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Mechanical Engineering
UNIVERSITY OF WISCONSIN–MADISON

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Relationship between Oshkosh, and ME department is a win-win

The Oshkosh Striker 3000 is used to put out aircraft fires.

When Oshkosh Corporation reevaluated its recruiting strategy, a key part of its new plan was to pursue a deeper engagement with the Department of Mechanical Engineering.

"UW-Madison has a great College of Engineering and a very strong mechanical engineering program, and we know when we get a top person out of the university, we're getting a very talented individual," says Tom Quigley (BSME '94), the vice president of business development at Oshkosh Corporation.

The Wisconsin-based Oshkosh Corporation, which designs and builds specialty trucks, military vehicles, truck bodies and access equipment, currently employs 96 UW-Madison alumni, and 40 of those alumni are engineers. "We've had very good luck with UW-Madison students," Quigley says.

While Oshkosh had previously collaborated on projects with department faculty, staff and students, Quigley says the company wanted to explore additional ways to engage the department and students. So in fall 2014, Oshkosh became the first-ever sponsor of Advising Day, on which all mechanical engineering classes are canceled and students gather en masse for formal advising sessions with faculty.

Oshkosh's sponsorship covered the cost of food and expenses for holding the event. In addition, the company displayed one of its vehicles and staffed an information booth. "Our involvement with Advising Day was a major success for us. It really gave us access to many mechanical engineering students, and we want to continue to sponsor this," Quigley says.

Oshkosh experts also have delivered Lindbergh lectures to grad students, and the company plans to continue its involvement in the lectures. "We see value in getting our subject matter experts in front of grad students and helping them understand the depth and breadth of the advanced engineering activities that we do on a daily basis, which includes modeling and simulation, mechanical design, electrical design, advanced materials and software development," Quigley says.

(Continued on back page)

Solar prophets: A history of UW-Madison's Solar Energy Lab

In 1954, a highly accomplished 65-year-old chemistry professor named Farrington Daniels "sought solace in the sun, the poor man's atomic power plant," according, that is, to his wife Olive. Her 1978 biography, *Farrington Daniels: Chemist and Prophet of the Solar Age*, paints a vivid picture of Daniels' vision of spreading solar energy research from Madison to the world.

At a time when few, if any, voiced concerns about meeting future energy demands with fossil fuels, this vision was unusual indeed.

Unusual, but not unfunded. With money from the Rockefeller Foundation, Daniels and John Duffie, a 29-year-old chemical engineering professor, set up shop in what Olive called a "20x40-foot grey wooden shack, which had formerly been the primate laboratory, or monkey house."

Naming their new building UW-Madison's Solar Energy Lab (SEL), Daniels and Duffie began to study how to harvest energy from the sun to power simple home appliances. The lab was one of the first of its kind in the world.

Since fossil fuels were cheap and abundant in the 1950s, there was virtually zero interest in funding research on the domestic use of solar energy. The Rockefeller Foundation's mandate was to focus instead on bringing solar energy to developing countries with limited or non-existing access to electricity.

Designing applications to help people accomplish basic tasks such as cooking, refrigeration and water heating was a perfect fit for Daniels, a man of many ideas and strong humanitarian feelings. These feelings were perhaps amplified by a sense of guilt about his earlier professional involvement in the Manhattan Project, which had developed the atomic bomb. *(Continued on p.4)*

The professorial staff of the Solar Energy Lab in 1984 included** (from left) **chemical engineer John Duffie and mechanical engineers Sanford Klein, William Beckman and John Mitchell.

In mid March, warm weather caused us all to celebrate the arrival of spring to Madison; then in late March we had to use the snow shovels again. The volatility in weather this winter has been matched by the volatility in fuel prices, which for a change have been in the consumer's favor. Our reliance on fossil-derived fuels for domestic and transportation uses, and the marketplace volatility of these fuels, motivates the continued focus on energy research in the Department of Mechanical Engineering. Energy research in our department has been mainly concentrated in two major research groups for more than a half century. The Solar Energy Lab (SEL) was founded in 1954 and its fascinating history is chronicled in these pages. The Engine Research Center (ERC) was founded in 1946. Both groups have profoundly impacted their respective scientific fields through groundbreaking research, and both groups are celebrating the retirement of one of their most important faculty this spring. Professors Sanford Klein and Rolf Reitz will both retire this year. They have left a rich legacy of scholarship in the SEL and ERC, respectively, while impacting the careers of a generation of graduate students. They are joined by the retirement of Professor Neil Duffie, who has long been a pillar of the manufacturing research group. These are shoes that cannot be filled, but our junior faculty are pioneering new areas of research and I am confident the department's future will be as bright as its past and present.

