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Section

ScaleUp

ENRICHING THE NEXT GENERATION OF CHEMICAL ENGINEERS

**AIChE's ScaleUp:
A Win-Win
for Students
and Industry**



AIChE's ScaleUp: A Win-Win for Students and Industry

In an increasingly competitive global environment, how can chemical engineering students and companies alike align to meet the challenges ahead? Simply put, through AIChE's ScaleUp program.

Launched in 2007 to strengthen connections between industry and chemical engineering students, ScaleUp is well positioned to meet key issues facing the profession today. Safety awareness and leadership development are just two of the areas that ScaleUp is currently addressing through its varied programming and initiatives.

Designed to effectively prepare a new generation of chemical engineering professionals for the workforce, ScaleUp subsidizes AIChE membership for over 15,000 chemical engineering students at 171 ABET-accredited colleges and universities in the United States and Canada. Among the many benefits students derive from their participation in the program are a host of internship opportunities and eligibility for more than \$50,000 in annual scholarship awards through AIChE. Students also have access to *Chemical Engineering Progress* (CEP) magazine, the ChemE-on-Demand collection of webinars



Photo: Margot Hartford



Photo: Douglas Clark



Photo: Douglas Clark

and videos, and a myriad of resources through AIChE's eLibrary.

Equally important, subsidized membership facilitates student involvement in local chapters, where they build technical and leadership skills, network with industry professionals, and gain exposure to industry best practices.

Underscoring the program's emphasis on process safety, West Virginia University (WVU) was the host site for the first-ever Process Safety Boot Camp for university students. On a weekend in April 2013, nearly two

dozen engineering students at WVU participated in a unique educational experience, learning process safety fundamentals typically taught to professionals in the field.

The two-day course, funded by ScaleUp sponsor Bayer Material-Science, focused on safety fundamentals such as hazard identification, risk analysis, safe operating procedures and best practices, incident investigations, asset integrity, and regulatory compliance.

The course, a collaborative effort between the AIChE Foundation and

AICHE's Center for Chemical Process Safety (CCPS), was taught by CCPS Technical Director Louisa Nara, herself a graduate of WVU, and Don Abrahamson, a CCPS staff consultant and 44-year industry veteran.

Says Nara, "The course provides a solid foundation for students as they move into industry and gives them an awareness of the vulnerability that we all face in processing and manufacturing hazardous materials."

Dr. Rakesh Gupta, Chair of the Chemical Engineering Dept. at WVU, concurs. "It is extremely important that our students graduate with a proper knowledge and appreciation of process safety. The Process Safety Boot Camp introduced students to proven best practices and a culture of safety. What they learned will help them throughout their professional careers," he says.

Amanda Thorp was a senior at WVU when she was selected to participate in the boot camp. When asked why the program was beneficial, she explained, "When I begin my job with BP I will be dealing with higher-risk processes and procedures. I will be able to take what I learned about process safety and use that knowledge to help improve the safety culture of the plant and make sure we are taking all the necessary precautions to prevent and mitigate hazardous incidents." Thorp's favorite part of the boot camp experience was hearing about case studies. "I believe we can learn a lot from past mistakes," she said.

AICHE's commitment to safety awareness is further emphasized by ScaleUp's partnership with CCPS's Safety and Chemical Engineering Education (SACHE) program, which enables students to study process safety course materials online. Since 2008, SACHE has awarded nearly 20,000 certificates of safety achievement to engineering undergraduates who have completed the interactive online courses.

Why Sponsor AICHE's ScaleUp?

Through corporate sponsorship, ScaleUp provides subsidized AICHE membership for undergraduates. ScaleUp promotes technical expertise and professionalism in the future chemical engineering workforce.

Sponsors have access to the brightest future employees through AICHE's student resumé database, career fairs, and student conferences. Sponsors also benefit from increased exposure and visibility at AICHE meetings and events, as well as discounts on AICHE products.

Corporate sponsorship of ScaleUp furthers the profession by creating a prepared and responsible workforce. Society gains a new generation of engineers with a better understanding of industrial process safety and a heightened awareness of the consequences of safety failures. Sponsor companies welcome a talented and innovative group of young professionals to the workplace.

For more information on AICHE ScaleUp, contact Darcy Lorin at darcl@aiche.org or (646) 495-1398.

Safety awareness is only a small part of the far-reaching ScaleUp program. From Chem-E-Car competitions to Engineers Without Borders (EWB), ScaleUp offers students a rich variety of opportunities, all of which bring classroom theory to life.


