Message from the School Head

Spring here in Corvallis is truly an inspiring time — the energy of our seniors as they look to graduation, the pride of our engineering student groups as they head out to various competitions, the excitement in the eyes of prospective students as they tour campus.

I am especially looking forward to the Engineering Undergraduate Expo on May 17, when students across the college will showcase their capstone projects. It is always a wonderful event, one that demonstrates the impact of an Oregon State education while forecasting the impact our graduates will make as they head out into the workforce.

I am also excited for the changes coming for our current and future students. The College of Engineering is replacing our professional program (Pro-School) model with a "continuous progression model" starting in the fall. This new model will provide students opportunities to immerse in engineering fundamentals early on, as well as to explore different engineering disciplines, while helping to ensure they graduate on time.

This change is part of larger curriculum reform the college is implementing to ensure that Oregon State continues to provide a forward-looking education that matches the needs of industry as well as those of our students.

We have also placed a greater focus on students' first-year experience. One example of this is in our new MIME 101 class, successfully piloted this past fall, which was redesigned from the ground up to provide hands-on experiential approaches to enhance creativity and build problem-solving skills.

To this end, we created a new and unique dual major in mechanical and manufacturing engineering. Students enrolled in this program will now have the flexibility to focus more on the product development side of manufacturing — something our industry partners have identified as a critical need.

These are just a few of the innovative ways we are working to provide impactful educational experiences that produce graduates who drive change throughout their lives.

I hope as you read more about the goings-on at the School of Mechanical, Industrial, and Manufacturing Engineering, you will be inspired too.

With regards,

Harriet B. Nembhard, Ph.D.
School Head of Mechanical, Industrial, and Manufacturing Engineering
Eric R. Smith Professor of Engineering
Geoff Hollinger envisions a future where autonomous robotic systems navigate any environment, no matter how dynamic or unpredictable, with limited help from humans, gathering and sharing real-time information for the benefit of scientists, first responders, and the general public.

Hollinger, an assistant professor of mechanical engineering at Oregon State University, recently won a prestigious National Science Foundation CAREER Award for his proposal titled “Topological Planning in Information Space for Intelligent Robotic Systems,” which will help take his research closer to that goal.

More and more, marine and aerial drones are being used for applications such as environmental monitoring, search and rescue, surveillance, and scientific exploration. However, in most cases, a human is required either to remotely operate the vehicles or to specify waypoint locations in a fixed plan for the vehicle to follow.

“These approaches lead to severely limited performance by restricting the capabilities of vehicles,” Hollinger said. “They can’t adapt to changing conditions, incorporate high-level goals given by human operators, or perform introspection as their environment, mission, and teammates change. This project seeks to bridge the gap between current systems that naively follow waypoints and intelligent systems capable of adapting to mission and environmental changes.”

Hollinger proposes enabling teams of autonomous vehicles to make decisions on their own regarding information collection, cost minimization, and how best to achieve their goals.

Toward that end, Hollinger will develop new planning techniques based on various methods for computing the topological features of a space (i.e., things that remain constant in a changing environment), which will allow robots to determine how to react and adapt based on their mission.

“Instead of thinking about topology in the obstacle space, we want to think about topology in what’s called the information space,” said Hollinger. “The information space represents concepts like informative regions, regions that have features that are interesting to scientists.”

The algorithms Hollinger and his team develop will be made publicly available through open source distribution and used in ongoing collaborations with the Hatfield Marine Science Center, the Pacific Marine Energy Center, the ASSURE FAA Center of Excellence for Unmanned Systems, and the Oregon State College of Earth, Ocean, and Atmospheric Sciences.

In addition to research, this project also has a number of educational aspects. These include integration with a planned interdisciplinary marine robotics certificate program at Oregon State and a course module for Oregon high school students to learn about programming underwater robots.
When first-year students in the School of Mechanical, Industrial, and Manufacturing Engineering (MIME) begin training as engineers, one of their first steps is MIME 101, an orientation course meant to introduce the concepts and skills needed to be successful, both in academics and in the engineering profession.