Volatility has not been confined to weather and fuel prices this spring. As many of you have probably read, the university is facing significant cuts in the state budget. This will impact the department to an extent that is not fully known at this time, but we are committed to providing our students with the same high-quality education that all of you have received. How we accomplish this in the face of diminishing resources will be a challenge that the entire department will need to face together. However, the legacy of giving by alumni provides us with the ability to maintain the extramural activities that stimulate students and enrich their student experience.

U.S.News & WORLD REPORT

has ranked the mechanical engineering graduate program 13th— up 8 spots from last year.

ON WISCONSIN!

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Madison, WI 53706

Here's a chance to show your Badger engineering pride: We're excited to announce our online store, where you can purchase College of Engineering gifts and apparel. Check out our selection today at ***store.engr.wisc.edu****!*

Endowed Professorships

Investing in faculty excellence is a college priority— and one way we can attract and reward star faculty is through endowed professorships. Currently, approximately one-quarter of our engineering faculty members hold a professorship or chair—and our goal is to greatly increase the number of endowed professorships for both junior and senior hires.

A gift to the university will enable us to realize that goal: Alumni John and Tashia Morgridge made a landmark $100 million gift to UW-Madison in support of faculty excellence—and that gift provides a dollar-for-dollar match to other donors who make a gift to endow a professorship ($1 million), a chair ($2 million) or a distinguished chair ($3 million).

To make a gift for an endowed professorship, contact Cathleen Walters, COE associate dean for advancement, (608) 265-8021 or cgwalters@wisc.edu.

go.wisc.edu/supportME

Thank you for your continued support of the UW-Madison Department of Mechanical Engineering.

If you'd like to make a gift, you have a variety of options, including estate gifts, matching gifts, endowments, and an immediate gift, among others.

If you are considering a gift, contact Brad Green for more information on how to give:

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1848 University Ave.
Madison, WI 53726
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Q&A

with Professor Emeritus Marvin DeVries

Professor Emeritus Marvin DeVries retired from the department in 2005 after a 40-year career at UW-Madison in teaching, research and academic administration along with service in professional engineering societies. We caught up with DeVries by phone while he and his wife were staying at their condo in South Padre Island, Texas.

What have you been up to since retiring from the department?

After retiring, I taught one course, my favorite elective course on the theory and practice of metal cutting, during the fall semester for four years, giving me a connection to the department. I taught at the department's request, because they had hired a new faculty member, Frank Pfefferkorn, and while Frank was interested in teaching the course, his mentor committee had suggested he wait until he was promoted. And so I was happy to step in and to keep that course alive. After four years, Frank took the course over and has done a great job with it. I was happy to help the department during that period of time. Also, by that time, I had pretty much completed all administrative activities I had in several professional engineering societies.

Throughout my career I had several interesting kinds of responsibilities. In the late '70s, we spent a year living in England, where I had a Fulbright professorship at Cranfield Institute of Technology. Upon our return we developed the country's first manufacturing systems engineering program here at UW-Madison. I worked at the National Science Foundation in Washington, D.C., for three years and then spent four years as department chair.

Also, I was the president of two different professional engineering organizations—the Society of Manufacturing Engineers and the International Academy for Production Engineering headquartered in Paris, France. Those were fun years but they did demand a fair amount of travel and attention to activities over and above what my university responsibilities were, and when those times were over, I was happy to turn them over to the next group of leaders.

What things about retirement are you particularly enjoying?