The Chem-E-Car competition provides an invaluable hands-on learning experience for students. Participants design and construct vehicles that adhere to specific size constraints and harness energy created from chemical reactions for power. These competitions bring out the best in chemical engineering students as they learn to work in interdisciplinary teams. Students also gain first-hand exposure to safety practices — they are required to pass safety assessments and complete extensive safety paperwork for their cars prior to the competition.

Engineers Without Borders affords students the opportunity to gain practical experience as they apply chemical engineering methods to the most critical humanitarian problems facing developing communities around the world. Chemical engineering students who volunteer for the nonprofit EWB collaborate with these communities and work on sustainable engineering

projects to help improve the quality of life for all people.

The ScaleUp platform is continually evolving. The Student Leadership Development Program, sponsored this year by Chevron, is garnering much enthusiasm from student participants. Designed to address the profession's critical need for well-trained managers who possess both technical proficiency and leadership skills, this annual initiative is open to a select group of students based on academic performance or involvement in AICHE's student leadership structure. The program, now in its third year, attracts some of the best and brightest chemical engineering students in the U.S. In workshops and break-out sessions, AICHE student leaders learn the fundamentals of effective leadership, teambuilding, conflict resolution, and negotiation — invaluable tools as they move forward in their careers.

Plans are now underway to extend ScaleUp globally to provide international chemical engineering students similar membership opportunities as their domestic counterparts. Countries that have been identified for expanded student membership development include Brazil, China, Singapore, India, Saudi Arabia, and Korea.



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All that we do is grounded in The Chevron Way — a statement of who we are, what we do, what we believe, and what we plan to accomplish. We seek people who align themselves with our standards of integrity, ingenuity, environmental protection, and high performance. We value diversity of thought, education, national origin, and gender.

Corporate responsibility at Chevron begins with safe operations, but it doesn't end there. We endeavor to advance the livelihood of all people — from improving the safety and health of the public to helping our employees succeed. As our long-term success is deeply linked to society's progress, we are committed to investing in our community. It's not just good business practice; it's the right thing to do. Find out more at www.chevron.com.

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- Our diverse and highly skilled global workforce consists of approximately 61,900 employees, including more than 3,600 service station employees.
- Intern and full-time hires in the U.S. work at various locations including California, Texas, Louisiana, Mississippi, Utah, Wyoming, and Pennsylvania.

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Is Your Company Looking for Return On Investment?



If so, look no further than ScaleUp, AIChE's corporate sponsorship program, which provides companies with:

- Access to AIChE's network of 171 ABET-accredited colleges and universities in the United States, Canada and Puerto Rico
- Opportunity to integrate more closely with engineering programs currently training new professionals
- Reach within a pool of promising engineering talent to fulfill both short-term and longer-term business goals
- Opportunity to support underserved engineering constituencies
- Corporate exposure and brand messaging through AIChE's publications, website, signage and events
- Opportunity to build relationships with engaged student engineers and fellow industry professionals

To become a ScaleUp corporate sponsor, contact Darcy Lorin, Director of Corporate Relations, at darcl@aiche.org or (646) 495-1398.

Invest in the Future ... Invest in ScaleUp

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A Passion for Exceeding Expectations

Air Products (www.airproducts.com) touches the lives of consumers around the globe in positive ways every day. With over 18,000 employees and operations in more than 40 countries, we serve customers across industries — from food and beverage, health and personal care, to energy, transportation, and semiconductor materials. We supply a unique portfolio of atmospheric gases, process and specialty gases, performance materials, equipment, and services.

Founded in 1940, Air Products has built a reputation for its innovative culture, operational excellence, and commitment to safety and the environment. Our aim is to develop lasting relationships with our customers and communities based on human qualities: understanding their needs, doing business with integrity and honesty, and demonstrating a passion for exceeding expectations.

We strive to protect the environment in our hundreds of operating communities throughout the world. From local plants to executive leadership, volunteer efforts are encouraged at every level of the organization.

Working at Air Products

Air Products draws strength, opportunity, and financial growth from the diversity of its workforce. Our employees understand and identify with our business objectives and

express and contribute their own ideas. Our success is directly attributed to a work environment that is collaborative, inclusive, and respectful of all people.

Co-op, Intern, and Full-Time Career Development Program Opportunities

Co-ops and internships are a valuable part of our overall career offerings. From our Allentown, PA, headquarters to several locations throughout the U.S., students can experience the Air Products work environment by contributing to challenging projects that have real impact on our business.