This past fall, when students walked into MIME 101, they entered a space wholly redesigned to engage, inspire, and ignite their creativity. Over the previous year, faculty in MIME worked to innovate these first contacts with students through hands-on creative activities, teamwork, and competition.

The redesign aligns with Oregon State University’s strategic goal of providing a transformational educational experience, says Nordica MacCarty, assistant professor of mechanical engineering. She was one of the principal designers of the course, along with David Nembhard, professor of industrial engineering, and Jennifer Parham-Mocello, assistant professor of computer science.

In the previous iteration of the course, students disassembled a consumer product and brainstormed ways they might improve upon it. “Unfortunately, they had little basis for improving upon a well-considered design,” Nembhard said.

The new course draws on hands-on experiential approaches to enhance students’ creativity and problem-solving skills and follows a design-build-test framework familiar to most professional engineering environments. Students work in teams to solve specific tasks using small robots. Teams then challenge their designs against those from other teams to complete a set of specific tasks such as navigating a maze, following a path, or transporting an object to a specific destination.

“There is considerable literature that shows competition improves learning outcomes,” Nembhard said. “While collaboration can outperform competition, involving aspects of both is valuable for engineering education.”

“Teamwork in high schools is often collaborative but rarely designed along functional lines,” MacCarty said. “For many students, this is their first formative experience in a cross-functional team, where members bring unique skills to the table.”

“Since Engineering is a teamwork based field it was nice to begin the experience with the same type of strengths and challenges, that come along with teamwork, that I may see after college,” said Amelia Garza, a first year student in industrial engineering.

Practical knowledge of key engineering and science disciplines are still disseminated through traditional lectures, but these are focused on providing key tools to aid students as they design their system. These include mechanical engineering to describe the physical structure and capabilities of their robot, manufacturing engineering employed in 3D printing novel components for their system, computer science approaches to program their robot to complete each task, and industrial engineering to optimize their system for performance and, ultimately, competitiveness.

Overall, MacCarty and Nembhard are happy with the end result. “While we will be further recalibrating these activities for the coming fall term, the goals to engage students in practical and hands-on experiential learning have been met in the redesign,” Nembhard said.

The new class has proven valuable not just for undergraduate students. The four graduate teaching assistants who assisted in the revamping also gained valuable firsthand experience in course development process.

“Creating an entirely new eight-lab curriculum from scratch using materials that were new to all of us was a challenge,” MacCarty said. “But we had a fantastic team of graduate students to help put it together and pull it off!”

The redesign was supported by a Scaled Learning Innovation Grant from the university as well as one from the OSU Women’s Giving Circle. Those funds allowed for the purchase of dozens of Lego and Cozmo robots, tablet computers to control them, and eight 3D printers.
DUAL MAJOR BRIDGES GAPS IN NEW MANUFACTURING REVOLUTION

BY OWEN PERRY

Manufacturing in the United States is thriving. Last year, manufacturing sector output was more than double what it was 20 years ago, according to the U.S. Bureau of Labor Statistics.

“Manufacturing is changing,” said Karl Haapala, associate professor of advanced manufacturing. “The deployment of new information, sensing, and control technologies as well as advances in materials science and processing are driving these changes. Industry wants engineering graduates who understand those intersecting domains.”

The 2000s saw a decline in overall manufacturing employment. Most of the jobs lost were held by low-skilled workers. Since 2010, there has been a resurgence of manufacturing jobs, but there remains a dire and growing need for highly skilled production workers and engineers. It is predicted that 2 million new manufacturing jobs will be created in the U.S. over the next 10 years.

In fall 2018, to meet industry’s changing needs, the College of Engineering launched a new undergraduate program that combines majors in manufacturing engineering and mechanical engineering.

“Manufacturing is highly interdisciplinary,” Haapala said. “It requires understanding product design and development, as well as understanding how an entire manufacturing enterprise operates.”

For many years, Oregon State has offered a dual major in manufacturing engineering and industrial engineering, which allows students to focus on the industrial, or organizational, side of manufacturing — learning to develop processes and systems that are efficient and effective.