Just having more time to spend with family. We have family in the Madison area. We have two children here, and five of our seven grandchildren are close by. Our oldest son's family lives in Michigan, so not too far away. As grandparents, we have a lot of grandparent activities to go to including band and orchestra concerts, sporting events and the like, and we enjoy family times very much. Our family is close-knit and we've been very blessed with good kids and grandkids and we have great times when the family gets together.

And since retirement, my wife and I regularly travel to two places. We come down here, to South Padre Island, Texas, from about mid-January through February, making sure to get out of South Padre before the spring breakers show up. And we also have a leased lakefront home in the upper peninsula of Michigan along with a small recreational lot right on Lake Superior that's about 15 miles away from that home. We really enjoy being up there. We like fishing and doing outdoorsy things as "Yoopers." We're up there some three to four months out of the year, so in any given year, we're probably in Madison only about six or seven months at most.

What do you miss about working in the department?

I miss working with former colleagues and teaching and interacting with students. I do come in infrequently, and of course Engineers' Day is always a big time of the year, when I get a chance to see some of the faculty and alumni. Our current chair Jaal Ghandi is someone hired during the four-year period when I was department chair, and it's great to see individuals like that mature and develop into good leaders of the department.

Alum receives SAE Myers award

Derek Splitter (BSME '06, MSME '10, PhDME '12) received the 2014 SAE Myers Award for Outstanding Student Paper. He was selected for the award in recognition of his SAE paper, *"Improving the understanding of intake and charge effects for increasing RCCI engine efficiency."*

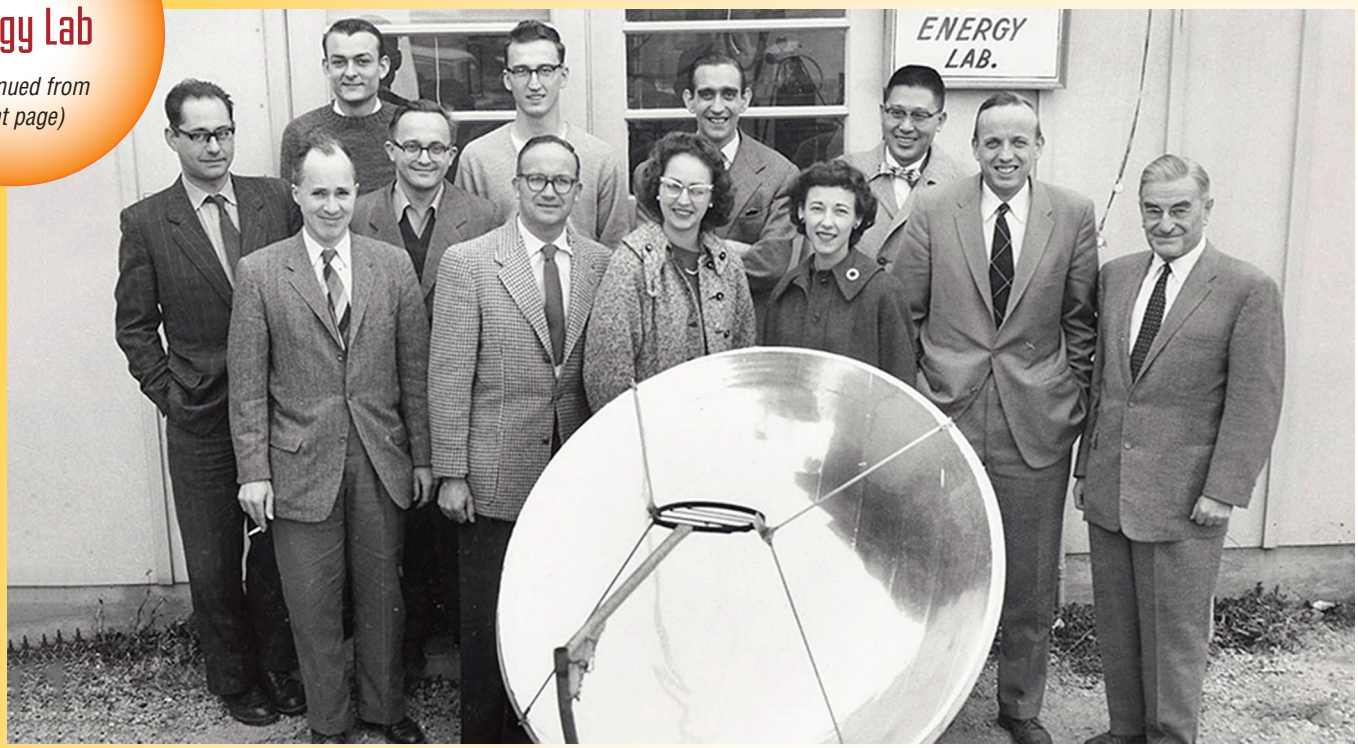
The paper covers work that Splitter did as a PhD student with the UW-Madison Engine Research Center under Wisconsin Distinguished Professor of Mechanical Engineering Rolf Reitz. Splitter investigated the relationships between the thermo-dynamic and chemical interactions governing engine efficiency.