The Air Products Career Development Program (CDP), a full-time rotation program after graduation, is offered to BS and MS engineers, PhD engineers and scientists, BS and MS information technology specialists, and financial and commercial MBAs. CDP participants develop their skills and interests through a rotation of three different assignments, lasting 8 to 12 months each, during the first three years of employment. CDP participants work with their mentors to explore opportunities and long-term career paths. For more information about Air Products career opportunities, visit www.AirProducts.com/careers.

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Since 1940, Air Products has built leading positions in key growth markets such as semiconductor materials, hydrogen, natural gas liquefaction, and advanced coatings and adhesives. We are recognized for our innovative culture, operational excellence, and commitment to safety and the environment. Air Products has operations in over 40 countries, and over 19,000 employees around the globe.

Visit www.airproducts.com/careers



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Next-Generation Process Optimization Solutions

AspenTech (www.aspentech.com) is a leading supplier of software that optimizes process manufacturing for the energy, chemicals, and construction industries, as well as other industries that produce products from chemical processes. With integrated aspenONE solutions, customers are better able to increase capacity, improve margins, reduce costs, and become more energy efficient.

Industry-leading aspenONE solutions feature Aspen Plus and Aspen HYSYS process simulators within Manufacturing Execution Systems (MES), Advanced Process Control (APC) systems, Petroleum Supply Chains, and Supply Chain Management structures. Together, they help create an integrated workflow that enables collaboration and faster, smarter decision-making across the organization.

Founded in 1981, AspenTech grew out of MIT's Advanced Systems for Process Engineering (ASPEN) Project. Today, AspenTech has more than 1,200 employees operating from over 25 offices worldwide, with headquarters in Burlington, MA, and three R&D centers in Burlington, Houston, and Shanghai. To learn more, visit www.aspentech.com.

Career Opportunities at AspenTech

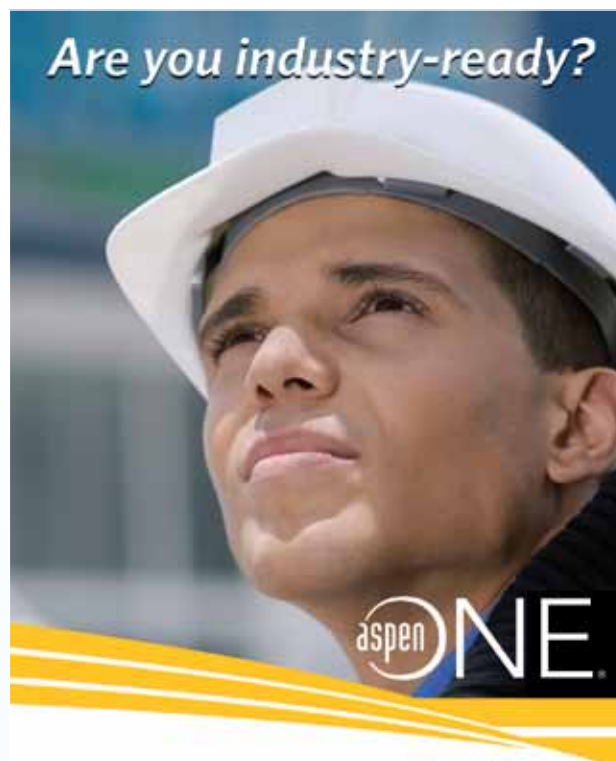
With a culture of leadership and innovation spanning several decades, AspenTech is an ideal workplace for creative problem solvers interested in taking on the next generation of industry challenges. Employees use engineering training and knowledge to innovate and create a more sustainable world, and produce software that is based on the latest IT platforms in mobile computing, social media, and more.

Career opportunities are available for chemical engineering students and graduates in software development, usability and user experience, product management and marketing, technical consulting, support, and implementation services. We are looking for individuals with energy, a desire to learn, curiosity, and leadership, who are capable of working in multi-disciplinary teams and bringing creative ideas and fresh perspectives.

AspenTech offers global experience, mentoring, and rotating assignments. Contact Amy Ferreira (amy.ferreira@aspentech.com) in Human Resources for additional information.

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Read the white paper *Transformation of Process Engineering—Innovations and Best Practices* by going to www.aspentech.com/CEP.

For more info, contact AspenTech's University Program at University.Program@aspentech.com or call us at 1-855-882-7736.