Now, with the new mechanical and manufacturing engineering dual major, students have the option to focus more on the product development side — translating initial concepts into physical items that can be competitively produced.

Dustin Harper, a junior and one of the first students to pursue the new degree, says he is excited to take on the challenge.

“Manufacturing is highly interdisciplinary. It requires understanding product design and development, as well as understanding how an entire manufacturing enterprise operates.”

Hu also sees the new dual major as a competitive advantage once she graduates. “The dual major in manufacturing engineering and mechanical engineering can take you anywhere,” she said. “Having the relevant class experience and projects related to manufacturing engineering, in particular, will definitely set me apart from a pure mechanical engineer and vice versa.”
GRADUATE STUDENTS SHOWCASE THEIR SOLUTIONS

BY GALE SUMIDA

Doing good work well

When Steven Hattrup asks people what they like about their jobs, he’s not just making small talk. As a doctoral student in industrial human systems engineering and the holder of the Good Work Fellowship, Hattrup’s research focuses on designing work systems.

Much of work design has concentrated on making work systems efficient, but that often created dehumanizing conditions. Hattrup’s research looks at ways to make work fit the humans, and not the other way around.

“For example, if employees think they’re lifting too much weight, I would never suggest a weight training routine for them,” said Hattrup. “I would suggest they use a hoist or a jack that eliminates the weight that they were lifting.”

Working under the guidance of Kenneth Funk, associate professor of industrial and manufacturing engineering, Hattrup’s research looks at defining the characteristics of good work from three angles: industrial organizational psychology, industrial engineering, and sociology.

He has developed a qualitative method, he said, “to find intelligent, substantiated methods to collect data, analyze the data, and do something with that to redesign the work.”

Hattrup’s next step is to begin a longitudinal study using these characteristics as measuring devices to design surveys and interview questions to redesign work for groups of employees. “It’s not a cookie cutter mold where we say here’s good work, apply it. It’s a specific process that caters to a specific group of employees,” he said.

As the MIME first place winner at the College of Engineering’s 2019 Graduate Research Showcase, Hattrup was able to present his research at the College of Engineering’s Oregon Stater Awards. He was thrilled to be able to talk with alumni and industry representatives. “I met fellow industrial engineers who run companies and understand how important it is to design good work for their employees,” he said. Hattrup also made connections with local organizations where he’ll be able to apply his research.

A humanitarian approach

In humanitarian engineering, students often create solutions to help serve the basic needs of people in developing countries, such as the need for clean water, clean cooking, or health products.

Jennifer Ventrella, a recent graduate of the humanitarian engineering program (with a degree in mechanical engineering and applied anthropology), says the solution doesn’t always fit the situation.

“One of the gaps we found is that the technologies aren’t always designed to fit the context that they’re going to,” she said. “Maybe a U.S. engineer develops a water pump, but once it’s installed at its final destination, it might break or not fit how people normally get their water, and it becomes unused.”

Ventrella uses the interdisciplinary nature of her degree to first understand people and their cultures to allow others to create technologies that can best fit their needs.

Ventrella’s research focuses on monitoring cookstoves to help solve the health problems and environmental damage caused by cooking over open fires. People have developed many improved stove designs, but it’s difficult to know if they’re working as intended. “Once it actually goes into someone’s home, they might not use it consistently or maybe use too much fuel. Since that can be difficult to measure, you don’t really know what true impact those stoves are having, so you really don’t have a good way of knowing if your program is successful,” said Ventrella.

Working with mechanical engineering assistant professor Nordica MacCarty and anthropology assistant professor Shaozeng Zhang, Ventrella designed sensors and placed them in homes in Uganda and Honduras to monitor fuel consumption, which helps them understand how people are using the stoves and can lead to better designs.

Ventrella found it useful to present her research at the showcase. “I liked both the opportunity to learn about other people’s research and then also to be able to share my own,” she said. She found it especially valuable to clearly display her results and explain to people why her research matters.

