

CCPS® ANNUAL REPORT 2021



CCPS
Center for Chemical Process Safety

An AIChE Technology Alliance

About CCPS

The Center for Chemical Process Safety (CCPS®) is a not-for-profit, corporate membership organization within AIChE that identifies and addresses process safety needs for facilities that handle, store, use, process, or transport hazardous materials. CCPS member companies, working in project subcommittees, define and develop useful, time-tested guidelines that have practical applications within industry. CCPS educates employees of member companies through its events, courses, books, tools, online resources, and publications.

CCPS Vision Statement

A World without Process Safety Incidents

CCPS Mission Statement

CCPS is committed to achieve a world without Process Safety incidents by:

- Serving as a premier worldwide resource for Process Safety knowledge and understanding
- Advancing Process Safety culture, technical concepts and management practices
- Enhancing individual and organizational Process Safety competency
- Fostering collaboration within and across organizations, at all levels
- Promoting Process Safety as a key societal value and foundation for responsible, sustainable operation



Expanding global and regional engagement

- AFRICA
- ARGENTINA
- AUSTRALIA
- BOLIVIA
- BRAZIL
- CANADA
- CHINA
- GERMANY
- INDIA
- ISRAEL
- JORDAN
- KUWAIT
- SAUDI ARABIA
- SINGAPORE
- SWITZERLAND
- THAILAND
- USA

The CCPS Story

Just after midnight on December 3, 1984, water contamination of a tank of methyl isocyanate in Bhopal, India initiated a series of events that led to a catastrophic toxic release, killing more than 3,000 residents and injuring over 100,000.

In February of 1985, industry leaders asked the American Institute of Chemical Engineers (AIChE) to lead a collaborative effort to eliminate catastrophic process safety incidents. On March 23, 1985, AIChE formed the Center for Chemical Process Safety (CCPS); CCPS completed *Guidelines for Hazard Evaluation Procedures* a short time later.

As we enter 2022, we pause to reflect on the progress we've made, while we continue to honor the memories of those lost in Bhopal, by striving for a future where we can eliminate all process safety incidents. Toward this end, we remain committed to learning from incidents, advancing the practice, and collaborating broadly to implement safety measures. Vision 20/20 serves as our road map. Come join the "Global Community Committed to Process Safety" — be ready for the future by working to create it.

Message from the Executive Director & CEO



2021, by all accounts, was a good year for CCPS. Despite the pandemic still being a factor in preventing in-person events, CCPS was able to continuously deliver quality programming via virtual platforms to enable our members to stay safe and informed. And because of the quick pivot we made last year to virtual, CCPS was better positioned to efficiently engage members with the subject matter content that was of particular value and importance throughout this year.

I want to begin by thanking all 228 members for their steadfast support and engagement. I also wanted to acknowledge the twenty-two new member companies from ten countries that joined CCPS in 2021. We continue to see an expansion in the types of industries joining CCPS, and look forward to your engagement and sharing of best practices globally. CCPS thanks you for believing in our vision and mission.

A highlight of CCPS' more noteworthy accomplishments in 2021:

- CCPS' **Vision and Mission Statement** were updated as a joint effort between CCPS' Managing Board, Advisory Board, Planning Committee, At-Large and Emeritus Members. The new Vision Statement "A World without Process Safety Incidents" was the outgrowth of this effort, which reflected a succinct, easy to remember, future-leaning statement. The Mission Statement was also updated; it is a prioritized and action-oriented statement.
- The **Process Safety Beacon** is celebrating its **20th Anniversary**. The Beacon, available in 41 languages, still serves as the most valuable resource for process safety information sharing amongst plant operators. And to celebrate its anniversary, three "Book of Beacons" were published in an online, expanded version for members-only. More online "Book of Beacons" will be published in 2022.
- The Process Safety Incident Database, a valued membership benefit, containing over 830 incidents, has a new modern platform to allow members to quickly navigate, sort, analyze, and search data more efficiently on specific topics with the ultimate outcome of learning about and from process safety incidents.

- To support students, early career professionals, and anyone who intends to build their process safety competency, **CCPSf** (CCPS Process Safety Fundamentals Certificate) was launched. The program is also ideal for the mid-career professional who is adding process safety responsibilities to their job.
- CCPS and its members **expanded our regional engagement** by virtually hosting twenty-eight conferences, meetings, roundtables and workshops in nine countries. We continue to work collaboratively to bring process safety knowledge and best practices to our constituents. By working together with our member companies, we are able to specifically address the subjects that are of greatest import, both topically and regionally.