The award, established in 1997, is given annually for the best technical paper written by a student and presented at a major SAE meeting. It recognizes the late Phil Myers and his wife Jean for their lifelong devotion to students and SAE. Myers was a renowned expert on internal combustion engines, and before his retirement, a professor at UW-Madison. Together with his wife, they set a high standard for excellence, concern for students, and involvement with SAE.

Splitter, a researcher at the Fuels, Engines and Emissions Research Center at Oak Ridge National Laboratory, will receive the award and an honorarium at the 2015 SAE World Congress April 21, 2015.

The Solar Energy Lab

(Continued from front page)



Farrington Daniels *(right)****, John (Jack) Duffie*** *(second from right)* ***and other SEL members (1955).*** *Photos courtesy of the UW-Madison Archives.*

Daniels becomes international spokesperson for solar energy

During SEL's first decade, Daniels traveled to Mexico, hoping to establish solar cookers as a substitute for cooking with wood, charcoal or cow dung; to the South Pacific islands of Tahiti and Rangaroa, and to Ecuador's Galapagos Islands, hoping to supply drinking water with simple solar stills that could be built from local materials; and to the sandy beach of the Daniels' cabin in Door County, where he tested experimental prototypes of a solar refrigerator, a solar air conditioner and a solar engine-driven water pump.

Daniels' efforts in the developing world had mixed results, according to Sanford Klein, Ouweneel Bascom Professor of Mechanical Engineering and SEL's current director. One problem with the solar cookers was their inability to store energy for later use. "People did not want to decide when to eat based on when the sun was shining," Klein says.

However, where one product failed, another endured: Solar water heaters were considered the most commercially successful application of solar energy in the mid-1960s. While not invented at SEL, Daniels and Duffie helped promote these water heaters all around the world. "Today, there are more solar water heating systems in China than there are water heating systems in the U.S.," Klein says.

In an oral history interview recorded in 1976, Duffie summarized SEL's biggest early accomplishments: "We built the springboard from which the lab's later successes were launched, and attracted first-class students and young faculty."

Those young faculty included William Beckman, a University of Michigan mechanical engineering PhD. After joining SEL in 1963, he would become its second director 25 years later.

Daniels' success as an international spokesperson for solar energy was instrumental in founding in 1955 what is now the thriving International Solar Energy Society (ISES). And thanks to Duffie's early efforts, Madison became one of only 26 cities in the country for which detailed solar radiation data were collected manually, long before computers and satellites greatly simplified the task.

U.S. oil crisis spurs SEL funding

During SEL's first decade, the ratio of investments in solar versus nuclear energy was about five minutes to one year," Duffie noted.

Going from bad to worse, funding for SEL was virtually non-existent from 1965 to 1971. Reasons included low domestic energy prices, a waning interest in taking solar energy to developing countries, and a strong constituency for the peacetime use of nuclear energy.

Illustrating his strong commitment to solar energy, in the 1960s Daniels used some of his own money to see ISES through its financially most dismal period. Both the society and SEL considered, and rejected, proposals to terminate their respective activities during this difficult time.

However, SEL's endurance through this dry funding period would soon pay off. The early 1970s were an era of tremendous change for the lab, as well as the entire country: The 1973 oil crisis drove home the message that fossil fuels would not always be abundant and readily available to millions of American citizens.