(Continued on next page.)
Aid workers put their lives on the line to treat patients with Ebola and other highly infectious diseases. Can robots help make their jobs a little easier and allow more people to survive? Bill Smart, professor of robotics, is exploring how robots may be most useful during outbreaks. He has partnered with Doctors Without Borders — an aid organization that brings medical humanitarian assistance to victims of conflict, natural disaster, and disease epidemics. Together, they are examining how current robotic technology might be useful in Ebola treatment units. They are also exploring ways future technology may be used to automate work in similar environments, such as disinfecting treatment tents or delivering supplies to doctors. Interventions like these could free up medical staff to focus more directly on patients’ needs, which has been shown to increase the likelihood of survival.

Learn more about this project and other research at the College of Engineering on our podcast, “Engineering Out Loud.” Subscribe from your favorite podcast app, or listen online at engineeringoutloud.oregonstate.edu.

Unintended consequences

After the Titanic disaster, a new law required ships to have more lifeboats on board. In 1915, the SS Eastland was retrofitted with additional lifeboats, affecting the stability of the ship. While docked in the Chicago River and loaded with passengers, the Eastland rolled over and killed hundreds.

Hannah Walsh, a graduate student in mechanical engineering, uses this as an example of unintended consequences, a concept most often used in the social sciences that she is working to apply to engineering. Unintended consequences differ from engineering failures in that unintended consequences are instances in which an engineered product is fulfilling an intended function, but is also doing something unintended. These can be positive or negative.

Working with mechanical engineering professor Irem Tumer, Walsh looked at examples of unintended consequences and defined three archetypes: unintended drawbacks (design works as intended, but has other consequences that don’t affect the original intent); sabotaging consequences (undermines the fundamental solution and is often a quick fix design decision); and perverse consequences (design decision has an opposite effect than what was planned).

Walsh developed models for each archetype using causal loop diagrams and system dynamics modeling. “The future direction of my research is to integrate these models into the engineering design process to avoid adverse unintended consequences,” she said.

At the showcase, Walsh was happy to get feedback from those who stopped to find out about her research. “They want to know what the big picture is, and how the research will have a positive impact on society,” she said.
Connections forged here in Corvallis have led to award-winning research from scientists across three continents. The collaboration, which included two Oregon State University doctoral alumni and a number of faculty, won the best paper award at the Journal of the American Ceramic Society Awards Symposium.

The lead author, Nitish Kumar, a research associate at the School of Materials Science and Engineering at the University of New South Wales in Australia, received his doctorate in materials science from Oregon State in 2016.

He worked on the project with a fellow alumnus Eric Patterson (’12 Ph.D., materials science), who now works as a materials research engineer at the U.S. Naval Research Laboratory, as well as their former advisor, Dave Cann, professor of materials science, in addition to a number of other researchers.

“Making the research for this award took about 2 1/2 years, and receiving this award was an indication of our research being recognized and appreciated by the wider scientific community,” Kumar said. “I consider this award and the Graduate Research Assistant Award from College of Engineering at OSU as the two biggest awards I have received for my research.”

Their paper focuses on a relatively new class of materials — bismuth perovskites. A perovskite is a type of crystal structure commonly used in the design of electronic materials because of its inherent versatility. In particular, bismuth-based perovskites have been the focus of great interest by researchers as a potential replacement for more toxic materials such as lead. (Bismuth and lead are next to each other on the periodic table and chemically similar.)

However, it has been a big challenge for materials researchers to develop materials that can compete with lead-based materials. The present work involves the development of new bismuth-based materials targeted for high-temperature capacitor applications.

“The materials we were working on showed some impressive properties,” Kumar said. “We looked at what further information we need to fully understand their behavior and what characterization tool can provide us with that information.”

The paper, titled “Defect mechanisms in BaTiO3-BiMO3 ceramics,” examines the role of point defects in this new class of materials. These “defects” are not flaws or cracks or something macroscopic. Rather, “point defects” refers to irregularities in the lattice on the atomic scale. The particular point defect central to the paper is an oxygen vacancy, an empty site in the crystal lattice where an oxygen ion is supposed to be.

