AIChE®

ScaleUp

Special Advertising Section

Enriching the Next Generation of Chemical Engineers

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

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It's not often that a tooth-paste-powered car whizzes by you accompanied by boisterous applause, unless you happen to be at one of AIChE's regional or national Chem-E-Car competitions.

These exciting, high-energy events are made possible by ScaleUp, a program launched in 2007 to strengthen connections between industry and chemical engineering students. Chem-E-Car competitions bring out the best in chemical engineering students, as they compete using chemically-powered model cars of their own design and construction.

The Chem-E-Car competition is only one facet of ScaleUp. The program's corporate sponsors take an active role in engaging and educating the next generation of chemical engineers, with a strong emphasis on process safety. "Our ScaleUp sponsorship is a demonstration of our commitment to and partnership with AIChE and the students," says Cynthia Murphy, a Chevron University Affairs Manager. ScaleUp effectively prepares a new generation of innovative chemical engineering professionals in order to improve and further the industry as a whole.

Through corporate sponsorships, ScaleUp offers free AIChE membership to over 15,000 chemical engineering students at over 160 U.S. and Canadian colleges and universities. Students who are part of the ScaleUp program benefit from internship opportunities provided by sponsor companies and eligibility for more than $50,000 in scholarships awarded annually through AIChE. Free membership allows students to access *Chemical Engineering Progress* magazine, ChemE On Demand, and a wealth of industry resources through AIChE's eLibrary.

More importantly, subsidized membership is the catalyst for getting students involved in their local chapters, where they are building their technical and leadership skills, networking with industry professionals, and becoming better prepared for their careers.

Chris Lowe, a 2012 University of Massachusetts graduate, says, "The connections that I've made with professionals at the local and national levels helped me to see where I can be in a few years. I've also interacted with my peers from across the country. They're the next

ChemE professionals, and I've started relationships with them now that can help me in my career."

Putting theory into practice

ScaleUp offers a rich variety of programs, from the Chem-E-Car to safety courses and Engineers Without Borders, that bring classroom theory to life. Owen Jappen, a 2011–2012 Stevens Institute of Technology junior and AIChE chapter board member, for example, has helped organize plant tours and trips to local section dinner meetings for Stevens ChemEs. "Initially I thought this would be just a fun thing to do, but then I began meeting and talking to people in industry and seeing what they're learning about and how equipment really works. I think it's important to get beyond a string of equations and symbols on the page," Jappen says.

Owen was active on the Stevens Chem-E-Car team and found it was also a source of practical, hands-on learning. Chem-E-Car teams design and construct chemically-powered vehicles within certain size constraints. As student participants begin to design their cars, they discover the many ways a car can be powered. That toothpaste-powered car, for instance, runs on a hydrogen peroxide and potassium iodide mixture, known as elephant's toothpaste. "Students get creative and try different types of reactions, including fuel cells, the Peltier reaction, or a bio-reaction, such as beef liver and hydrogen peroxide," says Tim Raymond, Associate Professor and AIChE Student Chapter Advisor at Bucknell University.

Getting the car to operate successfully requires more than just a chemical reaction; the students must also learn to work in interdisciplinary teams. "The systems integration of the car design was a new aspect for me. I liked that the Chem-E-Car involved working with advisors from different disciplines. For example, when we needed to build a circuit for the car, we had to talk to an electrical engineering professor. We also worked with the machinist at the school to design parts of the car," says Kevin Conner, a 2011–2012 Stevens Institute junior and Chem-E-Car team member.

The Chem-E-Car also helps students understand the importance of safety in industry. "Students learn a lot about safe operation. They need to do job safety assessments and a huge amount of safety paperwork for their cars," says Tim Raymond.

As part of the partnership between ScaleUp and the Center for Chemical Process Safety (CCPS), Safety and Chemical Engineering Education (SAChE) membership has been provided for all undergraduates. The SAChE program allows students to learn about process safety via interactive material online, and earn a certificate of safety achievement. Since 2008, SAChE has awarded nearly 11,000 certificates to undergraduates who have studied and completed process safety course materials online. "The safety program was a good reference source for me on my summer internship," comments David Monteiro, a 2011–2012 Stevens Institute junior. SAChE also sponsors annual safety awards for the National Student Design Competition and the Chem-E-Car competition.

Chemical engineering students can put classroom learning to work by volunteering with the non-profit Engineers Without Borders (EWB). As EWB volunteers, students apply chemical engineering methods to the most critical humanitarian problems

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 resume 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 will gain a new generation of engineers with a better understanding of industrial process safety, and a renewed respect for 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.