In response to the crisis, the National Science Foundation and then the Energy Research and Development Administration (ERDA)—the predecessor of today's Department of Energy (DOE)—created new funding opportunities for solar energy research. Beckman says ERDA and the DOE provided the majority of SEL funding for the next 40 years.

TRNSYS software builds SEL's international reputation

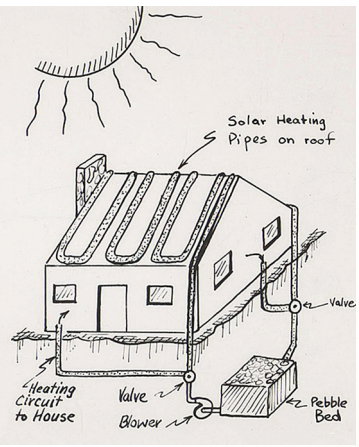
Daniels passed away in 1972, just a year before Klein's arrival in Madison officially ended SEL's "BC" (before computers) era. Pursuing his doctorate in chemical engineering under Duffie and Beckman, Klein earned an international reputation for his computational research even before his PhD thesis was officially published.

The TRaNsient SYStems (TRNSYS) software, the most enduring outcome of Klein's dissertation, would also lay the foundation for SEL's worldwide reputation. Though originally developed to model the performance of solar energy applications, the researchers soon realized that TRNSYS was the first computerized tool for evaluating just about any type of energy system.

"TRNSYS allows its user to put together different parts of a system like a tinker-toy set, solve all mathematical equations, and take care of all the bookkeeping tasks that are needed to evaluate how well the system meets its goal. It replaced experiments that would have taken years to complete," Klein says.

By the time Beckman became SEL's second director in 1988, the software had already become the worldwide standard tool for evaluating system performance in the energy sector.

In addition to its international success, Beckman says TRNSYS immediately became an invaluable educational tool for UW-Madison's engineering students.



Rooftop solar heating *illustration by Farrington Daniels.*

To this day, students continue to thoroughly test, tweak, and expand the software's functionality, and document their newly contributed ideas in master's and doctoral theses.

In 1983, SEL became the first lab in the world to receive the Weeks Award from ISES in recognition of TRNSYS and other pioneering research. TRNSYS also became a springboard for start-up companies such as the energy-consulting firm Thermal Energy System Specialists Inc. in Madison, which was founded in 1994 by two of Beckman and Klein's graduate students.

SEL turns focus to concentrating solar power plants

Sixty years ago, Daniels, the untiring prophet of the solar age, called the sun "the poor man's atomic power plant." One could argue that SEL has come full circle since then.

"Nuclear and solar researchers, who used to be enemies, now work together," Klein says, referring to his DOE-funded collaboration with Mark Anderson, a research professor of engineering physics at UW-Madison.

Daniels constructed solar stills as part of the work with the SEL.

Indeed, nuclear and solar power plants differ only in the source of the heat they use as an energy storage medium; how that heat is converted to electricity is very similar, which is why Klein and Anderson have now joined forces in designing modern concentrating solar power (CSP) plants.

A CSP plant uses a system of many mirrors to concentrate, or focus, the sun's energy on a heat transfer fluid. This working fluid, which may be oil or molten salt, is heated to extremely high temperatures. When electricity is needed, the working fluid transfers thermal energy to the power block, where heated water spins a steam turbine generator.

Since the energy contained in the hot fluid can be stored for later use when the sun may no longer shine, this creates a very flexible system. In addition, the generation of electricity by conversion of solar thermal energy is about twice as efficient as that of photovoltaic cells, the workhorse inside the familiar rooftop solar panels.

These days, Klein and Anderson are working on a new generation of CSP plants that would use so-called supercritical carbon dioxide ($S\text{-}CO_2$) as a working fluid. Thanks to its much greater heat transfer efficiency, future CSP plants would not only produce electricity more efficiently, but would also take up much less space.

SEL is also developing new cooling methods for CSP plants. Currently, a tremendous amount of water is used to cool down the turbine-turning steam after it is done producing electricity. This is a problem for CSP plants in desert areas rich in sunlight, but poor in water resources.