Understanding the role of defects is an important research area in materials science, because defects often affect performance. For example, the failure of a capacitor or an ultrasonic transducer is often due to a fundamental problem with the material. Rather, failure is caused by how the defects behave. (They may migrate over time, they may enable breakdown, they may initiate corrosion, etc.)

Once the defect chemistry of a material is understood, defects can also have beneficial effects. State-of-the-art ultrasonic transducers — used in biomedical applications, sonar, and non-destructive testing — rely on a piezoelectric material that has intentionally added defects. These defects are used to precisely engineer the properties of the transducer material to be highly sensitive to acoustic signals so a high-resolution image can be obtained.

While there has been progress in improving the materials properties of these new bismuth perovskites, the underlying defect chemistry of these systems is relatively unexplored. This National Science Foundation funded project helped to develop a framework for understanding the interrelationship between point defects, processing conditions, and properties.

“These materials show great promise,” Cann said. “With improvements in the properties guided by the results of this project, there are many potential applications that can be considered such as intermediate temperature solid oxide fuel cells, dual phase membranes, and other energy applications.”

Other collaborators on the project included Till Frömling from the Institute of Materials Science, Technische Universität Darmstadt; Edward P. Gorzkowski from the U.S. Naval Research Laboratory; Peter Eschbach from the College of Science at Oregon State University; Michael P. Muller and Roger A. De Souza from the Institute of Physical Chemistry, RWTH Aachen University; and Julie Tucker and Steve Reese from the College of Engineering at Oregon State University.
MIME STUDENTS SELECTED FOR PRESTIGIOUS DOE RESEARCH PROGRAM

BY STEVE LUNDEBERG

Two doctoral candidates in the School of Mechanical, Industrial, and Manufacturing Engineering have been selected for the Department of Energy’s Office of Science Graduate Student Research program.

Mechanical engineering students Ari Clauser and Zac Taie are among 70 honorees nationwide, from 52 different universities.

The program’s goal is to prepare graduate students for STEM careers deemed critically important to the Office of Science mission by providing graduate thesis research opportunities at DOE laboratories in collaboration with DOE scientists.

The research opportunities advance the students’ thesis work while providing access to the expertise, resources and capabilities available at Department of Energy facilities. Students spend between three and 12 months in the program.

Clauser, a third-year student in materials science under assistant professor Melissa Santala, is studying the characterization of interfaces between platinum nanoparticles and gamma alumina, a metastable phase of aluminum oxide used in catalysis.

Her project involves imaging the atoms at the interfaces using phase-contrast high-resolution transmission electron microscopy and scanning transmission electron microscopy at the National Center for Electron Microscopy at the Lawrence Berkeley National Laboratory in Berkeley, California.

Taie, who like Clauser hopes to graduate in 2020, is studying thermal-fluid sciences under Chris Hagen, associate professor of energy systems engineering.

Taie’s dissertation work is designed to help enable a societal transition from fossil-sourced natural gas to renewably generated hydrogen and methane.

“The first component of my doctoral work is composed of system-level engineering and economic analyses of electrochemical water-splitting devices used to couple the electrical and gas energy systems in the Pacific Northwest,” he said. “The second component is to conduct fundamental research into the mass transport physics localized at the electrocatalyst interface that limits electrolyzer performance.”

Taie will also be working at the Lawrence Berkeley lab.

A RELUCTANT STUDENT WINDS HER WAY TO OREGON STATE AND HER ENGINEERING DREAM JOB

BY STEVE FRANZEL

Byxbe’s advisors and teachers urged her on. Convinced of her potential, Byxbe’s advisors and teachers urged her on. After changing to the engineering track, she enrolled in algebra classes at a local community college to bone up on her math, which she hadn’t studied for a decade. Along the way, she held down various jobs and completed two NASA internships.

