

# THE BENT

OF TAU BETA PI

The Engineering Honor Society

SPRING 2012



3D Printing Comes of Age  
Making Ethical Decisions  
Contributors to Tau Beta Pi

# TOYOTA

moving forward

Toyota Technical Center



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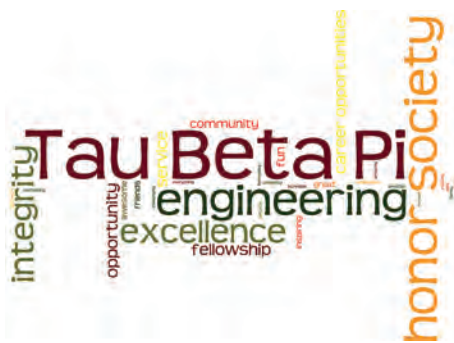
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Toyota is an Equal Opportunity Employer and supports a diverse and inclusive workplace.



In April 2012, the wait will be over! Tau Beta Pi is updating the insignia items offered through our General Store to provide members with modern apparel options. To date, we have received nine submissions for the **2012 T-shirt Design Contest**. Let your voice be heard and vote by *March 31* for your favorite design by visiting [www.tbp.org](http://www.tbp.org). The winning design will be used on hoodies, t-shirts, and other new merchandise.

# the **Bent** of

Spring 2012  
Vol. CIII / No. 2

*f*ounded at Lehigh University, South Bethlehem, Pennsylvania, June 15, 1885, by Edward H. Williams Jr., A.B., A.C., E.M., Sc.D., LL.D. (1849-1933). Key and name registered in U.S. Patent Office. Member, American Society for Engineering Education and (co-founder) Association of College Honor Societies. Affiliate, American Association for the Advancement of Science.

## Features

**Searching For That Killer App! ..... 12**  
by Alan S. Brown

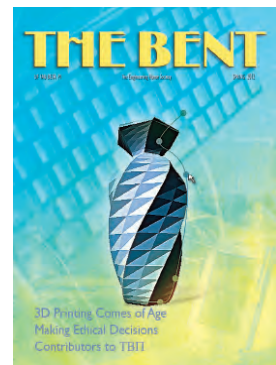
**Making Ethical Decisions ..... 17**  
by Dr. Elizabeth A. Stephan, David Bowman, Dr. William Park, Dr. Benjamin Sill, and Dr. Matthew Ohland

### ON THE COVER:

*Alan Brown reports on how a new generation of people and machines are revolutionizing 3D printing.*

*In a separate feature, we look at ethics and ways to make them part of the decision-making process.*

*Cover artist: Dali Polivka*



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Editor: Curtis D. Gomulinski, MI E '01      Editorial Assistants: David S. Roberts  
Editorial Board: Dr. Lyle D. Feisel, P.E., IA A '61; Samuel C. Florman, P.E., NY A '44; and Dr. John W. Prados, P.E., TN A '54

THE BENT of Tau Beta Pi® (ISSN 0005-884X) is published quarterly for \$10 per year by The Tau Beta Pi Association, Inc., Room 508, Dougherty Hall, The University of Tennessee, Knoxville, Tennessee 37996-2215; www.tbp.org; FAX 865/546-4579; email: tbp@tbp.org. Life subscriptions are \$60. Printed in U.S.A. Periodicals postage paid at Knoxville, TN, and at additional mailing offices. SUBSCRIBERS and POSTMASTER: Send address change, request for online subs., & other correspondence to tbp@tbp.org or to: THE BENT of Tau Beta Pi / P.O. Box 2697 / Knoxville, TN 37901-2697. Telephone: 865/546-4578  
Vol. 103 No. 2      Circulation: 88,000      Initiated Members: 531,700

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*The Tau Beta Pi Association was founded at Lehigh University in 1885 by Edward Higginson Williams Jr. to mark in a fitting manner those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character as students in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in engineering colleges.*  
—Preamble to the Constitution

COUNCIL'S CORNER

## Vision and Strategy—Moving Forward

**b**its and pieces of TBPI's Vision Development process have been highlighted in recent editions of *THE BENT*. A group of experienced national leaders and visionaries met three times in New York in 2011 and will meet two more times in 2012. The goals are to formulate a *blue sky* vision for TBPI, develop basic strategy and initiatives, and implement the organizational structure to execute the vision. Much progress has been made and many challenges await.

I would like to share my thoughts about what has really stood out to me as the Vision Development process moves forward. First and foremost, it has been eye-opening to see current and former CEOs of major corporations and leaders of prestigious universities in action. It is clear that they are Tau Bates who have mastered leadership and visionary skills to a very high level. TBPI is fortunate to have attracted their assistance. I expect that many of their successes are attributable to the solid foundation of their engineering education. They understand problem solving, leadership, and the many opportunities that come with a successful engineering education.

It was interesting to hear from each member of the Vision Development Group regarding their ideas for improving TBPI. The messages were presented in many forms; however, each of the concepts had many common features. I will only mention a few of the thoughts that stuck out in my mind. Ralph Rockow: involve members of all ages and at all stages of their careers. Gil Amelio: promote the engineer's responsibility to society with integrity. Ray Rothrock: society at every level depends on good engineering. Harry Lange: promote engineering as an attractive career. Rodger Smith: set up TBPI as a cool objective for freshmen and sophomores in engineering to achieve. Pat Harker: promote liberal education. Henry Schacht: serve as a role model for other organizations by choosing one thing and doing it really well. These snippets only capture a small sense of very thoughtful discussions.

Jay Light, our facilitator, suggested that we concentrate on TBPI's ability to influence engineering, like a career trajectory, with three focus areas:

- How do we interest talented students to study engineering?
- How do we influence what happens to engineering students while they are in school?
- How can we help them after graduation?

Several candidate models were identified and two of the models seemed to resonate well. The *Army of 8000*

model is a powerful concept whereby the 8,000 or so new TBPI graduates each year would serve as exciting role models for secondary school students. The *Army* would increase in size each year and could be organized to leverage corporate outreach programs, for example.

*Facebook* and *LinkedIn* are electronic models that allow current members and recent graduates to use new technologies and web-based tools to remain connected. It could build more "connective tissue" among the *Army of 8000*.



The Vision Development Group reached out to the delegates at the 2011 Convention to determine what could compel students to want to join the *Army of 8000*. Student focus groups discussed topics ranging from membership benefits to thoughts about engaging members after graduation. Each of the 32 groups contained 10 students and lively discussions were the norm. Much data were collected and have been compiled for the group's meeting on April 5.

Taking a periodic look at the way an organization operates can be very healthy and oftentimes, very revealing. It provides an opportunity to revisit processes and procedures that may have become outdated.

The student group discussions pointed out a couple of areas that need immediate attention. Plans are underway to improve communications between Headquarters Office and the 238 chapters. The need for an enhanced website was also quite clear and we are preparing for a major upgrade! Student comments clearly suggest that a richer undergraduate experience will lead to a strong interest in becoming and staying engaged after graduation. We need to establish more ways for alumni to participate.

Comments from the student groups have inspired discussions among national officials which may result in a new format for the 2012 Convention. It is encouraging to feel the energy that is being generated by these meetings which were not even part of our thinking prior to the close of the 2010 Convention.

Yes, the vision and strategic development process is moving TBPI forward. The momentum is building. It is an historic time for the Association.

—Larry A. Simonson, Ph.D., P.E.  
South Dakota Alpha '69, President

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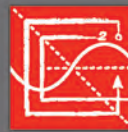
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## TAU BETA PI PLANNED GIVING

Tau Beta Pi's updated 26-page guide to planned-giving opportunities shows how your support can benefit both TBPi and your financial situation.

Topics include:

- Gifts of cash, stock, real estate, and life insurance,
- Charitable remainder trusts, and
- Charitable lead trusts.

To request a copy, email:  
[GivingBooklet@tbp.org](mailto:GivingBooklet@tbp.org)  
or write:

Tau Beta Pi  
P.O. Box 2697  
Knoxville, TN 37901-2697



## MENTOR NOMINEES DUE APRIL 1

### TBPI MCDONALD MENTOR AWARD

Marion and Capers W. (North Carolina Gamma '74) McDonald and TBPI established an award to celebrate excellence in mentoring and advising among TBPI educators and engineers. The honor recognizes those who have consistently supported the personal and professional development of their students and colleagues through mentorship.

As engineering educators or as professionals in industry, government, or service organizations, these TBPI mentors contribute to our engineering community in many ways, serving as effective advocates and guides in both professional and administrative matters. They show true concern for individuals, support an environment for developing talents, and have earned respect and recognition for their contributions to their field and to the greater community.

Recipients of the TBPI-McDonald Mentor Award are presented a special medallion and a \$2,000 cash award (\$1,000 to honoree and \$1,000 to chapter). Any chapter or member may nominate any alumnus member(s). The following material in digital format must arrive at Headquarters by April 1:

- 1) A one-page summary of achievements and/or contributions exemplifying the objective of the award.
- 2) Two letters of reference from persons other than the nominating party or sponsoring chapter president who are familiar with the nominee's contributions and achievements, such as a dean or supervising personnel.



EDITORIAL

# We Want You!

I had the distinct pleasure of installing the California Alpha Epsilon Chapter at the University of San Diego on February 25. We have included information about USD in this issue, and details about the installation will be published in the Summer issue of THE BENT. Following the installation, I spoke to several recent graduates who are interested in continuing their involvement in Tau Beta Pi.

We have published several articles recently about the Vision Development Group and the focus groups conducted at the Indianapolis Convention. One of the key items that came out of the focus groups and reiterated in my conversations with alumni is the need for opportunities to stay involved in Tau Beta Pi. While we are always looking for volunteers to serve as District Directors, Engineering Futures Facilitators, Chapter Advisors, and MindSET leaders, there are not enough opportunities for everyone. The obvious opportunity for involvement is through an alumnus chapter; regrettably, only 18 are currently active.

Fortunately, we have alumnus chapters chartered in 60 different locations across the country and the process to reactivate or start a new chapter has never been easier! The necessary documents and steps involved to get a chapter off the ground are available on our web site ([www.tbp.org/alumni](http://www.tbp.org/alumni)). The staff at Headquarters is available to answer questions, provide helpful hints, and put you in touch with members who have successfully started and maintained an alumnus chapter.

We are gathering the names and contact information of alumni interested in getting together to meet and network or possibly forming an alumnus chapter. We set up a Google doc ([www.tbp.org/alumni/involve.cfm](http://www.tbp.org/alumni/involve.cfm)) to collect this information and will share it among the members in different cities and regions around the United States. If there is enough interest, we will include our international alumni in this process! If you prefer, you can provide your information to Headquarters by email ([tbp@tbp.org](mailto:tbp@tbp.org)) or phone (800/828-2382).

This initiative is not a replacement for the communities already established on Facebook, LinkedIn, or TBP Connect/InCircle. These social networking sites are a great way for our alumni to connect with members in their local area or around the world. In fact, we have seen a number of great conversations among alumni interested in getting together to meet and network. At the same time, we know that not all of our alumni use these social resources. While social networking is great for organizing activities, connecting people, and sharing information, there is still a great deal of value in having groups that conduct activities outside the confines of the virtual world.



There is clearly a need for an outlet for alumni to engage with each other "in the real world." Current students have overwhelmingly indicated their desire to stay involved after graduation, and alumni, in the midst of their careers as well as retirees, are looking for a way to reconnect with fellow members. I encourage

every member of Tau Beta Pi to complete the alumnus involvement form. If you are in an area where an active alumnus chapter already exists, we will forward your information to them. If you are in an area without an alumnus chapter, we will put you in contact with other alumni in your area. The level of involvement will be up to the members. It can be as simple as getting together for drinks or as formal as establishing an alumnus chapter. Either way, we hope you will consider getting more involved in *your* honor society. We need *your* support to succeed!

Until Later,

## CHANGE OF ADDRESS THE BENT

Name \_\_\_\_\_ Chapter \_\_\_\_\_ Class \_\_\_\_\_

New Address \_\_\_\_\_ Effective date of new address: \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ Email \_\_\_\_\_

Email this information to: [addresschange@tbp.org](mailto:addresschange@tbp.org)

Or complete and mail this form to: Tau Beta Pi / P.O. Box 2697 / Knoxville, TN 37901-2697



## LOG ON!

[www.tbp.org/pages](http://www.tbp.org/pages)

About TBPI Publications Chapters  
For Members General Store Giving to TBPI

### Member Benefits

Find benefits and useful discounts  
[ForMembers/Benefits/Benefits.cfm](http://ForMembers/Benefits/Benefits.cfm)

### Career Opportunities for Tau Bates

Job board, networking, and more  
[ForMembers/Careers/Index.cfm](http://ForMembers/Careers/Index.cfm)

### Member Lookup

Determine if someone is a member  
[ForMembers/MemberLookup.cfm](http://ForMembers/MemberLookup.cfm)

### Collegiate Chapters

Links to chapters and officers  
[Chapters/CollegiateChapters.cfm](http://Chapters/CollegiateChapters.cfm)

### K-12 MindSET Program

News, resources, links, and more  
[About/Programs/K12/index.cfm](http://About/Programs/K12/index.cfm)

### Volunteer Opportunities

[ForMembers/Volunteer/Potential.cfm](http://ForMembers/Volunteer/Potential.cfm)

### Subscribe to THE BENT

[Publications/Bent/Subscriptions.cfm](http://Publications/Bent/Subscriptions.cfm)

### Email address change

[ContactUs/AddressChange.cfm](http://ContactUs/AddressChange.cfm)

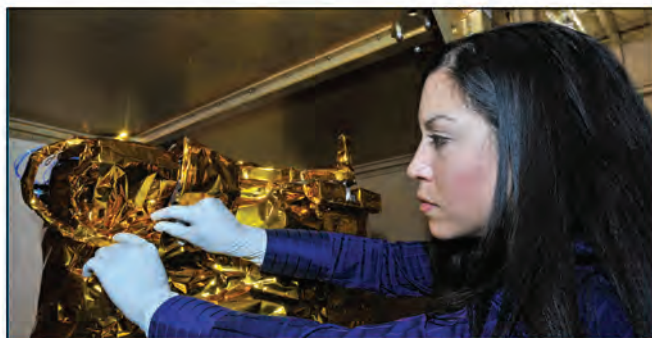
TBP's website is continuously improved to help you find your classmates, current events, awards, announcements, & member benefits. Staying connected to Tau Beta Pi is easier than ever.

[www.tbp.org](http://www.tbp.org)

## 2012 DISTRICT CONFERENCES

THE DISTRICT PROGRAM provides a vital link between the Association and individual chapters. Each year the Directors meet with students at regional conferences to provide both retiring and new officers opportunities to improve chapter operations and to socialize. **Interested alumni are encouraged to attend**, but should email [tbp@tbp.org](mailto:tbp@tbp.org) for details. All chapters are urged to elect new officers before their District conference.

DISTRICT	LOCATION	DATE
1	Medford, MA	Mar. 31
2	New York City, NY	Feb. 11-12
3	Philadelphia, PA	Feb. 10-11
4	Annapolis, MD	Mar. 31
5	Greenville, SC	Mar. 3
6	Lexington, KY	Mar. 24
7	Cleveland, OH	Mar. 31
8	Milwaukee, WI	Apr. 21
9	Rolla, MO	Mar. 3
10	Austin, TX	Mar. 24
11	Minneapolis, MN	Mar. 31
12	Fort Collins, CO	Feb. 24-25
13	Phoenix, AZ	Mar. 3
14	Seattle, WA	Mar. 3
15	Stockton, CA	Mar. 17
16	Claremont, CA	Apr. 14



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Since 1951, when MIT Lincoln Laboratory was established to build the nation's first air defense system, the Laboratory has been applying advanced technology to solve problems critical to national security. Decade after decade, our people have envisioned incredible technology – and projects that start out as vital to national security often become just as vital to the everyday technology of the future. More than 700 patents have been granted for technologies developed by the Laboratory's staff. And in the past two years, Lincoln Laboratory has been awarded nine R&D 100 Awards that recognize the year's 100 most technologically significant innovations.

If you'd like to contribute to US national security in an environment of incredible innovation – one where you'll develop systems from the initial concept, through research and analysis, to design and prototyping, and finally to real-world application – then begin your career at MIT Lincoln Laboratory.

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- Computer Science and SW Engineering
- Cyber Security
- Digital Signal Processing
- Electrical Engineering
- Machine Learning and Computer Vision
- Modeling and Systems Architecture
- Physics

All positions are located in Lexington, MA.

For information on our current opportunities, please visit [www.ll.mit.edu/employment](http://www.ll.mit.edu/employment)

For information about our schedule of on-campus information sessions and interview dates, please visit [www.ll.mit.edu/college](http://www.ll.mit.edu/college)

As an Equal Opportunity Employer, we are committed to realizing our vision of diversity and inclusion in every aspect of our enterprise. Due to the unique nature of our work, we require U.S. citizenship.





## WHO'S WHO

**Dr. George H. Heilmeier**, *Pennsylvania Delta '58*, pictured at top, has



received the Charles Stark Draper Prize from the National Academy of Engineering. Along with T. Peter Brody and Wolfgang Helfrich, he was honored for development of the LCD screen. The \$500,000 annual award recognizes engineers whose accomplishments have benefited society. The NAE also presented the 2012 Bernard M. Gordon Prize to **Dr. Clive L. Dym**, *MA Z '62*, second down; **Dr. M. Mack Gilkeson**, *LA B '42*, third down; and **Dr. J. Richard Phillips**, *CA A '56*, bottom, "for creating and disseminating innovations in undergraduate engineering design education to develop engineering leaders." They created a curriculum at Harvey Mudd College credited with profound influence on other institutions.



**Clara C.-W. Shih**, *California Gamma '05*, has been elected to the Starbucks board of directors. She is chief executive officer of Hearsay Social, provider of one of the leading enterprise social media platforms. Shih is a pioneer in the technology industry. In 2007, she developed the first business application on Facebook called



*Faceconnector*, and subsequently authored *The New York Times* best-seller, *The Facebook Era: Tapping Social Networks to Market, Sell, and Innovate*.

**Thomas A. Schwartz, P.E.**, *Massachusetts Delta '73*, is vice chairman of the testing and materials society ASTM International board of directors. He is senior principal, president and head of the building technology group at Simpson Gumpertz & Heger Inc. Schwartz served on the ASTM board of directors from 2006 to 2008 and in 2010.



**Richard T. Whitcomb**, *Massachusetts Alpha '43*, an aeronautics engineer whose contributions at NASA's Langley Research Center made supersonic flight practical, will join pioneers in the National Aviation Hall of Fame in Dayton, OH. Whitcomb who died in 2009 at age 88, pioneered soda-bottle shaped fuselages and winglets on the tips of wings that reduced drag, while raising speed without extra power.



**Dr. Lisa Su**, *Massachusetts Beta '91*, has joined chipmaker AMD as senior vice president and general manager, global business units. She was most recently senior vice president and general manager, networking and multimedia at Freescale Semiconductor Inc. Dr. Su will oversee AMD's business units focused



on the client, commercial, graphics, professional graphics, and game console markets.

**Dr. Gordon W. Day**, *Illinois Alpha '66*, is the 2012 and 50th president



of the Institute of Electrical and Electronics Engineers. He spent most of his career in research and management at the National Institute of Standards and Technology. His personal research ranged from optical measurements to development of standards for optical fiber and new concepts in instrumentation. He is a past president of the IEEE Photonics Society and of IEEE-USA.

**Dr. Christopher T. Jones**, *Georgia Alpha '86*, has received a Black Engineer of the Year award for career achievement in Industry. He is senior vice president and general manager at the integrated logistics and modernization division of Northrop Grumman Corporation. While working on his doctorate, Dr. Jones received a BEYA award in student leadership.



**Dr. Casimer M. DeCusatis**, *Pennsylvania Beta '86*, has received Sigma Xi's Walston Chubb Award. He is an IBM Distinguished Engineer based in Poughkeepsie, NY, where he currently serves as a network and I/O architect for solutions, including extended distance connectivity.



# National Academy of Engineering

*The National Academy of Engineering has elected 66 new members and 10 foreign associates, announced NAE President Dr. Charles M. Vest, WV A '63, in mid-February. Election to the academy is among the highest professional distinctions accorded an engineer. Membership honors those who have made outstanding contributions to "engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature" and to the "pioneering of new and developing fields of technology." New Tau Beta Pi/NAE members are listed below.*

**Dr. Michael I. Baskes, CA B '65**, adjunct professor, department of mechanical and aerospace engineering, Jacobs School of Engineering, University of California, San Diego, La Jolla. For contributions to the embedded atom method for predicting the structure and properties of metals and alloys.

**Dr. Craig H. Benson, P.E., PA A '85**, Wisconsin Distinguished Professor, director of sustainability research and education, and chair of civil and environmental engineering and of geological engineering, University of Wisconsin, Madison. For improvements in design, construction, and monitoring of earthen liners and covers for municipal hazardous and radioactive waste landfills.

**Dr. Mary C. Boyce, VA B '81**, Ford Professor of engineering and department head of mechanical engineering, Massachusetts Institute of Technology, Cambridge. For contributions to understanding the mechanics of deformation in engineered and natural polymeric solids.

**Dr. Joan F. Brennecke, TX A '84**, Keating-Crawford Professor of chemical and biomolecular engineering and director of the energy center, University of Notre Dame, Notre Dame, IN. For innovation in the use of ionic liquids and supercritical fluids for environmentally benign chemical processing.

**Dr. Max William Carbon, IN A '43**, professor emeritus of nuclear engineering, University of Wisconsin, Madison. For establishing engineering educational programs for nuclear reactor design and safety.

**Dr. Jared L. Cohon, MD A '69**, president and professor of civil and environmental engineering, Carnegie Mellon University, Pittsburgh. For contributions to environmental systems analysis and national policy and leadership in higher education.

**Robert L. Crippen, TX A '60**, former astronaut and director of the NASA Kennedy Space Center; and retired president and chief executive officer, Thiokol Propulsion Group, Palm Beach Gardens, FL. For leadership in human space flight and development of solid fueled rockets.

**William P. Delaney, NY G '57**, director's office fellow, MIT Lincoln Laboratory, Lexington, MA. For contributions to radar systems for national defense.

**Dr. Steven P. DenBaars, AZ A '84**, Mitsubishi Chemical Professor in solid state lighting and displays, materials department, University of California, Santa Barbara. For contributions to gallium nitride-based materials and devices for solid state lighting and displays.

**Dr. Dennis E. Discher, CA A '86**, Robert D. Bent Professor of chemical and biomolecular engineering, University of Pennsylvania, Philadelphia. For elucidation of the effects of mechanical forces on cell physiology and stem cell development.

**William W. George, GA A '64**, professor of management practice, Harvard Business School, Cambridge, MA. For applying engineering principles to manufacturing to advance health care.

**Dr. James W. Jones, TX B '67**, distinguished professor, department of ag-

ricultural and biological engineering, University of Florida, Gainesville. For contributions to understanding climate change, environmental impacts, and sustainable agricultural systems.

**Dr. Richard K. Miller, CA A '71**, president and professor of mechanical engineering, Franklin W. Olin College of Engineering, Needham, MA. For establishing a new paradigm for undergraduate engineering education and establishment of Olin College.

**Dr. K. Dane Wittrup, NM B '84**, C.P. Dubbs Professor of chemical and biological engineering, and associate director, Koch Institute for Integrative Cancer Research, Massachusetts Institute of Technology, Cambridge. For developments in protein engineering, protein expression, and quantitative pharmacology.

**Dr. Steven J. Zinkle, WI A '80**, UT-Battelle corporate fellow and director, materials science and technology division, Oak Ridge National Laboratory, Oak Ridge, TN. For advancing understanding of radiation damage in metallic and ceramic components.

## Foreign Associate

**Dr. Chao-Han Liu, RI A '64**, distinguished visiting scholar, Academia Sinica, Taipei, Taiwan. For contributions to ionospheric research and international leadership in atmospheric remote sensing.



## LETTERS

### The Limits of Logic

•Your Lyle's Laws – The Limits of Logic [Winter 2012] brought back a vivid memory that “proved” to me the validity of your new Law. I thought you may enjoy this added confirmation as it occurred early in my career similar to your experience.

I was privileged to work my entire 45-year career with the same company in six uniquely different technical and management disciplines. During the course of those years I worked with some brilliant and creative engineers and patiently effective managers. It is one of my earliest memories that reinforced the concluding summary to your article: “...exercise your logic but...listen to your gut.”

I had spent the better part of a week designing, checking, and rechecking a complex radial beam platform for use inside a field erected nuclear reactor. The purpose of the platform was to support customized internal machining, welding, and stress-relieving equipment during the entire construction phase of the reactor. The loads were varied and numerous and were to be applied from both the top and the bottom of the platform in a variety of combinations. The design also had to accommodate the field crews working on top of and below the platform.

As a new young engineer, I was decidedly proud of my design as I reviewed the summary sheet of perhaps 20-30 pages of calculations. The summary included the applied load cases, design codes, and the structural member sizes I had selected.

I took the calculation package to my boss with a sense of personal satisfaction that I had applied the best engineering thinking and logic to the most complex problem I had seen in my fledgling career. He was a very respected engineer who had 35 years of experience in the design of complex and custom equipment. He was always invited to participate in complex designs required by the global divisions of the company.

Now in those days smoking in the office was acceptable. My boss loved his pipe and when he was thinking hard the blue smoke haze from his favorite pipe would permeate his office and the hallway. As I took my design to his office to indicate I was finished, he just looked me in the eye and asked if I was confident of my work. Of course I was!

He lit up his pipe, tamped down the ash with a blackened forefinger, filled the office with a blue haze, and looked at my summary sheet for perhaps, at the most 3-5 minutes. He never picked up a pencil (or slide rule in those days) or turned over the front page. He gently tossed the package to the corner of his desk and simply said “...your beams are too small.”

I was dumbfounded and, in a corporately respectable, way protested that he had not even looked at my calculations and that I was sure they were adequate. With a puff of smoke he popped my balloon and sent me back to my desk with the words “...it just shows how wrong you can be.”

It took me several hours of checking but he was very right. The lesson learned was that his 35 years of experience had earned him a level of judgment (“gut”) that, at that point, overshadowed my best logic. It was a seminal experience for a young engineer as I gained a new understanding, respect, and a desire to earn this important and critical element of engineering that had never been referenced in my formal education.

I enjoyed your article.

*William “Ross” Carn, UT A '64*

•Lyle has it right! After you've done the logic, you have to listen to your gut [Winter 2012]. I learned that many years ago, although I didn't realize it until some time later.

When I was looking for a job just before graduating, I had a number of offers. I ranked them by things like salary and location and found the one with the best numbers. This part was relatively easy. Then I thought about

it for a while and decided to accept the “best” offer. It wasn't until some time later that I realized that I had let my gut make the final decision.

After doing the easy part (the numbers or whatever), think about it for a few days (or less if it's not really all that important) and see whether you're comfortable with the result. If you are, accept it. If you're not, it means that you left something out of the analysis. It could be something really important or it could be something unimportant that seems important at the time. For instance, you might have considered the geographic location but forgotten that you want to live near (or far from) your relatives. Or you might want to live near them but just had a fight with one of them, so you chose the job that's far away. Or you might want to live away from them but Mom just made that apple pie you love so much.

After figuring out what was missing from the original analysis, you have to decide just how important it really is. Then, and only then, can you come close to making a “good” decision. But, whatever decision you make, you have to remember that things change. What seems like a good decision now could turn out to be the wrong thing, no matter how you make the decision. As Niels Bohr said, “Prediction is very difficult, especially about the future.”

*E. Ted Grinthal, NY E '92*

•In the Winter 2012 issue of THE BENT, Lyle asks and answers, “What is this thing called intuition, and how does it work? I don't know.”

Here is an explanation I got from an Objectivist philosophy lecturer. It makes sense to me, and I hope it does to Lyle also.

“Intuition is pattern recognition by the subconscious, resulting in a thought or insight, often accompanied by an emotion. In the context of the situation you are in or the problem you are trying to solve, the subconscious takes into account all



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*John H. Davis, Ohio Γ '60*

### Utmost Pride

•Enclosed is a donation to the Tau Beta Pi Association.

It is a pleasure to be able to provide a small amount in aiding the ongoing efforts of Tau Beta Pi in the education of our young engineering students. I still wear my Bent with the utmost pride.

*John F. Piccolo, UT A '58*

### Asbestos Issue

•I thank William O. Felsman Jr., OH A '50 for his letter [Winter 2012] shedding light on the question of asbestos at the World Trade Center which had surfaced in an earlier letter. It was a very interesting quote by Herbert Levine, patent-holder of the spray-on

asbestos slurry process that Mr. Felsman revealed that caught my eye.

Apparently Mr. Levine had said, “If a fire breaks out above the 64th floor, that building [either of the towers] will fall down.” How prophetic! Indeed, did Mr. Levine elaborate? Perhaps he could explain all of the anomalies regarding the quality of the “collapse” of the twin towers with respect to either the official “impact by hijacked airliners” cause and/or the elaborate reinforcement of said story by NIST’s fire scenario.

*John V. Mizzi, P.E., NY A '63*

•Messrs. Cedro/Felsman [Winter 2012] make the same point: The triumph of ideology over reason.

Mr. Cedro asks the Green-driven how long it will take for the energy-conserving “improvements” to recover their capital costs? Mr. Felsman points out that the Green-driven withholding of asbestos insulation from the top one-third of the twin towers possibly hastened their collapse. (Conjecture yes, but within the bounds of reason.)

I remember back in the turbulent 60s/70s a wise man said to me, “The

purpose of the revolutionary is to get on with the revolution.” That ethic drives the single-minded of every generation.

*Jack W. Osgood, P.E., MI A '49*

### Dimension Issue

•On page 16 of the Winter 2012 issue of THE BENT, there is a dimensional error. Ms. Bell writes that 3 megawatts used by the supercomputer is roughly equivalent to the typical power use of 2,000 to 3,000 homes.

It would have been fine if the sentence ended there (I’m conservative and draw between 0.3 and 0.46 kilowatts, but pegging the average home at 1KW I think is reasonable). The problem is that the sentence continues, “for a year.” A watt is a rate of energy usage, but by tacking on a time period to the comparator, it was turned into a quantity of power (measured in watt-hours, not watts). That makes this comparison an apples to oranges one.

Other than this minor gaffe, it was an excellent article and I always enjoy reading THE BENT from cover to cover.

*Russell T. Nevins, MA B '77*

## EXECUTIVE COUNCIL MEETINGS

### The Executive Council met via teleconference on November 30 and December 19, 2011.

The Council reviewed a proposal to provide funding to establish chapters at the 1890 land grant colleges and universities. The Council directed Executive Director C.D. Gomulinski to work with L.W. Faidley, Ph.D., IA A '67, to determine the level of interest in starting collegiate chapters at these schools.

The Council accepted the recommendation from the 2011 MindSET Committee to develop a step-by-step guide to starting MindSET activities and approved a proposal for MindSET to be submitted for the ASEE's ninth annual workshop on K-12 engineering education.

The Council reviewed the preliminary petition for a new collegiate chapter from the local engineering honor society at St. Louis University, and Councillor J.F.K. Earle, Ph.D., P.E., was named to represent the Council on an inspection visit on February 3, 2012.

The Council reviewed a proposal from the executor of the Charles O. Forge, CZ F '56, estate. The Council authorized Mr. Gomulinski to work with the executor to negotiate the sale of Tau Beta Pi's interests in the Forge Family Limited Partnership.

The Council accepted the first-quarter financial report and requested that additional information be included with the second-quarter financial report.

Mr. Gomulinski reviewed proposed changes at Headquarters including payroll disbursement and the email system.

A schedule of District Conferences was reviewed, and assignments were made for national-official representation at all 16 Districts. The Council reviewed plans for other national meetings, and dates and locations were approved.

In compliance with a recommendation from the 2011 Convention, the invitation of the Washington Delta Chapter to host the 2014 Convention in Spokane was accepted pending identification of a suitable means of transportation between the hotel and Convention Center.

### The Executive Council met in Orlando, FL, on January 14, 2012.

Vice President Solange C. Dao, P.E., reviewed the charter of the Advisor Recruitment and Development Committee. L.W. Faidley, Ph.D., IA A '67, and P.D. Homen, CA Y '85, were appointed to the committee with terms ending January 1, 2014, and May 20, 2014, respectively.

A bequest payment of \$10,000 was received from the estate of Charles M. Webster, OH B '50, and the Council allocated it to the Engineering Futures Fund.

The Council reviewed proposals from two firms to serve as auditors for 2012-2014, and directed Mr. Gomulinski to determine if a single year extension with the previous

auditor would be possible.

