to reveal understanding and limits of a technique, and while he values the insight and direction they provide, he feels their idealized nature makes them insufficient for establishing credibility of a technique in the real world. Credibility requires experimental demonstration, and experimental work reveals the problems that need solutions. So his research program (both synthesis and analysis) has always been, and continues to be, driven by its experimental component and “the possible.”

Russ enjoyed growing up in the mid-Atlantic of the ‘50s and ‘60s, and in the next two decades he equally enjoyed the contrasting culture, climate, style, and food that the South presented to the “Yankee” among them. He also learned from the contrast and discovered that there are many ways to



**Russ and Donna and the latest of their “ultimate” homes.**



achieve an end. For instance, engineers and business leaders of the South were just as creative, productive, and focused on winning as their counterparts in the North, but in a humanly gracious style. He was pleasantly surprised to have unknown perceptions identified and challenged, and to discover that gentleness could be an essential part of the “American way.” Accordingly, upon completion of his PhD, he considered that another region might provide additional personal joy and insight, and moved to Lubbock and Texas Tech University. He subsequently enjoyed the many levels of experiences he had there—Tex-Mex food, rodeos, the incredible sun, and Texas-Friendly.

While he was in Lubbock, Russ married Donna, a Texan with three sons (so once again, he was the one with the accent). Planning on staying there forever, they built their ultimate dream house. Russ designed it and Donna decorated it, and while this is *not* a recommended exercise for spouses, it worked for them. Later, the family moved to Stillwater and placed all their equity into an even grander ultimate house, which they once again designed and decorated. When a new family came to town and told their builder about the sort of house they wanted to build, the contractor responded, “I already built that house, and the owners just might sell it to you.” The bottom line is that Russ and Donna have now built four houses in their fifteen years of married life. They have lived in the present home for over a year now, and friends are asking, “When’s the next one?”

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*I’m sure that other people will also mention Russ’ annual Christmas letter, his creativity always surprises and delights me.*

*Lisa Bullard, PhD  
Lecturer and Director of NCSU  
Undergraduate Studies*

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When Oklahoma State University was seeking a new School of Chemical Engineering Head, Russ was looking for an opportunity to contribute on a broader level. The former Heads,

Bob Maddox, Billy Crynes, and Rob Robinson, had created a very strong program legacy, and he felt honored to be chosen to oversee its continued development.

Russ says it is easy to brag about the program at Oklahoma State. Some of the accomplishments he is especially proud of are

- *For three of the past ten years, a team of OSU chemical engineering seniors won First Place overall in the AIChE National Process Design Contest.*
- *For six years in a row the OSU AIChE Student Chapter has been honored with an “Outstanding” rating (top 10%) by the AIChE.*
- *Last year an OSU senior who placed first in the regional paper competition, placed second overall in the nation.*
- *This year the OSU juniors won the regional ChemE-Car contest, and will compete nationally, as did three OSU teams in the past four years.*
- *For the past ten years OSU chemical engineering students have sustained a first-time pass rate of 97% on the FE Exam.*
- *Last year two undergraduates were recipients of Goldwater scholarships, and last year one of the seniors was selected by USA Today to their All-USA Academic First Team.*

Russ believes that being a professor allows one to make a substantial contribution to the quality of life through developing human resources, through developing the knowledge and tools that can be used throughout a lifetime, and through developing the infrastructure to support those efforts. He thoroughly enjoys helping chemical engineering make that kind of a contribution in society. □