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Corporate social responsibility is intrinsic to Corning's heritage, and has shaped the public's value and trust in our company. Our employees participate in humanitarian initiatives and fundraisers for the people, organizations, and communities around Corning's offices and manufacturing facilities.

Corning has a heritage and culture unlike any other company. The belief that diversity plays an essential role in our success is deeply rooted in our employees. We are diverse not only in gender, ethnicity, and race, but also in age, sexual orientation, work styles and levels, perspective, education, and skill sets.

Chemical Engineering at Corning

Today, approximately 450 Corning chemical engineers develop and improve technologies that support optical communications, advanced displays, environmental and life science initiatives, and specialty materials. We use advanced

modeling methods and experimental design to generate the basic information for product and process development. Our chemical engineering expertise and core competencies include application of mass and energy balances, transport phenomena, non-ideal fluid mechanics, surface science, and reaction engineering.

The contributions of chemical engineers at Corning go beyond our product and process technologies. Many engineers move on to prominent managerial positions, further demonstrating the versatility and importance of this discipline at Corning.

A Career with Corning

Corning offers challenging assignments and experiences in nations and cultures worldwide. Corning's approximately 29,000 employees work in 70 locations, including research centers in North America, Europe and Asia. For more information about our internship and employment opportunities, visit www.corning.com/careers.

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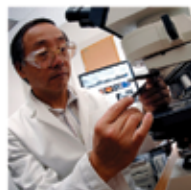
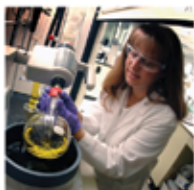


Corning, the world leader in specialty glass and ceramics, is a proud sponsor of the AIChE ScaleUp Program.

Chemical Engineers have made substantial contributions at Corning throughout its history in the research, development, implementation, and operation of the company's major innovative products and processes. Our chemical engineers develop and improve technologies that support optical communications, advanced displays, environmental, life science, and specialty materials.

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- Protecting the planet through responsible operations and the pursuit of breakthrough technologies aimed at solving world challenges.
- Creating a workplace that thrives on employee development, proactive career feedback, health and wellness offerings, diversity and inclusion, and employee engagement.
- Enabling a dynamic and friendly work environment that values diverse perspectives, is mutually respectful, and benefits from the vision of leaders who rank among the best in the industry.

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Dow has approximately 52,000 employees globally, including 26,000 in North America. Our global scale and breadth offers employees the opportunity to carve out a unique career path. Dow collaborates with universities and colleges to offer co-op and internship programs to chemical engineering students. Dow also hires recent ChemE graduates into rotational programs that provide diverse experiences in manufacturing, engineering, and R&D. ChemEs have the opportunity to work at 197 manufacturing sites in 36 countries. More information on career opportunities at Dow is available at www.dow.com/careers.

More About Dow

- **Our Mission:** to innovate what is essential to human progress by providing sustainable solutions to our customers
- **Our Vision:** to be the most profitable and respected science-driven chemical company in the world
- **Our Values:** integrity, respect for humankind, and environmental protection.

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$e = mc^2$

$\sum_{n=-m}^{\infty} x^n$

$E(\Delta) = E\left(\frac{np}{\sum x}\right)$

$\sin^3 x + \sin^2 x \cos x = ?$

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Innovation has always been the driving force at UOP going back to our creation in 1914. The company's extensive patent portfolio began when revolutionary inventor Jesse A. Dubbs commercialized the Dubbs thermal cracking process, setting the technological foundation for the modern refining industry. Today, UOP has more than 2,200 active patents worldwide, covering important advances in process technology, catalyst and adsorbent materials, and equipment design. UOP continues to develop its technology offerings as a 21st century leader in all of its industries.

As part of Honeywell's Performance Materials and Technologies business group, UOP is equipped to offer the most

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Explore UOP Career Opportunities

Headquartered in Des Plaines, IL, UOP has 3,600 U.S. employees and an additional 1,000 employees outside the U.S. Chemical engineers work at all of our worldwide locations in R&D facilities, sales offices, and technical service centers. Our engineers work with advanced technologies, global customers, and the most innovative, talented minds in the industry. Your career path at UOP will encompass diverse, challenging assignments that span product lines, job types, businesses, and countries. New engineers and technologists grow with us through on-the-job training, online courses, classroom learning, and coaching. Visit us at www.uop.com.