I encourage you to take some time to review this Annual Report to see the many other initiatives that took place this year. As I looked back from a year ago, I had hoped we would see each other in-person throughout 2021. Unfortunately, that did not happen. I do believe that will change in 2022, and I'm looking forward to the in-person collaborations, conversations, and educational opportunities that will be even more engaging and productive. As always, I want to thank our members for their continued support of CCPS, and their ongoing passion to bring process safety to the forefront to make the world a safer place. I wish you all a safe and healthy 2022.

A handwritten signature in black ink that reads "Shakeel S. Kadri".

Shakeel Kadri
CCPS Executive Director & CEO

Highlights from the Year



CCPS celebrates the **20th anniversary** of the **Process Safety Beacon**, the premier go-to resource for industry professionals, available in 41 languages.

"If readers have learned half as much from reading the Beacons as I did by working with the Beacon Committee to write them, then it has been a highly successful process safety tool."

Dennis Hendershot, Beacon Editor (2005-2019)

"Congratulations on your significant milestone. I have shared many Beacons over the years. They are informative and useful to a wide audience. I am confident your good work has prevented injury and loss in the process industries".

David Lewis, Consultant Chemical Engineer,
Kiah Consulting

Virtual Events



28

VIRTUAL EVENTS
IN 9 COUNTRIES



4,000+

PROCESS SAFETY GLOBAL
PROFESSIONALS ENGAGED

- 5 Student Boot Camps
- 4 Faculty Workshops
- 5 Conferences
 - 17th Global Congress on Process Safety
 - 2021 European Conference on Process Safety and Big Data
 - Latin American Conference on Process Safety
 - 3rd Middle East Process Safety Conference
 - 6th Global Summit on Process Safety
- Regional Meetings, Panel Discussions, Roundtables and Webinars

Resources to Explore

Vision 20/20 Assessment Tool

5
INDUSTRY
TENETS

Vision 20/20 is driven by five industry tenets of **committed culture; compliance with standards; intentional competency development; vibrant management systems; and enhanced applications of lessons learned**. It is further enriched by four global societal themes, including; **enhanced stakeholder knowledge; meticulous verification; harmonization of global standards; and responsible collaboration**.

4
SOCIETAL
THEMES

Using a self-assessment tool, containing Vision 20/20 and RBPS elements, companies can determine their process safety maturity levels (1-4). The tool will identify gaps to address areas for improvement to move up to the next level. With the gaps identified, the road map will provide links to existing CCPS tools and resources to develop or improve management systems. For questions contact Louisa Nara at louna@aiche.org.

20
RBPS
ELEMENTS



2

New **Golden Rules** addressing 'Combustible Dust' and 'Chlor-Alkali' were published.



PROCESS SAFETY INCIDENT DATABASE
From the Center for Chemical Process Safety

The **Process Safety Incident Database (PSID)** has a new software design, which includes updated reporting analytics and key content enhancements.

Get Your Company Involved

JOIN CCPS as a member company to help prevent catastrophic process safety incidents.



NOT A CCPS MEMBER YET?
Contact CCPS:
Email ccps@aiche.org or call 1.646.495.1371 aiche.org/ccps

SHARE your expertise by participating in the Global Congress on Process Safety (GCPS), Global Summit on Process Safety (GSPS), a CCPS Regional Conference, or a Global or Regional Technical Steering Committee meeting.



CONFERENCES, MEETING & EVENTS: aiche.org/ccps/conferences-events

MENTOR your new employees by bringing them to the Young Professionals program at the GCPS.



aiche.org/community/sites/committees/young-professionals
As a new member, link with an existing member company to gain valuable knowledge and improve your CCPS experience.

PARTICIPATE by getting your company involved in CCPS' Vision 20/20 Responsible Collaboration activities throughout the year.



Contact Louisa Nara for more information: louna@aiche.org

VOLUNTEER

for a CCPS project subcommittee. Share your knowledge and help shape industry best practices. There are several ongoing projects that can be found on the CCPS website. Highlight your expertise by contributing to project development or participate as a peer reviewer. Key contributions will be recognized in the books published. This is a chance to be recognized as an expert in your field.



Your company must be a CCPS member to volunteer for a project. Contact Dr. Anil Gokhale at anilg@aiche.org to volunteer for one of the projects on the CCPS website.