To be honest, engineering hadn’t really excited her. The decision was strictly practical — a path to a secure career and a means to ensure that her mother didn’t have to work until she was 70, as her father had. Then she discovered human factors engineering, and her dutiful studies morphed into a passion. “I didn’t even know the discipline existed until I’d been an engineering student for at least a couple of years,” Byxbe said. “I felt this cosmic tie-in with yoga, with the biomechanics of dance and kinesiology, and it was all wrapped up in this package of how humans interact with systems and machines.”

But as her senior year approached — her sixth year at Oregon State — Byxbe confronted the frightening prospect that she wouldn’t be able to pay her bills — wouldn’t earn her degree after all. Her fear was palpable and at times debilitating. She took a second part-time job.

(Continued on next page.)
Haapala receives Fulbright Scholar award

Karl Haapala, associate professor of manufacturing engineering, has been selected for the Fulbright-Tampere University Scholar Award to improve economic, environmental, and social performance of metal-based additive manufacturing processes through integrated machine learning and process modeling. Haapala and his family will spend the 2019-2020 academic year at Tampere University (TAU) in Tampere, Finland.

“I’m honored to have received this prestigious Fulbright award,” said Haapala. “I’m excited to have the opportunity to work with world class researchers in design engineering and smart manufacturing at Tampere University.”

He aims to build upon existing knowledge in advanced manufacturing and automation at TAU – augmenting it with his expertise in unit manufacturing process modeling and systemic sustainability assessment. This experience will extend collaborations initiated in 2018 with TAU Automation and Mechanical Engineering (AME) faculty, where he was hosted for six weeks as a visiting professor. In late 2018, two of his former master’s advisees, whom Haapala continues to co-advise, began their doctoral studies in Finland with his collaborator, Eric Coatanea, professor of mechanical engineering and industrial systems.

In addition to conducting research during his year abroad, Haapala plans to offer instruction in industrial sustainability and digital manufacturing. This award will enable him to work directly with TAU researchers and at lab facilities and to develop skills and course materials in new areas that he can bring back to Oregon State University.

The award is a special grant within the Fulbright U.S. Core Scholar Program administered by the Council for International Exchange of Scholars (IIE/CIES).

Joshua Gess' indelible memories from playing wheelchair basketball at Auburn University.

The thrill of taking a last-second shot is one of Joshua Gess’ indelible memories from playing wheelchair basketball at Auburn University. With 6 seconds on the clock — and down a point, 40-39, against Shepherd Spinal Center — Auburn called a timeout to map one last play. The team fanned out and jockeyed for position. Gess rolled off a pick and snagged the inbound pass at the right edge of the free-throw line.

Three seconds.

“It was pass or shoot,” he said. “No one was open, so I took the shot. It’s all still so clear in my mind; I’ll never forget exactly where I was on the court when I missed. The buzzer sounded, and I rolled away feeling so dejected. We’d played so hard.”

Immediately, Gess’ teammates rallied around him. Each one laid a reassuring hand on his shoulder and offered words of encouragement.

“You played a hell of a game the other day.”

Gess, taken aback, barely sputtered a thank you.

“Thanks, man," Gess said. "It still gives me chills when I think about it. It was such a special moment.”

And on yet another day, he was rolling through campus when a student stopped him and said, “You played a hell of a game the other day.”

Gess, taken aback, barely sputtered a thank you.

“Thank you," Gess said. "That means a lot."
In September 2007, Gess was a 24-year-old doctoral student when an accident left him paralyzed below the waist. Basketball had always been a huge part of his life. Now, forced to watch from the sidelines, Gess regarded the game as just another layer of frustration weighing down his long, strenuous rehabilitation. At the repeated urging of Auburn’s wheelchair basketball coach, Gess acquiesced and agreed to give the sport a try. It gave him back the game he loved and also offered a means to reengage with the world at large.

“Disabled people can be reclusive,” Gess said. “It takes some effort to put ourselves back into circulation, and playing basketball again was a big step in that direction.”

Gess describes wheelchair basketball as a combination of chess and demolition derby. “A lot of strategy, a lot of contact,” he said. “People watching for the first time are often surprised by the intensity and the skill required.”