Mr. Gomulinski reported on the status of the 2011 Alumnus Giving Program. For the program year ending January 31, revenue is down 11 percent and the number of gifts is down by 7 percent compared to the same period the previous year.

The Council approved the Engineering Futures Strategic Plan and recommended conducting a pilot program for middle school students. The Council reviewed a proposal to conduct a marathon Engineering Futures session hosted by the Texas Delta Qatar Chapter.

Councillor Earle provided an update on the MindSET program, and grants were approved for New York Gamma, Florida Epsilon, and Pennsylvania Beta.

The Council reviewed the Distinguished Alumnus Program and appointed President Simonson to work with the committee to enlarge the pool of candidates for the award. Dr. E.P. Gorzkowski III, PA A '99, L.C. Gascoigne, NY N '97, and E.S. Styles, AL A '85, were appointed to the Laureate Selection Committee.

The Council approved a proposal for office equipment

## TBPI Directory

### Executive Council

**President Larry A. Simonson**, Ph.D., P.E., SD A '69, SDSM&T Foundation, 306 E. St. Joseph St., Suite 200, Rapid City, SD 57701.  
(larry@tbp.org)

**Vice President Solange C. Dao**, P.E., FL A '95, 1110 E. Marks St., Orlando, FL 32803.  
(solange@tbp.org)

**Councillor Jonathan F.K. Earle**, Ph.D., P.E., FL A '65, 8516 SW 20th Lane, Gainesville, FL 32607.  
(jonathan@tbp.org)

**Councillor Jason A. Huggins**, P.E., FL A '96, 4701 Hickory Shores Blvd., Gulf Breeze, FL 32563.  
(jason@tbp.org)

**Councillor Norman Pih**, TN A '82, # 10, 811 W. Cherry Ave., Flagstaff, AZ 86001.  
(norman@tbp.org)

### International Headquarters

**Executive Director Curtis D. Gomulinski**, MI E '01, P.O. Box 2697, Knoxville, TN 37901-2697.  
(curt@tbp.org)

**Asst. Sec.-Treas. Roger E. Hawks**, NY A '75, P.O. Box 2697, Knoxville, TN 37901-2697.  
(roger@tbp.org)

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at Headquarters. Mr. Gomulinski also presented a plan for electronic delivery of chapter mailings.

The 2011 Convention held in October in Indianapolis, Indiana, was reviewed and judged to have been successful, and the Council reviewed recommendations presented during the meeting. Councillor Norman P. Pih reported on information gathered by the focus groups, and the Council requested Director of Development Pat McDaniel prepare a summary for the Vision Development Group. The Council accepted the recommendations of the Constitution and Bylaws Committee regarding the Code of Conduct. Recommendations regarding an Alumnus Chapter Committee and changes for electronic voting were received and accepted.

The Council received and approved disbursement of funds as budgeted for activities of the California Gamma Chapter.

### The Executive Council met via teleconference on February 16, 2012.

A contribution of \$14,000 was received from GEICO, and the Council allocated it to the Engineering Futures Fund.

Mr. Gomulinski reviewed and answered questions regarding the second-quarter financial report, and the Council accepted the report as submitted.

S.L. King-Monroe, *MI E '08*, was appointed as an Engineering Futures Facilitator to a term ending June 30, 2014.

Councillor J.A. Huggins reviewed the meeting of the District Program Planning Committee held on January 28, in Atlanta, Georgia. The Council received recommendations regarding an eligibility exercise for advisors at the 2012 Convention and changes to the Convention schedule.

The Council approved the inspection report of the visit to the petitioning group at St. Louis University; the petition for a new collegiate chapter will be presented to the 2012 Convention.

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### CALL FOR WRITERS

The Editor of THE BENT is frequently searching for well-written, general-interest, feature articles for the magazine. Many of you have the appropriate experience and are qualified for and capable of preparing such a feature. If you have a topic that you believe would be suitable, email

us. Members working on interesting research or design projects are encouraged to submit an article. Manuscripts should be 1,000-3,000 words, double-spaced, and submitted as a text or MS Word document. Publishing decisions cannot be guaranteed. Proposals can be sent to [tbp@tbp.org](mailto:tbp@tbp.org).

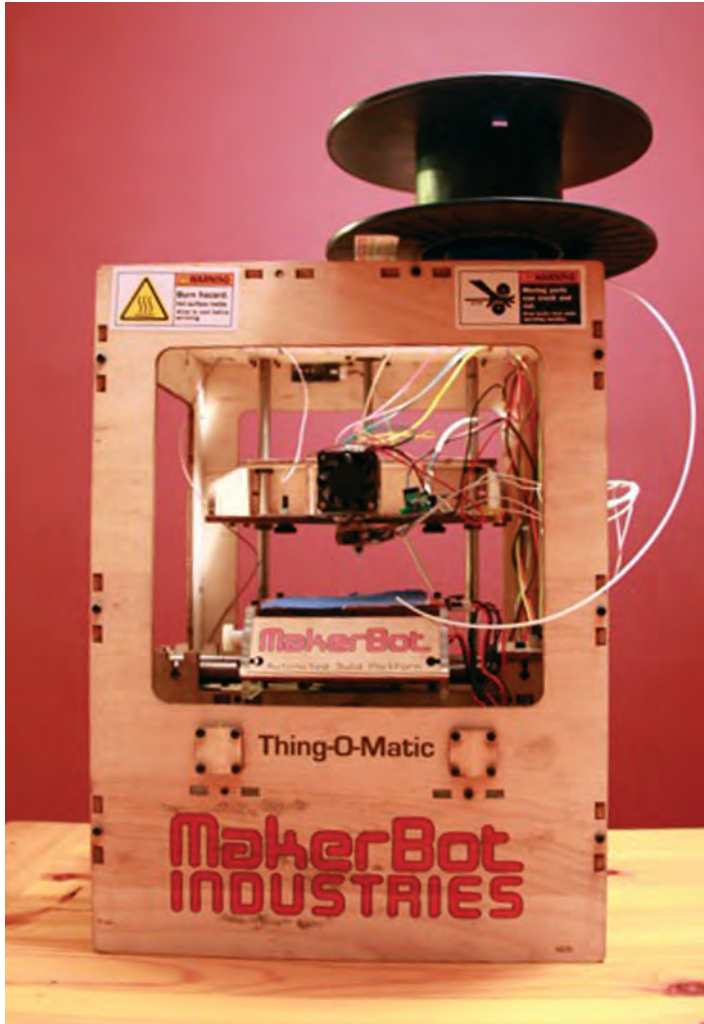
# Searching For That Killer App!

*A New Type of 3D Printing: A 25-year-old technology has caught the fancy of a new generation of designers and engineers. From iPhone cases to customized sake sets, will anything ever be the same again?*

by Alan S. Brown

**C**ALL IT THE Pocket Factory Tour. This past January, Bilal Ghalib and Alex Hornstein, two 26-year-old computer science graduates of University of Michigan and MIT, respectively, set out from San Francisco with four inexpensive 3D printers in the back of their Prius.

They had met years ago over the Internet. Ghalib was building a \$50 laser cutter, Hornstein a computer-controlled Etch-a-Sketch. Ghalib went on to work on autonomous vehicles and set up Egypt's first hacker space, where people with common technology interests shared resources and ideas.



"Rancho", one of the MakerBot Thing-O-Matics that Ghalib and Hornstein have taken on their road trip.

Hornstein spent time at Idealab, a technology incubator that launched dozens of companies, then moved to Hong Kong to start the city's first private hacker space. After it went belly up, he and Ghalib decided to take their 3D printers on the road. They called the project Pocket Factory. They wanted to discover whether they could make a living by designing, producing, and selling products made on their hand-assembled 3D printers.

"We set up in art galleries, parks, and flea markets and we make custom belt buckles, iPhone cases, and 3D portraits. People could talk to us about the uses they see for the technology, and we see what they are willing to pay for," Hornstein said from Salt Lake City.

The tour was a hit in San Francisco, where technophiles embraced customized plastic iPhone cases. But a flea market in Victoria, B.C., was a total bust. "They weren't interested in our story or our products," Hornstein related. "We had some really nice, polite Canadians come up and tell us, 'What you're doing is really stupid.'"

Welcome to the world of makers and ubiquitous 3D printers. A growing cadre of enthusiasts believes that one day, practically everyone with a computer will create artwork, kitchen utensils, spare parts, chocolate desserts, and, yes, iPhone cases and belt buckles, from a small machine on their desk. Some dream of printing robots, others changing the design process as we know it.

## Industrial Strength

If this vision sounds far-fetched, then consider how mainframe computer jocks felt when they read the first ads for the Altair 8800 PC kit in *Popular Electronics* in 1975. The movement attracted hobbyists and visionaries, like Steve Jobs and Bill Gates. Yet PCs did not really take off until the first spreadsheet program, VisiCalc, was introduced in 1979. It made PCs essential in businesses and, later, homes.

Industrial strength 3D printers have grown increasingly capable over the past 25 years, but they are expensive. Think of them as mainframe computers.

Ghalib and Hornstein built the MakerBot Thing-O-Matics in the back of their Prius from kits that cost about \$1,000. They are equivalent of those 1974 Altairs. As they travel cross country, Ghalib and Hornstein are searching for that killer app, the design or business model that will turn their road trip into a thriving business.

They are not alone. Over the past two years, more than a dozen new companies have jumped into the market. Fab shops have opened to make 3D prod-



A design screen and the “printed article” sake set from Shapeways.

ucts. Developers have created software that lets anyone customize products. And as the gap between industrial and hobbyist 3D printers shrinks, visionaries are rethinking what might be possible.

3D printing is a child of the digital age. It starts with a 3D CAD drawing, and slices it into thin layers that it prints one at a time. Industrial printers do this by fusing powders or crosslinking resins. The process resembles how a child might build a tall castle one row of Lego bricks at a time.

Over the past decade, they have grown larger, faster, more accurate, and less expensive. They work with a broader range of plastics, ceramics, and metals, including aluminum, titanium, and Inconel.

Once limited to prototypes only, today’s printers churn out complex, limited volume, and customized parts. Some, like molds with conformal cooling channels, are nearly impossible to build any other way.

Ghalib and Hornstein do not live in that world. Their three Thing-O-Matics (they cannibalize one to keep the others running) and an Up! are not as sophisticated. They replicated CAD designs by extruding layers of molten plastic three to five times thicker than their industrial counterparts.

On the other hand, these printers are cheap. MakerBot Industries prices Thing-O-Matic kits at \$1,099. Delta Micro Factor sells the Up! for \$2,600, but it comes assembled. They are an order of magnitude less than the least expensive industrial printer.

Equally important, hobbyist printers are closing the performance gap quickly. “When we started, our printers were 60 percent as good as the commercial models at 1 percent of the price,” said MakerBot CEO Bre Pettis. He claims his new model, the Replicator, is as fast as commercial 3D printers and has similar resolution. “When we were start-

ing out, our layers were 0.5 millimeters thick. Now they’re 0.2 millimeters.”

The Replicator is a distinct break from the past. To start with, it ships assembled. Pettis could build the Thing-O-Matic in six hours, but it took newbies 20 to 40 hours to assemble it. “Now, when they get the machine, it is a better consumer experience. We’ve opened the market from people who read *Make* to people who read *Wired*, people who are interested in technology rather than do-it-yourselfers,” Pettis said.

Replicator also has a bigger build space. “Instead of something you can hold in the palm of your hand, we can make things that take two hands to hold,” he continued. “You can print a life-sized skull from CAT scan data, and make other models that you can use in the real world.”

### Opened The Door

Finally, the new machine has two nozzles and can print parts in two colors at the same time. This sounds almost trivial, but once the developers figured out how to do this (by interleaving instructions to each printer head), they opened the door to printing parts in any number of colors and perhaps in several different materials.

Pettis recognizes the need for a killer app. He even has a candidate: *Thingiverse.com*, a website where the MakerBot community shares designs. “We weren’t sure what people would use our printers for, so we built Thingiverse to see if a killer app would emerge,” he said.

In many ways, the killer app is everything. People download files for things as practical as coat hooks and smartphone holders. Other times, something seems to catch Thingiverse’s collective fancy.

“A designer named Zaggo downloaded a design for a whistle, and within half an hour, hundreds of people around the world were making it. That was the first thing on the site



that went crazy. The next day, it was shower curtain rings or some-

thing else," Pettis recalled.

Others have built on the community concept. Shapeways is an example. Artists and designers set up online shops and upload their CAD files. When a customer purchases a product, Shapeways builds it to order on its 3D printers. The company, which started in the Netherlands, operates a manufacturing facility in Eindhoven and plans to open one in New York City in 2012.

Shapeways uses higher end 3D printers. It shows. The products on its website are slick. Some appear handmade. Others are mind-bogglingly complex.

Dutch kinetic artist Theo Jansen's Strandbeests are an example of the latter. Since 1990, he has built stunning combinations of gears, PVC pipe, and articulating joints that capture the wind to walk. For Shapeways, he has shrunk his giant designs to bread loaf size. Strandbeests come out of the 3D printer fully formed, with dozens of moving parts, ready to start their journey without any assembly.

### More Typical

Kevin Wei is perhaps a more typical Shapeways designer. An adjunct assistant professor at Columbia University's graduate school of architecture, he makes jewelry on the side. His recent work uses a repeating style of ornamentation called cosmatesque. In its heyday, around 1100 AD, it decorated luxury goods ranging from illuminated manuscripts to church interiors.

The arms of his bracelets have faceted sides so light flashes and flickers off them. "You can get that effect by hand, but you need extremely skilled people to do it," Wei explained. That would make the bracelets unaffordable.

Nor would they be as precise. "There is beauty in repetition," Wei said. "When you try to do this with human hands, you can't help but see the imperfections."

Wei does not print his jewelry directly. Instead, he prints

a castable resin model, a positive of the bracelet. Shapeways arranges for someone to dip the model in plaster, then melt it away. That leaves behind a mold cavity with precise, detailed interior structures, he said.

Other companies have followed Shapeways' success. Freedom of Creation, another Dutch company, features an enticing array of lighting, chairs, trays, jewelry, coat hangers, and smartphone cases.

Shapeways CEO Peter Weijmarshausen calls these fab shops "the democratization of production." He has the numbers to prove it: Shapeways' member community of 100,000 sold more than 750,000 products in 2011 alone, he claimed.

Weijmarshausen argues that people want custom products. They rebuild their cars, add onto their homes, and paste decals on the laptops. 3D printing gives them just that, with at least some of the economies of scale of mass production.

Shapeways is pulling out all stops to make its products more customizable for people who have never heard of CAD. An example is the Shapeways sake set creator.

It begins with an image of a deep cup with a pronounced lip. Two sliders on the side determine surface smoothness and the twist of the cup's planes. On the side of the cup are a series of connected dots that describe its curve. By moving the dots, users can make the cup and lip longer or shorter, thinner or thicker, and more or less curved.

The possible combinations are infinite. One looks like a sake tumbler, another a cup, a third a shallow bowl, and the fourth a flower vase. "We'll print it in ceramics and send it to you in 10 days," Weijmarshausen said.

In London, Digital Forming is on the same track. Its technology lets customers modify a product's shape, surface design, color, and material.

"Most of what we call customization today on the web is really variant production, variations of the same product. What if we allow people to really customize, and take

this customization one level further and engage people in the design process to shape and manipulate?" Lisa Harouni, Digital Forming's CEO, asked the audience at the Wired UK conference last November.

### Printed Articles

A detailed bracelet from Kevin Wei, top left, contrasts with Cornell's screen-to-silver, bronze and plastic creations in this graphic.



She wants her audience to find out. While her company operates its own design website, she really wants to sell its technology to major lifestyle brands and professional product designers. Her goal is to help them produce custom products in mass at affordable cost.

Digital Forming's sleek design showcase is a world away from Ghalib and Hornstein's often quirky creations. In addition to customized iPhone cases and belt buckles, they have developed gourd-shaped lampshades, a plastic gramophone that clips onto an iPhone's speaker, and a servo-powered Silly String shooter. Yet beneath their playfulness is a very serious idea: 3D printing lets designers and inventors prototype and test ideas almost instantly.

The Silly String shooter is an example. "Driving into Salt Lake City, we saw a Dollar Store and pulled over to get some stuff we could turn into products that would be cool," Hornstein related. He picked up two cans of Silly String.

"We thought it would be cool to make an automatic Silly String shooter with a distance sensor for when somebody gets close," he said. Using some off-the-shelf electronics, he had a working product within 24 hours.

"In product design, that's insane. I've been working in product design for three or four years, and if we got things out in three months, that was crazy," Hornstein said.

Weijmarshausen sees the same compressed time frame. The first iPad cover, he noted, appeared on Shapeways only four days after Apple launched the product.

"Products will evolve much quicker than past," he explained. "If you are mass producing them, you need to make 1,000 and sell them before you go to version two. The iPhone case went through 12 iterations in just one year."

### Slashes Risk

He also claims that 3D printing slashes risk. Individuals and companies may have squandered their time, but they are not left with thousands of unsold products and useless molds. "If no one buys it, it's a pity, but you didn't lose any money on it," he said.

Yet these attempts at customization just tap the surface of 3D printing's capabilities. The technology enables designers to create objects that would be impossible to manufacture using traditional methods.

A startling example is a stainless steel, load-bearing engine block segment created by Within Technologies. The London-based engineering firm was founded by Siavash Mahdavi, who is also a partner in Digital Forming.

The block contains two pipes that merge and exit from the side, as well as members to support the load, all sandwiched between two flat plates. If it had been machined, it might have two holes drilled from the top that meet a larger hole drilled in the side, surrounded by straight up-and-down supports.

Instead, the block looks like an alien life form. The pipes merge gracefully into one another, reducing the resistance to flow caused by right angles. The supports appear to grow out of the plates, and look more like a magnified form of life than anything designed by traditional engineering methods.

That is the point. Mahdavi did not design the part on a CAD system. Instead, he set weight, load, and flow goals.



### MakerBot Takes off

MakerBot has come a long way since it was founded in January 2009 by Bre Pettis (above with printers awaiting shipment), Zach Smith, and Adam Mayer. That was shortly after Pettis, a former middle and elementary school teacher, discovered the RepRap project while creating videos for *Make*, a do-it-yourself technology magazine.

RepRap, short for "replicating rapid prototyper," was the first open source DIY 3D printer. It looked like a large, wired up Tinkertoy cube with a thermal extruder mounted on a Cartesian platform. It was the brainchild of Adrian Bowyer, a senior lecturer in mechanical engineering at the University of Bath in the United Kingdom. His vision was a printer that could build its own parts and evolve as users modified the design.

"We started this business because we wanted one for ourselves," Pettis said. "When we were done, it was so clear that we should be making these machines."

None of the partners were engineers, although Smith was a founding member of the RepRap Research Foundation (and Bowyer was one of the company's first investors.) In true Maker fashion, they plunged right in. "We used to joke that if we were engineers, we would have taken five or six years to design it. Instead, it took lots of caffeine and two-and-a-half months," Pettis chuckled.

They called it the Cupcake because its build space was the size of the pastry. It cost \$750 and differed from the RepRap models in two key ways. First, RepRap had evolved into an ecosystem worth of designs. "If we downloaded a design today and you downloaded one tomorrow, we may not have been able to share parts or software," Pettis said. He wanted a machine with more commonality, so users could share improvements across the entire user community.

Secondly, they wanted to simplify building a machine. At the time, people who wanted to build a RepRap printer needed to order parts from many different vendors (as well as certain parts that could be built only by other RepRap machines). "It could take six months to get the parts. We wanted a kit, a box with everything already in it," Pettis said.

Makerbot uploaded all the source files on its Website, Thingiverse, so anyone could download them and make a Cupcake. Yet the kit was an instant hit. Eighteen months later, it introduced the Thing-O-Matic, a larger, faster machine that incorporated many of the modifications users had created for the Cupcake.

By January 2012, when MakerBot released its latest model, Replicator, it had already shipped 7,500 3D printers.



Lemon squeezers, above, with a bird bones iPhone case, right, created by Digital Forming.

Then he used software to evolve the structure. The software started with a set of rough guesstimates, then picked the one that most closely met Mahdavi's goals. It randomly varied that structure, assessed each of its progeny, and reiterated the process with the best candidate. After several generations, the design emerged.

Evolution works because 3D printing has decoupled production from its traditional constraints, such as the ability of a shop to actually machine a design.

### Powerful New Technology

Mahdavi is not the only one looking at this powerful new technology. Hod Lipson's lab at Cornell University has developed software to design soft-bodied robots. The robots contain three types of cells, graduate student Jason Yosinski explained. One type contracts, one type expands, and a third provides support. "By moving them through random mutations over thousands of generations, we can generate our best guess of how to make a robot that walks," he said.

Lipson's lab has not yet printed a walking soft robot. On the other hand, it has launched its own open source 3D printer project, Fab@Home, printed out scallop and celery hors d'oeuvres in the shape of the Space Shuttle, and printed a robot fish that wiggles its tail.

Lipson's lab has also launched a website, *endlessforms.com*, that lets users evolve forms by voting. By September 2011, the site had attracted 25,000 visitors, who had evolved two million organisms, a total of 130,000 generations.

Those are big numbers, and they have attracted the attention of investors and large corporations alike. Foundry Partners, a venture capital firm, has invested \$10 million in MakerBot. Shapeways spun out of Royal Philips Electron-

ics' lifestyle incubator and recently received \$5 million from Union Square Ventures.

Autodesk, a major CAD software supplier, is releasing 123D, simplified online CAD software that enables users to design 3D printing and laser cutting projects. 3D Systems has teamed with Freedom of Creation to create a low-cost 3D printer.

Perhaps more tellingly, Pirate Bay, a website best known for helping people download copyrighted movies, songs, and games for free, announced that it would host 3D printing files. It has even coined its own word, "physibles," to describe them.

Where will it lead? The answer is emerging more quickly than anyone expected. Perhaps Ghalib and Hornstein will have found their killer app by the time they reach New York. Maybe we will all be printing out spare parts and jewelry from our desktop 3D printers in 10 years.

Given the speed of the industry's evolution, almost anything is possible.

**Alan S. Brown** has been an editor and freelance writer for more than 25 years and lives in Dayton, NJ (*insight01@verizon.net*). A member of the National Association of Science Writers and former co-chair of the Science Writers in New York, he graduated magna cum laude from New College at Hofstra University in 1974. He is an associate editor of *Mechanical Engineering* and contributes to a wide range of engineering and scientific publications.

# Ethical Decision Making in Today's Engineering Classrooms

by Dr. Elizabeth A. Stephan, Ohio Kappa '93, David R. Bowman, Dr. William J. Park, Dr. Benjamin L. Sill, North Carolina Alpha '67, and Dr. Matthew W. Ohland, Florida Alpha '96

**e**VERY DAY, we make numerous ethical decisions, although most are so minor that we do not even view them as such.

- *When you drive your car, do you knowingly violate the posted speed limit?*
- *When you unload the shopping cart at your car, do you leave it in the middle of the parking lot, or return it to the designated area?*
- *You know that another student has plagiarized an assignment; do you rat him or her out?*
- *A person with a mental disability tries to converse with you while waiting in a public queue. Do you treat him or her with respect or pretend he or she does not exist?*
- *In the grocery store, a teenager's mother tells her to put back the carton of ice cream she brought to the cart. She walks around the corner and places the ice cream on the shelf with the soft drinks. Do you ignore this or approach the teenager and politely explain that leaving the ice cream in that location will cause it to melt and increase the cost of groceries for everyone else, or do you return it to the freezer yourself?*
- *When going through a public door, do you make a habit of looking back to see if releasing the door will cause it to slam in someone's face?*
- *You notice a highway patrolman lying in wait for speeders. Do you flash your lights at other cars to warn them?*
- *A cashier gives you too much change for a purchase. Do you correct the cashier?*
- *You are on the lake in your boat and notice a person on a JetSki chasing a great blue heron across the lake. The skier stops at a nearby pier. Do you approach the skier and reprimand him for harassing the wildlife?*

On a grand scale, none of these decisions is particularly important, although some might lead to undesirable consequences. However, as an aspiring engineer, you may face

numerous decisions in your career that could affect the lives and well-being of thousands of people. Just like almost everything else, practice makes perfect, or at least better.

The more you practice analyzing day-to-day decisions from an ethical standpoint, the easier it will be for you to make good decisions when the results of a poor choice may be catastrophic.

In very general terms, there are two reasons people try to make ethical decisions.

- *They wish to make the world a better place for everyone—in a single word, altruism.*
- *They wish to avoid unpleasant consequences, such as fines, incarceration, or loss of job.*

## Acceptable Behavior

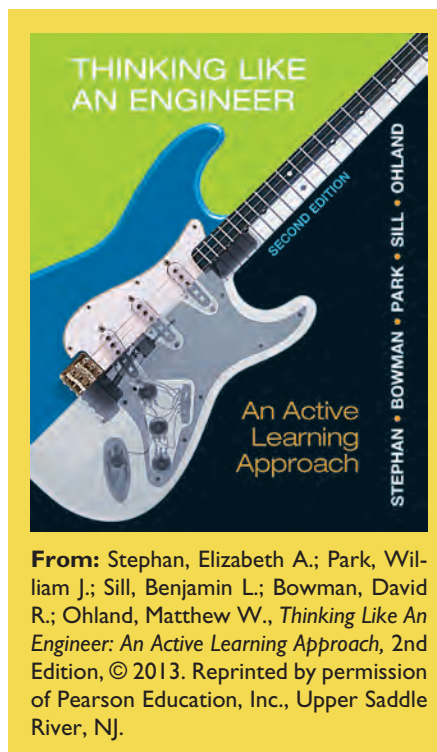
In an ideal society, the second reason would not exist. However, history is replete with examples of people, and even nations, who do not base their decisions solely on whether or not they are acting ethically. Because of the common occurrence of unethical behavior and the negative impact it has on others, almost all societies have developed rules, codes, and laws

to specify what is and is not acceptable behavior, and the punishments that will be meted out when violations occur.

The major religions all have fairly brief codes summarizing how one should conduct their life. Some examples are given below; other examples exist as well.

- *Judaism, Christianity, and derivatives thereof have the Decalogue, or Ten Commandments.*
- *Islam has the Five Pillars in addition to a slightly modified and reorganized form of the Decalogue.*
- *Buddhism has the Noble Eightfold Path.*
- *Baha'i has 12 social principles.*
- *In Hinduism, Grihastha dharma has four goals.*

Secular codes of conduct go back more than four millennia to the Code of Ur-Nammu. Although by today's standards,



**From:** Stephan, Elizabeth A.; Park, William J.; Sill, Benjamin L.; Bowman, David R.; Ohland, Matthew W., *Thinking Like an Engineer: An Active Learning Approach*, 2nd Edition, © 2013. Reprinted by permission of Pearson Education, Inc., Upper Saddle River, NJ.

some of the punishments in the earliest codes seem harsh or even barbaric, it was one of the earliest known attempts to codify crimes and corresponding punishments.

Admittedly, although not specifically religious in nature, these codes are usually firmly rooted in the prevailing religious thought of the time and location. Through the centuries, such codes and laws have been expanded, modified, and refined so that most forms of serious antisocial behavior are addressed and consequences for violations specified. These codes exist from a local to a global level. Several examples are given below.

- *Most countries purport to abide by the Geneva Conventions, which govern certain types of conduct on an international scale.*
- *Most countries have national laws concerning murder, rape, theft, etc.*
- *In the United States, it is illegal to purchase alcohol unless you are 21 years of age. In Great Britain, the legal age is 18.*
- *In North and South Dakota, you can obtain a driver's license at age 14 1/2. In most other states, the legal age is 16.*
- *It is illegal to say "Oh, boy!" in Jonesboro, Georgia.*
- *Many cities, such as Santa Fe, New Mexico, have ordinances prohibiting use of cell phones while driving.*

### Real-World Decisions

Some ethical decisions are clear-cut. For example, essentially everyone (excluding psychopaths) would agree that it is unethical to kill someone because you do not like his or her hat. Unfortunately, many real-world decisions that we must make are far from "black and white" issues, instead having many subtle nuances that must be considered to arrive at what one believes is the "best" decision.

There is no proven algorithm or set of rules that one can follow to guarantee that the most ethical decision possible is being made in any particular situation. However, numerous people have developed procedures that can guide us in considering questions with ethical



Good people do not need laws to tell them to act responsibly, while bad people will find a way around the laws.—Plato

ramifications. A four-step procedure is discussed here, although there are various other approaches.

**Step 1:** Determine *What* the issues are and *Who* might be affected by the various alternative courses of action that might be implemented.

We will refer to the *Who* as stakeholders. Note that at this point, we are not trying to determine how the stakeholders will be affected by any particular plan of action.

The issues (*What*) can refer to a wide variety of things, including, for example, personal freedom, national security, quality of life, economic issues, fairness, and equality.

The term stakeholders (*Who*) does not necessarily refer to people, but might be an individual, a group of people, an institution, or a natural

system, among other things.

**Step 2:** Consider the effects of alternative courses of action from different perspectives.

Here, we look at three perspectives: consequences, intent, and character.

### Consequences

When considering this perspective, ask how the various stakeholders will be affected by each alternative plan being contemplated. In addition, attempt to assign a relative level of importance (weight) to each effect on each stakeholder. For instance, an action that might affect millions of people adversely is almost always more important than an action that would cause an equivalent level of harm to a dozen people.

### Intent

The intentions of the person doing the acting or deciding are considered in this perspective, sometimes called the "rights" perspective. Since actions based on good intentions can sometimes yield bad results, and vice versa, the intent perspective avoids this possible pitfall by not considering the outcome at all, only the intentions.

It may be helpful when considering this perspective to recall Immanuel Kant's Categorical Imperative: "Act only according to that maxim

## Excerpts From The Code Of Ur-Nammu

- If a man commits a murder, he must be killed.
- If a man commits a robbery, he will be killed.
- If a man commits a kidnapping, he is to be imprisoned and pay 15 shekels of silver.
- If a man knocks out the eye of another man, he shall weigh out half a mina of silver.
- If a man has cut off another man's foot, he is to pay 10 shekels of silver.
- If someone severed the nose of another man with a copper knife, he must pay two-thirds of a mina of silver.
- If a man knocks out a tooth of another man, he shall pay 2 shekels of silver.

# Ethical Decision Making in Practice

Your company has been granted a contract to develop the next generation of electronic cigarette, also known as a “nicotine delivery system,” and you have been assigned to the design team. Can you in good conscience contribute your expertise to this project?

**Step 1:** Identify the issues (What) and the stakeholders (Who).

## Issues:

- Nicotine is poisonous and addictive.
- These devices eliminate many of the harmful components of tobacco smoke.
- Laws concerning these devices range from completely legal, to classification as a medical device, to banned, depending on the country.
- There are claims that such devices can help wean tobacco addicts off nicotine.
- The World Health Organization does not consider this an effective means to stop smoking.
- Whether an individual chooses to use nicotine should be a personal decision, since its use does not generally degrade a person’s function in society.
- The carrier of the nicotine (SQ-90% of the total inhaled product) is propylene glycol, which is relatively safe, but can cause skin and eye irritation, as well as other adverse effects in doses much larger than would be obtained from this device.
- A profit can be made from nicotine products or anti-smoking devices.

## Stakeholders:

- You (your job and promotions)
- Your company and stockholders (profit)
- Cigarette manufacturers and their employees and stockholders (lost revenue)
- Tobacco farmers (less demand)
- The public (less second-hand smoke)
- The user (various health effects, possibly positive or negative)

**Step 2:** Analyze alternative courses of action from different perspectives.

## 1. Consequences

- You may lose your job or promotion if you refuse.
- If you convince management to abandon the project, the company may lose money.
- If you succeed brilliantly, your company may make money hand over fist, and you receive a promotion and a raise.
- If the project goes ahead, the possibility of future lawsuits exists.

- Users’ health may be damaged.
- Users’ dependence on nicotine may either increase or decrease.

## 2. Intent

- Should everyone use electronic cigarettes, or at least condone their use?
- Should use of electronic cigarettes be unrestricted by law?
- Would/like to risk nicotine addiction because of using these devices?
- Would I be able to kick my tobacco habit by using these devices?

## 3. Character

- Would a person of good character develop this device, use it, or condone its use?
- Would work on this project (thus implicitly condoning its use) or use of the device itself enhance or degrade my character?
- Would my personal spiritual leader, or other person I revere, condone development or use of this product?

**Step 3:** Correlate perspectives.

Here we enter the realm of subjective judgment. The individual author responsible for this example has a definite personal answer, but it is in the nature of ethical decision making that different people will often arrive at different results in good conscience. You would have to weigh the factors identified from the different perspectives (including any that have been overlooked or knowingly omitted) to arrive at your own conclusion. We refuse to dictate a decision to you.