Volunteer Today: aiche.org/ccps/community/projects/accepting-volunteers

COMMUNICATE the message by forwarding CCPS' *Process Safety Beacon* to your colleagues, available in 41 languages.



Sign up for the CCPS Beacon: aiche.org/ccps/process-safety-beacon

ADVERTISE your company's services, logo and website for FREE at CCPS' online Professional Services Directory. This opportunity is only available to CCPS member companies. For information on how to get your company listed, please contact Michele Horwitz at michh@aiche.org.



Review current listings at: aiche.org/ccps/community/members/directory

EDUCATE your workforce

by getting involved with the CCPS education curriculum, with face-to-face and virtual instructor-led courses including *Process Safety Boot Camp* (CH 900) / *Foundations of Process Safety* (CH 910), *Incident Investigation* (CH901), *Recognizing Catastrophic Incident Warning Signs* (CH850), and our many eLearning courses on process safety and related topics.



aiche.org/academy

MODEL your company as a process safety champion for CCPS publications, monographs, and tools.



PUBLICATIONS: aiche.org/ccps/publications

MONOGRAPH: aiche.org/ccps/publications/process-safety-monographs

TOOLS: aiche.org/ccps/tools

CONNECT with your process safety peers through CCPS LinkedIn.



Join CCPS LinkedIn Group: linkedin.com/groups/105603

DEMONSTRATE OR BUILD YOUR COMPETENCY

CCPSC – this elite global Process Safety Certification is based on experience and knowledge of the CCPS RBPS elements. The assessment is based on a rigorous application and exam which is given three times per year. Learn more at aiche.org/ccpsc



CCPSf – this new certificate program is ideal for early career professionals and students. It includes 24 process safety courses, and awards a certificate upon completion.

Learn more at aiche.org/ccpsf

Resources to Explore

Books and Monographs Completed in 2021

- *Process Safety for Engineers: An Introduction, 2nd Ed.*
- *Human Factors Handbook for Process Plant Operations: Improving Process Safety and System Performance*
- *Managing Cybersecurity in the Process Industries: A Risk-Based Approach*
- *2020 Significant Process Safety Incidents Monograph*
- 3 online editions of the *Book of Beacons*



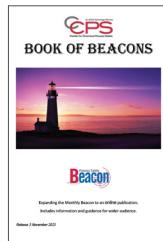
For a list of CCPS ongoing projects, please refer to our Projects Page (aiche.org/ccps/projects).

Process Safety Beacon

Produced by CCPS, the *Process Safety Beacon* is a resource aimed at delivering process safety messages to plant operators and other manufacturing personnel. The monthly one-pager, often used as a training tool, covers a breadth of process safety topics. Each issue discusses a real-life accident, and describes the lessons learned and practical means to prevent a similar accident in your plant. With an estimated distribution of a million readers, and published in 41 languages, the *Beacon* is CCPS' most widely read publication.

Book of Beacons now available online, for members-only. aiche.org/ccps/process-safety-beacon/book-of-beacons

aiche.org/ccps/process-safety-beacon



Process Safety Incident Database (PSID)

The **CCPS Process Safety Incident Database (PSID)**, is a lessons learned tool, available to most member companies and contains over 830 incident details. In 2021, CCPS upgraded PSID to include a new software design, which contains updated reporting analytics as well as key content enhancements such as; simplified incident classifications, root causes, emergency response, and references to key RBPS elements. System updates include dynamic search functionality, multi-level filtering, analytics, etc. Member companies who wish to register and enhance the breadth of knowledge in PSID by contributing content can contact ccps_psid@aiche.org.



Video of 2019 Significant Process Safety Incidents

This video highlights some of the incidents that took place in 2019, which provide awareness and raise the sense of vulnerability that is important for a good safety culture.

aiche.org/ccps/education/videos

RAST and CHEF

Originally donated to CCPS by The Dow Chemical Company, the Risk Analysis Screening Tool (RAST) and its companion guidance have had major updates and were reissued in 2021. Both RAST and the Chemical Hazards Engineering Fundamentals (CHEF) guidance are available to help industry and academia worldwide make better decisions when evaluating and reducing process safety risks.

The **Risk Analysis Screening Tool (RAST)** is an Excel-based software that is used to help validate hazard scenarios and evaluate process risks. RAST is an excellent tool for assisting Process Hazards Analysis (PHA) teams, managing the risks associated with changes to a process or evaluating and potentially reducing the risks of a process during its design. Version 4.0 of the RAST software was released in May 2021.