He wanted to share it all. After settling in at the College of Engineering in fall 2015, Gess set his sights on developing a wheelchair basketball program at Oregon State University. The only option at the time was the intramural league at Dixon Recreation Center. His goal is to join a sanctioned league and play in regional tournaments against community-based teams within five years. Eventually he’d like Oregon State to host a community in a broader way. It certainly did surprise me,” Gess said. “For disabled students to see so many able-bodied people cheering them on was fantastic.”

Disability programs for young people with disabilities. He also receives a high level of commitment to adaptive sports, according to Gess.

“My dream is to see the emblem for Oregon State Wheelchair Basketball prominently displayed above the building entrance,” he said. “Imagine recruiting students and telling them, ‘This is our home. This is where you’ll play.’ Most schools don’t have that.”

He also predicts a high level of fan support because of the region’s inclusive culture.

“Auburn crowds typically exceeded 200. I believe we could draw four times that number,” Gess said. “For disabled students to see so many able-bodied people cheering for disabled athletes will really encourage disabled students to want to be part of the community in a broader way. It certainly did that for me.”

Yildirim arrived in the U.S. in 1983 and after spending a year in San Francisco learning English, he followed a friend to Corvallis to begin graduate school at Oregon State. “Everybody was riding bicycles,” he said. “So, I bought a bicycle, a raincoat, and became an Oregonian.”

He immersed himself in his studies and campus life. It was during this time he met his future wife, Yolanda, who was studying accounting and business.

Yildirim says he continues to use the methodologies he learned in his engineering classes when making business decisions.

After completing his master’s degree in mechanical engineering, he took a job with the San Mateo, California based PACCEO Corp., a subsidiary of the Japanese firm Mitsui Group that designs cranes for ports and container terminals. This was his first exposure to the global shipping industry. “After five years working with the Japanese, I learned their management system and I was starting to put the puzzle pieces together and look at the big picture,” he said.

He returned home and began to apply his new skills to growing the family business. He first focused on foreign trading operations, including importing coal from Siberia. When the company earned $50,000 in its first month importing nearly 10,000 tons of Russian coal, Yildirim’s
imagination soared. Six years later, the revenue from importing coal was high enough for Yildirim and his brothers to diversify their investments by exploring opportunities in shipbuilding, port management, and bulk commodity trading. They then slowly moved into the mining business and acquired more ports. The shift launched them into a new league.

The company has received several notable recognitions. Yildirim ranks 61 on Lloyd’s List of the 100 most powerful and influential persons in the global shipping industry. He is also ranked the ninth most powerful person in the container terminal business and the third most powerful person in the chromium industry by ICDA and CRU.

Ron Sarazin
Academy of Distinguished Engineers
B.S. INDUSTRIAL ENGINEERING, 1976
PRESIDENT, OLYMPIC PERFORMANCE, INC.

Ron Sarazin likes to help people and companies solve problems.

He owns Olympic Performance Inc., a training and consulting company based in the Portland area. For nearly 30 years he has been providing executive coaching, strategic planning, and project management training to enhance personal impact and organizational performance. His clients come from industry, city and state governments, nonprofits and federal agencies.

After graduating with a bachelor’s degree in industrial engineering, Sarazin launched his career at Alcoa; gained experience with internal consulting at PACCAR; and then joined Cook–Newhouse and Associates to help clients adopt new manufacturing and distribution processes. Then in 1983, he took a job with Portland General Electric (PGE). The electric utility company was trying to become more progressive, and Sarazin decided that PGE was a place where he could make a difference.

After eight years serving in various management capacities, he realized he missed the technical, problem solving side of the profession and wanted to get back into consulting. The timing was right, as PGE was beginning to downsize. They offered him a repositioning package that enabled him to start Olympic Performance.

Sarazin coached girls’ soccer, ages 9 to 16, for more than 21 years. He kept coaching long after his daughters grew out of it because he enjoyed helping girls improve and perfect their skills. It’s a strategy he’s also found useful in coaching adults. “The more people improve the fundamentals of what makes them a good player, the better a team becomes and the more games they win,” Sarazin said. “It was never about winning games; it was about the journey they took to get there.”