**Step 4:** Act on your decision.

If your decision was that working on this project poses no threat to your soul (if you happen to believe in such), probably little courage is required to follow through, since your career may blossom, or at least not be curtailed. On the other hand, if you believe that the project is unethical, you need to have the intestinal fortitude to either attempt to change the minds of management or refuse to work on the project, both of which may put your career at risk.

*Thanks to the Rutland Institute for Ethics at Clemson University including Dr. Daniel Wueste, Kelly Smith, Stephen Satris and Charlie Starkey. This procedure is based on the toolbox approach presented in their Ethics Across the Curriculum Seminar.*

## Engineer's Creed

As a Professional Engineer, I dedicate my professional knowledge and skill to the advancement and betterment of human welfare. I pledge:

- To give the utmost of performance
- To participate in none but honest enterprise
- To live and work according to the laws of man and the highest standards of professional conduct
- To place service before profit, the honor and standing of the profession before personal advantage, and the public welfare above all other considerations

In humility and with need for Divine Guidance, I make this pledge.

## Fundamental Canons

Engineers, in the fulfillment of their professional duties, shall

- Hold paramount the safety, health, and welfare of the public
- Perform services only in areas of their competence
- Issue public statements only in an objective and truthful manner
- Act for each employer or client as faithful agents or trustees
- Avoid deceptive acts
- Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession

whereby you can, at the same time, will that it should become a universal law.” To pull this out of the eighteenth century, ask yourself the following questions:

- (a) Is the action I am taking something that I believe everyone should do?*
- (b) Do I believe that this sort of behavior should be codified in law?*
- (c) Would I like to be on the receiving end (the victim) of this action?*

### Character

Character is the inherent complex of attributes that determines a person's moral and ethical actions and reactions. This perspective considers the character of a person who takes the action under consideration. There are different ways of thinking about this. One is to simply ask: Would a person of good character do this? Another is to ask: If I do this, does it enhance or degrade my character? Yet another way is to ask yourself if a person you revere as a person of unimpeachable character (whoever that might be) would take this action.

### Step 3: Correlate perspectives.

Now look back at the results of considering the issues from the three perspectives. In many cases, all three perspectives will lead to the same or a similar conclusion. When this oc-

curs, you have a high level of confidence that the indicated action is the best choice from an ethical standpoint.

If the three perspectives do not agree, you may wish to reconsider the question. It may be helpful to discuss the issue with people whom you have not previously consulted in this matter. Did you omit any factors? For complicated issues, it is difficult to make sure you have included all possible stakeholders and consequences. Did you properly assign weights to the various aspects? Upon reconsideration, all three perspectives may converge.

If you cannot obtain convergence of all three perspectives, no matter how hard you try to make sure you left nothing out, then go with two out of three.

### Step 4: Act.

This is often the hardest step of all to take, since ethical action often requires courage. The whistle-blower who risks losing his or her job, Harriet Tubman repeatedly risking her life to lead slaves to freedom via the Underground Railroad, the elected official standing up for what she knows to be right even though it will probably cost her the next election, or even something as mundane as risking the ridicule of your friends because you refuse to go along with whatever questionable activities they are engaging in for “fun.” Ask yourself the question: “Do I have the courage to do what I know is right?”

### Plagiarism

You probably know what plagiarism is—claiming someone else's work as your own. This is most often used in reference to written words, but may be extended to other media as well. From a legal standpoint, plagiarism per se is not illegal, although it is widely considered unethical. However, if the plagiarism also involves copyright infringement, then this would be a violation of the law. Certainly, in the context of your role as a student, plagiarism is almost universally regarded as academic dishonesty, and subject to whatever punitive actions your school deems appropriate.

In some cases plagiarism is obvious as when an essay submitted by a student is almost identical to one found on the Internet, or is the same as that submitted by another student. It is amazing how frequently students are caught cheating because they copied verbatim from another student's work, complete with strange mistakes and bizarre phrasing that grab the grader's attention like an 18-wheeler loaded with live pigs locking its brakes at 80 miles per hour. (Thanks to Gilbert Shelton for that image.)

### Far Less Clear

In other cases, things are far less clear. For example, if you were writing a short story for your English class and used the simile “her lips were like faded tulips, dull and wrinkled,” can you (or the professor) really be sure whether that was an original phrase or if you had read it at some time in the past, and your brain dragged it up from your subconscious memory as though it were your own?

We all hear or read things during our lives that hang around in our brains whether we are consciously aware

of them or not. We cannot go through life in fear of being accused of plagiarism because our brain might drag up old data masquerading as our own original thought, or even worrying about whether our own original thoughts have ever been concocted by another person completely independently.

### Problems That Arise

Any reasonable person (although admittedly, there is a surfeit of unreasonable people) will take the work as a whole into account. If there is simply a single phrase or a couple of instances of wordings that are similar to another source, this is most likely an innocent coincidence. On the other hand, if a work has many such occurrences, the probability that the infractions are innocent is quite low.

We arrive here at intent. Did you knowingly copy part of someone else's work and submit it as your own without giving proper credit? If you did not, stop worrying about it. If you did, Big Brother, also known as your professor, is watching, possibly with the assistance of high-tech pla-

giarism detection tools. (A tip of the hat to George Orwell.)

Ethical decisions in engineering have, in general, a narrow focus specific to the problems that arise when designing and producing products or services of a technical nature. Engineers and scientists have, by the very nature of their profession, a body of specialized knowledge that is understood only vaguely, if at all, by most of the population. This knowledge can be used for tremendous good in society, but can also cause untold mischief when used by unscrupulous practitioners.

Various engineering organizations have thus developed codes of conduct specific to the profession. Perhaps the most well known is the Code of Ethics for Engineers developed by the National Society of Professional Engineers (NSPE).

The entire NSPE Code of Ethics is rather long, so we included only the Engineer's Creed and the Fundamental Canons of the Code in this article. Read the complete code at <http://www.nspe.org/Ethics/CodeofEthics/index.html>.



**Dr. Elizabeth A. Stephan**, *Ohio Kappa '93*, at right, joined the faculty at Clemson University in January 2002 in the General Engineering Program, assuming the role of Director of the program from August 2007 – December 2010. Beth has served as a District Director since 1996 and is the chief advisor to South Carolina Alpha.

**David R. Bowman**, center, taught in the General Engineering Program from January 2006 to November 2011.

He recently accepted a position with Jobscope, an Engineer-to-Order ERP software company based in Greenville, SC, in mobile application development.

**Dr. William J. Park**, left, has been an associate professor at Clemson University, teaching in the General Engineering Program since the fall of 1992.

**Dr. Benjamin L. Sill**, *North Carolina Alpha '67*, second left, is an Alumni Professor Emeritus of Civil Engineering, having retired in 2008 after 32 years at Clemson University. Beginning in 1999, he served as the Director of Clemson's General Engineering Program. In 2007, he helped establish a new Engineering and Science Education

Department at Clemson, and served as its chair until his retirement.

**Dr. Matthew W. Ohland**, *Florida Alpha '96*, second right, is currently an associate professor of Engineering Education at Purdue University. He was the 2002-2006 National President of Tau Beta Pi and currently serves as the chief advisor to Indiana Alpha. He is presently the Chair of the ASEE Educational Research and Methods division.



## University of San Diego

For more than six decades, the University of San Diego has been dedicated to providing values-based education with a mission grounded in Catholic social teaching. Students are encouraged to explore how faith and reason are compatible in education, and to develop strong moral convictions. USD welcomes students, faculty, and staff of all faiths, in the belief that all people benefit from an examination of other traditions. The university's 180-acre campus is called Alcalá Park, and the Spanish Renaissance architecture that characterizes Spain's centuries-old University of Alcalá serves as the inspiration for the buildings on the university campus.

Under the leadership of Mother Rosalie Clifton Hill of the Society of the Sacred Heart and Bishop Charles Francis Buddy of the Diocese of San Diego, USD began as separate colleges for men and women. The founding charter of the

San Diego College for Women and San Diego University – comprised of the San Diego College for Men and the School of Law – was granted in 1949; in 1972, the academic institutions merged into the University of San Diego that is governed by an independent Board of Trustees.

An education at the University of San Diego is founded on one principle--the pursuit of excellence. In 2011, *U.S. News & World Report* ranked USD as one of the top 100 universities in the nation. Their engineering undergraduate programs were ranked No. 27 in the nation. According to the Princeton Review, USD is ranked No. 2 in the category of best campus environment and the fourth most beautiful school in the country. *Bloomberg Businessweek* ranked the school of business administration No. 36 in undergraduate business programs.

The combination of academic excellence and values has made USD a leader in innovation. Under the current leadership of President Mary E. Lyons, USD has become one of the greenest college campuses in the nation. Recent projects on the university's 180-acre campus include the installation of more than 5,000 photovoltaic panels on 11 buildings across the campus, expected to generate seven percent of the university's peak energy needs. This establishes USD as the second-largest solar energy producer among all private U.S. colleges and the 12th largest solar facility on a college campus in the nation.

USD's sustainability innovations include the first e-waste collection center on a college campus. In 2011, the Student Life Pavilion earned gold LEED certification, reflecting the facility's exemplary environmental practices. The pavilion's market, Tu Mercado, is one of the nation's first on-campus, organic food markets.

This spirit of innovation is also embodied in the university's engineering programs which began in 1987. In 2011, 44 students were awarded diplomas



in electrical, industrial and systems, and mechanical engineering, making it one of the largest graduating classes ever.

“USD is the only school in the country where all engineering graduates earn both a Bachelor of Arts and a Bachelor of Science degree in an accredited engineering program,” explained Kathleen Kramer, PhD, CA O’86, director of engineering programs and professor of electrical engineering. “Our students are challenged to create effective solutions to the world’s most complex challenges and become thoughtful, informed, and engaged participants in the global community.”

Those include answers to challenges such as finding renewable energy and sustainable water resources both at home and around the world. Last year, senior engineering students created projects to convert rainwater into energy to power a vehicle and a “smart shower” to make people more mindful of the water they’re using.

This summer, four recent engineering graduates will help bring solar electricity to war-torn Sudan. Through the *Engineering a Brighter Sudan* project, the four plan to install a power generation storage system for the Theou Village School in southern Sudan. In addition to illuminating the village, it will power batteries, laptop computers, and cell phones.

The Sudan solar project is an example of the senior design projects that students are required to complete. In the fall and spring, students demonstrate their designs and inventions at an open house. In many cases, these projects receive financial, in-kind, or mentorship support from businesses and organizations in the San Diego community.

“What is so encouraging about hands-on projects like these is the ability to move from concept to fruition so students can measure and appreciate their ability to use their education to improve people’s lives,” Kramer said. “Your typical ‘plain vanilla’ engineers are wonderful technical problem solvers, but they don’t have all of the abilities that come with the bachelor of arts side of the degree.”

In addition, every full-time faculty member in the school of engineering has a Ph.D. and comes to USD with a breadth of practical experience and a strong commitment to student learning and scholarship.

Class sizes are kept small, with fewer than 20 students per class and faculty—not graduate assistants—teach all classes to foster relationships between student and faculty that extend beyond classroom walls. Engineering classes take place in Loma Hall on campus.

The engineering programs follow the philosophy that students learn by doing, in addition to listening to lectures and reading textbooks. The programs require extensive lab work to provide the problem-solving experience that turns students into engineers before they graduate.

With this real-world experience, it’s not surprising that USD’s engineering students are in high demand for internships in the San Diego area, leading to career opportunities once they graduate.



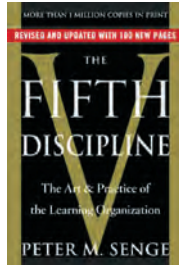
The campus, above and right, overlooks Mission Bay, and features Spanish Renaissance architecture. The Joan B. Kroc Institute of Peace and Justice, top left, features photovoltaic panels that help to provide seven percent of USD’s peak energy needs. Loma Hall, left, is the venue for engineering programs.

*This article was prepared by Richard Acello, a San Diego-based writer who covers a variety of technology, business and legal issues. The story of the California Alpha Epsilon Chapter installation on February 25, 2012, will appear in the Summer issue.*



## AUTHORS

**Dr. Peter M. Senge, California Gamma '70**, wrote *The Fifth Discipline: The Art and Practice of the Learning Organization*. Dr. Senge is director of the center for organizational learning at the MIT Sloan School of Management. The book



focuses on group problem solving using the systems thinking method in order to convert companies into learning organizations. The five disciplines represent approaches (theories and methods) for developing three core learning capabilities: fostering aspiration, developing reflective conversation, and understanding complexity. It has 424 pages and is published by Doubleday/Currency.

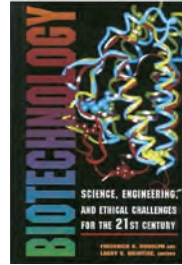
**Lt. Col. John D. Cinnamon, Ph.D., P.E., Ohio Eta '06**, has authored *Hypervelocity Gouging Impacts*. The book addresses the effects of hypervelocity impact, summarizing research efforts as well as setting out the theoretical foundation for understanding material interactions at



such velocity—on the order of Mach 8.5 and above. The author evaluates the phenomenon and offers recommendations to mitigate it. Lt. Col. Cinnamon is an adjunct professor with the Air Force Institute of Technology, and is currently a student at the Joint Advanced War-fighting School, Joint Forces Staff College, Norfolk, VA. Published by AIAA, it is a 254-page hardback.

**Dr. Frederick B. Rudolph, Missouri Beta '66**, and **Dr. Larry V. McIntire, New York Delta '66**, have edited *Biotechnology: Science, Engineering, and Ethical Challenges for the*

*21st Century*. Experts from science, law, industry, and government explore a cross-section of emerging issues. The book offers straightforward explanations of basic science and provides insight into the serious social questions raised by these findings. The 278-page hardback from Joseph Henry Press is also available as a paperback.

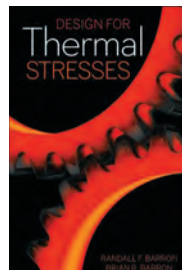


**Dr. James D. Livingston, New York Delta '52**, has written *Rising Force*, subtitled *The Magic of Magnetic Levitation*. In this introduction to “maglev”—the use of magnetic forces to overcome gravity and friction—he takes lay readers on a journey of discovery, from



basic concepts to applications, such as Chinese trains that travel 250 miles per hour without touching the tracks. The former GE physicist and MIT lecturer moves from Peter Pan to Harry Potter, and shows there is magic in conquering gravity. The hardback has 288 pages and is published by Harvard University Press.

**Dr. Randall F. Barron, Louisiana Gamma '58**, professor emeritus of mechanical engineering at Louisiana Tech, and his son Dr. Brian R. Barron, lecturer in mathematics and statistics there, have written *Design for Thermal Stresses*. It is a college-level



engineering textbook that provides design tools that allow engineers to understand and alleviate potential problems involving thermal stresses.

The book introduces various numerical and analytical design approaches for issues surrounding thermal stresses. Practical application of the principles for practicing engineers and students are presented through sample problems and exercises. The 528-page hardback is published by John Wiley & Sons.

**Bernard R. Berson, P.E., Connecticut Beta '57**, has co-authored *Career Success in Engineering*. He and Douglas E. Benner, P.E., produced the work to provide guidance, based upon more than 75 years of combined experience as practicing engineers. The



book is targeted at engineering students and recent entries to the field. Their combined efforts were intended to provide guidance to young engineers in areas that they believed would have benefited them at the early stages of their careers. The 326-page volume is published by Kaplan.

**Fred J. Bissert, Pennsylvania Gamma '56**, has written *A Fresh Look At Four End-Time Prophecies*, which examines four of the Bible's prophecies that are looming on the horizon. He believes the events that are currently occurring are at last helping to



put the pieces of the prophetic puzzle together, thus justifying a new assessment of Biblical revelation of tomorrow's news. Bissert was employed for 38 years by Duquesne Light Company as a superintendent and manager. The 222-page paperback is published by Xulon Press.

# Additional Contributors to the 2011 Alumnus Giving Program

The names of an additional 2,405 Tau Beta Pi alumni who made donations to the Association in the 2011 Alumnus Giving Program between November 16, 2011, and January 31, 2012, appear in two separate listings on the following pages. Added to the 8,714 members whose contributions were acknowledged in the Winter 2012 BENT, the complete group of donors totaled 11,119. These loyal and generous members gave a total of \$905,309 with a record average gift of \$80.29 vs. \$80.00 last year! Gifts received after February 1 and other gifts designated for the 2012 campaign do not appear but will be published in the Winter 2013 issue.

The generous assistance of each member is deeply appreciated by the Executive Council and other national officers of the Association. The financial resources have permitted strengthening our programs in several areas that emphasize the importance of Tau Beta Pi's basic objectives and that help all collegiate chapters and student members.

Donors' names are arranged alphabetically within their chapters. Names of members who have qualified for the Tau Beta Pi Donor Recognition Clubs are listed only in the first section below. Names followed by an \* participated in Cleve Campbell's matching challenge.

Names marked with a † symbol are of deceased members in whose memory donations were made either by relatives and friends or through bequests. In addition to the gifts acknowledged here, several were made anonymously through the Combined Federal Campaign, Network for Good, or JustGive and are also deeply appreciated. Matching entities are listed on page 31.

## Recognition Club Donors

The names of 1,781 Tau Beta Pi alumni appear in this first section. They made donations between November 16, 2011, and January 31, 2012, AND they have also made CUMULATIVE contributions to Tau Beta Pi through the years totaling from \$250 to more than \$1,000,000. These, plus the 6,279 names listed in the previous issue, bring the total number of 2011 recognition club donors to 8,060.

The Donor Recognition Clubs are part of our effort to recognize a donor's total lifetime cumulative giving to Tau Beta Pi. Such continuous support significantly contributes to the overall strength of the Association and allows our Society, with confidence in our financial resources, to plan for modest growth in our services to the engineering profession. These clubs were chartered by the Executive Council in 1986 and have been set at the following levels:

Matthews Club	\$500,000	Alpha Club	\$25,000	Chi Club	\$1,000
Nagel Club	250,000	Beta Club	10,000	Second Century Club	500
Williams Club	100,000	Delta Club	5,000	Founder's Club	250
Heikes Club	50,000	Zeta Club	2,500		

### MATTHEWS CLUB

CA † Forge, Charles O. '56

### WILLIAMS CLUB

IA A Campbell, P.E., Cleveland L. '47  
MDA † Zimmerman Jr., Marlin U. '44

### ALPHA CLUB

RI A Anonymous '72

### BETA CLUB

CA B Schlinger, Warren G. '44  
CA E Pappone, Daniel C. '77  
CO B Anonymous '78  
IN A Sarkisian, Nancy L. '77  
IA A Moyer, James H. '51  
NJ A Bezos, Jeffrey P. '86  
NY K Knox, Keith T. '70  
OH B Webster, Charles M. '50  
SD A Gomulinski, Tricia E. '98  
TX A Yates Jr., Saint Clair P. '65  
TX B Relyea, James R. '53  
WI † Cronce, Richard G. '77

### DELTA CLUB

CA B Sartelle, John E. '79  
CA A Davis, John L. '60  
CA E Chow, Chi-Hui Robert '85  
CA Z Grigsby, David A. '84  
CA O Turhollow, Charles R. '81  
CO A Laughlin II, George T. '75  
FL A Anonymous '99  
Anonymous '00  
Bolton, Charles H. '62  
Kalter, Howard L. '66  
FL B Crews, Renard C. '70  
GA A Brown III, Emil W. '82  
IL † Haase, John A. '53  
IN A Griffin, Abbie J. '74  
Schwind, Ralph E. '50  
KS A Kleist, Robert A. '51  
MAA Keogh, Brian J. '84

MAA Fenton, Harvey A. '58

Lee, Richard G. '51

MAE Holm, John W. '43

Prendiville, John F. '48

MI † Fay, John E. '56

MI E Frye, James H. '51

NHA Sherman, John L. '54

NJ A Mendelsohn, Andrew J. '77

OK A Hall, Ralph R. '64

PA † Barrow, Bruce B. '50

TN † Hall, Kristofer Brian '98

TX A Lyon, Robert Y. '50

VA B Breerer, Jeffrey W. '83

WVA Baker, David W. '76

Landes II, Junior H. '64

### ZETA CLUB

AL B Acree, Elaine S. '76  
AZ B Story, Franklyn H. '81  
Stout, P.E., Roger P. '77  
AR A Biggadike, Robert H. '58  
CA A Meyer, Jack A. '54  
CA B Lippey, Gerald Z. '55  
Shombert, Lee A. '79  
CA † Johnson Jr., Franklin P. '50  
CA A Sekimura, Gerald T. '73  
CA E Friedmann, Norman E. '50  
Smernoff, Kenneth B. '67  
Tozaki, Ronald Y. '74  
CA H Crotchet, Denton R. '71  
CA O Koblitz, Gordon F. '66  
CA I Pickett, Stephen E. '75  
CA M Fewell, Thomas J. '72  
CA N Caddock Jr., Richard E. '72  
CA E Hickey, Robert W. '88  
CO B Harris, James R. '68  
Harris, Karen L.W. '74  
CT A Bishop, Broughton H. '50  
CT B Chatfield, Larry A. '71  
FL B Tilles, Arno William '84  
IL A Fue, Harold '57  
Goad, Thomas C. '55  
Pfefer, Bernard L. '47

Vandermyde, Mark '78

IL † Cook, Stanton R. '49

Lee, James A. '88

White, Robert C. '56

IN A Buchholz, Richard F. '47

Felten, Loren D. '57

Ford, Steven R. '80

Neal, Stuart M. '56

Sealacek, Warren R. '45

Taylor, Harold L. '51

IN B Badger, Jerry D. '62

IN † Buran Jr., Joseph E. '75

IN A Stechholz, Jonathan M. '72

IA A Feinsel, Lyle D. '61

Gardiner, William H. '55

KS A Mitchell, James E. '85

KY B Lambert, Linda M. '88

LA A Comeaux, Ph.D., Keith A. '89

Williams, Colleen D. '82

ME A Brigham, Ernest B. '53

MDB Hawkins, Albin L. '80

MAA Duris, Robert A. '74

MAB Ladd, P.E., Charles C. '55

Poduska, John W. '59

MAA Carter Jr., Arthur A. '51

MAE Sladek, P.E., John R. '77

Stevens, Janet M. '72

MAZ Cetti, Richard P. '70

MI A Colbry, Dirk Joel '06

Colbry, Ph.D., Kathleen L. '99

MI B Funk Jr., Clarence G. '63

Jenekhe, Samson A. '77

MI † Battel, Steven J. '79

Luchini, P.E., John R. '71

Padzielski, Robert J. '70

Simmons, Charles D. '50

MI E Ciarkowski, Arthur A. '71

Gomulinski, Curtis Dennis '01

Phillipart, Nancy L. '80

Thompson, George W. '55

MI Z Pettiford, Steven D. '72

MO † Rossetti, David J. '74

NJ A Petschek, Charles I. '44

Post, Edwin L. '62

NJ B Mudie, Samuel H. '62

NY B D'Avignon, Edward J. '88

NY A Hart, Marjorie Leigh '51

NY I Dujmich, Louis C. '78

Judd, Robert P. '78

NY A Abrardo, Joseph M. '72

NY E Runowich, Carl J. '84

NC A Vercaemert, Carol S. '76

NC † Anapol, Edward '76

Linker, Edward M. '47

OH B Throckmorton, Dean W. '82

OH † Albery, James O. '59

OH Z Zelms, Charles M. '73

OH H Senyk, Joseph M. '67

OK A Morris, Jay K. '81

OR A Eden, James D. '79

PA B Ruday, Lewis D. '80

Stockburger, Richard '73

PA E Sarkisian, Matthew J. '84

PA H Hetteche, Leroy R. '61

Thompson, Robert A. '60

RI A Jessup Jr., W. Edgar '44

Pritchard, Robert L. '46

SC A Bailey, Susan G. '86

Harman, J. Patrick '65

SC B Bashore, Allen S. '51

Gibbons, Joseph H. '56

TN A Cook, James M. '72

Froula, P.E., Ret., James D. '67

Massimini, Michael I. '76

Peishel, Frank L. '61

Pih, Norman P. '82

TN B Marianelli, Walter D. '75

Parrish Jr., Thomas F. '75

Rowan Jr., William H. '55

TX A Klump, D. Craig '77

TX B Ingram, Wesley W. '77

Tye III, John M. '67

TX A Plank, Michael J. '83

Rushing, Jay A. '76

TX Z Wint, Stephen P. '83

TX H Schmidt, Robert W. '84

UT A Morrison, Michael George '88

VT B Crawford, David C. '52

VA A Brown, Lee Merry '88

Pitzer, William G. '75

VA B Harras, Edgar D. '67

WAA Gunter, Robert A. '62

Okita, Richard Y. '56

WAB Cass, Robert D. '83

Grossman, Robert J. '59

WI A Smith, Rodger F. '64

### CHI CLUB

AL A Talbot, Thomas F. '52  
Vollberg, Walter K. '73  
AL B Delorenzo, Joseph D. '57  
AL † Herbst, Jane N. '80  
AL A Koelbl, Terry G. '84  
AKA Braun, David R. '74  
Cline, John R. '81  
Dombrowski, Roger A. '69  
AZ A Bailey, Harold E. '71  
Da Silva, Eduardo G. '58  
Erickson, Kenneth L. '68  
Redfern, Julie Jacks '83  
AZ B Cline, John F. '93  
Lanzinger, Donald J. '72  
CA A Gottwald, Carl H. '48  
McCune Jr., Earl W. '79  
Naftzger, Howard J. '49  
Ravenscroft, Dewey S. '63  
Van Dyke, Korbin S. '80  
CA B Hammer, David A. '64  
Mueller, Albert H. J. '47  
CA † Hardison, R. Logan '57  
Hess, Kenneth L. '74  
Hetzl, Geoffrey O. '82  
Marks, Stuart W. '84  
Rodriguez, David A. '58  
Sansbury, James D. '66  
Ullman, Marc A. '83  
CA A Boss, JoAnn M. '80  
Conlin, Carter B. '45  
Fong, Franklin M. '69