"We filled a baby pool with corn starch and water. This mix forms a non-Newtonian fluid — like quicksand — so you can run across it without sinking, but if you stand still, you sink. We held contests and even gave out Fig Newtons."

—Victoria Baldwin, Stevens Institute student

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in developing world communities. For instance, Davesh Shah, University of Pennsylvania engineering major, volunteered his expertise for a sustainable water and sanitation project in El Salvador.

Building a professional network

AIChE's campus-based chapters offer students many opportunities to get to know their peers in a fun, relaxed atmosphere. The Stevens Institute chapter, for instance, ran an event that created a big on-campus buzz. Victoria Baldwin, a 2011–2012 junior and chapter board member, explains, "We filled a baby pool with corn starch and water. This mix forms a non-Newtonian fluid — like quicksand — so you can run across it without sinking, but if you stand still, you sink. We held contests and even gave out Fig Newtons."

Students can network with their peers by organizing a regional student conference. Victoria Baldwin and Owen Jappen were on the Stevens student committee that organized AIChE's 2012 Mid-Atlantic Regional Student Conference. Held on the Stevens campus, the conference had over 20 schools registered with over 250 student attendees, and required many hours of planning and organizing. Says Victoria, "We accomplished a lot with a small group of students. I'm really proud of what we did."

Christina Delago, a 2011–2012 Stevens sophomore, helped plan the conference's closing banquet. "I've made such good friends through AIChE and I really enjoyed working with them on the conference," says Christina. "And attending the event was a great networking opportunity."

Students also value networking with professionals from AIChE's 100+ local professional sections. "When I had the opportunity to meet professionals, I got to see what the work environment was like. It also gave me an established network for my career," says Owen Jappen. Adds Kevin Conner, "As a 20 year old, it was interesting for me to talk to a more senior person, who was also interested in seeing what I was learning and how things are changing."

Social media and the ChEnected

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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.

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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.

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online community provide still more opportunities for students to connect, especially with young professionals. David Monteiro is one of the many students, for example, who follow ChEnected on Facebook. "The site helps me learn about different fields and see what's new in the discipline," says David.

David is also the chair of AIChE's Executive Student Committee (ESC). He works closely with Michelle Marsnick, AIChE's Undergraduate Student Program Lead, to enhance communications among national and international chapters. As part of this effort, he is helping to develop a student chapter website, which will make information sharing among chapters easier. "One challenge for chapters is getting speakers to come in. The new website will be interactive, and will help the chapters share speaker information and other best practices," he says.

Developing leadership skills

It did not take long for Chris Lowe to get hooked on AIChE. The UMASS chapter was hosting the regional conference in his freshman year, and it was looking for help with conference planning and logistics. He volunteered, worked closely with chapter leadership, and held responsibility for its $13,000 budget. The conference was successful, and he moved on to a chapter leadership position as treasurer the next year.

"Your ChemE training is very technical; but outside of group projects, you don't work with a team or develop interpersonal skills," Chris points out. "My AIChE involvement was a huge part of developing my own management style. It was a good hands-on approach. You definitely learn to work with people you may not like, but you have to work together to do chapter programming."

Chris also helped Arjun Gopalratnam, AIChE's Young Professional and International Program Lead, run the 2012 Student Leadership Development Conference (SLDC), which is a one-day conference with the goal of sharpening student leadership skills. "Arjun and I moderated a role-playing workshop that focused on the different personalities you work with in the chapter. Managing volunteers and especially managing peers is not easy at any level," says Chris. "In this exercise, five students ran a mock executive board meeting. They'd role-play, and then we'd ask 'What just happened here?' We built on student feedback and got everyone discussing, thinking, and strategizing."

Companies that hire chemical engineers also see the value in the leadership experience gained by participating in AIChE student chapters. "I recruit engineers for Chevron's internships and full-time positions and one of the areas I always ask students about is leadership. What matters to me is not whether a student has had a large leadership role or not, but rather that the student has had some leadership experience as opposed to just having an opinion about leadership," says Cynthia Murphy. "AIChE provides many leadership opportunities within the student chapters, with the options ranging from formal leadership positions such as club officers to simply taking on a small task — and everything in between."

Gaining a competitive edge

As technology continues to accelerate at breakneck speed, the demand for chemical engineers shows no signs of decreasing. Companies need to hire the best and brightest if they expect to keep their competitive edge, and the ScaleUp program plays a role in making that happen. "New challenges in materials, clean energy, environment, health and safety, and more, await the next generation of creative thinkers and problem solvers," says Manolis Kotzabasakis, AspenTech's Executive Vice President, Products. "As a ScaleUp sponsor, we support the development of emerging chemical engineering talent to benefit industry and society at large."