By increasing efficiency and reducing plant size, Klein and Anderson's approach could also yield significant cost savings.

From solar cooker prototypes to supercritical carbon dioxide, SEL has come a long way in the 60 years since Daniels began tinkering in a smelly grey shack that used to house monkeys. But while the technology has changed dramatically, the thermodynamic principles of solar energy have not. And SEL is just as committed to teaching its students how to apply them to the challenge of harvesting useable energy from the sun as it was in 1954.

Klein does not anticipate a change in this mission anytime soon.

Enhancing the department's reputation with a professorship

In the manufacturing industry, K.K. Wang's pioneering research in injection molding and polymer processing was a game-changer worldwide. By endowing the Kuo K. and Cindy F. Wang Professorship in the Department of Mechanical Engineering, Wang (MSME '62, PhDME '68) ensured he will have an ongoing impact by supporting faculty research, teaching and technology transfer to industry. Endowed professorships enable departments to attract and reward star faculty.


Kuo K. and Cindy F. Wang

After he finished his PhD at UW-Madison, Wang became good friends with a fellow assistant professor named Marvin DeVries. Wang says his enduring friendship with DeVries and his pride in receiving his graduate degrees from the Department of Mechanical Engineering influenced his decision to endow the professorship at UW-Madison, even though he spent most of his academic career as a professor of mechanical engineering at Cornell University.

Wang was an assistant professor in the UW-Madison Department of Mechanical Engineering for two years. In 1970, he joined the faculty at the Sibley School of Mechanical and Aerospace Engineering at Cornell University. Wang founded the Cornell Injection Molding Program (CIMP) in 1974 and has been its director since. CIMP is a pioneer of interdisciplinary research in engineering involving university, government and industry. Inspired by industrial needs, CIMP was first funded by the National Science Foundation, then jointly supported by an industrial consortium of major corporations worldwide. Through CIMP, and after decades of focused group effort and technology transfer activities, Wang realized his dream of applying a firm scientific basis to injection molding—which previously had been performed through trial-and-error methods. Today, the use of accurate computer simulation software has become an integral part of product and tool design in injection molding industry.

"The science and knowledge behind simulation and computer-aided design in the plastics industry has its roots in K.K. Wang's work."

—Tim Osswald, the Kuo K. and Cindy F. Wang Professor

"The science and knowledge behind simulation and computer-aided design in the plastics industry has its roots in K.K. Wang's work," says Kuo K. and Cindy F. Wang Professor Tim Osswald. "He brought science into injection molding and polymer processing, and his work with CIMP practically propelled what is now the injection molding industry. His footprint is everywhere."

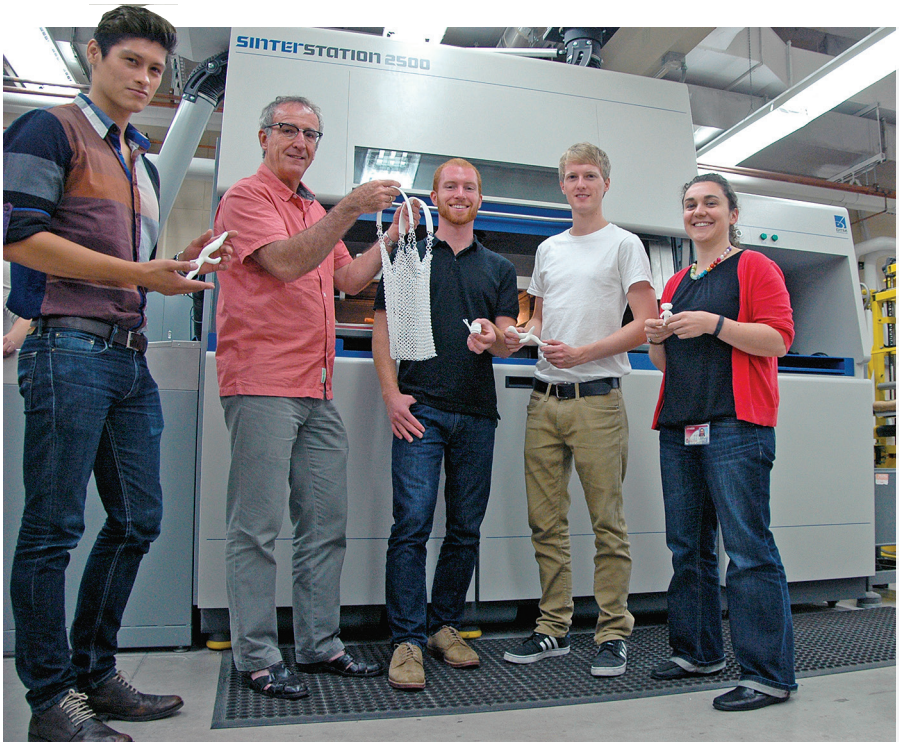
The CIMP industrial consortium consisted of more than 50 major corporations globally. They were very interested in computer simulation programs, which were byproducts from the basic research, for immediate applications. Wang agreed to let the companies in the consortium use the software in-house, but the software's popularity had a downside for Wang's research group. Because grad students wrote the software rather than professional programmers, there were a lot of bugs. Companies would regularly call asking for help when they had issues with the software, and Wang's postdoctoral students were spending too much time fielding these requests.