**CHI CLUB, CONTINUED**

CA E	Zehrbach, Bill E. '69	Harris, Albert F. '73	Thal Jr., Herbert L. '53	TN G	Darling, James P. '59	CO A	Kranzler, Irvin '54
	Curry Jr., Winfield S. '57	Knapp, Roy M. '63	Weinberg, Richard S. '81		Steelman, James T. '71	CO B	Aronson, Haskell Harold '52
	Gaunt, Arnold J. '86	Leamon, Richard G. '67	Werner, Stuart L. '54	TN E	Wileox, Leslie M. '77		Ashwood, Edward R. '75
	Gliksmann, Jerome A. '62	Shankles, Larry E. '69	NY A Higgins Jr., J. David '53	TX A	Baker, William E. '52		Knapp, Barry G. '81
	Karagozian, Ann R. '78	KS F Benton, Kirk '78	Kemp, Paul S. '51		Edgar, Arlen L. '57		Ramey Jr., Robert B. '42
	Masumura, Albert A. '62		Bucher, William A. '76		Edwards, Thomas H. '67	CO F	Lee, Don E. '59
	Wenck, James C. '77		NY A Bauer, Arthur R. '63		Goff, David L. '89	CO A	Fisher, James E. '78
	Woo, Raymond '72		NY E Dunning, William E. '61		Haschke, Chester G. '50		Mehring, James W. '72
CA Z	Antush, Richard M. '75		FEather, Gary A. '80		Moorman, Charles T. '59	CT A	Bugel, Robert H. '45
	Downey, James B. '62		Howe, P.E., Richard S. '59		Reese, Michael S. '70		Lehman, Philip L. '76
	Going Jr., E. Jackson '49	LA A	Compton, Ronald R. '72		Sweet, Paul A. '70		Montermoso, Juan P. '69
CA H	Burrows, Stanford '63		Kleinpeter, Joseph A. '65		Wilson, Randy Wayne '97		White Jr., Erskine N. '45
CA O	Kawahara, Lester M. '80		Lusted, John A. '69	NY H	Levy, Jeffrey M. '74	TX F	Zydney, Andrew L. '80
	Piburn, Russell J. '75		Richardson, John D. '72		Schattner, Bernard L. '56		Johnson, Terry R. '55
CA I	Majdan, John '74	LA B	Bourgeois, Brian S. '82		Valcourt, Jean-Mary K. '85		Rachford Jr., Henry H. '45
CA K	Seanlan, Lawrence A. '68		Buesinger, Robert F. '78	NY O	Kelley, F. Douglas '78	TX A	Biard, James R. '54
CA A	Cohn, Stephen G. '70		Mullins, Peter L. '57	NY I	Berman, Jay I. '78		Knowles, David W. '80
	Pickles, William R. '80		Paul Jr., Howard C. '80	NY K	Moore, Duncan T. '69		Linn, William R. '81
	Yamamoto, Ko '84		Perrin III, Shepard F. '83	NY A	Ball, James E. '75	TX E	Badgett, James G. '81
CA M	Heitkamp, Ross S. '85	LA F	Poole, Ronald G. '69		Schmitt, Robert E. '71	TX H	Cawoski, Victor G. '74
	Mitsuoka, Jeffrey M. '79		Sigmund, John A. '75	NY M	Silverman, Joel S. '74		Fairehild, Jack E. '53
CA N	Rund, John E. '73	MEA	Atkinson III, Leland G. '78		Czuba, John S. '78	UT A	Eide, Eric Norman '89
CA O	Campbell, William J. '65		Garfield, Henry G. '65	NY E	Mathews, Joseph R. '81	VT A	Ketcham, Kenneth J. '68
	Fitzsimons, Michael J. '79	MDB	Bromley, Ralph W. '44	NY I	DeVoe, Charles G. '76	VT B	Berkman, Richard L. '69
	Mulvihill, Michael E. '60		Chase, Ronald J. '71	NY P	Curran, Paul J. '83	VA A	Anderson, Willie C. '75
	So, Wilson F. '68		Kirschbaum, Alan I. '71		Roldan, Mark J. '85		Garner, Patrick L. '72
	Treinen, James P. '85		Lambrechts, James R. '73	NC A	Solaski, Thomas P. '85		Hardy Jr., Edward L. '69
CA P	Beavers, Timothy R. '78		Rowland, R. Wilson '51		Hall, Michael L. '83	VA B	Carpenter, Joseph A. '63
CA P	Owens, Lawrence P. '82		Toense, Robert E. '76		Walker, Gary K. '70		Doughty, Gary S. '77
CA O	Viatt, Heather Watson '97		Rowland, R. Wilson '51	NC F	Franks, Marla J. '79		Herrington, William A. D. '64
CO A	Knight, William J. '79	MAA	Bernacki, Stephen E. '70		Unzelman, Louis R. '69		Hughes, Richard L. '78
	Roberts, Christopher R. '78		Snively, Fred S. '60	NC G	Roberts, Marla J. '79		Jones, Harry N. '71
CO B	Aerstin, Franklin G. P. '64	MAB	Brandes, Richard D. '57	OH A	Klinch, Kathleen Desartis '90		Long, David A. '91
	Bartlett, Paul E. '51		Clauss Jr., John S. '54		Oravec, Joan M. '71		McConnell, Fred L. '64
	Eason, Ernest D. '71		Dickey, Robert L. '74	OH B	Orner, Peter A. '57		Parr, Arthur Coleman '96
	Otsuki, Steven P. '71		Freeman, Reed H. '61		Fazzoni, Gregory F. '76		Snidow III, Lyle C. '74
	Tinnan, Mitchell T. '76		Heatwole, Antony J. '64	OH G	Hamilton, Edward L. '73	VA F	Campbell, Dale A. '72
	Wood, John E. '71		McKim, Thomas F. '75		Pollock, Flavil M. '77	VA A	Jamison, Donald Kinzie '57
CO G	Hough, H. Vernon '52		Pershing Jr., John A. '75		Becher, Charles D. '72	WAA	Dracup, John A. '56
CO A	Cermak, P.E., Jack E. '47		Smallwood, Richard D. '57	OH H	Guins, Thomas S. '69		Eastman, James S. '53
CO E	Hepworth, Richard C. '63		Smoot, William N. '56		Hagenlocker, Edward E. '62		Follett, Mark S. '74
CT A	Fischer, Edward Michael '89	MAA	Harty Jr., Frederick R. '61		Hohman, Charles M. '67		Matthews, Nancy N. '81
	Flint Jr., Robert C. '62		Smith, Paul R. '68		Hollenbaugh, Roger E. '71		McCalla, William T. '59
	McLeod, Christopher K. '77	MAE	Frost, George C. '50		Kinzel, Evelyn S. '69		Moerbesk, Peter J. '69
CT B	Klopfenstein, Rex C. '59		Marks, Robert A. '54		Kinzel, Gary L. '68		Reichel, Jere D. '66
	Thompson, Gerald F. '50	MAZ	Novmer, Arthur A. '51		Meyers, Frederick D. '49	WAB	Shanafelt, Robert E. '67
DE A	Folsom, Steven A. '77		Cain, John F. '61		Monter, George C. '60		Langley, Duane D. '55
	Levie, Stefan Gerhard '91		Fontana, Mario H. '55	OH A	Orkins, James E. '66	WVA	Oakley, Fanning T. '53
	Morrow Jr., John L. '73		Grzeslak, Kazimierz T. '88		Kurzen, Mark R. '71		Blackshaw, George L. '58
DC A	Belcher, Wade D. '70		Gusciora, Kenneth H. '69		Miller, Truesdell C. '64		Fleischer, Charles J. '70
	Gathungu, Peter Maina '93	MI A	Harrison, C. Brett '64		Moore, Mathew F. '62		Gould, Marvin B. '63
DC B	Maggio, John J. '81		Bonner, Robert C. '60	OH E	Basta, Edward D. '82		Lengyel, Nicholas M. '70
	Youssefmir, Paul '78		Griffin, Albert W. '80	OH Z	Frederick, Wm G. D. '58	WVB	Johnson, Newton E. '75
DC F	Altamore, Annette '79		Houthoofd, Janet M. '76	OH H	Cole, Neil R. '75		Thornton, James R. '81
	Ashie, Ibrahim A. '70	MI B	Kupfer, Michael D. '83		Hager, Douglas S. '85	WI A	Lutz, Leroy A. '60
FL A	Alonso, Hector '72		Sandretto Jr., Peter P. '64	OH O	Kohlhaas, Richard L. '62	WI B	Yuen, David P-K '73
	Brungard, Martin A. '85		Saul, William E. '55	OK A	Doyle, James T. '65		Hutton, Teresa Jean Jean '91
FL B	Ault, Richard H. '64		Smeagel Jr., Thomas F. '57	OK B	Markland, Ralph John '88	WI F	Whittington, Laura Lee '88
	Jennings IV, Tipton D. '54	MI F	Wacker, Don H. '52	OK F	Smith, William P. '80	WYA	Simon, Karen A. '83
	Slavetskas, James B. '70		Albin, Mehmet '88	OR A	Royce, Robert M. '73		Fassett, P.E., Gordon W. '74
FL G	Lienhart, Stephen R. '76		Coates, Larry L. '78		Basore, Paul A. '78		Gallensky, Neil E. '82
	Shimura, Mitsuo '74		Hansen, Charles '46		Freese, William E. '50		Hand, M. Maureen '94
FL A	Nugent, James Charles '95		Hertler, Eugene G. '59		Hansen, Steven W. '69		Beard, James L. '61
	Palm, William H. '55		Kelly III, Clinton W. '50		Lynch, Stanley C. '73		Hansen, Steven W. '69
FL E	Stierlen, Lorelei Beth '97		Liepa, Mark A. '81	PA A	Milton, Stuart W. '84		Lynch, Stanley C. '73
GA A	Backhaus, George P. '83		Pepper, Julia L. '84		Niedermeyer, Rex '77	AL A	Hill, Gregory J. '74
	Barber, Brian R. '81		Reines, Jose '59		Bardt, Ronald L. '58	AL B	Trapane, Karen L. '82
	Coons, Louis W. '81		Sanguinetti, John W. '70		Bechtel, Thomas F. '58		Dodson, Gene A. '57
	Cooper Jr., Basil P. '65		Seidel, David A. '81		Fowler Jr., W. Beall '59		Gachet, Thomas H. '60
	Deloach, Thomas C. '69		Walker Jr., H. Carl '58		Hopkins, Richard H. '63	AL E	Shields, Clark R. '71
	Malone, Thomas A. '63		Zuk, David M. '70		Ring, Robert B. '55		Wallace, Ronald S. '75
	Monk, Robert F. '63	MI A	La Bella, Salvatore A. '63	PA B	Saal, Frederick A. '54	AL E	Mincey, John Wayne '70
	Peatman, John B. '56		King, James B. '65		Sherman, William J. '60	AZ A	Atkinson, Dale R. '86
	Rogers, Don E. '63	MI E	Lachele, Roger E. '75		Ciucia, James A. '72		Berg, Jeffrey R. '93
	Snare, Daniel M. '80	MI Z	Cischke, Susan M. '76		Magnus, John C. '48	AR A	Chen, Daniel J. '83
IL A	Jones, Douglas W. '80		Hanson, Henry A. '66		Slocum, Helene Zuber '85		McLaughlin, Dennis P. '80
	Mueller, Thomas R. '85	MNA	Lapakko, Kim A. '76		Myth, John '61	CA A	Robidoux, Phillip H. '80
	Ostrodka, David L. '70		McLeod, Gary W. '70		Zimmerman, Susan L. '78		Hegeman, Louis E. '65
	Schoenberg, Kurt F. '72		Severson, John A. '72	PA F	Beitel, Frank P. '51	CA B	Feldsher, Theodore B. '85
	Zielsenki, Edward L. '74	MS A	Jerome, Dennis C. '67		Helfer Jr., Arleigh P. '67		Ong, Allen '70
IL B	Kinast, John A. '79		Crabbe, Emmanuel F. '81		Roberts, George A. '39	CA B	Reed, Donald E. '44
	Lewis, Burton A. '48	MO A	Donaldson, Albert L. '75		Sheker, Robert E. '91		Capowski, Anthony J. '83
	Uherek, Frank C. '74		Myles, M.D., Thomas D. '82	PA A	Sokal, Allen M. '68		Creutz, Michael J. '66
IL F	Cunningham, Richard G. '43		Oehrke, Timothy C. '75		Alquist, Richard P. '60	CA F	Dryden, Eugene H. '55
	Dompke, Richard K. '56		Sprouse, Loren V. '73	PA E	Huke, John A. '43		Hill, Roger C. '63
	Timmerman, Nancy S. '72		Ash Jr., Richard L. '70		Mansfield, Brian David '91		Dunham, James G. '73
IL A	Hachtel, Dale A. '68	MO B	Bondi, James O. '71		Ebner, Alan M. '61		Hakeman, Darren J. '92
IL Z	Woyna, Mark A. '87		Ernest, Terry L. '82	PA Z	Hunt, Steven D. '80		Inouye, Lance M. '68
IN A	Carlson, Richard A. '70		Koehler, David E. '75		Wakeley, Thomas A. '71		Landers, Carl F. '88
	English, James A. '57		Peat, Robert J. '79	PA H	Gilman, Thomas C. '66		Likins, Peter W. '57
	Faulkner, William H. '71		Schwent, Dale G. '84		Hills, Frederick J. '61		Mitchell, Donald B. '59
	Hanover, Marilyn K. '78	MO G	Byrne, Clare M. '78		Swartz, William E. '54		Palmer III, Everett A. '65
	Hooks, Collis C. '64	MT A	Collins, Douglas M. '71		Daniels Jr., Harold E. '66	CA A	Roodhouse, James G. '59
	McGraw, Earle P. '50		Johnson, Richard M. '56	PA O	Gigliotti, Michael P. '73		Tsukamoto, Kyle S. '81
	Shaffer, Gerald H. '74	NE A	Criswell, Marvin E. '65		Walsh, Daniel J. '69		Vincenti, Walter G. '38
	Sublette, Ivan H. '49		Shaneyfelt, Marty R. '84	PR A	Merceder-Heimann, Marilia '82	CA A	Grant, John G. '65
	Toombs, H. Dean '59	NJ A	Murphy, Kevin J. '78		Realy, Henry S. '71	CA E	Shiells, David J. '78
	Yoder, Norman E. '71		Schmidt, Arthur J. '68		Saharian, Alexander '56		Goodkin, Mitchell A. '68
IN B	Rose, Willis E. '44	NJ B	Cohen, Robert B. '77		Vigiar, Judith W. '83		Lisiewicz, Valerie Anne '87
	Heidrich, Steven J. '82		Fletcher, Leroy S. '58	RI B	Luz, James J. '80	CA Z	Tucker, Leonard L. '76
	Kukla, James A. '72		Jindra, Clifford P. '78		Holcombe, Milton W. '53		Benson, Chris A. '84
	Lombard, Michael G. '76		Krumins, Aivars E. '75	SC A	Roat, Ph.D., P.E., Suzanne '85	CA O	Javete, Donald F. '51
	Mason, James A. '56		Kunz Jr., Joseph J. '73		Rushton, Floyd R. '63		Gilman, Larry '73
	Richter, Richard T. '70	NJ A	Lisle Jr., Thomas K. '69	SC B	Thomas Jr., Cunningham P. '58	CA K	Reis, Thomas A. '77
IN A	Brems, Robert R. '63		Sevier Jr., James Montraville '96		Gustafson, Richard A. '63		Bethune, Edwin M. '84
	Lorenz, Mark J. '80	NMB	Storrs, Edward L. '81	SC F	Pittman, Steven M. '79	CA A	Oliver, Carmen D. '91
	Schmalz, Peter B. '69		Borkowski, Norman P. '52		Bocklund, Lori S. '83	CA A	Kiss, Robert D. '85
	Spring, Bradford H. '59	NY F	Bornhorst, Bernard R. '60	SD B	Goodwin, William A. '49	CA N	Stanley, Richard L. '79
	Bookin, Marvin L. '57		Cole, Marie Sayre '84		Stickle, Gene P. '53		Chew, James S. B. '84
	Buckman, Douglas A. C. '81		Lequar, James Kay '87	TN A	Trundle, Max Don '72		Donnelly, Jeffrey P. '85
	Drum, Alfred W. '64		Roberts, John W. '86		Green Jr., Thomas B. '75	CA Z	Emery, Linda R. '82
	O'Connell, Michael J. '87		Schultz, Stephen P. '70		Hefinger, Richard S. '72	CA O	Reukauf, Paul J. '70
	Reinhardt Jr., William H. '48		Stallman, Thomas F. '59	TN B	Johnston, Stephen J. '76	CA S	Schmitt, Thomas G. '74
IA B	Corrao, Debbie G. '93		Staudinger, James R. '77			CA Y	Page, John A. '61
KS A	Black, Arthur G. '70						Frankel, Craig A. '86
							Intagliata, John David '95

**SECOND CENTURY CLUB**

AL A	Hill, Gregory J. '74
	Trapane, Karen L. '82
AL B	Dodson, Gene A. '57
	Gachet, Thomas H. '60
	Shields, Clark R. '71
	Wallace, Ronald S. '75
AL E	Mincey, John Wayne '70
AZ A	Atkinson, Dale R. '86
	Berg, Jeffrey R. '93
	Chen, Daniel J. '83
	McLaughlin, Dennis P. '80
	Robidoux, Phillip H. '80
AR A	Hegeman, Louis E. '65
CA A	Feldsher, Theodore B. '85
	Ong, Allen '70
	Reed, Donald E. '44
CA B	Capowski, Anthony J. '83
	Creutz, Michael J. '66
	Dryden, Eugene H. '55
	Hill, Roger C. '63
CA F	Dunham, James G. '73
	Hakeman, Darren J. '92
	Inouye, Lance M. '68
	Landers, Carl F. '88
	Likins, Peter W. '57
	Mitchell, Donald B. '59
	Palmer III, Everett A. '65
	Roodhouse, James G. '59
	Tsukamoto, Kyle S. '81
	Vincenti, Walter G. '38
CA A	Grant, John G. '65
	Shiells, David J. '78
CA E	Goodkin, Mitchell A. '68
	Lisiewicz, Valerie Anne '87
	Tucker, Leonard L. '76
CA Z	Benson, Chris A. '84
	Javete, Donald F. '51
CA O	Gilman, Larry '73
	Reis, Thomas A. '77
CA K	Bethune, Edwin M. '84
	Oliver, Carmen D. '91
CA A	Kiss, Robert D. '85
	Stanley, Richard L. '79
CA N	Chew, James S. B. '84
	Donnelly, Jeffrey P. '85
	Emery, Linda R. '82
	Reukauf, Paul J. '70
	Schmitt, Thomas G. '74
CA O	Page, John A. '61
CA S	Frankel, Craig A. '86
CA Y	Intagliata, John David '95

**SECOND CENTURY CLUB, CONTINUED**

	Rathjen, Keith R. '56	MI E	Mertz Jr., Harold J. '61	NY A	Braun, Bernard '65	Scherer, John H. '65	WI F	Wilhelmi, James J. '69		
	Stevens, Stephen A. '77		Zickafosse, Michael Wayne '97		Monroe, Charles W. '53	Snider, Eric H. '75		Scherer, Richard A. '74		
KS A	Johnson, George L. '43	MI Z	Gomez, Lloyd E. '55	NY M	Hurewitz, David L. '64	Wayne, Hugh S. '49		Thomas, David E. '85		
	Masoth, William H. '82		Scarlatelli, Michael G. '76	NY N	Gluszak, Timothy J. '88	Brady, Jeffery E. '85	WYA	Bender, P.E., Donald L. '53		
	Sueller, Leonard G. '58		Wallace, Stanley E. '75		Havas, Donald W. '67	Feldmann, Andrew Russell '89		Lester, Roger N. '87		
KS I	Koelliker, James K. '67	MI H	Harder, Shawn J. '80	NY E	Mercando, M.D., Anthony D. '76	Prunty Jr., Robert W. '71				
	McKinnis, Steve R. '74		Polkinghorne, Bruce R. '50		Snyder, William J. '81	SC I	Baggett, Charlie C. '63			
KY A	McIntosh, Ritchie D. '75	MNA	Ball, William L. '70	NY I	Steinle, Kathleen S. '77	Kelly, Robert T. '86	AL A	Chancey, Carol '96		
	Taylor, Ronald Lee '89		Braaten, David L. '75	NY II	Drexel, Peter G. '69	Kennedy, Thomas W. '64		Josephson, William Ernst '87		
	Thoney, P.E., Roger N. '76*		Chapin Jr., George G. '47	NY P	Faaland, Robert W. '77	SD A	Beacom, E. Kevin '82	Josephschrodt III, Francis J. '74		
KY B	Cocanougher, David S. '83	MS A	Mills, Marvin L. '65		Kull, Philip R. '86	TN A	Bowers, Robert W. '68	AL B	Doughty, Ralph O. '61	
	Hundley, John S. '87		Williams, Michael L. '80		McBrien, William J. '87		Davis Jr., Fred T. '74		Cavender, James M. '66	
	Hundley, Theresa H. '87	MS B	Gray, James M. '88	NCA	MacHnik, Nicholas J. '76	Henson, Joe M. '58		AL I	Little, George A. '81	
	Lambert, Michael Todd '88		MacDonald, Glenn E. '78		Minday, Richard M. '66	Hooker, James W. '62	AL Z	A La Roche, David F. '86		
	Raderer, Thomas K. '73	MO A	Brownfield, David L. '68		Shepherd, Steven Olin '94	Hunt, Roy J. '67		Lane, Timothy Robert '91		
LA A	Angelo Jr., Ernest '56		Caruthers, James R. '69	NC I	Skinner, James O. '73	Shoemaker, John E. '67	AR A	Leonardi, Suryanto F. '86		
	Franklin Jr., Duard D. '74		Henderson, Betsy A. '84		Ando, Robert R. '73	Snyder, Kevin Lloyd '93		Clark, Terence B. '56		
LA I	Ball Jr., John G. '61		Stiefemann, Michael C. '86		Board Jr., John A. '82	Welch, David O. '60		Goodson, Gary M. '77		
	Sewell, P.E., Curtis R. '69		Thoe, Terrence W. '92		Bullard, John C. '47	Williamson, James M. '79	CA A	Jenkins, Lynn P. '81		
LA A	Garber, James D. '66	MO B	Benson, William A. '77		Chambers, William F. '60	TN B	Convery, Thomas Patrick '02	CA A	Chew, Richard S. '65	
LA E	Champagne Jr., Leo Pierre '76		Hacker, Alden G. '62		Farst, Douglas E. '79		Drago, Joseph A. '65		Griswold Jr., Thomas F. '72	
ME A	Degon, Robert J. '66		Schmidt, Thomas E. '70		Flowers III, George H. '65		Hauenstein, Stephen F. '77		Hall, Robert M. '70	
	Jones, Jeffrey A. '75		Stevens II, Oramel D. '72		Moulton, Paul R. '80		Petersen, Eric S. '84		Hogge, Wilbur E. '80	
	McKusick, James E. '82		Stevens, Robert E. '85		Scarborough, Paul R. '72		Atchison Jr., Paul C. '66		Kaprielian, Elmer F. '42	
	Musk, Ph.D., Jeffrey H. '86		Wilreker, Victor F. '72	NC D	Hollar, Donna A. '88		Britton, Thomas C. '88		Love, Chilton '65	
	Plesset, Robert J. '81		Zimnick Jr., Harold E. '64	ND A	Vastag, Harold J. '69		Crawford Jr., Walter K. '62		Lee, Raymond '04*	
MD A	Burck, James M. '86	MO I	Briner, Charles D. '52	OH A	Bondor, Paul L. '63		Smith, Benjamin L. '68	CA B	Jensen, Pauline H. '77	
	Frisco, Louis J. '49		Burgi, Charles E. '51		Brichford, Thomas K. '55		Fernbacher, John M. '82		Scandella, Carl J. '66	
	Linaweafer, F. Pierce '55		Kilert, Albert H. '63		Honious, Robert Todd '69		Skaras, John '73	CA I	Batemann, Terry S. '58	
	Powell, P.E., Charles A. '50		Lum, Thomas '51		Thro, Stuart W. '64		Zeis, John F. '62		Grolle, Timothy F. '78	
	Rochkind, Allen '65		Mills, Robert A. '57		Best, Robert A. '55		Smelser, P.E., Ronald E. '71		Love Jr., Ralph E. '57	
	Wiseman Jr., William J. '64		Standridge, Charles R. '75	OH B	Stelnek, Richard B. '55		Hight III, Terry H. '70		Madden, Christopher J. '85	
MD B	Eberly, Steven C. '87	MT A	MacKin, R. Peter '81		Au, Ralph D. '71		Hoover, Thomas E. '56	CA A	Heine, Thorsten '93	
	Greville, Edgar M. '67		Osgard, Dennis M. '62	OH I	Joehlin, Stanley W. '60		Magee, John V. '81		Morette, Vincent C. '62	
	Jansen, Russell O. '74	MT B	Ahlgren, Kyle Duane '95		Nodes, P.E., Scott E. '84	TX B	Evans III, Peter '80	CA E	Hollar, Ray R. '78	
	Kanofsky, Hal S. '70		McDonnell, Kathleen G. '83		Riedel, Kimberly S. '90	TX I	Watts, Thomas L. '75	CA E	Lew, Marshall '71	
	Law Jr., Preston E. '60	NHA	Charron, Ronald H. '64		Spicer, John Paul '96	TX A	Coman, Paul Daniel '03		Stein, Eugene P. '68	
	McMiean, Donald G. '76		Kieffer, Roger A. '61		Stephenooff, Mark S. '79		Dokos, Nick G. '57	CA Z	Sabbatini, Julian '68	
	Perkins, Michael Joseph '95		Littlefield, Raymond S. '73		Zeller, Hugh J. '66		Kunze, Glenn R. '77	CA H	Bahr, Alfred J. '58	
	Schaefer Jr., William J. '62	NJ A	Appuliese, Michael F. '72		Cull, Ronald C. '70		Madeley, Hulon M. '58		Chin, Roy K. '84	
	Tracey, John S. '74		Ciccolella, Sergio A. '72		Kubinec, William R. '67		Masset, Donald A. '70	CA Z	Holstead, Raymond H. '71	
MA A	Whitehead, Edward R. '62		Ehrhardt, William C. '68		Rutledge, Sharon K. '84		Newton, Philip L. '67		Kovalick, Albert W. '72	
	Berndt Jr., Edward C. '44		Gresnif Jr., John F. '66		Johnson, Scott D. '76		Nuccio, Robert P. '51	CA I	Thornton, Roger Lane '93	
	Bujaucus, Gerald A. '79		Helfrich, John H. '50		Shilling Jr., Walter William '97		Schwierke Jr., Perry J. '60		Cook, John R. '76	
	Carlson, William W. '81	NJ B	Sussmann, Kenneth P. '72		Murphy, Charles J. '77		Motley, Edward M. '76	CA I	Hoeckstra, Gerben N. '66	
	Eggimann, Wilhelm H. '54		Adams, Frank G. '53		Kriete, Vance R. '63		Norwood Jr., Edwin B. '67	CA K	Kern, Jack C. '71	
	Royea, James Edward '92		Capasso, Michael A. '82	OH E	Rutledge, Sharon K. '84		Rivers, Larry D. '75	CA A	Sanick, Susan R. '72	
MA B	Balazs, Phillip T. '69		Capo, John R. '69		Johnson, Scott D. '76		Southall, Hugh L. '68	CA M	Clark, David James '99	
	Bennett, Kenneth Harold '89		Plant, Stephen I. '65		Shilling Jr., Walter William '97		Whittle, Linda J. '84		Kirkpatrick, Steven E. '80	
	Borrmann Jr., George H. '57		Tanner, Robert B. '64		Murphy, Charles J. '77		Foster, Otis C. '82	CA N	Morrison, J. A. '84	
	Cox, Russell N. '49		Gagliardo, Reginald S. '70		Kriete, Vance R. '63		Lopez, Norma J. '78		Pitzer, Allan G. '66	
	Denhard, William G. '42	NJ I	German, Dorothy M. '73		Lambert, Donald Christopher '94	TX I	Lopez, Norma J. '78		Watson, William W. '66	
	Goldman, Barry '76		Goodrich Jr., Robert R. '70		Steffanelli, Loretta M. '86	TX A	Cartier, Jason O. '87	CA E	Anderson, Clayton Jerome '95	
	Hampter, Robert W. '48		Lipuma, Charles R. '53		Jarvis, Paul E. '63		Garcia, Danny '85		Michener, David Clayton '90	
	Kulin, S. Andrew '49		Padgett, Richard J. '72		Robinson, Alan H. '56		Perez, Romeo R. '82	CA E	Robinett, Robert Lloyd '93	
	Wrinn, Joseph F. '59		Reitano Jr., Anthony J. '72		Smith Jr., Clifford V. '54		Saenz, Ida F. '84	CA I	Schroeder, Steven A. '78	
MA A	Benedict, Kurt G. '55		Sulzberger, Carl L. '62		Buchanan, Marlowe J. '92		Stewart, Robert '82	CA T	Black, Stephen H. '85	
	Colen, Esq., Frederick H. '69		Garing, John D. '80		Bradley Jr., Charles W. '51		Stewart, Robert '82		Lawrance, Charles H. '42	
	Murch, Robert E. '58	NJ D	Mahaney, Donald R. '55		Hernjak, James Gregory '96		Piccolo, John F. '58	CA T	Montgomery, Tami A. '86	
	Quock, Pamela B. '78		Mills, Franklin P. '84		Hjorth, Beverly E. '79		Spong, Robert N. '58	CA O	Crichton, David Drewry '97	
	Shaer, Norman R. '58		Prutzman, Robert A. '72		Knorr, David B. '74		Craig, Donald D. '82		Miks, Kathryn F. '87	
	Surtrees, Robert E. '55		Wolff, Richard J. '72		Leach, Jeffrey D. '77		Clark, David T. '81	CO B	Anderson, John A. '39	
MA E	Glatfelter, William '87		Busch, Robert D. '72		Link, Roderick W. '44	VT B	Colonna, James L. '65		Davis, Gregg R. '77	
	Jurczyk, Thomas W. '71		NMI		Parsons Jr., Donald F. '70	VA A	Evans, Gary K. '77	CA E	Drexel, Charles F. '43	
	Lichtig, John F. '83		NMB		Coombes, Bernard F. '55		Hopson, Robert C. '69		Greene, Christopher S. '73	
	Travers, Harvey C. '48		NYA		Hjorth, Beverly E. '79		MacKay-Smith Jr., Alexander '59		Hora, Keith Y. '87	
MA Z	Costa, Bruce A. '79		Silbert, Glenn R. '75		Link, Roderick W. '44		Ring, Jesse B. '69	CO A	Morgan, James I. '55	
	Philbrook, T. Varnum '73		Zimmerman, Robert W. '77		Parsons Jr., Donald F. '70		Wyant III, Thomas R. '71		Olson, David R. '79	
MA H	Daniels, Susan C. '81	NY B	Demyanovich, Sara E. '85		Coombes, Bernard F. '55	VA B	Dollard, Joseph S. '51		Walker, John S. '53	
	Whitley, Norman L. '75		Falvo, Louis '59		Hjorth, Beverly E. '79		Gresham, James A. '83	CO A	Longino, Barbara D. '80	
MA I	Allen, Karen Leonard '89		Smith, Kelvin C. '55		Link, Roderick W. '44		Sloan, Forrest E. '83		Longino, James L. '81	
	Schultz, Steven A. '82	NY I	Brand, Terrance Alan '90		Parsons Jr., Donald F. '70		Summers, Drew D. '79	CT A	Feinman, David M. '49	
MI A	Bayer, Dorothee A. Rometsch '83		Bruch, Charles G. '59		Coombes, Bernard F. '55		Taylor Jr., John F. '83		Mengwall, Martin Lennart '94	
	Giddings, Louise E. '83		Lynch, Karen Allen '86		Hjorth, Beverly E. '79		Wayne, Jennifer S. '83	CT B	Berg, Kenneth P. '73	
	Golden Jr., August '66		Lynch, Michael F. '87		Link, Roderick W. '44		McGowan, David M. '89		Conklin, James C. '50	
	McGowan, Michael J. '75		Merdinger, Charles J. '45	PA B	Parsons Jr., Donald F. '70		Swats, Charles F. '74	DE A	Pittenger, Michael T. '73	
	Solis, Ruben S. '78		Mohr, Wendell C. '53		Coombes, Bernard F. '55		Cahill, Robert S. '72		Tybout, Richard A. '43	
MI B	Bohren, James F. '67		Pennisi, Joseph Michael '89		Hjorth, Beverly E. '79		McHenry, John P. '62	DC A	Grayson, Rodney M. '71	
	Dejonge, Michael K. '65		Sacks, Alexei Hiram '90		Link, Roderick W. '44		Rosen, Donald G. '58		Karydas, Apostolos E. '62	
	Halpin, John A. '51		Spengler, Stewart R. '52		Parsons Jr., Donald F. '70		Smith, Jeffrey F. '82	DC B	Sharpe, Irene W. '63	
	Leven, Peter Johannes '93		Stevens, Richard K. '64		Coombes, Bernard F. '55		Myers, Richard M. '80		Delgado, Antonio J. '93	
MI I	Anderson, Richard W. '66		Walczak, Dennis J. '76	PA I	Hjorth, Beverly E. '79		Trippel, Robert C. '57		Kosnik, Christine Josephine '95	
	Bloomer, Craig D. '80		Walter, Ret, John A. '60		Link, Roderick W. '44		Whiting, Richard M. '76	DC I	Greenwood, Sarah Caldwell '06	
	Bloomer, Kristine K. '81		Weigle, Robert E. '51		Parsons Jr., Donald F. '70		Zimmerman Jr., Albert R. '58		Fl A	Milburn, David M. '91
	Brophy, Jere H. '56		Williams IV, Carter N. '66		Coombes, Bernard F. '55		Dehart II, P.E., Robert E. '72		Shelton, Mark R. '80	
	Camner, Morris H. '50	NY A	Alasti, Ali '84		Hjorth, Beverly E. '79		Janeshek, Anthony M. '74	FL B	Westphal, Roger A. '86	
	Coats, Keith H. '56		Damesek, Scott G. '80		Link, Roderick W. '44		Collins, David Y. '48		Gonzalez, Cristina M. '79	
	Delgass, William N. '64		Waring, Michael D. '65		Parsons Jr., Donald F. '70		Diedrich, Donald L. '69	FL C	Stambolian, Damon Burns '98	
	Earl, George C. '66		Feldman, Robert E. '59		Coombes, Bernard F. '55		Easton, David W. '68	FL I	Bowman, Harold J. '77	
	Friess, John G. '57		Lombardi, Francis A. '70		Hjorth, Beverly E. '79		McNamara, Robert T. '62		Prosser III, David S. '77	
	Gibbons, Harold M. '50		Metzko, Alfred E. '64		Parsons Jr., Donald F. '70		Meister, James R. '78	FL E	Hansen, Christian Michael '88	
	Grants, Valdis '64		Pinnes, Edward L. '71		Coombes, Bernard F. '55		Page, Christopher Scott '90		Bunzl, Rudolph H. '43	
	Guttman, Richard T. '60		Rosen, Fredric K. '62		Hjorth, Beverly E. '79		Pristelski, James S. '66		Gaulter, Kenneth W. '81	
	Hammond, Donal D. '52		Choma, Peter '73		Parsons Jr., Donald F. '70		Siekier, Frederick A. '70		Jory, Virginia V. '71	
	Hedding, Dale P. '61		Alvy, Reuben R. '42		Coombes, Bernard F. '55		Wellauer, John C. '65		Leathers, James C. '81	
	Hosford, William F. '50		Bergh, Gerald K. '58		Hjorth, Beverly E. '79		Wulf, Kurt H. '63		Lee, George H. '70	
	Iler, Gerald W. '49		Beron, Michael '71		Parsons Jr., Donald F. '70		Wymelenberg, Richard J. '77		Pipkins, Daniel Scott '88	
	Linnell, J. Scott '78		Del Mazo, Jorge R. '69		Coombes, Bernard F. '55		Hughes, Philip J. '66		Sullivan, Francis J. '86	
	Lugten, John B. '76		Dicker, Daniel '51		Hjorth, Beverly E. '79		Lenz, Marsha J. '86		Tyber, Harold B. '74	
	Lust, Robert V. '78		Wasserman, Herbel '48		Parsons Jr., Donald F. '70		McMorrow, Daniel Patrick '98		Tyler, Stephen M. '84	
	Maker, Pamela A. '81		Bulman, David H. '58		Coombes, Bernard F. '55		Mooney, Thomas J. '79	ID A	Ahlschleger, Alan D. '87	
	Nicols, George '85		Faigle, Gary V. '78		Hjorth, Beverly E. '79		Panning, Martin H. '49		Spangrude, Gene R. '73	
	Poy, Alfred Lim '91		Kaylor, James M. '88		Parsons Jr., Donald F. '70		Wick, Paula B. '81	IL A	Allison, Herman D. '69	
	Sherman, Larry G. '66		Johnston, John C. '69		Coombes, Bernard F. '55					
	Siewiorek, Daniel P. '68		Roos, Gregory J. '79		Hjorth, Beverly E. '79					
	Simons, Janet L. '77		Telesco, John C. '69		Parsons Jr., Donald F. '70					
	Simons, Joseph L. '75		Hinshaw, David J. '86		Coombes, Bernard F. '55					
	Sivier, Kenneth R. '51		Levy, Cynthia A. '80		Hjorth, Beverly E. '79					
	Smith, T. Murray '72				Coombes, Bernard F. '55					
	Stuart, John K. '54				Hjorth, Beverly E. '79					
	Toliver, Christopher M. '74				Coombes, Bernard F. '55					
	Weber, Michael F. '78				Hjorth, Beverly E. '79					
	Ye, Eric T. '84				Coombes, Bernard F. '55					
MI A	Minnich, Katherine P. '78				Hjorth, Beverly E. '79					
	Schleier, Thomas G. '52				Coombes, Bernard F. '55					

# The Heritage Society

The Heritage Society was established in 2001 to recognize and honor those who continue the tradition of outstanding support by remembering TBP in their plans. Heritage Society members, listed below, have included a provision in their estate plans to benefit the Association and have informed TBP of this commitment. Their support is gratefully acknowledged, and their names will appear each spring.