Supporting and encouraging emerging technical talent are also important to Corning (Corning, NY). "At Corning, we want to make sure students get the best education and are available to us. We are making resources available to students and supporting the profession. Our involvement in ScaleUp will ensure we get highly educated chemical engineers in the future," says Andre DaCosta, PhD, Corning's chemical engineering manager for manufacturing technology and engineering, and an AIChE Fellow.

Students know that their involvement in AIChE is crucial to building and honing their own professional edge, as many ScaleUp sponsor companies offer internship opportunities to undergraduates.

Participation in AIChE's regional and national student conferences also helps students gain an edge. At these conferences, students can participate in the Chem-E-Car competitions, attend paper and poster sessions, and have some fun by playing ChemE Jeopardy. Conferences may also offer presentations on wealth management or applying to graduate school.

Victoria Baldwin had the opportunity to participate in an annual student conference soon after she became involved in AIChE. "I presented research at the conference poster session on antireflective films for photovoltaic cells," she says. "I had the opportunity to present to judges and professors who were there for the conference."

Victoria and Owen Jappen offered a workshop for students called

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Bayer: Science For A Better Life

Bayer MaterialScience LLC (www.bayermaterialsciencenafta.com) is a leading producer of polymers and high-performance plastics in North America. It is part of the global Bayer MaterialScience business, which has approximately 14,800 employees at 30 production sites around the world. Bayer MaterialScience's 2011 North American sales were $2.9 billion.

The company manufactures high-tech polymer materials and develops innovative solutions for products used in daily life. Sustainability is central to Bayer MaterialScience LLC, and is based around innovation, product stewardship, corporate management excellence, social responsibility, and respect for the environment. The main segments served are the automotive, electronics, construction, medical, sports, and leisure industries.

Welcoming innovative professionals

Bayer MaterialScience's North American headquarters are located in Pittsburgh, PA, and welcome innovative professionals who exhibit leadership, integrity, and efficiency. These characteristics are important factors to the success and fulfillment of the company's mission "Science For A Better Life." Bayer's employees are considered the company's most valuable asset. Ongoing training and development programs help employees remain at the top of their fields.

Many Bayer MaterialScience careers are heavily reliant on science, technology, engineering, and math (STEM). Approximately 22% of Bayer's 2,400 U.S. employees have jobs directly related to engineering. Bayer fosters many STEM initiatives, such as the national award-winning Making Science Make Sense (MSMS) program. MSMS is a company-wide initiative that advances U.S. science literacy through hands-on, inquiry-based science learning, employee volunteerism, and public education. By working closely with educators and organizations, Bayer hopes to inspire the next generation of innovators and build scientifically literate citizens, regardless of their career paths.

Bayer strives to attract the best and the brightest. It offers competitive compensation and benefits, and recognizes outstanding accomplishments by its employees — who represent a diversity of races and cultures at all levels of the organization.

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AspenTech has the largest share in the worldwide process engineering tools market. Our offerings include industry-leading products such as Aspen Plus and Aspen HYSYS. We are also a top provider of manufacturing execution systems (MES) and advanced process control (APC) solutions. The industries we serve develop and manufacture products that improve lives and are used daily worldwide.

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Career opportunities at AspenTech

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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 bring creative ideas and fresh perspectives.

AspenTech offers global experience, mentoring, and rotating assignments. Contact Josephine Haney (josephine.haney@aspentech.com) in Human Resources for additional information.