Around this time, one of Wang's early PhD students was interested in starting a company that would offer an improved, debugged version of the software. The student completely rewrote the software in a new computer language, but he didn't have the money to start a company. Wang became an investor and the two co-founded the company, Advanced CAE Technology, where Wang served as a non-executive chairman. "It released me and my grad students from the burden of troubleshooting software issues, and those companies immediately become customers of Advanced CAE Technology," Wang says.

Wang says his co-founder ran the company very successfully, establishing it as the most advanced software company dealing with polymer processing at the time. After about a dozen years, the CEO decided to sell the company, and by that time the small amount of money Wang had invested resulted in significant capital gain.

As he was contemplating what to do with the windfall, Wang says he read an article in the Department of Mechanical Engineering's alumni newsletter about Professor Emeritus Phil Myers and his wife, Jean, making a gift to endow a professorship. Then, while attending an international conference in Australia, he met up with his longtime friend DeVries for dinner, and they discussed the Myers' gift. When DeVries, who was department chair at the time, learned of Wang's high capital gain, he suggested that Wang use the money to endow a professorship, which would make a big impact in the department.

Wang agreed. He and his wife established the Kuo K. and Cindy F. Wang Professorship in 2001. "Like Phil Myers, we wanted to help the department attract star faculty or keep internal world-class professors from being hired away by the competition," Wang says. "I knew Phil and respected him very much, and I was moved by his motivation to endow a professorship for the purpose of enhancing the department's reputation."



From left: William Aquite, Tim Osswald, graduate students Neil Doll and Christian Schafer and Assistant Professor Natalie Rudolph holding objects created using additive manufacturing technology. *(Photo by Scott Gordon)*

Professorhip helps launch high-impact research and grad careers

An endowed professorship played a big role in establishing UW-Madison as a leader in additive manufacturing teaching and research.

Tim Osswald, who holds the Kuo K. and Cindy F. Wang professorship, says the professorship's annual discretionary funding gives him the resources to explore uncharted research directions that have the potential to yield high-impact breakthroughs. Because it's very difficult to secure outside funding for these types of projects, the funding from the professorship is essential for jump-starting the initial research.

"The professorship brings funding where there is none," Osswald says. "No big funding agency is going to fund me in an area where I haven't published. But if I'm interested in a new area and think I can contribute, this professorship gives me the freedom to start a research project in that area and see if I get promising initial results without first having to get funding from an outside agency."

If the early research is encouraging, Osswald can then write proposals to secure outside funding and continue the research.

Osswald says funding from the professorship was instrumental in kick-starting additive manufacturing research in the Department of Mechanical Engineering. When he was interested in developing a technique to make powders for use in additive manufacturing, funding wasn't available from outside agencies. So he used funds from the professorship to build and research a die system to make powders.

"We were able to try out the idea, and it worked," he says. "The project really took off, and it has actually created a whole research area here. It brought us into additive manufacturing and also expanded our research into other areas."