- Aagaard, Dr. James S., *IL* '53  
 † Alford, Henry M., *MS* A '27 (Dec'd.)  
 † Althouse, Ernest E., *PA* A '26 (Dec'd.)  
 † Anderson, Marshall, *MI* '32 (Dec'd.)  
 Anonymous Alumnus, *MA* B  
 † Arm, David L., *PA* E '30 (Dec'd.)  
 † Banner, Charles E., *OH* '47 (Dec'd.)  
 Barnes, Raymond H., *MI* '40  
 Basta, Edward D., *OH* E '82  
 Beans, Dr. E. William, *OH* '53  
 Burns, Carlisle V., *NY* A '50  
 Budd Jr., Col. Roger, *IL* A '62  
 Campbell, P.E., Cleveland L., *IA* A '47  
 Cancilla, Charles E., *CA* Z '59  
 Colbry, Dr. Dirk J., *MI* A '06  
 Colbry, Dr. Kathleen Luchini, *MI* A '99  
 † Curtis, Dr. Richard A., *OH* A '64 (Dec'd.)  
 † Donoghue, Leonard W., *MA* A '37 (Dec'd.)  
 Dooley, George H., *NH* A '53  
 † Duenweg, Col. Louis, *IN* B '36 (Dec'd.)  
 † Dulles, John W. F., *AZ* A '43 (Dec'd.)  
 Fisher, James E., *CO* A '78  
 Fleming, John R., *IA* B '50  
 † Forge, Charles O., *CA* '56 (Dec'd.)  
 Forslund, Donald C., *NJ* A '60  
 Froula, P.E., James D., *TN* A '67  
 Fue, Harold, *IL* A '57  
 Gendron, Roger J., *IL* B '55  
 Gomulinski, Curtis D., *MI* E '01  
 Gomulinski, Tricia E., *SD* A '98  
 † Hanley, Edward P., *IL* B '42 (Dec'd.)  
 Herke Jr., Frederick P., *OH* A '54  
 † Heymann Sr., Andrew P., *FL* A '39 (Dec'd.)  
 Jackel Jr., Henry E., *IN* B '57  
 Jennings-King, Sherry D., *TN* A '93  
 Johnsen, Roy L., *MI* B '57  
 Johnson Jr., James W., *NC* A '77  
 † Jones, David S., *KS* A '49 (Dec'd.)  
 Kern, Jack C., *CA* K '71  
 † Kolff Van Oosterwijk, H.L.J., *CA* A '50 (Dec'd.)  
 † Liggett, John A., *MI* A '43 (Dec'd.)  
 Luce, John W., *FL* '50  
 Luchini, P.E., Dr. John R., *MI* '71  
 † Lucken, Ernest G., *NY* '42 (Dec'd.)  
 McDonald, Capers W., *NC* '74  
 † Nelson, Thomas A., *CA* A '49 (Dec'd.)  
 Orkins, James E., *OH* '66  
 Pierce, Russell W., *WA* A '70  
 Ray, Frederick H., *OH* E '49  
 † Reed, Dr. Charles E., *OH* A '34 (Dec'd.)  
 Regula, Dr. Donald W., *MI* E '63  
 Reinhardt Jr., William H., *IA* A '48  
 Sax, Franklin S., *MO* '75  
 Scheffler, P.E., Paul H., *PA* Z '48  
 Schmoller, Ralph H., *OH* A '61  
 † Scribner, A. Clayton, *NY* '29 (Dec'd.)  
 Siller Jr., Dr. Curtis A., *TN* A '66  
 Slafer, Lorena I., *CA* A '68  
 Smith, Andrew L., *MS* A '48  
 Smith, Richard N., *OR* A '57  
 Smith, Rodger F., *WI* A '64  
 † Stechmeyer, John P., *OH* E '48 (Dec'd.)  
 Stella, Damien F., *AK* A '82  
 † Strom Jr., George J., *CA* '56 (Dec'd.)  
 Swanson, P.E., Hilmer S., *WA* A '76  
 Swanson, Dr. John A., *NY* A '62  
 Taber, Norma J., *MO* '80  
 Tarwater, James P., *MO* B '51  
 † Taylor, Paul D., *KS* A '58 (Dec'd.)  
 Teti Jr., John J., *WV* B '71  
 Tydeman, Frederick J., *CA* A '73  
 Tyson, Samuel E., *PA* B '48  
 Weissman, Martin J., *NY* E '58  
 White, Robert C., *IL* '56  
 Widmann, Bradley H., *NY* A '69  
 Williams, David C., *TX* B '47  
 † Winkler, Albert H., *AZ* B '75 (Dec'd.)  
 Wisner, Benjamin G., *CA* A '49  
 † Zimmerman Jr., Marlin U., *MD* A '44 (Dec'd.)

Please contact Patricia McDaniel at [pat@tbp.org](mailto:pat@tbp.org) if you wish to be included as a member of the Heritage Society.

## FOUNDER'S CLUB, CONTINUED

- |                                 |      |                               |                                    |                                 |                                   |
|---------------------------------|------|-------------------------------|------------------------------------|---------------------------------|-----------------------------------|
| Brunetto, John S. '76           | KS A | Pack, Garrett E. '60          | Trementozzi, Ralph '85             | Martin, Bruce Douglas '97       | Diefenbacher, Robert H. '59       |
| Ellis, Paul D. '66              |      | Rock, Brian A. '85            | Trementozzi, Venus K. '84          | Prickett, Gordon O. '58         | Gordon, Benjamin Bruce '97        |
| Fitzgerald, Arthur G. '61       |      | Vijgen, Paul '87              | MAZ Kopec, Thomas E. '80           | MS A Dowdle, Walter L. '67      | Graves, Charles J. '60            |
| Hang, Kenneth W. '66            | KS   | Gudenkauf, Wayne Anthony '93  | MAH Leung, Xwinx B. H. '87         | Garnett III, James M. '65       | Lenney, Robert V. '62             |
| Jacobson, Jerome '50            |      | Scarborough, Kirk D. '82      | MAO Moran, James E. '83            | George, P.E., James F. '71      | Walter, Robert W. '64             |
| Karlatzke, Jeffrey Arthur '97*  | KY   | Beilman, Donald S. '54        | MI A Herrick, Robert J. '68        | Hicks Jr., Alfred B. '73        | White, Andrew H. '71              |
| Kareken, Ronald S. '57          | LA   | Bouvier Jr., Maurice J. '59   | Hills Sr., Richard E. '61          | Steele Jr., W. Glenn '68        | NY A Beaubien, Robert Patrick '90 |
| Kipp, Lyle D. '86               |      | Millar, John S. '68           | Hole, Kevin Michael '90            | MS B Miles Jr., John H. '71     | Gordon, James P. '85              |
| Papamarcos, Mark S. '82         |      | Robert, Stephen Douglas '03   | Hunt, Charles B. '80               | MO A Salerno, Michael J. '84    | Gorlin, William B. '83            |
| Rosenthal, Mark A. '81          | LA   | Licciardi, Dolleen M. '79     | Mates, Robert E. '86               | Sandridge, Jack R. '65          | Lazar, Dale S. '74                |
| Ross Jr., William C. '86        | LA   | Sutton, Jerry K. '67          | Meckler, Carrie Lynn '98           | Taylor, James S. '77            | NY E Duffy, John A. '71           |
| Wishner, Richard P. '56         |      | Thomas, P.E., Gerald R. '75   | Nastas III, George '66             | MO B Bach Jr., Wilbert E. '50   | Karger, Walter '54                |
| IL B Kufta, Richard W. '77      | LA   | Savoy, Mark L. '85            | Salisz, Albert A. '75              | Hall, Johnnie E. '59            | NY H Davidoff, Donald A. '72      |
| Stocker, Danny L. '86           | MD   | Aaron, Nelson H. '80          | Su, William Perry '90              | Jenkins, G. Willard '59         | Rubin, David K. '59               |
| IL F Derlacki, Walter R. '45    |      | Belaga, Myron W. '50          | Tschamer, Christopher G. '83       | Oberschelp, William F. '53      | Stecher, Leonard S. '44           |
| Henze, Edward D. '50            |      | Catlin Jr., John C. '69       | MI B Barnhart, Kent T. '83         | Preston, P.E., Scott Steven '97 | Sugin, P.E., Leonard '55          |
| Ho, Benjamin '87                |      | Leith, Robert S. '51          | Klatt, James M. '52                | Thompson, George W. '53         | NY O Franz, John W. '70           |
| Moore, Jeffrey A. '73           |      | Petersen, Randolph A. '77     | Kranz, Paul R. '63                 | MO G Ladewig, Scott James '90   | Free, Albert P. '78               |
| IL A Zeller, Sean Michael '92   |      | Sniegowski, Gary H. '78       | Meiselman, Herbert J. '62          | Patterson, James Glen '99       | Hunt II, William E. '59           |
| IL E Fiochio, Samuel D. '73     |      | Windham, Robert C. '74        | Zollinger, Howard A. '51           | MT A Fischer, Douglas A. '74    | Marvin, Mayne D. '80              |
| IL Z Murray, Daniel A. '93      | MDB  | Bohe, Michael E. '85          | MI G Ash, Russell A. '51           | Johnson, John L. '49            | Schwind, Daniel R. '76            |
| IN A Bach, Gary R. '74          |      | Calvert, J. F. '84            | Badalament, Michael A. '91         | MT B Jones, Sharon Alane '93    | Young Jr., Lloyd W. '66           |
| Carpenter, Randall W. '82       |      | Cascio, Horace E. '77         | Balotner, Donald W. '62            | NV A Linebarger, Janna L. '71   | NY I Ahlman, Lars T. '71          |
| Davis, Perry N. '72             |      | Ciconte, Anthony T. '71       | Byce Jr., Richard C. '51           | NHA Bean, Stanley O. '57        | Deluca, Richard T. '73            |
| Doak, Don W. '58                |      | Cuesta, Ernesto '71           | Dalby Jr., John C. '68             | Herrin, Ned E. '50              | Issapp, P.E., Alan B. '74         |
| Edelsohn, Charles R. '48        |      | Gray, Donald L. '55           | Emrick Jr., William F. '52         | Johnson Jr., Carl E. '53        | Levy, Rami C. '92                 |
| Flanigan, David L. '66          |      | Roberts, Victor D. '64        | Foulke, James A. '59               | Qualters, Kevin R. '85          | NY K Isaacs, Morton S. '66        |
| Harrod, Byron N. '71            |      | Schulman, Joseph R. '44       | Frantz, John A. '75                | Russell, Earl D. '57            | Peters, Kenneth J. '87            |
| MacKlin, Dennis G. '81          |      | Sennewald, Perry F. '53       | Gross, Paul H. '83                 | NJ A Boardman, Thaddeus J. '52  | NY A Madia, Michael '81           |
| Mills, Michael S. '69           | MAA  | Kerr, William A. '60          | Islip, Philip N. '79               | Wertheim, Gunther K. '51        | Passut, Charles A. '67            |
| Riley, Daniel W. '71            |      | Weeks, Frank E. '46           | Jones, Bruce E. '81                | Wolosky, Irwin S. '68           | NY M Fredlund, John R. '83        |
| Schmertzler, Alvin L. '45       | MAB  | Bangser Jr., William '48      | Malloch, Charles D. '57            | NJ B Cole, George W. '83        | NY E Green, Gary P. '71           |
| Seefeldt, Waldemar B. '47       |      | Baxter, Gail D. '74           | Miekha, Richard G. '56             | Lawler, Barbara E. '82          | Haller, Marc F. '85               |
| Simnick, James J. '74           |      | Bergles, Arthur E. '57        | Passman, Richard A. '44            | Schulz, Edward D. '79           | Vitulli Jr., Joseph L. '80        |
| Smith, Gary R. '78              |      | Ciaramaglia, Frederick J. '69 | Upham, Donald L. '58               | York, Brian J. '82              | NY O Baxter, Scott C. '85         |
| Southam, Robert E. '78          |      | Goren, Leora Michelle '91     | Wingard, Joseph '80                | Young, Clifford N. '83          | Eggleston, Peter A. '81           |
| Yokomoto, Charles F. '64        |      | Greene, David L. '68          | MI A Trama, Louis A. '73           | NJ F Bross, Warren C. '56       | Volkman, Arthur G. '81            |
| IN B Raff, Barry E. '67         |      | Johnson, Timothy L. '68       | MI E Youkstetter, Frederick H. '57 | Busch, Robert E. '68            | NY P Shakhshober, Douglas J. '85  |
| IN G Coolahan Jr., James E. '71 |      | Margulis, John R. '54         | MI Z Margolin, Giovanni '70        | Meany Jr., Thomas J. '66        | NY A Hartmann, Martin R. '83      |
| Fitzgerald, Edward J. '86       |      | Morin, Gene D. '58            | MI Z Carpenter, Robert D. '82      | Sulzberger, Virginia Claire '62 | Rossin, Alan R. '79               |
| Foley, Dan J. '70               |      | Penn, Franklin E. '40         | Groffey, James E. '48              | NJ A Abes, Jeff Isaac '97       | NY A Bennett Jr., C. Leonard '63  |
| Lykins, P.E., David Rickert '96 |      | Post, Allen E. '66            | Kipp, Carl R. '83                  | NMA Anger, Denise Chavira '96   | Bishop, Ernest A. '73             |
| Makarewicz, Peter J. '73        |      | Seagle, John P. '55           | MI H Chute, Richard '49            | NMB Gallegos, Floyd R. '82      | Buckner, Harry Benjamin '92       |
| Sillio Jr., Charles B. '65      |      | Shinko, Martin S. '72         | Grice, James Christopher '99       | NMF Gollmer, Nicholas Alan '95  | Keith, Alan R. '82                |
| Walsh, John S. '80              |      | Tou, Frederick N. '81         | Longenecker, James R. '94          | NY A Feuerstein, Stewart F. '80 | NC F Astorino, Arthur '79         |
| IA A Brackett, Robert C. '48    | MAA  | Zukowski, Charles A. '81      | Pascany, Kenneth Michael '86       | Friedman, Morton B. '48         | Davidson, P.E., Lindell A. '49    |
| Hayes, John O. '66              |      | Anderson, Thomas T. '57       | MI O Kaiser, Stephen G. '76        | Moody, J. Roger '58             | Proctor, James F. '56             |
| Hicks, Roger D. '57             |      | Hunt, Robert F. '59           | Merrick, Nelson J. '71             | Repetti, Ronald V. '57          | ND A Penne-Delaney, Beth M. '88   |
| Huber, Robin '93                |      | Iovanna, Paul R. '78          | MI I Sherry, Eric '84              | NY B Engel, P.E., Howard D. '50 | Schmidt, Wayne J. '50             |
| Neumayer, Robert '59            |      | Levin, Neil '80               | MI I Haupt, Shelby K. '84          | OH A Leight, David M. '75       | Berman, Barry L. '64              |
| Rowe, Alvin G. '63              | MAE  | Weigand, Christopher D. '77   | Lyle II, Arthur Raymond '93        | Rubinstein, Ian Z. '69          | Hartsell, Debra Lynn '90          |
| Sorensen, John A. '62           |      | Field, Leslie A. '83          | MNA Edeskuty, Fred J. '49          | Spearot, James A. '67           | Hartsell, Michael David '91       |
| Veenstra Jr., Henry R. '71      |      | Nordstrom Jr., Carl H. '73    | Felt, Warren A. '44                | Stanton, James W. '61           | Holloway, Walter M. '67           |
| IA B Lammers, Leon '59          |      | Nowell, Randall J. '73        | Larson, Keith A. '84               | NY G Beesley, Arthur H. '75     | Litzler, Thomas C. '53            |
| Nicodemus, Keith L. '52         |      | Perry, Ronald F. '62          |                                    | Covello, Joseph '63             | Marcus, Julius L. '60             |

**FOUNDER'S CLUB, CONTINUED**

Radke, Charles E. '55	Jenks, Steven G. '73	RI B	Brady III, William J. '80	Garey, James R. '60	Trotter, Vanessa H. '97
Ricart, D. Glenn '71	Stone, Solon A. '52		Braman, David P. '76	Hopper, Bruce L. '67	VA A Peay III, J. H. Binford '62
OH B Bodoci, Andrew '65	PA A Albright, Carl H. '55		Burger, Laurie A. '76	Murthy, Prahlad N. '92	WA A Beckman, T. Jane I. '75
Dartnall, R. Donald '47	Breingan, William D. '51		Byers, Thomas L. '86	Schroeder, Scot A. '81	Chou, Chung-Kwang '75
Greene, Samuel J. '75	Fehnel, Gary N. '79	SC A	Mitnick, Margaret H. '85	Soncraut, Charles U. '71	Danielson, Donald H. '54
Harris, Neil H. '79	Frey, P. Wayne '51		SC A Kennedy, Dana Melissa '02	Wright, Charles E. '62	Englund, Edward J. '56
Hatch, Jeffrey A. '74	Greer, Carl C. '62		Kragas, Tor K. '79	TX E Damoff, Howard A. '84	Grant, Patrick W. '75
Heberling, Thomas '62	Hallberg Jr., Edwin '51	SC B	Lancaster, Harry L. '80	TX E Dunbar, Ph.D., Bonnie J. '83	Haase, Richard H. '50
Shields, John L. '75	Phelps, David R. '62		SC B Seelke Jr., P.E., John L. '70	Smith, Kevin G. '81	Levin, Marc E. '80
Wilke, Raymond J. '81	Ruth, Richard L. '68	SC F	Wilson, Samuel Scott '91	TX H Chandler, Pierce L. '67	Mace, Leslie E. '75
OH F Engen, Todd C. '81	Schatz, John A. '77		SC F Frailx Jr., James T. '59	Le, Anhnguyet Thi '99	Oren, Kjell '79
Golding, James M. '75	Swartwout, John B. '73	SD A	Sullivan, Jack L. '79	Ripenewalt, J. Richard '69	Semke, Leon K. '58
Harris, William E. '58	PA B Martignetti, Joseph F. '78		SD A Bier, James J. '84	TX E Hippenstiel, Ralph D. '72	WA B Comstock, Lori A. '78
Miller, Samuel H. '61	Ross, David S. '69		TN A Kleinschmit, Nathan Irvin '01	TX E Trejo, Pablo Antonio '00	Stephens, John L. '51
Witzgall, W. Kenneth '61	Trocchio, James T. '82	TN A	Blazier, Stephen D. '74	UT B Hart, Robert E. '73	WA G Ott, John '87
Zupancic, Michael A. '87	Warren, Mark L. '81		Diaz, Amy A. '96	UT B Mildenhall, G. Thomas '75	WA A Bailey, Gardmer S. '74
OH A Hupp, William M. '69	PA F Bloom, Jeremy A. '73		Dye, Giles S. '61	Paxton, Thornton S. '63	WV A Fisher, Ervin C. '68
Kizlik, Lawrence James '90	Chong, Jike '01		Lundy, Ted S. '54	VT A Egner Jr., J. David '79	WV A Kacik, Richard J. '84
Miller, Rodger K. '65	Frison, Bradley J. '82		McConnell Jr., Oaldie K. '51	Sweeny, Gregory N. '70	Mongold Jr., Guy E. '50
OH E Henfling, Richard N. '84	Hall, Thomas J. '49		Picquet, Norman E. '50	VT B Abbott, Walter H. '53	WV B Hainer, Victor Keith '00
OH Z Spicer, Alvin L. '67	Jourdian, John M. '84		Rasnake, Mark Steven '94	VA A Binder, Ronald W. '74	Howard, Michael Ray '93
Woeller, Arthur C. '70	PA A Cavallaro, Joseph R. '81		Robertson, Janet P. '85	VA A Broaddus, Susan R. '85	WI A Cook, Dennis C. '62
OH H Curran, Edward T. '48	Werwa, Eric '92	TN B	Campbell Jr., Henry G. '59	Cosby, James G. '61	Tahl, Kenneth L. '57
Downey, James R. '83	PA E Catudal, Joanne B. '80		Casson, Leonard W. '81	Kiss, Linda D. B. '85	Tausche, Paul E. '48
Spector, Marvin '73	Hartsel, James E. '62	PA Z	Fagan, Tony D. '85	McGhee, Kenneth H. '64	Wernecke, Charles R. '66
Stevens, Mark Richard '04	PA Z Griggs, Robert J. '84		Petersen, Stephanie O. '84	Reynolds, Albert B. '53	WI B Haas, Robert S. '45
OH E Begovich, John M. '74	Shaton, George '68	TX A	Trimble, Darrell T. '77	Rodeffer, Charles C. '58	Hauser, Eric D. '77
OH I Muskoff, Terry E. '67	PA H Clarke, Charles W. '86		TX A Ammerman, Wesley B. '70	Stickler, Robert L. '54	Lind, Robert A. '64
OH K Adams, Daniel J. '78	Fruci, Natale A. '55		Bouchier, Joe T. '67	VA B Davidson Jr., Charles A. '70	Pelt, Thomas E. '70
Suhoza, Keith Andrew '91	PA E McElheny, James E. '70		Kuehnast, Walter U. '78	Ernest Jr., Charles L. '70	WI G Siehr, Tim M. '86
OH M Clement, Susan Seitz '96	PA A Francisco, Amy Denise '99		Machemehl Jr., Charles A. '57	Kern, David P. '98	WI E Nelson, Ladd Eric '91
OK A Cramer, Karen F. '80	PA A Leiss, Wayne G. '76	TX B	Penley, Percy A. '48	Myers, Kenneth S. '53	WI A Meacham, Scott A. '88
OK B Petruska, Gregory J. '80	PR A Perez, Luis A. '88	TX F	Jenkins, William '58	Smith III, Cloid R. '75	Reed, Bret Joseph '89
OK F Miani, Lino M. '86	RI A Olding, Duncan R. '55	TX A	Caddes, Donald E. '58	VA F Korte, P.E., John J. '80	
OR A Chapman, James A. '58	Salmon, Edward D. '66		Tilton, James C. '76	Rausch, Leonard E. '80	
Gibbs, Bruce F. '79			TX A Dowling Jr., Clloyd J. '51	Simmons, William Allan '95	

# In Grateful Appreciation of 2011 Member-Contributors

AL A Downs, Brian Joseph '07*	CT B Evitts Jr., Joseph K. '80	Shimp, Alan B. '55	Haritatos, Nicholas J. '52	MI K Folkert, Karalyn Faith '03*
Jones, Edwin E. '75*	CT F Lockard, Alan A. L. '85*	Staehle, Robert L. '77	Kim, Gina '02	MNA Anderson, Charles D. '82*
Watters, Robert Edward '91	Weidler, Michael Joseph '91	Striz, Alfred G. '76	Michel, Robert C. '50	Bernat, Harry '49
AL B Bailey Jr., Boyd L. '74	DC A Naluwoza, Samalie N. '05	IN B Bechtel, Morris A. '64	Torrielli, Luisa Kathleen '98	Goldstein, Richard J. '48
Drummond, Donna L. '84	DC F Aunon, Serena Maria '97	Heavin, Robert A. '73	Weston, Theresa A. '80	Harris, Charles A. '61*
Harris, Nicholas Andrew '09*	FL A Crowe, Randal A. '70	Pepper, Dennis J. '80	MAA Clark, Robert A. '57	Koch, Lynn J. '83
King, Timothy V. '85	Grau II, Erwin F. '67	IN F Callera, Daniel Patrick '77	Fogel, Arlene Beck '77	MS A Corey, Marion W. '54*
Pileteri, Joseph '74	Julian, Harold V. '74	Hicks, Phillip Michael '08*	Hart, James L. '54	Kyzar, R. Andy '67
Ramsey, James D. '64	Knuckey, Thomas S. '86	Morrissey Jr., Thomas N. '64	Young, Wendell S. '45	Warren, James T. '60
Roper, Daniel L. '78	Talbot, Michael T. '71	Sushinsky, Kathryn Marie '09*	MAE Devney, Peter '89	MS B Echols, John A. '67
Sas, Martin S. '73	FL B Senzer, Eric Brian '05	IN D Bublitz, Mark C. '86*	Gould, Daniel Patrick '09*	MO A Oberlag, Gerald A. '66
AZ A Brusck, Richard G. '65	FL F Glenn, Frederick '92	Golddammer, Samuel F. '68	Greenleaf, Francis D. '42	Philipp, Cynthia C. '80
Culbert, Christopher J. '81*	Ledford, Gary D. '75	Kastman, Kenneth H. '66	Laos, Takis '78	Weber, Arthur R. '47
Rosoff, Henry '79	Levins, P.E., Jess W. '74	IN E Nagielski, Lawrence S. '81	Lerner, Herbert A. '50	MOB Bash, David Michael '06
AZ B Allen, F. Grant '63*	FL A Ambrose, Hollis Hedges '82	IA A Benson, Steven G. '76	Lockhart, Newton F. '54	Berry, Alok K. '84
AR A Humphrey, Ronald D. '82*	FL E Hook, Mark S. '96	Maffield, Christopher James '95	Nichols, Matthew Keith '04*	Cerny, Timothy M. '78
CA A Chang, Benjamin C. '88	Tiberio, John Paul '90	Shih, Tom I-ping '76*	Tsang, Janis Chan '87	Knepper, Andrew E. '51
Hamilton, Leroy L. '58	GA A Andrews, Harry W. '70	IA B Edwards, Donald A. '50	Beerman, Maxim V. '86	Riley, Kenneth G. '56
King, Michael R. '65	Carlsen, Edwin C. '81	Madsen, Nels H. '78	Button-Shafer, Janice '54	Spears, Andre Trevor '90
McManus, Robert A. '77	Cordero, Jason Daniel '08*	KS A Coudeyras, James Christian '94	Freeman, Jacob Ross '04	MN B Burns, Steven M. '81
Routbort, Jules L. '60	Cullen Jr., Frank H. '73	Crisler, Robert M. '56	Hayryleiw Jr., Michael '65	MO F Matheu, Amanda Lee '99
CA B Alekseyev, Viktor Yuryevich '00	Dundervill, Walter E. '58	Edge, Norman C. '53	Hazelton, Arthur R. '66	Mitzel, Kevin R. '95
Drehman, Alvin J. '78	Grissett, Dirk A. '88	Givechi, Mehrdad '83	Miller, Kendall G. '79	Schroeder, John C. '86
CA F Fisher, Benjamin P. '74	Hays, James C. '50	Gormish, Michael J. '87	Richardson, Alan M. L. '70	Stephens, Mary Elizabeth '88
Karpel Jr., Edward James '01	Jaklitsch, P.E., James J. '80	Hornor, John M. '70	MAH Hero III, Alfred O. '80	Ungar, Eric E. '51
Kent, David R. '60	Ketts, Bruce L. '70	Lake, Orley L. '61	Stanton, Stacey Kristine '10*	Vanhouten, Robert '47
Richardson, John L. '56	Parker, Elton L. '47	O'Brien, Harry G. '59	MA E Hansen, Eric Warren '93	Wessling, Donald R. '60
Viegas, John R. '58	Raynes, Herman D. '48	Ronnau, James F. '85	MA E Marchese, Sean S. '89	MT A Leclair, Michelle D. '84
Volk, Robert D. '51*	Weber, Eric D. '87	Tackman, Norbert E. '61	O'Melia, Sean Ryan '05	Penberthy, John T. '75*
CA A Choa, Victor K. '78	Williamson, Michael F. '79	KS B Mengelkoch, Gerald Allen '94*	MAI Zawacki, David Vincent '98	Reller, Robert L. '71
Fujihara, Glenn Y. '74	ID A Cavalieri, Ralph P. '75	Schneidewind, Deanna C. '99	MI A Amar, Jack J. '73	WEstein, P.E., Daniel P. '77
Hooper, Brian D. '67	Diedrick, Justin Michael '00	KS F Heronemus, Daryl L. '77	Conkind, Daniel L. '65	NE A Fulton, Eric T. '02
Kobayashi, Mark V. '79	Howard, David L. '92*	KY A Hill, Glenn C. '65	Helmiller, Wayne R. '80	Kaminski, Wayne A. '79
CA E Aghabeg, Darren Hovick '89	IL A Wieggers, Ph.D., Brandy Sue '02	Kline, Zachary Trevor '05	La France, Leo J. '65	Tan, Chee-Peng '99
Bienstock, Bernard J. '68	Alagappan, Vairavan '86	Midkiff Jr., Kenneth C. '79	Vincent, Mervin C. '64	NV A Athey, James M. '82*
Gleichman, Douglas M. '83	Anderson, Richard E. '67*	Nelson, Donald P. '70	MI B Chekan, Vicki A. '90	NHA Brucker Sr., Paul B. '83
Platus, David L. '53	Doerfler, Daniel D. '79	Bullard, Salem C. '63	Ilax, Susan B. '77	Gleske, Indulis U. '70
Wagner, Christian N. J. '51	Gust, Lawrence Alan '93*	Kile, Winston E. '66	Ivesdall, Trygve A. '56	Mayo, James F. '76
Yang, Stephanie N. '07	Harkey, Carl W. '78	Schober, James M. '83	Luttinen, Gail L. '68	WOit, James Loughlin '10*
CA Z Owen, Mark J. '75	Herning, Joel G. '69	LA B Marko, William A. '81*	Thoune, Diane Lynn '98	NHB Cloyd, Joseph R. '92
Sasuga, Valerie Sachie '95	Jacobson, Paul A. '80	LA F Wille, Josh Andrew '09*	MI F Balachander, R. S. '87	NJ A MacMillan, Robert N. '52
CA H Noonan Jr., John T. '69	Musser, Linda R. '81*	Easley, Kelley V. '81	Burnham, Lewis A. '55	Maroulis, Alexandros '04
Paul, Dehabrata '91	Shapland, Robert R. '44	Judice, Reggie P. '75	De Boer, Douglas F. '78	Stein, Gary R. '67
CA E Chen, Andrew T. '87	IL B Rao, Prashant Sadananda '94	ME A Miller, Stanley J. '49	Dean, Clifford A. '50	Tensfeldt, Thomas G. '81
Mijares, Ernest R. '62	Valent, Philip J. '63*	Whitney, P.E., Lynnette A. '99	Fey, Albert E. '55	Wagner, Michael W. '77
Seigman, Paul A. '95	IL F Borden, Roy H. '80	MDA Doll Jr., Martin L. '78	Gustavson, Richard E. '62*	NJ B Jagodinski, Lorraine W. '84
CA I Gong, Howard '82	Bruns, Michael W. '87	Mied, Richard P. '68*	Hale, Kimberly O'Donnell '93	Kossmann, Richard J. '55
Swaidan, Brian E. '68	Nudd, Oliver R. '92	Porter, Neil C. '86	Lou, Zheng '84	Smith, Christian E. '56
Thompson, Michael Y. '71	Pector, Scott W. '78	Reyner, Charles Jeffrey '05	Majeske, Donald D. '54	NJ F Berkowitz, Ellsworth D. '81
CA A Nelson, Thomas A. '67	Zook, Jerry L. '65	Ulanowicz, Robert E. '64	Ponka, Francis E. '74	Dagras, Paul Jorge '92
CA M Chang, Fu-Lien '74	IL A Cornelius, Steven K. '86	MDB Aberg, John R. '75	Schepis, Deborah Kalef '83	Hernandez, David Carlo '03
Taylor, Michael S. '78	Dahn, Robert D. '85	Bloom, Seymour '59	Walters, Jeffrey R. '86	Kobylzar, Thaddeus J. '58
CA N Amirhosseini, Michael M. '90	Kraatz, Roland L. '65	Drager, John A. '64*	MI A Hemminger, Joseph A. '69	Lieberman, Benjamin '10*
Baba, Steven T. '86	Andrew, Stephen P. '82	Guess, Arthur L. '65	Kudlac, Gregory A. '86	Pincus, George '59*
Cornish, Robert C. '08*	Becker, John Harman '03*	Koicisin, Joseph J. '59	Kudlac, Maureen Dorsey '86	Rossi, Richard J. '77
CA E Howard, Timothy C. '81	Brauer, Frank M. '51	Kulstad, M.D., Erik B. '92	Williams, William B. '55	NJ A Aughenbaugh, Jason M. '01
Turner, Michael J. '82	Clark, Ronald R. '62	Luber, Joseph L. '49	MI E Dawson, Deborah Olson '81	Bennett, Karl E. '76
CA F Crampton, Glen H. '71	Colville, James '59	McEnroe, Martin Patrick '88*	Fox, Roger L. '73	Maienschein, Jon L. '74*
CA E Miller, Thomas '82	Cutshall, Theodore W. '49	Van Espoel, John Michael '00	Gaunt, Frederick W. '67	Moore, James H. '84
CA T Bird, Brian A. '80	Derrick, David G. '68	Bowen, Stephen Gerard '86	Grant, Robert M. '75	NMB Emerson, David E. '77
CA V Schroeter, Everett Shuho '02	Dix, Rollin C. '57	Newman, Scott M. '84	MI Z Carpenter, Janet H. '82	NMF Gehris Jr., Allen P. '87
CO A Darling, Edwin E. '68	Duffner, Lee R. '57	Obstnik, Paul E. '86	Landis, Richard W. '69	NY A Choi, Yeon Sub Sub '07
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*The Scholars' Scholarship and the Fellows' Fellowship Clubs were established by the Executive Council in 2011 so that former recipients of these honors could continue the tradition of support for other Tau Bates. We acknowledge contributions made by the following Fellows and Scholars who responded to a separate appeal to help establish new scholarships and fellowships:*

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Bienfang, Cory L., SD B '09  
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 Silver, Jonathan C., CT I '08  
 Sprouse, Mary P., KS I '08  
 Sullivan, Kristin R., MI Z '08  
 Thomas, Dr. Zachary M., NY B '03  
 Woitd, James L., NH A '10

### FELLOWS' CLUB

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 Fersdahl, Mark C., SD A '02  
 Silver, Jonathan C., CT I '08  
 Thomas, Dr. Zachary M., NY B '03

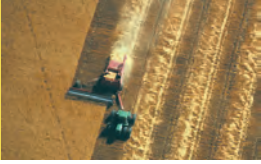
## Special Gifts

*A special gift was received in memory of Shawn R. Schwaller, SD A '95, from Dr. Marvin E. Criswell, NE A '65. A number of special gifts were received in recognition of the many years of service by James D. Froula, TN A '65 as Executive Director of Tau Beta Pi. Both Jim and Tau Beta Pi are grateful for this special recognition.*

## 230 Companies Match Gifts to Tau Beta Pi!

*The following 230 companies and foundations match gifts made by their employees to Tau Beta Pi. Their support is gratefully acknowledged by the Association. All matching gifts are allocated to the Tau Beta Pi Fellowship and Scholarship Programs to provide stipends for engineering undergraduate and graduate students. We welcome two new firms (\*).*

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## LYLE'S LAWS

# The Law of Contests

One of the activities in Navy boot camp was—and probably still is—instruction in various forms of self defense including formal gloves-on boxing. We may have followed Marquis of Queensbury rules but I think we mostly just flailed around while getting some of the basics of jabbing, blocking, bobbing and weaving and, of course, ducking. As the one week course came to an end, our instructor decided that we would have one final match between two “champions”, one from each of the two companies that had undergone the training together.