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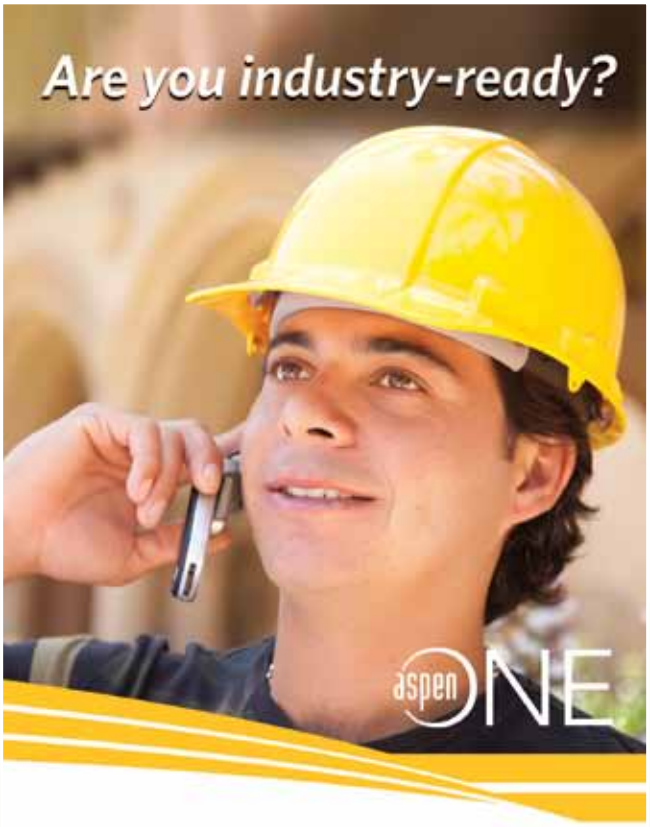

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Today, approximately 450 Corning chemical engineers develop and improve technologies that support optical communications, advanced displays, environmental and life science initiatives, and specialty materials. We use advanced modeling methods and experimental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

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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.

At Corning, possibilities become real, including yours.

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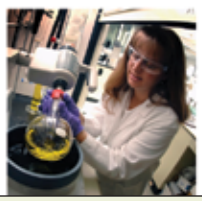


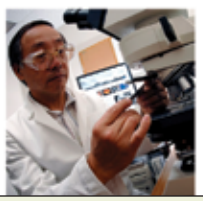

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More about Dow

- **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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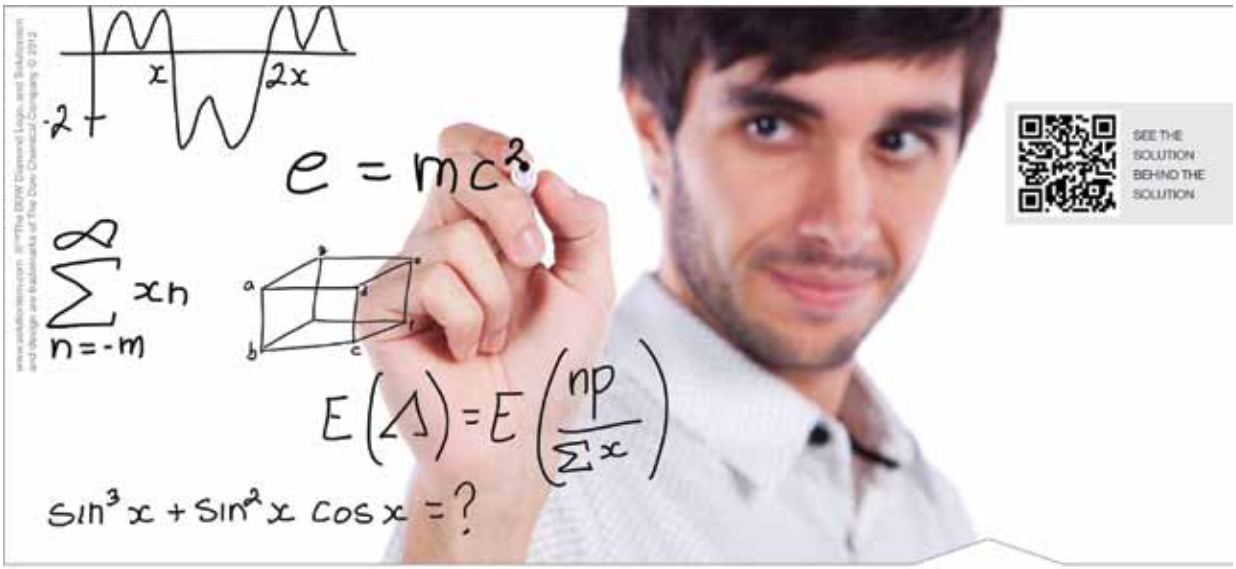

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"Building Bridges: Not Just for Civil Engineers Anymore". "We presented this workshop three times, and it was very successful," says Victoria. "It was about the value of networking, and we also talked a lot about the events we do as a chapter to foster networking."

Looking toward the future

Becoming involved in AIChE as a student has a long-term payoff for both the individual and the ChemE profession. "After I got my PhD, I returned to Bucknell, where I'd been involved in AIChE as an undergraduate," says Tim Raymond, who became not only Bucknell's Student Chapter Advisor and active in the Chem-E-Car competition, but also the Mid-Atlantic Regional AIChE Liaison and a Chair of the local professional section for six years.