To build on the success of that project, Osswald says the department needed an advanced 3D printer—a selective laser sintering (SLS) machine—to facilitate teaching and research in this area. Alumnus Robert Cervenka and his wife, Debbie, stepped up to help with a $1.5 million gift that, among other things, allowed the department to purchase an SLS machine, which is being used to train undergraduate and graduate students in additive manufacturing, as well as making parts required for senior design projects.

The professorship also includes funding for Osswald to hire a top graduate student as a research assistant to provide crucial support for cutting-edge projects. This graduate fellowship gives the student the opportunity to work closely with Osswald while also covering the student's tuition, research assistant salary, books, supplies and travel to conferences.

"It's a very generous fellowship, and for the grad students who receive it, it really puts them at ease financially," he says.

In fact, Osswald says the graduate fellowship connected to the Kuo K. and Cindy F. Wang professorship has propelled the careers of his graduate students. One fellowship recipient, Alejandro Roldán-Alzate, went on to complete postdoctoral research with Biomedical Engineering Professor Naomi Chesler. Ultimately, he was hired as a cardiovascular modeling scientist in the Department of Radiology in the UW-Madison School of Medicine and Public Health, where he works with doctors to plan safer and more effective surgeries for patients. Roldán-Alzate recently accepted a joint appointment with the Department of Mechanical Engineering.

Another fellowship recipient, William Aquite, served as chief engineer in Osswald's research group in the Polymer Engineering Center. He earned his PhD in 2014, and his dissertation involved research related to additive manufacturing. Aquite is currently a lecturer in the department and is being heavily recruited by several companies.

Osswald says Aquite's work, as well as that of other grad students who've conducted research with the SLS machine, can be traced back to that initial research project on making powders for additive manufacturing. And as proof of the success and importance of the department's additive manufacturing research, Osswald points out that the department is now receiving industrial funding for this research area. "Of mechanical engineering departments, I think in additive manufacturing we're now among the leaders with equipment, knowledge and experience," he says.

In addition to the many tangible benefits and success stories that have come from the Kuo K. and Cindy F. Wang professorship, Osswald says it's a huge honor to hold this professorship. "To me, it was like getting this big gold Nobel medal in the field of polymer processing, because everybody in my field, worldwide, recognizes the K.K. Wang name and knows about his great accomplishments," Osswald says.

Save the dates!

Each year, the College of Engineering hosts several alumni events around the country. Save the date for an event near you—and if you'd like us to add you to the invitation list for a specific event, please contact Stephanie Longseth, (608) 265-3496 or slongseth@wisc.edu.

January 13—Houston, TX

February 18—Bonita Springs, FL

March 26—San Francisco, CA

May 21—Seattle, WA

June 26—Chicago, IL

July 17—Fox Valley, WI

August 20—Twin Cities, MN

September 15—Milwaukee, WI

October 4—Washington, D.C.

October 16—Madison *(Engineers' Day)*

TBA—San Diego, CA

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Oshkosh, ME department *(Continued from front page)*

Quigley

Quigley says these engagement activities also help the company identify top students."We're looking for the students who are going to get excited about our products and excited about the engineering that we do, whether they're an undergrad or a grad student," he says. "We're looking for the right fit, and we think that UW-Madison gives us a great pool of resources to draw from due to the size and scope of the institution as well as the strong performance of the program."

Quigley says the company is starting to see its efforts pay off with greater awareness of Oshkosh and increased interest in the company's work among students. For example, seven mechanical engineering students from UW-Madison are participating in the Oshkosh intern program for 2015. "These activities not only benefit the university but also add value to Oshkosh, so it's a win-win for everyone," he says. "We see this as a partnership with the department that we want to grow."

Grainger Professor of Sustainable Energy Jaal Ghandhi agrees that the department benefits from its relationship with Oshkosh. "It's always beneficial to stay engaged with companies that are hiring our students," Ghandhi says. "It's useful for both students and faculty because we want to make sure our curriculum is developing engineers that are able to meet the needs of industry—and in particular, Wisconsin industry."

Pierce Saber's newly designed custom fire chassis.

Oshkosh M-ATV TerraMax autonomous mine sweep vehicle.