For reasons still not completely clear to me, I had been appointed Recruit Chief Petty Officer of our company of some eighty young men. The RCPO of the other company was about my size, so the decision was made that the two of us would defend the honors of our respective organizations. The contest was not a pretty sight—at least not from inside the ring. As it turned out, we were both considerably better at offense than defense and as we approached the fifth and final round, the ratio of blows landed to those blocked became larger and larger. The fight ended when my opponent landed a powerful right—or maybe it was a left, I don’t know—and good, red, Iowa farm boy blood gushed from both my nostrils and the fight was called. The instructor didn’t declare a winner, but everyone knew. The guy sitting there bleeding had lost. Hence Lyle’s Law of Contests: Sometimes you win. Sometimes you lose.

Would I have liked to win that contest? Absolutely. Was I disappointed because I lost? Absolutely. Was I sorry I competed? Well, my nose had some regrets, but after a little time for reflection, I was satisfied. I had stood toe to toe with my opponent and had given as good as I got. The honor of Company 181 was intact. It was a fair fight. I would live to fight—metaphorically speaking—another day.

As long as there are contests, there will always be winners and losers. Certainly most athletic games are designed to exclude the possibility of ending in a tie. If three companies bid on a job, only one will get the contract. When twenty people apply for employment at a company that has three openings, there will be more losers than winners. The Law of Contests warns of this situation but it doesn’t say what to do about it. That is because the advice appears to

be so conflicting, I couldn’t encapsulate it. Let me explain my dilemma.

The first bit of advice is to expect to win (see Lyle’s Law of Expectations. Model success. Expect the best.) (Winter 2005, also available at [www.tbp.org/pages/publications](http://www.tbp.org/pages/publications)). In other words, don’t even think that you might lose. When you are writing a proposal, think about how you will execute the project after you have been awarded the grant. As you go into an interview, be making plans about how you will be moving into your new office. As you step into the boxing ring ... Well, here the advice is simpler; don’t step into the boxing ring. But I trust that you get the picture. You have

to believe that you will win and know that you will not lose.

On the other hand, you’d better have a Plan B. A military commander moving troops into battle will always consider how to get those troops out if things go sour and they have to retreat. Prudence pays. So, if there are two agencies that might fund a proposal, submit it to both of them (you can sort out the details after they both have awarded you the grant). When you are looking for

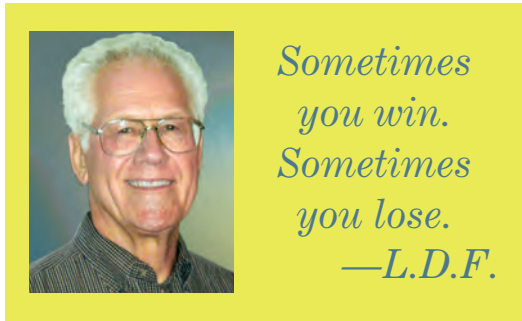
a job, don’t just apply to one potential employer. In other words, have a plan in case you lose.

So the advice is this: don’t even think about losing, but think about losing. Contradictory? Not really. The first refers to your attitude; believe that you will win. The second refers to your actions; prepare for the possibility that you might lose. They are not mutually exclusive. I can believe that I have found a stock that will only increase in value but prudence dictates that I not invest all of my savings in it.

Finally, I hope the Law of Contests will remind you that losing is not the end of the world. It may hurt. It may inflict considerable damage. But if you have contested honorably, there is no shame in losing.

For some years there has been a cartoon on refrigerator doors and in office cubicles showing a very satisfied dragon picking his teeth with a jousting lance. Surrounding him are various pieces of armor, a broken sword and a few horse-shoes. The caption reads, “Sometimes the Dragon Wins”. Sorry, noble knight, you have just become a casualty of the Law of Contests. Indeed, sometimes you lose.

But wait—as the hawkers on TV say—there’s more.



The casual observer of this cartoon will probably overlook the battered shield behind the dragon. Emblazoned on the shield of the vanquished and now digesting knight is the Latin inscription, “*Veritas et Honor*”. Truth and honor.

The message seems clear: the knight is defeated and so, too, are the virtues he championed. Or maybe not. The shield is still there, a little dented and bent, perhaps, and unnoticed by the dragon as he enjoys his postprandial repose. But it is still there. I think the message of this cartoon is, “Sure, I lost this one, but as long as truth and honor and the other virtues are not compromised, I am not beaten.” As Hemingway said in *The Old Man and the Sea*, “Man can be destroyed...but not defeated.”

Coming back to the boxing story, the final chapter was played out the next day when our two companies fell out to march to the mess hall. Even though I had bled profusely the day before, I showed up unmarked by combat. My opponent, on the other hand, had a black eye and his nose was swollen and the color of an over-ripe plum, lingering mementoes of our pugilistic encounter. Sometimes you win. Sometimes you lose.

—Lyle D. Feisel, Ph.D., P.E., *Iowa Alpha '61*

## PETITION TO THE 2012 CONVENTION

In addition to the two petitions reported on in the Winter 2012 edition of THE BENT, an additional petition for a collegiate chapter of Tau Beta Pi has been received and will be presented to the 2012 Convention in Lexington.

The Tau Beta Epsilon Engineering Honor Society has operated at St. Louis University since 2009, when its first members joined. This group submitted a preliminary petition for a new chapter in November 2011. It was approved by the Executive Council for an inspection, and a committee of eight national officials and representatives of two neighboring chapters visited in February 2012. The committee recommended without conditions that a charter be granted to the petitioning group.

St. Louis University is a private, Catholic, Jesuit university founded in 1818. The university is committed to educating “the whole person” and is located on an urban campus in the city’s arts district. Over 14,000 students are enrolled in 100 undergraduate and 50 graduate programs. All freshmen live on campus, and ample space is available for teaching, researching, studying, and relaxing. Honor societies include Phi Beta Kappa and Sigma Xi.

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The Parks College of Engineering, Aviation, and Technology was founded in 1927 and over 500 undergraduates are enrolled in eight academic programs (aerospace, biomedical, civil, computer, electrical, engineering physics, interdisciplinary, and mechanical). The Parks College is housed in three different buildings and students are actively engaged in hands-on activities and undergraduate research. Professional engineering organizations include ASME, IEEE and SWE.

This petition has the support of the administrative officials and faculty of the institution, and will go to the 2012 Convention with Council approval.

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## IN THE COLLEGES

### SPOTLIGHT

#### New York Campus Decision

Cornell University and Technion-Israel Institute of Technology won a New York City contest to build an engineering campus with a grant of land and \$100 million for infrastructure improvements.

The NYCTech campus may generate 600 spinoff companies and \$23 billion in economic activity over the next three decades, Mayor **Michael R. Bloomberg**, MD A '64, told a news conference. The Cornell-Technion proposal offered the most students, most faculty, biggest facility, and most aggressive time frame, the mayor added.

Cornell and Haifa-based Technion beat out six competing bids, including one from Stanford University.

The city is continuing negotiations with Columbia University, New York University, and Carnegie Mellon University about supporting an additional engineering project in the city.

Cornell plans to begin offering classes next year in leased space as it begins building at the site on Roosevelt Island in the East River. Cornell plans to move onto the campus by 2017 and finish construction of 1.3 million square feet by 2027. By 2043, the campus will have 2,500 students and 280 professors.

Cornell said the project will cost about \$1.5 billion. It doesn't plan on borrowing to finance the project and will rely on tuition and philanthropy, technology license fees, and corporate partnerships.

#### New Engineering Degree Peak

The number of B.S. engineering (and computer-science) degrees granted in 2009-10 jumped to 79,528, up by 4,208 (5.3%) from 2008-09 and 1.7% above the previous high of 78,178 in 1985-86.

From the previous year's total (13,420), the number of female graduates climbed by 8% to 14,478, which is 18% of the total degrees and below the record of 20.6% in 1999-2000. The

number of female graduates peaked at 15,282 in 2003-04. Data is furnished by the Engineering Workforce Commission.

In the TBPI class of 2010, the number of female members slipped to 23.5%—a figure that peaked eight classes earlier at 27.3%. Women comprise approximately one-third of the TBPI chapter presidents.

#### More Masters

Engineering master's degree recipients reached a new all-time high of 43,023 in the academic year ending in 2010, according to data from the ASEE.

This compared to 41,632 in 2009, and was the third consecutive year of growth after a dip from 2006 to 2008.

Master's enrollment has increased by 25% since 2005, reaching 103,335 this past fall. Degree growth is expected to continue for the next several years.

Some 54% of the 2010 master's went to U.S. permanent residents, while non-resident aliens took 46%.

#### Faculty Salaries

ASEE collected salary data from 147 public and private engineering institutions for the 2010-2011 academic year.

These salaries represent the average of the medians paid to tenured/tenure-track faculty. The salaries are based on a 9-month equivalent.

##### •Departments

Assistant	Associate	Full Prof.
•Aerospace		
\$81,302	\$99,183	\$129,701
•Biomedical		
\$83,508	\$98,328	\$138,162
•Chemical		
\$83,488	\$93,918	\$129,401
•Civil & Environmental		
\$78,111	\$91,324	\$118,394
•Computer Science (engineering)		
\$86,109	\$97,521	\$128,226
•Electrical & Computer		
\$84,542	\$96,183	\$123,568
•Industrial & Manufacturing		
\$79,094	\$93,392	\$126,584
•Mechanical		
\$80,193	\$91,810	\$119,961
•Metallurgical & Materials		
\$86,029	\$97,907	\$137,106

#### 2012 ACHS Meeting

Executive Director and Editor **Curtis D. Gomulinski**, MI E '01, was the of-

ficial representative of TBPI to the 2012 annual meeting for CEOs of the Association of College Honor Societies in San Diego, CA, on February 16-18.

The conference focused on strategic planning and goal setting for ACHS and included sessions on improving society operations. Tau Beta Pi is the only one of the six founding societies still active in the 71-member ACHS. Chi Epsilon was represented by **Dr. Thomas F. Wolff**, MO B '70, Omega Rho by **Dr. Yupo Chan**, P.E., MA B '67, and Mu Nu Gamma by **Dr. Gene T. Lineberry**, VA B '77.

### PEOPLE

**Dr. Robert A. Altenkirch**, Indiana Alpha '70, has become president



of The University of Alabama in Huntsville. Previously, he served as president of New Jersey Institute of Technology for nine years. A mechanical engineer with particular expertise in combustion and heat transfer, Dr. Altenkirch served as principal investigator for 10 space shuttle experiments on flames spreading in reduced-gravity.

**Dr. Harvey G. Stenger Jr.**, New York Delta '79, became president of



Binghamton University on January 1. He had been interim provost and executive vice president for academic affairs at the University at Buffalo since April 2011. Before joining UB, Dr. Stenger was a chemical engineering professor and dean at Lehigh University and oversaw the founding of the Pennsylvania Technology Alliance to promote economic and technology development.

**Dr. Gregory N. Washington**, Ohio Gamma '89, is now dean of University of California, Irvine's Henry Samueli School of Engineering. He recently served as an associate dean,



and interim dean, at The Ohio State University college of engineering. Dr. Washington's mechanical engineering research interest lies in dynamic systems, with an

emphasis on modeling and control of smart material systems and devices.

**Dr. Ilene Busch-Vishniac**, *Maryland Alpha '78*, has been named as the University of Saskatchewan's ninth president, starting July 1. Currently the provost and vice-president, academic at McMaster University, she previously served as dean of engineering at Johns Hopkins University and associate chair of mechanical engineering at the University of Texas at Austin.



**Dr. Lex A. Akers**, *Texas Beta '71*, has been appointed founding dean of the Caterpillar College of Engineering and Technology at Bradley University effective May 1. He comes to Bradley from the University of Missouri where he has been associate dean for academic programs and professor of electrical and computer engineering. The college was named in recognition of the manufacturer's lead gift of \$30 million to the Campaign for a Bradley Renaissance.



**Dr. Scott A. Ashford**, *Oregon Alpha '83*, pictured, professor and head of the school of civil and construction engineering at Oregon State University, has been selected as interim dean of OSU's college of engineering. He takes over for **Dr.**

**Ronald L. Adams**, *OR A '70*, who stepped down as dean after 13 years

to become OSU's first executive associate vice president for research. Dr. Ashford's research focus has been on public safety and reducing economic loss from earthquakes, tsunamis and coastal hazards. He traveled to Japan to study the impacts of last year's devastating tsunami and earthquake in work funded by the NSF.

**Dr. Michael J. Ginzberg**, *Massachusetts Beta '69*, is now dean of the American University School of business. He was previously dean of the school of business at Yeshiva University, dean and professor of business at University of Delaware's college of business and economics, and associate dean of the school of management at Case Western Reserve University.



## FACILITIES

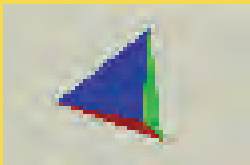
**Valparaiso University** has inaugurated the \$13 million Donald V. Fites Engineering Innovation Center, a state of the art addition to the current engineering and mathematics center. The new facility covers 13,470 square feet, and is made up primarily of laboratory and learning space for undergraduate students. The project also includes a renovation of about 4,300 square feet of existing laboratories. The new building is named after the retired chief executive officer and chairman of Caterpillar Inc., and member of the Valparaiso board of directors. It includes two suites of labs designed to support advanced student research. One suite has labs for materials science, materials engineering and structural engineering. The other is the energy systems suite, which includes the engine test cell, mechanical measurements lab, fluid mechanics lab and small engines lab.

**University of Wisconsin-Milwaukee** was awarded \$1.5 million as part of a \$30 million DOE program that is awarding funding to 24 universities to help train engineering students

while improving energy efficiency. The school will re-establish an industrial assessment center program to train engineering students in energy management concepts. As part of the project, engineering faculty and students plan to consult with small and medium-size manufacturers, assessing their energy use and identifying recommendations for opportunities to reduce waste. Indiana University-**Purdue University** Indianapolis is another of the schools receiving \$200,000 to \$300,000 a year for up to five years for an industrial assessment center. The other schools include **University of Kentucky**. The director of UK's Power and Energy Institute of Kentucky, **Dr. Lawrence E. Holloway**, *TX I '87*, said he thought UK's application stood out because of the university's various technical centers, such as the institute for sustainable manufacturing, that have established relationships with area industries.

**George Washington University's** school of engineering and applied science is receiving an \$8 million dollars gift from **A. James Clark**, *MD B '50*, chairman and CEO of Clark Enterprises, Inc. It will fund the A. James Clark Engineering Scholars program to recruit and graduate students who will become leaders in the profession. The scholars will enroll in a unique boot camp that will guide students to think like professional engineers. They also will have opportunities to intern and study abroad and interact with engineering alumni.

**Texas A&M University** is to have a department head chair in industrial and systems engineering following a \$2 million gift from philanthropists **Dr. William M. Barnes**, *TX Δ '64*, and wife Sugar. He retired in 1991 after serving as senior vice president, finance and planning, and chief financial officer for Rockwell International. The chair holder will focus on student support, faculty development, curriculum enhancement, and research initiatives in the department of industrial and systems engineering. It is funded through the Texas A&M Foundation.



# Brain Ticklers

## RESULTS FROM FALL 2011

### Perfect

*Schmidt, V. Hugo	WAB '51
*Spong, Robert N.	UT A '58
Stribling, Jeffrey R.	CA A '92
Tellechea, Gabriel	TX A '87
*Thaller, David B.	MA B '93
Voellinger, Edward J.	Non-member

### Other

Alexander, Jay A.	IL Γ '86
Aron, Gert	IA B '58
Bertrand, Richard M.	WI B '73
Black, Janine	Non-member
Bohdan, Timothy E.	IN Γ '85
Brule, John D.	MI B '49
Couillard, J. Gregory	IL A '89
Eckley, Paul L.	NV A '75
Egenriether, Brian J.	SC Γ '10
*Griggs, Jr, James L.	OH A '56
Handley, Vernon K.	GA A '86
Harris, Kent	Non-member
Hasler, II, H. Victor	IN B '84
Jones, Donlan F.	CA Z '52
Hoyt, Joseph	6th grade
Sortino, Nicole	7th grade
Weldon, Grayson	6th grade
Jones, John F.	WI A '59
Jones, Michael P.	Son of member
Kimsey, David B.	AL A '71
Lalinsky, Mark A.	MI Γ '77
Marks, Lawrence B.	NY I '81
Marrone, James D.	IN A '87
Mercer, Robert	Non-member
Musser, Marion R.	OH A '57
Quintana, Juan S.	OH Θ '62
Rasbold, J. Charles	OH A '83
Rentz, Peter E.	IN A '55
Schultz Cruz, Daniel	PR A '07
Shaffer, Daniel A.	OH N '11
Siskind, Kenneth S.	RI A '86
Siskind, Amanda	Daughter of member
Stetson, II, Scott B.	CA T '12
*Stout, Roger P.	AZ B '77
Strong, Michael D.	PA A '84
Summerfield, Steven L.	MO Γ '85

\* Denotes correct bonus solution

## FALL REVIEW

The most difficult regular problem was No. 4 about the quadratic equation, which was almost as difficult as the Bonus about satellite orbits. The most popular problem was No. 1 about the cost of a turkey, which had twice as many entries as any other Tickler.

## WINTER SOLUTIONS

Readers' entries for the Winter Ticklers will be acknowledged in the Summer Bent. In the meantime, here are the solutions.

**1** There are no primes in the sequence 9; 98; 987; ... Any member of the

sequence ending in 0, 2, 4, 5, 6, or 8 is not prime; so only members ending in 1, 3, 7, or 9 need to be examined. However, in all these cases, the sum of the digits of the number is divisible by 3, which means the number is divisible by 3. Thus, there are no primes in the sequence.

**2** You were to find two three-digit numbers that sum to a four-digit number such that among them the digits 0 through 9 are used exactly once, that is  $ABC+DEF=GHIJ$ . There are 96 solutions with the maximum and minimum values of  $GHIJ$  being 1602 and 1026.

**3** The lock's combination is 2-5-3-6-4-1. Call the three guessed combinations C1, C2, and C3. Consider C2: there are  $6(5)/2 = 15$  ways for two digits to be correct. Try each of these 15 possibilities by crossing out the corresponding digits in C3. This will leave four digits in C3, for which at most one can be in the same position as one of C2's digits. If this doubled digit, when moved to the C2-C3 empty column, matches the corresponding digit in C1, then the combination has been found. Alternatively, if there is no doubled digit and one of the four C3 digits matches C1, then the combination has been found. For example, try 1 and 3 as the correct digits for C2, which leads to the situation shown in the table:

C1	4	5	6	1	3	2
C2			3			1
C3	2			6	4	5

If we move the 5 in C3 to the second (empty) column, everything matches and we get 2-5-3-6-4-1 for the combination, which is the only solution.

**4** The expected number of tosses of a pair of dice to get 1 through 6 in order is 17.0414. The best way to tackle this problem is by a decision tree. The probability of getting a specific digit in one toss of two dice is  $11/36$ , and the probability of getting both

the desired digit and the next digit is  $2/36$ , so the probability of getting just the desired digit is  $9/36$ , with relative probabilities of  $9/11$  and  $2/11$  of getting one or two matches. The decision tree has 13 branches, such as (1-2-3-4-5-6), (1-2-3-4-56), (1-2-3-45-6), etc., where a double digit means both values are thrown. The expected value ( $E_v$ ) of the number of tosses is the sum of the expected number of tosses for each branch, multiplied by that branch's probability. For any branch, the expected number of tosses is  $36/11$  times the number of steps in that branch. The table provides information on the 13 branches.

# single steps ( $i$ )	# double steps ( $j$ )	# single 6's ( $k$ )	# branches ( $N$ )
5	0	1	1
4	1	0	1
3	1	1	4
2	2	0	3
1	2	1	3
0	3	0	1

The expected number of tosses for a branch is  $(i+j)(36/11)$ . The relative probability is  $9/11$  for each single step,  $2/11$  for a double step, and  $11/11$  for a final single 6. Thus, the probability for a branch is  $(9/11)^i(2/11)^j(11/11)^k$ . The  $E_v = \sum N(i+j)(36/11)(9/11)^i(2/11)^j = 30,189,958/1,771,561 = 17.0414$ .

**5** PLANETS =  $8+14+12+4+3+2+9 = 52$ . Since there are more variables (17 letters) than equations (11 planets), we cannot directly solve for the letter values, but since C and Y only occur together and I and J only occur together, there are only 15 variables, meaning that we can pick four letters, say A, E, O, and U, and express all the others in terms of those four. By calculations like VENUS-SUN =  $V+E = 39-18 = 21$  or  $V = 21-E$ , URANUS-SUN =  $36-18 = U+R+A = 18$  or  $R = 18-A-U$ , and SATURN-SUN =  $33-18 = 15$  or  $T = 15-A-R = U-3$ , it is possible to express all the consonants in terms of A, E, O, and U. It is then a matter of trying different values for A, E, O, and U until a unique

set of values is found (A=12, C=6 or 7, E=3, H=13, I=15 or 16, J=16 or 15, L=14, M=10, N=4, O=11, P=8, R=1, S=9, T=2, U=5, V=18, Y=7 or 6).

**Bonus.** There are 7 fundamentally different paths. There are several ways to solve this puzzle, the most obvious being a large decision tree. A clever solution (outlined below), provided by **William W. Verkuilen**, *WI B '92*, involves finding certain combinations of moves (strings) that recur repeatedly in successful paths. The figure shows the six different kinds of cells (A to F) superimposed on the 5x5 grid.

A-1	C-2	B-3	C-4	A-5
C-6	D-7	E-8	D-9	C-10
B-11	E-12	F-13	E-14	B-15
C-16	D-17	E-18	D-19	C-20
A-21	C-22	B-23	C-24	A-25

The secret to finding a path is realizing that each string starts and ends on a C-cell. Based on only certain moves being possible and the required numbers of these moves, we can deduce that there are two cases (depending on whether there are 2 or 3 B-B moves) to consider and that a complete path for Case I consists of the following 8 strings:

- S1: C-A-F-A-C
  - S2a & b: C-A-C
  - S3a & b: C-E-C
  - S4a & b: C-D-D-C
  - S5: C-E-B-B-B-E-C
- while a Case II path consists of:
- S1: C-A-F-A-C
  - S2a & b: C-A-C
  - S4: C-D-D-C
  - S6a & b: C-D-C
  - S7a & b: C-E-B-B-E-C

Consider Case I. Since all placements of S5 are equivalent, we need to consider only one basic S5 string, so we'll use (4, 24)-12-15-23-11-3-18-(6, 10), where the numbers in parentheses mean either choice is valid. Then, the two S4's must be (2, 20)-17-9-(6, 24) and (4, 16)-19-7-(10, 22), while the two S3's must be 2-14-22 and 16-8-20. There are 6 possibilities for S1 (4 choices for adjacent corners and 2 for opposite corners). For each choice of

S1, the two S2s are set. Try (10, 22)-25-13-5-(2, 20) for S1, which makes the two S2's 6-21-24 and 10-25-22. Since each of the 8 strings making up a path is bounded by Cs and since no 2 strings in a successful path can have the same start and end Cs, once the order of the Cs is determined, the other cells can be filled in uniquely. One way to find a path, is to create a table, as shown. In the top row, enter S2a, S2b, S3a, and S3b; and in the second row, enter their corresponding starting and ending Cs. In the third row enter S1, S4a, S4b, and S5, and in the fourth row, enter their corresponding 2 possible starting and ending Cs. Now, in row 4, cross out one value in each pair in such a way that each of the numbers 2, 4, 6, 10, 16, 20, 22, and 24 appears exactly twice and no 2 strings have the same start and end values. If you can do this, a solution has been found (see example table below). If not, try a new S1, S2a, S2b combination.

S2a	S2b	S3a	S3b
6	24	10	22
16	20	2	22
S1	S4a	S4b	S5
2	4	4	10
20	16	16	22
2	6	4	6
20	24	24	10

To extract the path, start with S1 (16, 2), move to S3b (2, 22), then to S2b (22, 10), etc. to get the order of the Cs: 16-2-22-10-4-6-24-20-16, which upon inserting the rest of the cells gives: 16-1-13-5-2-14-22-25-10-7-19-4-12-15-23-11-3-18-6-21-24-9-17-20-8-16. Two other choices in row 4 give successful paths: 2-4-6-24-20-16-10-22-2 and 20-4-6-24-2-22-10-16-20. If we choose opposite corners for S1, we get two more solutions: 6-2-22-10-4-16-20-24-6 and 20-6-24-2-22-10-4-16-20, for a total of 5 paths for Case I. For Case II, a complete circuit consists of S1, S2a, S2b, S4, S6a, S6b, S7a, and S7b. Applying the same kind of logic to Case II produces two new paths—22-4-16-2-20-24-10-22 and 20-6-24-10-22-4-10-2-20—for a total of 7. (Only the C paths are given to save space.)

**Computer Bonus.** The fifth smallest Keith Number that is also a prime is 1,084,051.

## NEW SPRING PROBLEMS

Here are the new Spring problems. Except for the Computer Bonus, they can all be solved without a computer.

**1** Solve the following cryptarithm:  $O/NE + T/WO + S/IX = NI/NE$ , where / indicates division. As expected, TWO is divisible by 2, SIX is divisible by 6, and NINE is divisible by 9, but oddly TEN is divisible by 7. Each different letter represents a different digit, the same letter represents the same digit, and there are no leading zeros.

—H. G. McIlvried, III, *PA Γ '53*

**2** How many permutations of the integers 1 through N consist of a strictly ascending sequence followed by a strictly descending sequence. For example, for  $N = 9$ , one such permutation is (1-4-5-7-9-8-6-3-2). There must be at least two integers in a sequence, and N is considered to be a member of both sequences. Reversals are not considered to be different permutations, i.e. (2-3-6-8-9-7-5-4-1) is the same as the above example.

—Puzzle Corner in *Technology Review*

**3** Find a non-trivial ( $x, y, z \neq 0$ ) integral solution of the following cubic equation:

$$987,654,321x + 123,456,789y + z = (x + y + z)^3$$

We want the solution with the smallest positive value for  $(x + y + z)$ ; however, this does not imply that  $x, y,$  and  $z$  are all positive.

—The Contest Center

**4** In Green Town, half the farmland must be maintained in a natural state by law. To achieve this, in each field an inside strip around the four sides must be left uncultivated to provide habitat for wildlife. All fields are rectangles of the same size, 100m wide and an integral number of meters long. These border strips, which equal half the field's area, are a uniform and integral number of meters wide. It turns out that the digits in the length, when read from left to right, are in monotonically increasing order. What  
(Continued on page 45.)



## CHAPTER ETERNAL

*The condensed style of these notices of death is made necessary by Tau Beta Pi's large membership and space limitations in THE BENT. You may email or write the Editor for further facts concerning the following deceased members. The assistance of all is earnestly sought in reporting the deaths of Association members, with appropriate details.*

- AL A '37 **Gauggel, Herman J. W.**; October 28, 2007.  
'43 **Oglesby Jr., Sabert**; January 29, 2011.  
'44 **Johnson, Luther W.**; October 20, 2011.  
'52 **Boerner, Robert H.**; January 9, 2012.  
'53 **Boozar, Robert F.**; November 24, 2011.
- AL B '33 **Caldwell, John A.**; January 13, 2012.  
'36 **Morris, Glenn L.**; December 6, 2004.  
'37 **Ferraris, Silvio**; no details.  
'37 **Odiorne, Robert G.**; January 16, 2004.  
'49 **Acker, Richard N.**; December 29, 2011.
- AZ A '32 **Velasco, Jose R.**; May 3, 2001.  
'75 **Parrill, Leslie F.**; November 29, 2011.
- AR A '52 **Tait, George R.**; October 17, 2011.  
'56 **Causey, James C.**; July 18, 2011.
- CA A '47 **Wickham, George E.**; October 25, 2010.  
'50 **Hanson, Lester B.**; January 30, 2012.  
'61 **Shelley, Elbert A.**; February 10, 2011.  
'64 **Dillon, Rodney O.**; November 7, 2011.
- CA B '55 **Noonan, Thomas W.**; December 23, 2011.
- CA Δ '65 **Lew, Art Y.**; April 17, 2008.  
'66 **Loomis Jr., John S.**; April 30, 2010.  
'69 **Cass, Glen R.**; July 30, 2001.  
'69 **Griffith, James H.**; April 28, 2000.  
'70 **Lee, Robert**; September 9, 1991.  
'70 **Marfoe, Leon**; May 20, 2003.  
'70 **Melcher, William H.**; August 22, 2010.  
'71 **Cohen, Ernest**; April 2, 2009.  
'75 **Mas, Gonzalo Alvaro**; May 15, 2008.  
'75 **Tabaie, Saeed H.**; February 24, 2002.  
'76 **Ma, Kwok Po**; October 22, 2000.  
'80 **Hinderer, Joe E.**; November 16, 2002.  
'81 **Medrano, Ruben**; February 16, 2010.  
'84 **Patel, Upendra D.**; December 21, 2005.
- CA E '39 **Robinson, Lawrence B.**; March 21, 2005.  
'40 **McCann, Joe G.**; no details.  
'42 **Needham, Robert A.**; no details.  
'43 **Brenner, Robert**; no details.  
'43 **Lyman, John H.**; May 3, 2001.  
'43 **Sanders, Victor D.**; February 25, 2005.  
'44 **Harmon, Darell B.**; May 26, 2009.  
'45 **O'Brien, Philip F.**; October 2, 2007.  
'47 **Jennings, William S.**; January 16, 2011.  
'48 **Greif, Henry D.**; no details.  
'49 **Baer, Henry W.**; May 1, 1995.  
'49 **Norris, Henry W.**; July 6, 2006.  
'49 **Vollintine, Keith R.**; March 23, 2008.  
'50 **Carlson, Robert E.**; January 21, 1992.  
'50 **Eshleman, Arthur**; April 19, 2001.  
'50 **Helsel, Ronald W.**; August 17, 2007.  
'50 **Horn, David**; no details.  
'50 **MacKey, Richard C.**; May 6, 2010.  
'50 **Reynolds, James B.**; July 20, 2009.  
'51 **Bernstein, Karl**; February 26, 2009.  
'51 **Berry, Reed P.**; December 16, 2006.  
'51 **Dillon, Howard C.**; October 21, 1993.  
'51 **Ellis, Thomas O.**; July 24, 2005.  
'51 **Jamison, Jefferson P.**; August 10, 2007.  
'51 **Jamison, Nolan K.**; February 23, 2010.  
'51 **McGann, Rodney**; August 4, 1995.  
'51 **Sakuma, Sadao**; May 5, 1982.  
'51 **Wirth, Edward C.**; August 23, 2011.  
'52 **Bell, Ronald J.**; January 15, 1994.  
'52 **Feldman, Saul**; July 24, 2007.  
'52 **Haskell, Robert A.**; May 22, 2000.  
'53 **Mizushima, John S.**; November 29, 1993.
- '53 **Montooth, Jack W.**; June 5, 2010.  
'53 **Parsons, Mason M.**; March 15, 2007.  
'54 **Gilliland, Maxwell C.**; no details.  
'54 **Lynch, Lewis G.**; April 15, 1997.  
'54 **Rhine, William J.**; May 26, 1990.  
'54 **Rodriguez, Ralph**; June 17, 1996.  
'54 **Rubinstein, Robert**; April 21, 2007.  
'55 **Flack, Robert E.**; no details.  
'55 **Orton, Criley**; November 17, 2002.  
'55 **Phelan, John J.**; July 3, 1992.  
'55 **Schiner, George J.**; October 14, 2005.  
'56 **Fujitsubo, William S.**; October 23, 2009.  
'56 **Hinchcliff, Leo**; no details.  
'56 **Katz, Bernard**; January 25, 1993.  
'56 **Larson Jr., Elmer M.**; August 9, 2006.  
'56 **Neelands, John R.**; September 14, 1988.  
'56 **Silence, Neal C.**; no details.  
'56 **St John, Robert P.**; November 5, 1999.  
'56 **Taylor, Elmer N.**; December 1, 2010.  
'56 **Westland, Ronald A.**; no details.  
'57 **Anderson, Byron C.**; December 23, 2007.  
'57 **Corley, Charles F.**; October 20, 2007.  
'57 **Hazen, James K.**; August 3, 2008.  
'57 **Miller, Joseph**; July 5, 2007.  
'57 **Papetti, Robert A.**; June 29, 2007.  
'57 **Rieman, Francis C.**; March 10, 2006.  
'57 **Sawyer, James G.**; July 7, 2011.  
'57 **Smith, George A.**; November 3, 2005.  
'57 **Stillwaugh, Alan M.**; October 8, 1992.  
'57 **Thompson, Donald M.**; May 1, 2007.  
'58 **Abbott, Edward A.**; November 25, 1999.  
'58 **Black, Robert B.**; January 3, 2006.  
'58 **Brass, Jack**; January 2, 2005.  
'58 **Bravo, Richard J.**; March 4, 2011.  
'58 **Clay, Edward A.**; November 2, 1998.  
'58 **Gillman, Wallace M.**; March 29, 2007.  
'58 **Hara, Hiroshi H.**; February 14, 2005.  
'58 **Nakasone, Robert T.**; no details.  
'58 **Novak, William W.**; July 29, 1995.  
'58 **Rasmussen, Robert E.**; July 1, 2005.  
'58 **Stevenson, Frederick C.**; February 24, 2005.  
'59 **Addoms, Robert B.**; March 10, 2005.  
'59 **Blanc, Serge L.**; March 18, 2000.  
'59 **Cohill, George L.**; no details.  
'59 **Jew, Kan Shun**; December 21, 2007.  
'59 **Terrio, Franklin G.**; March 17, 2007.  
'60 **Benson, Lee B.**; November 20, 2000.  
'60 **Fassnacht, Charles**; March 9, 2006.  
'60 **Horowitz, Elliot**; no details.  
'60 **Johnson, Floyd O.**; June 5, 2004.  
'60 **Kaplow, Carl E.**; December 10, 1998.  
'60 **Kemp, Robert F.**; May 13, 2007.  
'60 **Lyons, Paul A.**; January 6, 2006.  
'60 **Scott, Jay R.**; August 12, 2009.  
'60 **Topham, John W.**; April 9, 2010.  
'61 **Peay, Earl A.**; December 25, 1992.  
'61 **Sloat, John B.**; December 14, 2005.  
'61 **Weitzman, Cay E.**; September 16, 2008.  
'61 **Yamanaka, Clarence T.**; April 3, 2007.  
'62 **Bradley, Harold D.**; October 21, 2008.  
'62 **Hendry, William L.**; June 20, 1938.  
'62 **Keenan, Robert K.**; January 11, 2002.  
'62 **Menigoz, Leslie L.**; February 17, 1990.  
'62 **Yutani, William Y.**; July 14, 1997.  
'63 **Acken Jr., Alfred D.**; March 19, 1997.