Sarazin believes strongly in giving back to the community and always has several service projects going. He is former board chair for the Washington County Community Action Organization, served on the Tualatin City Council, and is currently an industry advisory board member for MIME.

As much as Yildirim values education, it’s not surprising that the Yildirim Group supports educational projects in Turkey and beyond. Over the last three decades, the company donated all the labor and materials to build three vocational high schools and seven elementary schools in Turkey. In addition, the Garip and Zeycan Yildirim Foundation, launched in honor of Yildirim’s parents, provides scholarships for low-income students and also funds a range of health, environmental, and cultural causes.

Yildirim is also investing in Oregon State with a two-year, $300,000 research project to develop a special nickel and chrome-based superalloy for power plants that use supercritical carbon dioxide.

Yildirim is also acquiring other businesses. The shift launched them into a new league.

Jason Culp likes to make things. He is a prolific inventor and an advocate for the inclusion of science and technology in childhood education.

Culp is an engineering design manager for A-Dec, one of the world’s largest makers of dental chairs and equipment. The company was co-founded by Joan and the late Ken Austin (B.S. Industrial Engineering ’53; E.B. Lemon Distinguished Alumni Award, 2000), generous philanthropists and supporters of Oregon State.

Culp leads a team that designs custom-engineered cabinetry for the company. He likes using his ingenuity to meet the unique and changing needs of each customer and helping his group develop professionally.

“I love my job as a leader because I get to watch people grow,” Culp said. “When my team members come up with new ideas and see them built, it ignites a spark within them.”

While his career has primarily focused on the design of engineered-to-order products, he also coordinates offshore manufacturing efforts.

Culp says the internships he had at Atlas Copco Wagner and Blount while attending Oregon State helped him define a career focus.

“They fueled my passion for creating and building things and really infused the practical application of engineering,” he said.

Culp especially enjoys teaching young minds about science technology, engineering and math careers. He and his wife, Kelley, are four-year coaching veterans of the For Inspiration & Recognition of Science & Technology (FIRST) program in Wilsonville, Oregon. Culp also volunteers as a judge for high school level robotic competitions.

“I am investing in our future,” he said. “When you combine the robotics experience with the marketing and presentations skills these kids learn, it really opens the door for them to think about a potential career in a different way. They inspire me.”

In addition to his outreach with young students, Culp has served for six years on the industry advisory board for MIME.
At an early age, Todd Gerlach was interested in understanding how mechanical things work. His projects centered around Lego and radio-controlled cars and evolved into building bicycles and automobiles. “In my early years, I was better at taking things apart than putting them back together,” Gerlach said. “But I stuck with it, expanding my skills and confidence.”

Once at Oregon State, Gerlach became motivated to take full advantage of all the resources available to him. He spent free time at the well-equipped shop in Rogers Hall, exploring the dynamics of complex mechanics. For his senior design assignment, he built a high speed retrieval robot and demonstrated it for CBW Automation, the event sponsor. The project led to his first job working for the company in Colorado.

“The mechanical engineering program really had a profound impact on me,” he said. “I started seeing all the directions where my education and career could take me.”

Today, Gerlach heads the engineering and product development group for the Concrete Cutting & Finishing (CCF) Division of Blount International. His team is responsible for developing diamond tools and equipment for construction and infrastructure markets. When Gerlach joined Blount, he started in the Forestry Lawn and Garden Division as a product design engineer, then moved into corporate business development as a senior engineer tasked with helping to diversify Blount’s product portfolio. After designing and launching a new and innovative product, Blount offered him a management position within CCF in 2010, and then promoted him to the division’s director of engineering in 2016.

“I have always loved the technical and creative challenge of problem solving and data analysis,” he said. “But in my current role, I really enjoy learning about what motivates people and teams, how to bridge the gaps, and developing new talent to achieve extraordinary results.”

Gerlach has mentored many interns and junior-level engineers just entering the profession, which he believes has helped make him a valuable contributor to the industry advisory board for MIME.

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