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DuPont engineers meet new technical challenges every day — from research and development to plant scale up to operations to marketing. We hire professionals who desire to work at the leading edge of their fields. We offer opportunities to BS, MS, and PhD engineers, including full-time positions, internships, and co-op opportunities. Our Field Engineering Program provides an early career opportunity to experience DuPont's diversity through a series of rotational developmental assignments.

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ENERGY

Together we can decrease dependence on fossil fuels. DuPont is applying our deep knowledge of and experience in microbiology, fermentation, polymer science and electrochemistry to help make cars lighter, fuels cleaner, and sustainable energy sources, such as the sun, easier to harness.



PROTECTION

Together we can protect what matters most. DuPont is working with companies, governments, academics and scientists to develop a vast range of materials, products and consulting solutions that keep our environment, our families, industrial workers, and those who protect us safe.

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Merck's mission is to discover, develop, and provide innovative products and services that save and improve lives. We strive to transcend the world's greatest health challenges and to achieve our business goals responsibly. We work to expand global access to medications in an environmentally sustainable way and initiate community outreach programs. Learn more at www.merckresponsibility.com.

We believe that a diverse, inclusive workforce makes us a more innovative and agile company, attuned to the needs of our customers. We endeavor to create a workplace where different perspectives are respected and all opinions matter.

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develop, and implement processing and manufacturing technologies for new and existing products.

- *Equipment and facilities design.* Design and build advanced manufacturing plants and laboratories. Participate in all phases of project management, from the initial engineering drawings to the final startup phase.
- *Manufacturing and supply.* Support line production to maintain high performance levels. Engineer improvements to enhance safety and quality, and minimize environmental impact. Optimize processes to improve process quality, yield, and efficiency.

Rotation Program Opportunities

Our manufacturing rotation programs provide select hires with mentors and allow them to either rotate between three sessions (technical, operations, and business) or focus exclusively on technology, for two to three years. Additional, department-specific programs are available.

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At Merck, chemical engineers play an active role in the solutions we create. From the first drawing to project scale-up and the final phase of full production scale, they conceive, develop, and implement new processing and manufacturing technologies. Their ideas extend beyond the workplace and into the world. Our chemical engineers help us take on complex health challenges including AIDS/HIV, hepatitis C, and urban nutrition with the innovative medicines, vaccines, consumer health and animal products we discover and produce. Merck is proud that these professionals use our global resources to make a positive impact in their careers—and on lives around the world.

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Every day, Praxair helps one million customers become more profitable, more efficient, and more environmentally sound through the use of our products, advanced gas delivery systems, and applications technologies.

A global Fortune 250 company with 27,000 employees in more than 50 countries, Praxair is one of the leading industrial gases companies worldwide. As an industry leader, we continually develop more innovative ways to meet today's global challenges while preserving the promise of the future.

Revolutionizing the Industrial Gases Industry

Our commitment to global productivity and environmental performance is second nature for a company that got its start in 1907 as the first North American company to commercialize cryogenically separated oxygen. Praxair has led the development of processes and technologies that have

revolutionized the industrial gases industry. Just a few of our breakthroughs include the introduction of the first distribution system for liquid gas in 1917, and the development of an on-site gas supply at the end of World War II. Later, in the 1960s, Praxair introduced non-cryogenic means of air separation.

To date, the company has over 4,000 patents and pending applications.

Where Diverse Talent Makes an Impact

The diversity of our talented employees contributes to our ability to consistently exceed the expectations of customers across a wide range of industries. Whether we're starting operations in a new location, expanding into new fields, or developing solutions to one-of-a-kind challenges, our employees drive the innovation and creativity that enable us to deliver on our mission of making the world more productive.

Building your skills. Making your mark. Enjoying your challenge. Owning your future. These are all hallmarks of the Praxair experience, where, ultimately, top talent comes together from diverse backgrounds and makes an impact.

For more information about Praxair's career opportunities, visit www.praxair.com/careers.

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\$11B in sales

we are carbon neutral

in more than 50 countries

4th consecutive year as a TOP GREEN COMPANY by Newsweek

SHAREHOLDER RETURN 37% over past FIVE YEARS

FORTUNE 250 COMPANY

MORE THAN 85,000 hours contributed to community engagement efforts benefitting 300,000 people

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Selected for the NYSE Century Index

CR Magazine's 100 Best Corporate Citizens List



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Making our planet more productive includes engaging with and supporting Praxair's global communities. We are very proud to support the American Institute of Chemical Engineers.



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CORNING



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