- '63 Ahlquist, Carl N.; no details.  
'63 Smitha, Paul F.; January 15, 2006.  
'63 Timm, John E.; no details.  
'64 Holmstrom, John A.; July 2, 2011.  
'65 Capell, Alan J.; no details.  
'65 Greenberger, Henry; July 21, 2005.  
'65 Kinkade, Robert A.; April 9, 2005.  
'65 Nakich, Robert B.; May 28, 2007.  
'65 Watts, Curtis R.; December 20, 2001.
- CA A '69 Barton, Paul H.; no details.  
CA O '60 Lo, John B.; May 22, 2011.  
CO A '44 Hopp Jr., Harry F.; July 12, 2010.  
'46 McQuinn, W. Jones; March 9, 2011.  
'48 Domenico, Norman S.; March 27, 2011.  
'51 Linke, Robert W.; August 13, 2011.  
'53 Miller, Donald E.; April 26, 2011.  
'54 June, Ronald K.; April 28, 2011.  
'55 Harvey, William L.; January 16, 2012.  
'55 Thoma, James R.; October 24, 2009.  
'56 Gazewood, John; December 14, 2010.  
'58 Bagby, William C.; February 20, 2011.  
'64 Herrala, Karl W.; October 6, 2009.  
'82 Woods, Pamela Lynn; January 2, 2011.
- CO B '33 McCrumm, John D.; May 7, 2011.  
'37 Coyer, Elmer W.; October 6, 2007.  
CO Γ '50 Bryant, Howard H.; October 19, 2011.  
CT A '43 Jackson, David W.; October 21, 2010.  
'51 Golden Jr., Thomas E.; October 29, 2011.  
CT B '50 Cole, Edward F.; December 5, 2011.  
DE A '32 Corrigan, William A.; no details.  
'47 Piper, William H.; no details.  
DC Γ '50 Egloff, Edward; November 22, 2011.  
FL A '35 O'Neill, Albert E.; January 13, 2011. [*Centennarian 71*]  
'56 Ohanian, M. Jack; no details.  
FL B '46 Sells, Jackson S.; no details.  
FL Δ '53 Beck Sr., James K.; no details.  
GA A '35 Drum Jr., Leo J.; January 6, 2012.  
'37 Corral, Joseph M.; December 29, 2003.  
'37 Kuniansky, Max; May 14, 1996.  
'37 Ryan, James C.; February 27, 2004.  
'48 Plant Jr., Graeme D.; November 10, 2011.  
'50 Judd Jr., Hugh M.; no details.  
'53 Adams, George W.; March 25, 2011.  
'55 Walters, James V.; April 24, 2011.  
'65 Moore, Jon T.; October 17, 2011.  
'66 Austin, Joe D.; no details.
- IL A '35 Mader, Stanley C.; September 12, 2011.  
'36 Sear, Thomas B.; December 14, 2011.  
'42 White, George M.; June 17, 2011.  
'46 Tiedemann, Art T.; October 24, 2004.  
'50 Benson, Allen M.; June 19, 2011.  
'50 Gorozdos, Richard E.; August 14, 2009.  
'54 Lovestrand, Gordon L.; September 2, 2008.
- IL B '35 De-Boo, Joseph H.; November 4, 2011.  
'44 Black, Kenneth G.; November 27, 2010.  
'54 Bucher, F. William; no details.
- IL Γ '36 Alsaker, Allan; July 7, 2011.  
'49 Pearson, John; October 31, 2011.
- IN A '35 Bowlus, Omer E.; February 18, 2011.  
'35 Meyer, Raymond E.; July 26, 2002.  
'36 Read Jr., Davis; September 9, 1993.  
'37 Burrell, Kenneth H.; June 6, 2009.  
'37 Martin, Glen W.; June 23, 1994.  
'37 McEachron Jr., Karl B.; January 23, 2010.  
'42 Baker, Kenn L.; December 4, 2011.  
'45 Kendall, Robert C.; January 10, 2012.  
'47 Gilbert, Kendall E.; no details.  
'58 Wright, Richard; December 29, 2011.  
'59 Toombs, H. Dean; no details.  
'63 Doherty, Patrick K.; no details.  
'86 Cleary, James P.; no details.
- IN B '47 Wodicka, Carl R.; no details.  
'58 Denney, Kenneth L.; no details.
- IA A '36 Hadden, William J.; January 27, 1990.  
'36 Miller, Russell L.; October 12, 2004.  
'37 Johnson, Lloyd E.; October 3, 2011.  
'54 Weinberg, Morton; March 19, 2010.
- IA B '33 Voxman, Himie; November 22, 2011.  
'37 Baker, Forrest G.; January 22, 2009.  
'37 Butterworth, Louis Harper; November 28, 2009.  
'37 Elson, Forrest K.; September 8, 2003.  
'37 Morehead, Herbert L.; September 29, 1993.  
'49 Hudachek, Raymond J.; July 12, 2011.  
'64 Ries, James P.; December 10, 2011.
- KS A '34 Shepherd, John C.; June 9, 1998.  
'37 Johnson, Lathel M.; August 2, 1997.  
'37 Kuzmanovic, Bogdan O.; August 6, 2003.  
'37 Miller, John J.; September 29, 2006.  
'37 Robertson, Joseph L.; May 23, 2011.  
'45 Van Meter Jr., Orville E.; November 20, 2006.  
'46 Petesch, Eugene R.; November 21, 2011.
- KS Γ '45 Cottom, Melvin C.; November 19, 2011.
- LA A '49 Brummer Jr., Edmund A.; October 20, 2011.  
'52 Lasseigne, Oliver H.; March 19, 2005.
- LA B '55 Niklaus, John L.; no details.
- LA Γ '36 Chew, Woodrow W.; November 25, 1998.
- ME A '39 Costrell, Louis C.; June 8, 2009.
- MD A '36 Eager Jr., George S.; February 1, 2012.  
'37 Rittenhouse, Samuel A.; August 8, 2011.  
'38 Goudy, Paul R.; November 27, 2011.
- MD B '43 Vial, Peter F.; May 14, 2007.  
'49 Mannion Jr., James W.; October 10, 2011.  
'68 Williams, Hugh D.; August 7, 2011.
- MA A '37 Harvey, Francis S.; March 19, 2009.  
'37 Holmes, Ralph H.; December 15, 2003.
- MA B '34 Borger, John G.; August 13, 2011.  
'34 Krim, Norman B.; December 14, 2011.  
'36 Rapoport, Emanuel; June 10, 1993.  
'37 De Raimes Jr., Robert E.; February 21, 2002.  
'37 Reitz Jr., Lewis P.; January 5, 2002.  
'37 Robbins, Norman B.; November 24, 2010.  
'51 Von Recklinghausen, Daniel R.; August 22, 2011.  
'54 Cohen, Martin H.; December 8, 2010.  
'71 Markel, Lawrence C.; no details.
- MA Δ '36 Cioffi, Mario V.; March 25, 1988.  
'37 Flint Jr., Edward F.; May 1, 2007.
- MA E '37 Fisher, Austin W.; February 27, 2001.  
'37 Ganong, Warren L.; July 24, 2001.  
'48 Prendiville, John F.; December 25, 2011.  
'48 Rochefort, J. Spencer; October 16, 2011.  
'52 Whelpley Jr., George E.; January 7, 2011.  
'60 Cavanaugh, Thomas A.; December 10, 2009.
- MA Z '64 Jones, Paul C.; no details.
- MI A '43 Rivest, E. Lloyd; May 8, 2009.
- MI B '35 Durland, John R.; November 16, 2003.  
'36 Rozsa, John T.; no details.  
'37 Larsen, Grayland T.; October 15, 1993.  
'37 Lehto, Reino H.; November 20, 1994.  
'40 Shanahan, Roger T.; February 26, 2005.  
'53 Smith Jr., Gilbert R.; May 8, 2011.  
'65 Weingarten, Wayne E.; October 1, 2011.
- MI Γ '37 Allen, George W.; no details.  
'37 Barker, Jerry C.; August 31, 2008.  
'37 Brelsford, Harry W.; February 11, 2011.  
'37 McAnulty, James C.; October 3, 2010.  
'37 Seeley, Ralph K.; April 23, 1998.  
'41 Rankin, Woodrow W.; October 27, 2011.  
'43 Helms, J. Lynn; December 11, 2011.  
'49 Collins, Arthur R.; November 6, 2011.
- MI E '37 Dolphin, Woodrow B.; February 1, 1994.  
'48 Jay, David J.; no details. *Dir. of Alumni Affairs, 1971-73*
- MI H '90 Fleming, John F.; June 27, 2011.
- MN A '72 Torgerson, Brian C.; February 4, 2012.
- MS A '26 Garner, Daniel N.; May 8, 2003.  
'37 Davis, Paul R.; May 17, 2004.  
'37 Gelatka, Charles T.; May 23, 2001.

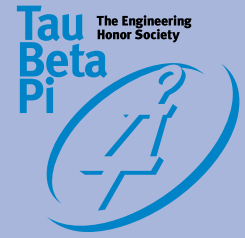
## CHAPTER ETERNAL

- '37 **Mullen, Malcolm Y.**; January 7, 2008.  
'47 **Hicks, Ralph L.**; December 2, 2011.  
'59 **Moore, Bobby C.**; June 13, 2010.
- MO B '37 **Cardetti, Richard J.**; February 11, 2004.  
'47 **Liddell, John W.**; October 19, 2011.  
'53 **Haynes, Myron B.**; April 8, 2009.
- MO Γ '37 **Bohrer, Charles N.**; May 26, 2011.  
'37 **Goran, Robert C.**; August 20, 1993.  
'37 **Scallet, Barrett L.**; February 5, 2010.  
'49 **Baldwin, Miles S.**; January 30, 2012.
- MT A '58 **Laport, Alexander K.**; September 19, 2011.  
NJ A '37 **Bogert, Charles A.**; March 20, 1988.  
'37 **Hague, Robert Z.**; June 4, 2006.  
'37 **Mathez, Edmond C.**; April 17, 2011.
- NJ B '37 **French, Clayton V.**; June 13, 2002.  
NY B '37 **Coney, Roger C.**; January 4, 2009.  
'52 **Clark, Philip B.**; October 20, 2011.
- NY Γ '68 **Worley, Cris A.**; December 31, 2011.  
'87 **Wenz, James F.**; no details.  
NY Δ '36 **Delibert, Joseph C.**; no details.  
NY E '37 **Lager, Fred**; March 20, 2005.  
'37 **Metzger, Sidney**; December 22, 2011.  
'53 **Scott, Andrew R.**; February 3, 2011.
- NY Z '37 **Bicknell, Albert W.**; March 30, 2003.  
'37 **Ramberg, Eivind G. F.**; July 12, 1999.
- NY H '41 **Koetsch, Julius F.**; November 12, 2010.  
'45 **Shinnar, Reuel**; August 19, 2011.  
'51 **Gross, Bernard**; December 17, 2011.
- NY Θ '78 **Bender, John F.**; August 27, 2011.  
NY I '32 **Eddy, Willard T.**; June 17, 2011.  
NY K '57 **Mates, Robert E.**; November 3, 2011.  
NY Λ '49 **Stark, Warren A.**; November 9, 2011.  
NY N '73 **Short, Daniel L.**; March 11, 2011.
- NC A '52 **Schlirf, John W.**; February 18, 2010.  
NC B '36 **Allison, Henry J.**; June 2, 2011.  
NC Γ '48 **Shapiro, Henry L.**; August 3, 2011.
- ND A '37 **Larson, Robert E.**; December 1, 2005.  
OH A '35 **Myers, E. Ware**; July 24, 2011.  
'37 **Coltman, John W.**; February 10, 2010.  
'37 **Henkel, Charles E.**; August 18, 2009.  
'70 **Dickinson, Bradley W.**; January 22, 2012.
- OH B '35 **Bereskin, Alexander**; April 10, 2011.  
'44 **Engelmann, Richard Henry**; August 11, 2010.
- OH Γ '36 **Miller, Robert N.**; May 26, 2003.  
'37 **Alexander, Randall G.**; February 16, 1993.  
'37 **Kress, Herman**; April 26, 2009.  
'37 **Kuntz, William H.**; November 15, 2009.  
'41 **Milligan, Robert T.**; July 29, 2011.  
'43 **Christianson, Halvor S.**; April 1, 2011.  
'43 **Hendricks, Walter E.**; February 14, 2011.  
'49 **Kettering, Gordon H.**; January 16, 2012.  
'56 **Ritter, Thomas L.**; April 19, 2008.
- OH E '37 **Huge, August W.**; August 19, 2011.  
'38 **Friedl, Elwin W.**; November 29, 2011.  
'42 **Anderson, Robert J.**; February 21, 2011.
- OH Z '60 **Sampayo, Felix F.**; no details.  
OH I '55 **Talbert, Leon O'Connor**; September 2011.
- OK A '38 **McIninch, V. Glenn**; no details.  
'50 **Carpenter, Pearl E.**; January 19, 2012.  
'51 **Hudson, Carrol D.**; November 9, 2011.  
'54 **Lipp, James P.**; May 7, 2010.
- OR A '37 **Bedford, Alexander W.**; March 27, 2010.  
'37 **McKenna, Cyril C.**; August 2, 2004.  
'37 **Merryman, Harold W.**; July 6, 1993.  
'46 **White, David C.**; January 11, 2012.  
'47 **Benz, Donald L.**; May 20, 2011.  
'53 **Poirot, James W.**; August 4, 2011.
- PA A '37 **Brown, Theodore R.**; January 26, 2011.  
'43 **Cahoon, Robert L.**; October 30, 2011.  
'43 **Caplan, Stanley**; June 11, 2011.  
'48 **Strayer, Carl W.**; May 6, 2010.  
'60 **Martin, Jay Robert**; December 4, 2011.
- PA B '50 **Petruska, Edward M.**; April 18, 2010.  
'51 **Bailey, Robert M.**; December 6, 2011.  
'61 **Deninger, Edgar J.**; October 4, 2008.  
'62 **Hall, Bruce T.**; October 8, 2011.
- PA Γ '36 **Dervaes, Albert R.**; March 19, 2008.  
PA E '37 **Nelson, Eric W.**; November 27, 2010.  
PA Z '37 **Adams, Ralph C.**; no details.  
'37 **Scott, Winfield A.**; November 17, 2010.  
'47 **Dinackus, Harry G.**; February 2009.
- PA H '49 **Galloway, James E.**; no details.  
'68 **McGinnis, Richard G.**; August 7, 2011.
- PA I '37 **Caccese, Lewis**; June 17, 2002.  
'49 **Butler, Robert H.**; no details.
- PA Λ '36 **Eckles, Charles C.**; June 25, 2005.  
SC A '41 **Barron, John I.**; December 31, 2011.  
'56 **McCraw Jr., Leslie G.**; May 25, 2011.  
'86 **Davis, John M.**; November 6, 2010.
- TN A '45 **Pih, Hui**; no details.  
'53 **Jones, Edsel T.**; December 17, 2011.
- TN B '49 **Brown Jr., John A.**; September 12, 2011.
- TX A '37 **Ross, Albert S.**; October 12, 2005.  
'40 **McBride Jr., Guy T.**; March 21, 2011.  
'49 **Guthrie Jr., Roger W.**; November 19, 2011.  
'49 **Linnard, Russell E.**; December 1, 2011.  
'52 **Mills, W. C.**; January 31, 2008.
- TX Γ '53 **Brock, James R.**; December 7, 2011.  
'63 **Oshman, M. Kenneth**; August 6, 2011.
- TX Δ '50 **Morris, James B.**; January 8, 2011.  
'55 **Laskoskie, Lawrence B.**; June 1, 2011.  
'56 **Dean, Robert R.**; November 13, 2011.
- TX Z '62 **Kraitchar, Robert E.**; December 6, 2011.
- TX H '74 **Blackwell, Ann L.**; September 9, 2011.
- UT B '80 **Low, Gordon K.**; no details.
- VT A '53 **Hawkins, Roger M.**; November 17, 2011.
- VT B '62 **Minnick, William A.**; June 24, 2011.
- VA A '29 **McMurdo, Charles**; December 31, 2011. [*Centennarian 62*]  
'42 **Sloan Jr., Thomas D.**; January 30, 2011.  
'72 **Crossan, Stephen C.**; January 20, 2010.  
'82 **Fries, Eric V.**; January 1, 2012.
- VA B '42 **Martin Jr., John W.**; October 19, 2011.  
VA Δ '36 **Segarra, Rafael A.**; February 25, 2006.
- WA A '37 **Dunford, James M.**; January 18, 2011.  
'45 **Penzien, Joseph**; September 19, 2011.  
'50 **Chin, Ark G.**; November 13, 2011.  
'52 **Long, Chester L.**; December 23, 1994.
- WA B '37 **Cammon, Robert B.**; September 30, 2010.  
'37 **Sewell, James A.**; March 3, 2011.  
'56 **Gibbons, Jack M.**; January 31, 2012.
- WV A '40 **Hall, Kendall L.**; February 2, 2012.  
'66 **Cook, Jason M.**; no details.
- WI A '37 **Burroughs, Charles W. L.**; March 3, 2007.  
'37 **Griffith, Leroy W.**; no details.
- WI B '37 **Katzban, John M.**; June 24, 2010.  
'43 **Wanta, Raymond C.**; January 26, 2012.
- ΣT A '44 **Davis Jr., Don D.**; January 2, 2012.

## LONG-TERM CARE EDUCATION

Because more than 60 percent of members age 65 and over will need some type of long-term care, it's wise to know about the different options that are available. A Long-Term Care Outreach and Education Program for members and families is offered through LTC Financial Partners. The program includes access to favorable rates on long-term care insurance from leading carriers. Learn more at — [lctbp.com](http://lctbp.com).

# Teamwork Can Take You Out of This World...



**ABOARD SPACE SHUTTLE COLUMBIA, STS-109** Mission Commander Capt. Scott D. Altman, USN, IL A '81, helps Mission Specialist Michael J. Massimino, Ph.D., NY A '84, with suit-donning prior to Mike's spacewalk during the Hubble Space Telescope's fourth servicing mission. Astronauts Massimino and James H. Newman went on to install the new Advanced Camera for Surveys (ACS) on Hubble. Some 70 Tau Bates have worked together as astronauts since the inception of the space program, and many more have served in the space agency and contractor teams that trained the astronauts, built their unique tools, put them into orbit, kept them there, and brought them safely home. (Photo: NASA)

Tau Beta Pi's Engineering Futures Program teaches students the special skills needed to create and run such effective teams, like resolving interpersonal problems, conducting effective meetings, and presenting results to stakeholders. Your chapter can schedule an Engineering Futures session by visiting [www.tbp.org/ef](http://www.tbp.org/ef).

**Learn to share your ideas and create tomorrow.**

## TBPi Engineering Futures ...make the difference





## DISTRICT DOINGS

### District 2

The New York Alpha chapter at Columbia University was the host to 85 student and alumni members for the District 2 Conference on the weekend of February 11-12.

Activities included leadership training, chapter operations workshop and social and networking opportunities between students and national officials. Meetings were held in the Mudd Engineering building at Columbia.

Student leaders from 19 chapters in New York and New Jersey, and The College of New Jersey, a petitioning chapter, arrived Saturday afternoon.

District 2 Directors led a chapter operations workshop, focusing on reports to Headquarters and the various key activities throughout the year. Association Vice President Solange Dao talked to the students about the national programs sponsored by TBI, such as Scholarships, Fellowships, Laureate, MindSET and many others.

Sunday included several hours of Engineering Futures training, to strengthen leadership effectiveness. Team chartering and group process sessions were presented by EF facilitators Cheryl Cheng and Richard Della'Rovere. At the same time, Carl Selinger provided a professional development workshop on soft skills.

The District Chapter Recognition Awards went to the top two chapter projects from New Jersey Beta and New York Nu. The conference closed with a well-deserved round of applause for the New York Alpha Chapter, which was assisted by the New York Eta and New York Xi. Conference Chair Dmitriy Timerman, NY A '12, thanked the attendees and invited them back. The District Directors urged all the student leaders to take the information that they learned back to reinvigorate their chapters and grow our membership.—**Anthony M. Olenik** NY T '08, District 2 Director



### District 3



The Tau Beta Pi District 3 Conference began Friday, February 10 with an ice skating and pizza social event where officers mingled, and got to know one another.

The 30 current and future officers from the 12 TBI chapters in Pennsylvania and Delaware spent the rest of the weekend learning about chapter operations, national programs and participated in an Engineering Futures session.

Association Vice President Solange Dao presented updates on the MindSET program and delivered a motivational speech about never allowing negative outside thought to deter your progress.

The District Chapter Recognition Awards went to the PA Beta and PA Zeta.

—**Dr. Edward M. Gorzkowski III**, PA A '99, District 3 Director

## District 12



The District 12 Conference, hosted by the Colorado Delta Chapter, was held at Colorado State University in Fort Collins, on February 24-25. A total of 60 members, including four advisors and two local alumni, representing 13 chapters attended.

The morning was filled with poster presentations and a focus group report by Executive Councillor Norman Pih. Advisor Marvin E. Criswell, *NE A '65*, and others from the host chapter took the

group on a tour of the engineering building which included laboratory demonstrations. Over lunch, CSU dean of engineering Sandra L. Woods, *MI A '87*, gave a presentation about increasing the number of women and minorities in engineering.

The afternoon began with an Engineering Futures overview session conducted by Facilitator Nancy Gray, *MI Γ '69*. New to the conference schedule was a simulation skit covering basic chapter operations (holding a meeting, scheduling initiation activities, etc.) complete with hilarious “bad examples” and commendable “good examples.” The event ended on a laudatory note by conferring Montana Alpha and Colorado Epsilon with Chapter Recognition Awards for their efforts to create an engineering competition and chapter bulletin board, respectively.

—**Gregory M. Newcomb**, *CO B '06*, District 12 Director

## District 16

President Larry Simonson has visited with hundreds of alumni and hosted numerous alumni receptions since 2007. The installation of a new chapter at the University of San Diego provided the opportunity for a repeat of the 2008 reception at the Manhattan Country Club in Manhattan Beach, CA. Held on Sunday, February 26, this event was unique because Larry introduced the group to our new Executive Director, Curt Gomulinski.

After a social hour, Larry presented a brief slide show to the group, which included an update on the progress of the recently formed board of current and former CEO's and representatives of academe, known as the Vision Development Group. This prompted interesting discussions about the Association's possible role ranging from engineering curriculum to setting public policy.

—**Patricia McDaniel**,  
*Director of Development*



Guests included: (first row, left to right) Myron Kayton, *NY I '55*; Ethel Laczko; John E. Anderson, *IA A '65*; Naomi Flieder; William G. Flieder, *IN A '51*; Dale L. Jensen, *WA A '56*; (second row) President Larry A. Simonson; Shirin R. Nikaein, *CA Δ '08*; Richard J., *CA Γ '80* and Dawn Martin; Harry E. Schauwecker, *OH Γ '52*; (standing) Executive Director Curtis D. Gomulinski; Caroline Dockrell; William R. Goodin, *CA E '75*; Jacquelyn and William L. Mason, *MI Γ '57*; William W. Chang, *MI Γ '61*. Not pictured were Pamela de Liz and Patricia McDaniel.



## FAMILIES

### Centenarians

Seventy-nine members have previously reached their second century and been identified by THE BENT. The full list is available at [www.tbp.org](http://www.tbp.org) under *Who we are/Distinguished members*. We identified four more gentlemen:

Randolph Whitfield, *GA A '32*  
b. February 9, 1909  
d. August 1, 2009

Francis D. Murphy, *ME A '32*  
b. May 27, 1909  
d. January 20, 2011

Monroe R. Weller, *NJ Γ '35*  
b. February 27, 1911

Arthur D. Quackenbush, *AL B '33*  
b. August 18, 1911

### Mother-Daughter

Here is a rare category in THE BENT. We happily welcome three more for a total of 15.

The Camoriano Family  
(See Bi-Spousal)  
Theresa F., *IN Γ '77*  
Nina C. Gladson, *VA B '10*

The Schaertl Family  
Lisa K., *SD A '84*  
Casey L. *NY Π '14*

### Bi-Spousal

The names of 745 Tau Beta Pi couples have appeared in THE BENT. To this most popular category, we welcome 35 additional families.

Monica S. Allen, *TX H '06*  
Jeffrey W. Allen, *TX H '05*

Sandra B. Anderson, *SD A '79*  
Roger A. Anderson, *SD A '79*

Stephanie E. Argyle, *MI Γ '91*  
Morris D. Argyle, *UT B '90*

Anahita Banaei, *TX H '10*  
Amir Khoobroo, *TX H '10*

Ashley L. Begley, *CO A '10*  
Thomas O. Begley, *CO A '10*

Debra E. Bessinger, *GA A '85*  
David J. Bessinger, *GA A '85*

Theresa F. Camoriano, *IN Γ '77*  
Guillermo E. Camoriano, *IN Γ '77*

Leslie G. Carnali, *PA A '78*  
Joseph O. Carnali, *PA A '78*

Annette M. Chao, *MI Z '86*  
Yi Hsien Chao, *MI Z '86*

Diane H. Conradi, *NH A '83*  
Scott Conradi, *VT A '88*

Colleen C. Degliomini, *NJ B '82*  
Philip A. Degliomini, *NJ Γ '75*

Sandra A. Delvin, *CA Δ '76*  
Carl H. Froehlich, *CA Δ '74*

Marnell L. Gibson, *CA Ξ '89*  
William F. Gibson, *CA Ξ '89*

Nina Camoriano Gladson, *VA B '10*  
David A. Gladson, *VA B '09*

Jacqueline I. Hall, *MS A '06*  
Christopher L. Hall, *MS A '06*

Barbara A. Headrick, *AZ B '73*  
Roy W. Headrick, *AZ B '70*

Kathleen A. Hershberger, *OH A '09*  
Andrew D. Hershberger, *OH A '09*

Karen M. Hilchey, *NY N '81*  
Richard W. Hilchey, *MA E '81*

Colleen L. Hill-Stramsak, *MI E '00*  
Steven A. Stramsak, *MI H '01*

Dianne S. Honomichl, *KS Γ '86*  
Kevin L. Honomichl, *KS Γ '86*

Anna M. Hungler-Rengering, *OH B '85*  
David J. Rengering, *OH B '85*

Lisa T. Koehn, *CA P '82*  
Calden R. Koehn, *CA P '82*

Maureen D. Kudlac, *MI Δ '86*  
Gregory A. Kudlac, *MI Δ '86*

Suzanne D. McCaskey, *TN A '80*  
Harold O. McCaskey, *SC B '79*

Laura E. Messner, *IL A '10*  
Mark C. Messner, *IL A '10*

Kari L. Munson, *WA B '11*  
Philip M. Munson, *WA B '11*

Amy N. Pierce, *OH I '09*  
Matthew E. Pierce, *OH I '10*

Lisbeth S. Quesnel, *NY K '85*  
David J. Quesnel, *NY O '72*

Deborah K. Schepis, *MI Γ '83*  
Randy S. Schepis, *NY Θ '83*

Janet L. Simons, *MI Γ '77*  
Joseph L. Simons, *IN Γ '75*

Sally J. Steadman, *WY A '69*  
John W. Steadman, *WY A '64*

Kimberly R. Stillmaker, *CA P '08*  
Aaron T. Stillmaker, *CA P '08*

Murielle M.-L. Ting, *IA A '98*  
Jason Ting, *IA A '90*

Daphne C. Tirado, *NJ A '82*  
Leo A. Tirado, *CA Γ '73*

Noy E. Vultaggio, *MI E '99*  
Andrew P. Vultaggio, *MI E '98*

### Multi-Generation

The names of 100 families with at least three generations of members have appeared here. We add three more.

The Morrow Family  
Thomas M., *IL A '39 (dec.)*  
Richard J., *KS A '76*  
Brian H., *KS A '05*

The Pawel Family  
Richard E., *TN A '53*  
Steven J., *TN A '80*  
Janet E. Robertson, *TN A '85*  
Aaron J. Pawel, *NC A '13*

The Porterfield Family  
David W., Sr., *WV A '55*  
David L. Dinsmore, *WV B '80*  
David W., Jr., *GA A '90*  
Diane P. Kees, *WV A '82*  
Nathan D. Kees, *VA B '08*

### Twins

THE BENT has previously published the names of 253 sets of twins. Listed are 11 more matched pairs:

The Bauer Family  
Amy E., *IA A '11*  
Christine M., *IA A '11*

The Bradshaw Family  
Alexander T., *AL B '13*  
Michael T., *AL B '13*

The Dedek Family  
Alanna S., *CA I '14*  
Gennelle C., *CA I '14*

The Drain Family  
Allison P., *NE A '13*  
Bethany A., *NE A '13*

The Gallettebeitia Family  
Alvaro, *FL E '10*  
Borja, *FL E '10*

The Hohmann Family  
Gerald D., *PA A '51 (dec.)*  
Lawrence A., *PA A '51 (dec.)*

The Johns Family  
Ethan P., *MO B '11*  
Owen M., *MO B '11*

The Klooth Family  
Carolyn M., *CA K '12*  
Markus S., *CA K '12*

The Nock Family  
Brian F., *NY Γ '13*  
Stephen P., *NY Γ '13*

The Perkins Family  
Austin W., *LA A '12*  
Bradley C.B., *LA A '12*

The Willis Family  
Kyle S., *IA A '12*  
Ryan P., *IA A '12*

•Jack W. MacKay, *Alabama Beta '35*, still a P.E. at the age of 103, is believed to be our oldest living member. He is a published author on steel, cast iron, and ductile pipe. MacKay served as president and board member of the Alloy Casting Institute and as chairman of the Cast Iron Pipe Research Association's public relations and advertising committees. After retiring from ACIPCO, MacKay served as vice president of NTW Tire Co. until 1982. MacKay lives in Birmingham, AL, and has worked as an engineering consultant for Caldwell-MacKay, his son's company, since 1981. He was inducted last year into the State of Alabama Engineering Hall of Fame.