David Monteiro is planning on staying active in AIChE and already thinking about what he can give back to an organization that has provided so many opportunities for his peers and himself. "I plan to remain involved with AIChE after I graduate. I'm going to love being the professional mentor, and give back to AIChE," says David. Chris Lowe agrees, "I'll stay involved as a Young Professional or as a YP member working with the students." ■

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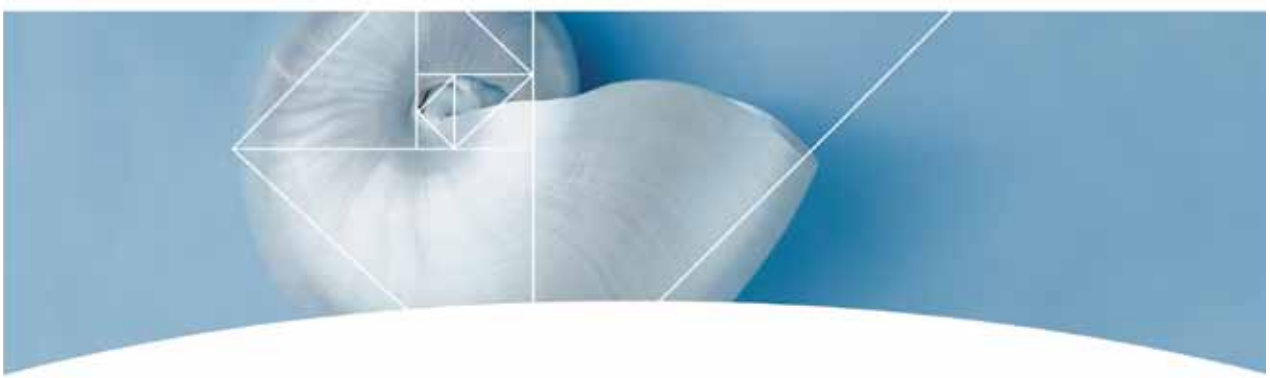

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Merck (www.merck.com) is a global health care leader with a diversified portfolio of prescription medicines, vaccines, and consumer and animal health products. Our continued ability to excel depends on the integrity, knowledge, imagination, skill, and diversity of our chemical and biochemical engineers.

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.

Internship and full-time engineering opportunities

Merck's U.S. locations for chemical engineering careers include: NJ, PA, VA, NC, TN, NE, and DE. Engineers apply engineering, science, and business skills to carry out core functions in many areas:

- **Process development, scale up, and launch.** Conceive, 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.

Join our team and collaborate with talented, dedicated colleagues while advancing your career. For more information, visit www.merck.com/careers.

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PRAXAIR

Innovative Thinking for Real-World Solutions

Praxair (www.Praxair.com) is a global Fortune 300 company focused on helping our customers become more profitable, efficient, and environmentally friendly. With 26,000 employees in more than 50 countries, Praxair has taken something as fundamental as air and turned it into ways to make breathing easier, food taste better, and plants operate more cleanly and efficiently — making our lives better in the process. As one of the leading industrial gases companies worldwide, we are developing more inventive ways to meet today's demands, while preserving the promise of the future.

Revolutionizing the industrial gases industry

Praxair was originally founded in 1907, and it was the first company in North America to commercialize cryogenically separated oxygen. The company adopted its name in 1992, from the Greek word "praxis", or practical application, and "air", our primary raw material.

For more than a century, Praxair has led the development of processes and technologies that have revolutionized the industrial gases industry. The company introduced the first distribution system for liquid gas in 1917, and developed onsite gas supply by the end of World War II. In the 1960s, Praxair introduced non-cryogenic means of air separation, and since then has continued to introduce innovative applications technologies for various industries. To date, the company has over 4,000 patents and pending applications.

Diverse opportunities

At Praxair, we are proud of our commitment to diversity. Understanding different cultures not only supports the development of a strong employee base at Praxair, it better equips the company to grow new and existing markets. Creating a culture that effectively manages, appreciates, and engages capable individuals from different cultures, backgrounds, and geographic locations is imperative in our global marketplace. The diverse experiences and ideas of our employees help us develop new and innovative business solutions.

Together we strive for an inclusive environment where diversity is valued. We accomplish this through various programs, including leadership forums for women and minorities, and mentoring and rotational assignments to provide employees with the knowledge, training, skills, and competencies needed to succeed. For more about Praxair's career opportunities, visit www.praxair.com/careers.

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