We are sorry to hear of the passing of our two oldest known members.

Charles E. McMurdo, P.E., *Virginia Alpha '29*, died December 31, 2011, at the age of 105 years, 5 months. He retired in 1971 from the Chesapeake and Potomac Telephone Company of Virginia, where he was an electrical engineer. McMurdo was a past chairman of the American Society for Quality Control, and was the oldest living alumnus of the University of Florida.

Albert E. O'Neill, *Florida Alpha '35*, passed away January 13, 2011, aged 102. He lived in Orlando, FL, for more than 60 years, and as a civil engineer, worked on water and sewage projects throughout the region. O'Neill was the oldest known living graduate of the University of Florida.

## BRAIN TICKLERS

(Continued from page 37.)

is the length of a field and the width of the border strip?

—Enigma by Keith Austin in  
*New Scientist*

**5** To increase his probability of throwing a 7, a gambler loaded a pair of dice as show in the table.

Pip Value	Prob. of Occurrence	
	Die 1	Die 2
1 & 2	1/4	1/12
3 & 4	1/6	1/6
5 & 6	1/12	1/4

One day, he accidentally grabbed one standard die and one loaded die. What was his probability of throwing a 7 with one loaded die and one standard die?

—*Mathematics Teacher*

**Bonus.** Arrange the integers 1 through 32 in a circle such that the sum of each pair of adjacent integers is always the square of an integer. Present your answer as a string of 33 integers starting and ending with 1.

—*Puzzles 101: A Puzzle Master's Challenge* by Nobuyuki Yoshigahara

**Computer Bonus.** Take any positive integer and apply the following

algorithm: (a) if the number is odd, multiply by 3 and add 1; and (b) if the number is even, divide by 2. If you continue this process, you will always end up with 1, no matter what number you start with. For example, 17 requires 12 steps (17-52-26-13-40-20-10-5-16-8-4-2-1). In the range of 1 to 10,000, which integer requires the most steps and how many steps are required?

—*Mathematical Amazements and Surprises* by Alfred S.

Posamentier and Ingmar Lehmann

Send your answers to any or all of the Spring Brain Ticklers to **Curt Gomulinski, Tau Beta Pi, P. O. Box 2697, Knoxville, TN 37901-2697** or e-mail to [BrainTicklers@tbp.org](mailto:BrainTicklers@tbp.org), plain text only. The cutoff date for entries to the Spring column is the appearance of the Summer BENT in early July. It is not necessary to include the method of solution. The Computer Bonus is not graded. The judges welcome any interesting problems that might be suitable for the column. Curt will forward your entries to the judges who are **F. J. Tydeman, CA Δ '73**; **D. A. Dechman, TX A '57**; **J. L. Bradshaw, PA A '82**; and the columnist for this issue,

**H. G. McIlvried, III, PA Γ '53.**

## CORRECTION

Several members noted a mistake on page seven of the Winter 2012 edition of THE BENT. The College of New Jersey was erroneously referenced by the letters NJIT. This should have been TCNJ as NJIT is the abbreviation for the New Jersey Institute of Technology, our New Jersey Gamma Chapter. We apologize for any misunderstanding this may have caused.

## LOANS AVAILABLE

Since 1935, TBP has assisted student members with their financial needs while in school or with payment of their initiation fee through our Student Loan Fund. Eligible students should never decline membership because they cannot pay the initiation fee. Chapter officers should provide information about the program to candidates in the invitation letters or during information meetings.

We are pleased to offer loans to students in amounts up to \$2,500 per member. Repayment is required after three years, and a simple interest rate of six percent is charged from the day the loan is received. Interested students can obtain additional information, promissory notes, and applications from [tbp.org](http://tbp.org).



## ALUMNUS NOTES

### Alabama Alpha

**Edgar L. Reynolds, '70**, is president of network operations at Cingular Wireless. A joint venture between the domestic wireless divisions of AT&T and BellSouth, Cingular is the largest wireless company in the U.S. Reynolds previously served as president of BellSouth Mobility, that provides wireless service across seven southeastern states. Prior to that, Reynolds served as president of BellSouth Mobility DCS and American Cellular Communications Corporation.

### Alabama Beta

**Michael A. Wolfe, '80**, has been appointed senior vice president and chief information officer at semiconductor giant AMD. He had been vice president of IT for product development and engineering at HP for five years. Wolfe will be responsible for managing AMD's global technology infrastructure. Prior to HP, he spent more than 24 years at Motorola and Freescale Semiconductor, working his way to the position of chief information officer of Freescale.



### California Beta

**Dr. Robert J. Lang, '82**, is an engineer who is also a leading origami artist and theorist. After earning his doctorate and working for NASA, he left engineering in 2001 for full-time origami work. Dr. Lang is known for his complex and elegant designs, studying the mathematics of the medium and using computers. He has made real-world applications to engineering problems, which included designing folding



patterns for an airbag manufacturer and work on a folding lens for space travel.

### California Delta

**David K. Pedersen, '84**, was recently appointed director of corporate responsibility and sustainability at Golden State Foods, a multi-billion dollar food distributor based in Irvine, California. Dave will develop a comprehensive strategy and implement programs designed to align company operations with client and societal needs within sustainability. He lives in Hermosa Beach, CA with his wife Lisa and their two sons.



### California Mu

**Kaitlin S. Spak, '09**, has announced her engagement to Stephen M. Gridler, a Cal Poly civil engineering graduate. He surprised Spak with a trip to Paradise Island, Bahamas, where he proposed after a day of swimming with dolphins. Spak



is enrolled at Virginia Polytechnic Institute and State University for a graduate degree in mechanical engineering and received a NASA fellowship to research at NASA's Jet Propulsion Laboratory in Pasadena, CA.

### California Sigma

**Dr. Trent R. Northen, '96**, is a principal investigator on the molecular cartography project at the Lawrence Berkeley National Laboratory, in Berkeley, CA. His research aims to construct detailed models of cellular communities metabolism and energetics. This approach is being applied to understand the dynamics

of microbial communities as well as the metabolic drivers of breast cancer and Huntington's disease.

### California Tau

**Edward Y.-W. Ku, '96**, has joined Vtion Wireless in Taiwan. Vtion is a leading provider of wireless data card solutions for mobile computing over wide area networks, and is expanding into Android applications.

### Kansas Alpha

**Marion F. Moon, '56**, has been named a fellow of the Oughtred Society. The society is dedicated to the preservation and history of slide rules and other calculating instruments. Moon was honored for her substantial contributions through the scholarly quality of her in-depth articles for the biannual *Journal of the Oughtred Society*.

### Maryland Gamma

**John S. Dowd, '12**, was named a first-team Academic All-American for the second consecutive year. The Navy senior guard was the first Navy football player in school history to be named to the team twice and is the first player in school history to be a three-time Academic All-American. Dowd was named to the second team as a sophomore. Dowd also earned an \$18,000 postgraduate scholarship from the National Football Foundation.



### Michigan Delta

**Gerald P. Ziemba, '57**, a chemical engineer, retired after seventeen years with the U.S. Government. He was program manager of the Commerce Department chemical weapons convention inspection management teams, which hosted international inspections of U.S. plants. He also served as a licensing officer for

chemical/biological-related exports. In 1994, he retired after 32 years with Dow Chemical AgroSciences. In 1988, he also retired as a colonel in the Chemical Corps in the Army Reserve.

#### Missouri Beta

**J. Ryan Muich, '12**, has been named an Academic All-American for the NCAA Division II first men's soccer team. He finished the season with two goals and three assists for S&T in its 10-6-2 campaign. He scored goals against nationally-ranked Indianapolis and Lewis and also tallied his three assists in games in which the Miners were victorious.

#### Minnesota Alpha

**Dr. Roger W. Johnson, '79**, has stepped down as editor of the United Kingdom-based journal *Teaching Statistics* after serving a four-year term. He will continue to be associated with the journal as a member of the editorial board. Dr. Johnson is a professor of mathematics and computer science at the South Dakota School of Mines and Technology.



#### New York Gamma

**David B. Gross '62**, won first place in the men's 70-74 Division of the 2011 USA Track & Field New Jersey long distance running mini 1 grand prix series. Earlier, he teamed up to win the USATF Masters men's 70s 5K national team championship, which was held in Syracuse, NY.



**Bradley J. Shelofsky, '11**, and **Adam Updegrove, '13**, have been named to Academic All-America Division III men's soccer teams. Shelofsky, a center back and team captain, was in the first team, while Updegrove, a midfielder, was selected for the third team.

#### New York Epsilon

**Wesley G. Brodsky, '71**, has been declared a certified wireless communication professional (WCP) by the IEEE. This certification is awarded for demonstrating abilities in wireless technologies, including RF engineering and network architecture, management, and security. Wes is now starting a consulting company: Wes Brodsky Wireless Communication. Previously, he was an engineer at Raytheon for 27 years.

#### New York Zeta

**Neil Yeoman, P.E., '56**, received the 2010 Clarence Gerhold Award of the separations division of the AIChE for "extensive technical and managerial contributions". Yeoman's 44 year career included 11 years as a process manager in charge of design of chemical process plants, 15 years as R&D director of a major supplier of chemical process equipment, and eight years as vice president of an engineering and construction company.



#### New York Nu

**Kevin P. Roe, '94**, a senior software engineer at the Maui High Performance Computing Center in Kihei, was married to Elaine Vanater on November 11, 2011, on the Maui Magic at sea. Kevin and Elaine were wed in the company of family and friends from both the mainland and Hawaii.

#### Ohio Zeta

**Anurag Gupta, '87**, has been appointed as president of Europe, Middle East, and Africa for Brightpoint, Inc., a provider of distribution and supply chain services to the telecom industry. His previous role at Brightpoint was senior VP of global strategy, corporate communications, and investor relations. Prior to Brightpoint, Gupta worked for Motorola Inc., for 13



years. He is also a 1989 Tau Beta Pi Laureate.

#### Ohio Lambda

**Dr. Athanasios D. Sarantopoulos, '86**, while pursuing an executive MBA program at the University of Indianapolis, Athens Campus, received the Honorary Heydar Aliev Award for excellence in academic work impacting on Azerbaijan and Azerbaijani-Greek relations. Dr. Sarantopoulos is employed by the Hellenic National Meteorological Service division of climatology and applications.

#### Pennsylvania Kappa

**David J. D'Annunzio, '12**, has been chosen for the Academic All-America Division III first men's soccer team. The goalkeeper was coming off a senior season in which he set the program record for career shutouts (29). For the 2011 season, D'Annunzio had a 0.73 goals-against average, a .770 save percentage and eight shutouts.

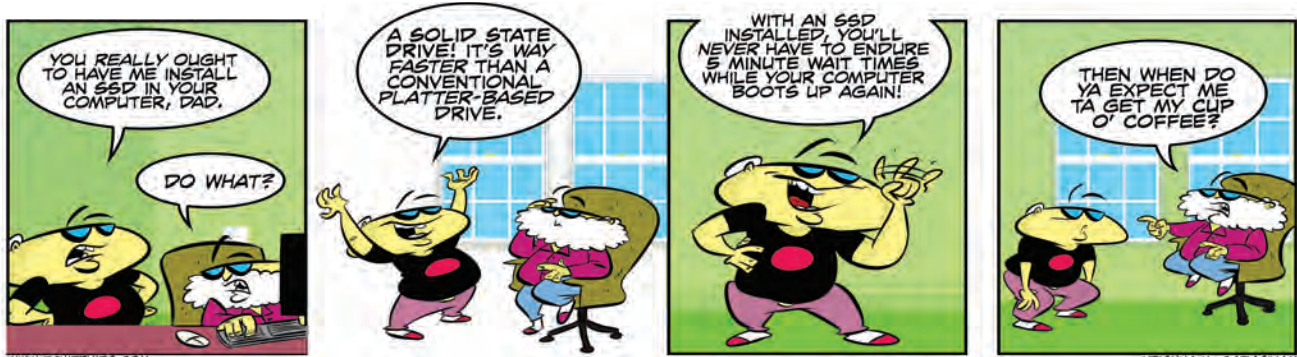
#### Wisconsin Alpha

**Rachel Clark Hughey, '00**, and **Michael P. Hughey, TX Δ '99**, are proud to announce the birth of their son, Eamon Clark Hughey. Eamon comes from a long line of TBPI alumni, including his grandfather **R. Michael Hughey, AL B '73**, and his great-grandfather **Grover C. Strickler Jr., OH Γ '44**.

### Write Your Own Alumnus Note!

Your fellow Tau Bates are interested in news about you. Send items about civic activities, honors won, weddings, births, promotions, changes in address, etc. to Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697 or to [alumnusnote@tbp.org](mailto:alumnusnote@tbp.org). Material for publication must be received for the **Spring** issue by February 1, **Summer** issue by May 1, **Fall** issue by August 1, and **Winter** issue by November 1. Include name, address, chapter, class year, and email address or phone number. Thank you!

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	• 10K WHITE GOLD.....	146.00	H.	WOMAN'S OVAL INCISED LETTER RING: • 10K YELLOW GOLD.....	295.00	
	• GOLD FINISH, SATIN BACK.....	29.00		RING SIZE: <input type="text"/>		<b>ALLOW 8 WEEKS FOR DELIVERY OF JEWELRY &amp; CERTIFICATES &amp; 12 WEEKS FOR DELIVERY OF CUSTOM-MADE RINGS.</b>
B.1(p)	OFFICIAL (FULL SIZE) BENT (PIN) FOR MEMBERS IS ENGRAVED WITH NAME, CHAPTER, & CLASS AT NO CHARGE, AND A PIVOTING PIN TO SECURE THE BENT TO A LAPEL IS SOLDERED ONLY ON NEW BENT: • 10K YELLOW GOLD.....	148.00	I.	TIE BAR, 50mm SOLID BAR WITH ALLIGATOR CLASP, GOLD FINISH (BENT NOT INCLUDED).....	57.00	
	• 10K WHITE GOLD.....	148.00	J.	EXPANDABLE TIE BAR, WITH ALLIGATOR CLASP AND 140mm CURB CHAIN, GOLD FINISH.....	54.00	
	• GOLD FINISH, SATIN BACK.....	28.00	K.	WOMAN'S SINGLE-LINK BRACELET, GOLD FINISH (BENT NOT INCLUDED).....	48.00	<b>DATE NEEDED FOR SPECIAL OCCASION:</b> _____
*B.2(p)	SMALL BENT (PIN): • 10K YELLOW GOLD.....	74.00	L.	CROSS PEN WITH BENT, GOLD FINISH.....	89.00	
	• GOLD FINISH, SATIN BACK.....	27.00	M.	REPLACEMENT MEMBERSHIP CERTIFICATE.....	13.00	Total Amount Enclosed: _____
*B.2(c)	SMALL BENT (CHARM): • 10K YELLOW GOLD.....	90.00	N.	MAN'S NECKTIE, 100% SILK, 95mm WIDE, NAVY & WINE STRIPES, WITH GOLD BENT.....	35.00	
	• GOLD FINISH, SATIN BACK.....	20.00	O.	STOLE: WHITE SATIN GRADUATION COLLAR EMBROIDERED WITH BENT.....	28.00	Shirt Size: _____
*B.3(p)	MINIATURE BENT (PIN): • 10K YELLOW GOLD.....	70.00	P.	<b>CERAMIC MUG: WHITE WITH 125th MOTIF..... 10.00</b>		Member's Name: _____
	• GOLD FINISH, SATIN BACK.....	26.00	R1.	T-SHIRT: 100% PRESHRUNK COTTON, BLACK WITH RADIANT BENT, (XXL: 20.00) S-M-L-XL.....	18.00	TBPI Chapter & Class: _____
*B.3(c)	MINIATURE BENT (CHARM): • 10K YELLOW GOLD.....	69.00	S.	<b>T-SHIRT: 100% PRESHRUNK COTTON, WHITE WITH BLUE LOGO ON BOTH SIDES, S-XL-XXL..... 8.00</b>		<b>SHIP TO: NAME:</b> _____
	• GOLD FINISH, SATIN BACK.....	25.00	T.	<b>GOLF SHIRT, 100% WHT. COT. PIQUE, BLACK TRIM COLLAR &amp; CUFFS, XL..... 25.00</b>		
C.	MINIATURE BENT, TO BE WORN AS A TIE TACK; CLUTCH AND CHAIN ASSEMBLY INCLUDED: • 10K YELLOW GOLD.....	89.00	U.1	UNSTRUCTURED, LOW-PROFILE, WHITE CAP WITH BLUE LOGO, TAU BETA PI ON SIDE.....	14.00	<b>ADDRESS:</b> _____
	• GOLD FINISH, SATIN BACK.....	24.00	U.2	UNSTRUCTURED, LOW-PROFILE, KHAKI CAP WITH BLACK LOGO, TAU BETA PI ON SIDE.....	14.00	
D.	MINIATURE BENT, GOLD FINISH, TO BE WORN AS A RECOGNITION BUTTON (CLUTCH INCLUDED).....	23.00	V.	TIE TACK, STERLING OVAL w/ PIN & CLUTCH, NOT SHOWN (SEE WEB).....	45.00	Email or day phone: _____
E.	WOMAN'S 3mm BALL-LEVER BACK EARRINGS, 14K YELLOW GOLD WITH 10K MINIATURE BENTS.....	159.00	X.	HONOR CORD: WHITE & ORANGE GRADUATION CORD, NOT SHOWN (SEE WEB).....	15.00	
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## CHAPTERS

### ALUMNUS CHAPTERS

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- Long Island Suburban, NY
- Newark, NJ
- New York, NY
- Rochester, NY
- Schenectady, NY
- Southern Tier, Binghamton, NY
- District 3**
- Lehigh Valley, Bethlehem, PA
- Philadelphia, PA—New, established June 2010.
- Wilmington, DE
- District 4**
- Baltimore, MD
- Hampton Roads, Newport News, VA
- Kanawha Valley, Charleston, WV
- Research Triangle, Durham-Chapel Hill-Raleigh, NC
- Richmond, VA
- Washington, DC
- District 5**
- Central Florida, Orlando
- Daytona Beach, FL
- Gainesville, FL
- Miami, FL
- Midlands, Columbia, SC
- Piedmont, Clemson, SC
- Puerto Rico
- Tampa Bay, FL
- West Palm Beach, FL
- District 6**
- Bluegrass, Lexington-Frankfort, KY
- Central Alabama, Birmingham
- Great Smoky Mountains, Knoxville-Oak Ridge, TN
- Louisville, KY
- Greater Gulf Coast, Mobile, AL
- Mid-South, Memphis, TN
- District 7**
- Central Michigan, Lansing
- Cincinnati, OH
- Dayton, OH
- Southeastern Michigan, Detroit
- Flint, MI
- Grand Rapids, MI
- Ohio's North Coast, Cleveland
- Columbus, OH
- District 8**
- Chicago Area, IL
- Central Illinois, Urbana-Champaign
- Milwaukee, WI
- District 9**
- Rolla, MO
- St. Louis, MO
- District 10**
- Houston, TX
- District 11**
- Ames, IA
- Minnesota, Twin Cities, MN
- District 12**
- Front Range, CO/WY
- Salt Lake City, UT
- District 13**
- El Paso, TX
- Phoenix, AZ
- Sun City, AZ
- District 14**
- Columbia River Basin, Richland, WA
- Portland, OR
- Puget Sound, Seattle, WA
- District 15**
- Sacramento, CA
- San Francisco Bay Area, CA
- San Francisco Peninsula, Palo Alto, CA
- District 16**
- Southern California, Los Angeles

- CA T 16 Univ. of California, Irvine
- CA Y 15 California State Univ., Sacramento
- CA Φ 15 Univ. of the Pacific
- CA X 16 California State Univ., Fullerton
- CA Ψ 16 Univ. of California, San Diego
- CA Ω 16 Harvey Mudd College
- CA AA 15 California State Univ., Chico
- CA AB 16 Univ. of California, Riverside
- CA AF 15 San Francisco State Univ.
- CA AA 15 Univ. of California, Santa Cruz
- CA AE 16 Univ. of San Diego
- CO A 12 Colorado School of Mines
- CO B 12 Univ. of Colorado at Boulder
- CO Γ 12 Univ. of Denver (inactive)
- CO Δ 12 Colorado State Univ.
- CO E 12 Univ. of Colorado at Denver
- CO Z 12 United States Air Force Academy
- CT A 1 Yale Univ.
- CT B 1 Univ. of Connecticut
- CT Γ 1 Univ. of Hartford
- DE A 3 Univ. of Delaware
- DC A 4 Howard Univ.
- DC B 4 Catholic Univ. of America
- DC Γ 4 George Washington Univ.
- FL A 5 Univ. of Florida
- FL B 5 Univ. of Miami
- FL Γ 5 Univ. of South Florida
- FL Δ 5 Univ. of Central Florida
- FL E 5 Florida Atlantic Univ.
- FL Z 5 Florida Inst. of Technology
- FL H 5 Florida A&M Univ.-Florida State Univ.
- FL Θ 5 Florida International Univ.
- FL I 5 Embry-Riddle Aeronautical Univ.
- GA A 5 Georgia Inst. of Technology
- GA B 5 Mercer Univ.
- IA A 14 Univ. of Idaho
- ID B 12 Idaho State Univ.
- ID Γ 12 Boise State Univ.
- IL A 8 Univ. of Illinois at Urbana-Champaign
- IL B 8 Illinois Inst. of Technology
- IL Γ 8 Northwestern Univ.
- IL A 8 Bradley Univ.
- IL E 8 Southern Illinois Univ. at Carbondale
- IL Z 8 Univ. of Illinois at Chicago
- IN A 8 Purdue Univ.
- IN B 8 Rose-Hulman Inst. of Technology
- IN Γ 8 Univ. of Notre Dame
- IN Δ 8 Valparaiso Univ.
- IN E 8 Trine Univ.
- IA A 11 Iowa State Univ.
- IA B 11 Univ. of Iowa
- KS A 9 Univ. of Kansas
- KS B 9 Wichita State Univ.
- KS Γ 9 Kansas State Univ.
- KY A 6 Univ. of Kentucky
- KY B 6 Univ. of Louisville
- KY Γ 6 Western Kentucky Univ.
- LA A 10 Louisiana State Univ.
- LA B 10 Tulane Univ. of Louisiana
- LA Γ 10 Louisiana Tech Univ.
- LA Δ 10 Univ. of Louisiana at Lafayette
- LA E 10 Univ. of New Orleans
- ME A 1 Univ. of Maine
- MD A 4 Johns Hopkins Univ.
- MD B 4 Univ. of Maryland
- MD Γ 4 United States Naval Academy
- MD Δ 4 Univ. of Maryland Baltimore County
- MD E 4 Morgan State Univ.
- MA A 1 Worcester Polytechnic Inst.
- MA B 1 Massachusetts Inst. of Technology
- MA Γ 1 Harvard Univ. (inactive)
- MA Δ 1 Tufts Univ.
- MA E 1 Northeastern Univ.
- MA Z 1 Univ. of Massachusetts at Amherst
- MA H 1 Boston Univ.
- MA Θ 1 Univ. of Massachusetts Lowell
- MA I 1 Western New England Univ.
- MI A 7 Michigan State Univ.
- MI B 11 Michigan Tech. Univ.
- MI Γ 7 Univ. of Michigan
- MI Δ 7 Univ. of Detroit Mercy
- MI E 7 Wayne State Univ.
- MI Z 7 Kettering Univ.
- MI H 7 Lawrence Technological Univ.
- MI Θ 7 Oakland Univ.
- MI I 7 Univ. of Michigan-Dearborn
- MI K 7 Western Michigan Univ.
- MI A 7 Grand Valley State Univ.
- MN A 11 Univ. of Minnesota-Twin Cities
- MN B 11 Univ. of Minnesota, Duluth
- MS A 6 Mississippi State Univ.
- MS B 6 Univ. of Mississippi
- MO A 9 Univ. of Missouri-Columbia
- MO B 9 Missouri Univ. of Science & Technology
- MO Γ 9 Washington Univ.
- MO Δ 9 Univ. of Missouri-Kansas City
- MT A 12 Montana State Univ.
- MT B 12 Montana Tech. of the Univ. of Montana
- NE A 9 Univ. of Nebraska-Lincoln
- NV A 15 Univ. of Nevada, Reno
- NV B 16 Univ. of Nevada, Las Vegas
- NH A 1 Univ. of New Hampshire
- NH B 1 Dartmouth College
- NJ A 2 Stevens Inst. of Technology
- NJ B 2 Rutgers Univ.
- NJ Γ 2 New Jersey Inst. of Technology
- NJ Δ 2 Princeton Univ.
- NJ E 2 Rowan Univ.
- NM A 13 New Mexico State Univ.

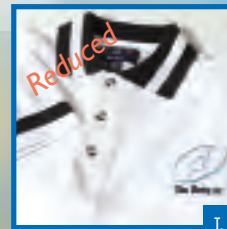
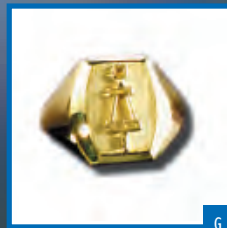
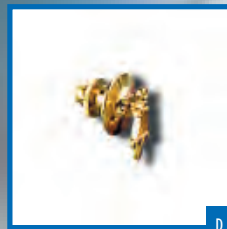
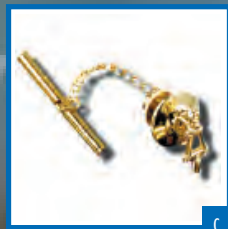
- NM B 13 Univ. of New Mexico
- NM Γ 13 New Mexico Inst. of Mining & Tech.
- NY A 2 Columbia Univ.
- NY B 2 Syracuse Univ.
- NY Γ 2 Rensselaer Polytechnic Inst.
- NY Δ 2 Cornell Univ.
- NY E 2 New York Univ. (inactive)
- NY Z 2 Polytechnic Inst. of Brooklyn (inactive)
- NY H 2 City College of CUNY
- NY Θ 2 Clarkson Univ.
- NY I 2 Cooper Union School of Engineering
- NY K 2 Univ. of Rochester
- NY Λ 2 Pratt Inst. (inactive)
- NY M 2 Union College
- NY N 2 SUNY at Buffalo
- NY Ξ 2 Manhattan College
- NY O 2 SUNY at Stony Brook
- NY Π 2 Rochester Inst. of Technology
- NY T 2 Polytechnic Institute of New York Univ.
- NY E 2 Alfred Univ.
- NY T 2 Binghamton University
- NY Y 2 United States Military Academy
- NC A 4 North Carolina State Univ. at Raleigh
- NC B 4 Univ. of N.C. at Chapel Hill (inactive)
- NC Γ 4 Duke Univ.
- NC Δ 4 Univ. of North Carolina at Charlotte
- NC E 4 North Carolina A&T State Univ.
- ND A 11 North Dakota State Univ.
- ND B 11 Univ. of North Dakota
- OH A 7 Case Western Reserve Univ.
- OH B 7 Univ. of Cincinnati
- OH Γ 7 Ohio State Univ.
- OH Δ 7 Ohio Univ.
- OH E 7 Cleveland State Univ.
- OH Z 7 Univ. of Toledo
- OH H 7 Air Force Inst. of Technology
- OH Θ 7 Univ. of Dayton
- OH I 7 Ohio Northern Univ.
- OH K 7 Univ. of Akron
- OH A 7 Youngstown State Univ.
- OH M 7 Wright State Univ.
- OH N 7 Cedarville Univ.
- OH Ξ 7 Miami Univ.
- OK A 9 Univ. of Oklahoma
- OK B 9 Univ. of Tulsa
- OK Γ 9 Oklahoma State Univ.
- OR A 14 Oregon State Univ.
- OR B 14 Portland State Univ.
- OR Γ 14 Univ. of Portland
- PA A 3 Lehigh Univ.
- PA B 3 Pennsylvania State Univ.
- PA Γ 3 Carnegie Mellon Univ.
- PA Δ 3 Univ. of Pennsylvania
- PA E 3 Lafayette College
- PA Z 3 Drexel Univ.
- PA H 3 Bucknell Univ.
- PA Θ 3 Villanova Univ.
- PA I 3 Widener Univ.
- PA K 3 Swarthmore College
- PA A 3 Univ. of Pittsburgh
- PR A 5 Univ. of Puerto Rico
- RI A 1 Brown Univ.
- RI B 1 Univ. of Rhode Island
- SC A 5 Clemson Univ.
- SC B 5 Univ. of South Carolina
- SC Γ 5 The Citadel
- SD A 12 South Dakota School of Mines & Tech.
- SD B 11 South Dakota State Univ.
- TN A 6 Univ. of Tennessee
- TN B 6 Vanderbilt Univ.
- TN Γ 6 Tennessee Tech. Univ.
- TN Δ 6 Christian Brothers Univ.
- TN E 6 Univ. of Memphis
- TN Z 6 Univ. of Tennessee at Chattanooga
- TX A 10 Univ. of Texas at Austin
- TX B 13 Texas Tech Univ.
- TX Γ 10 Rice Univ.
- TX Δ 10 Texas A & M Univ.
- TX E 10 Univ. of Houston
- TX Z 10 Lamar Univ.
- TX H 10 Univ. of Texas at Arlington
- TX Θ 13 Univ. of Texas at El Paso
- TX I 10 Southern Methodist Univ.
- TX K 10 Prairie View A & M Univ.
- TX A 10 Texas A & M Univ.-Kingsville
- TX M 10 Univ. of Texas at San Antonio
- UT A 12 Univ. of Utah
- UT B 12 Brigham Young Univ.
- UT Γ 12 Utah State Univ.
- VT A 1 Univ. of Vermont
- VT B 1 Norwich Univ.
- VA A 4 Univ. of Virginia
- VA B 4 Virginia Polytechnic Inst. & State Univ.
- VA Γ 4 Old Dominion Univ.
- VA Δ 4 Virginia Military Inst.
- VA E 4 Virginia Commonwealth Univ.
- WA A 14 Univ. of Washington
- WA B 14 Washington State Univ.
- WA Γ 14 Seattle Univ.
- WA Δ 14 Gonzaga Univ.
- WV A 4 West Virginia Univ.
- WV B 4 West Virginia Univ. Inst. of Technology
- WI A 8 Univ. of Wisconsin-Madison
- WI B 8 Marquette Univ.
- WI Γ 8 Univ. of Wisconsin-Milwaukee
- WI Δ 8 Milwaukee School of Engineering
- WI E 8 Univ. of Wisconsin-Platteville
- WY A 12 Univ. of Wyoming

### COLLEGIATE CHAPTERS (245)

- | Chap. Dist. | Institution                             |
|-------------|---|
| AL A 6      | Auburn Univ.                            |
| AL B 6      | Univ. of Alabama                        |
| AL Γ 6      | Univ. of Ala. at Birmingham             |
| AL Δ 6      | Univ. of Ala. in Huntsville             |
| AL E 6      | Univ. of South Alabama                  |
| AK A 14     | Univ. of Alaska Fairbanks               |
| AZ A 13     | Univ. of Arizona                        |
| AZ B 13     | Arizona State Univ.                     |
| AZ Γ 13     | Northern Arizona Univ.                  |
| AR A 9      | Univ. of Arkansas                       |
| CA A 15     | Univ. of California, Berkeley           |
| CA B 16     | California Inst. of Technology          |
| CA Γ 16     | Stanford Univ.                          |
| CA Δ 16     | Univ. of Southern California            |
| CA E 16     | Univ. of California, Los Angeles        |
| CA Z 15     | Santa Clara Univ.                       |
| CA H 15     | San Jose State Univ.                    |
| CA Θ 16     | California State Univ., Long Beach      |
| CA I 16     | California State Univ., Los Angeles     |
| CA K 16     | California State Univ., Northridge      |
| CA A 15     | Univ. of California, Davis              |
| CA M 15     | Calif. Poly. St. Univ., San Luis Obispo |
| CAN 16      | California State Poly. Univ., Pomona    |
| CA Ξ 16     | San Diego State Univ.                   |
| CA O 16     | Loyola Marymount Univ.                  |
| CA Π 16     | Northrop Univ. (inactive)               |
| CA P 15     | California State Univ., Fresno          |
| CA Σ 16     | Univ. of California, Santa Barbara      |

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