The **Chemical Hazards Engineering Fundamentals (CHEF)** is a Calculation Aid for those interested in understanding the engineering and mathematical framework of RAST. CHEF provides the background equations that are used. The calculation aid was updated and reissued in early 2021.

Tools, user's manuals, and case studies are on the CCPS website: aiche.org/ccps/resources/tools/risk-analysis-screening-tool-rast-and-chemical-hazard-engineering-fundamentals-chef

Safe Work Practices (SWP)

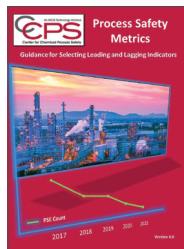
The **Safe Work Practices** are designed to reach and provide value to a very broad audience, including operations, maintenance, and engineering personnel in the process industries. It is also intended to appeal to management personnel as they attempt to justify the investment within their organization. Specific notes and potential vulnerabilities are presented, allowing users to personalize safe work practices to raise a sense of vulnerability for potential hazards. CCPS member companies who contribute to the SWP initiative will receive a special acknowledgment.

aiche.org/ccps/resources/tools/safe-work-practices

Leading and Lagging Indicators to Improve Process Safety Performance

This Guide is for those who wish to prevent major process safety events—incidents, accidents—by evaluating trends within their company's process safety systems. Companies managing, using, handling, and storing hazardous materials must continuously monitor and improve their process safety programs. Selecting and monitoring company-specific process safety metrics for leading and lagging indicators will help reduce process safety risks.

aiche.org/ccps/process-safety-metrics



Risk Based Process Safety (RBPS) Resources

The CCPS RBPS approach has been used to help improve process safety performance for more than a decade. It is based on four pillars: Commitment to Process Safety, Understand Hazard and Risk, Manage Risks, and Learn from Experience. In addition to the CCPS Guidelines (aiche.org/resources/publications/books/guidelines-risk-based-process-safety), there are many resources, such as webinars and book summaries, that can be used to help companies implement these pillars and their associated elements.

aiche.org/ccps/resources/rbps

CCPS on Knovel

As a CCPS member, your organization is entitled to a 35% discount on the CCPS collection on Knovel (www.knovel.com). For more information about subscribing to the CCPS collection on Knovel, contact Knovel directly at CCPSonKnovel@elsevier.com. Knovel offers the largest standalone collection with several titles that contain importable Excel data.



Evergreen/LOPA Database

The Evergreen/LOPA database is a simplified quantitative tool for analyzing and assessing risk. The tool was originally developed by user organizations as a streamlined risk assessment tool, using conservative rules and order of magnitude estimates of frequency probability and consequence severity. The resource is free for CCPS members.

aiche.org/ccps/resources/tools/lopa

Professional Services Directory

The Professional Services Directory is a resource for manufacturing companies. All providers listed are member companies specializing in process safety services.

aiche.org/ccps/community/members/directory

Chemical Reactivity Worksheet

The Chemical Reactivity Worksheet (CRW) is a free software program for determining the chemical reactivity of thousands of common hazardous chemicals, absorbent compatibility, and materials of construction suitability in chemical processes. The CRW predicts possible hazards when mixing chemicals and has been designed to help prevent dangerous chemical incidents. It is a beneficial tool for companies handling and storing hazardous chemicals, including emergency responders and planners.

aiche.org/ccps/resources/chemical-reactivity-worksheet



Launching your career with a strong process safety foundation to help create a safer, more livable world...

...begins in the classroom. As part of AIChE's *Doing a World of Good* campaign, and in conjunction with the Center for Chemical Process Safety (CCPS), industry and academia have come together to launch a major global initiative to improve and accelerate process safety education at the university level so now you can graduate with a strong foundation in process safety.

aiche.org/sache



Student Boot Camps

Student Boot Camps, sponsored by CCPS member companies, provide an introduction to engineering students about how leading companies across a variety of chemical process industry (CPI) sectors manage process safety to prevent catastrophic accidents involving toxic, highly reactive, and flammable materials. These events are part of the Undergraduate Process Safety Learning Initiative (UPSLI), a core priority of the AIChE Foundation's *Doing a World of Good* campaign. CCPS held five virtual boot camps in 2021, including an encore session for the University of California, Davis due to a high student registration count.

→ **Bayer Sponsored CCPS Student Boot Camp**
April 10-11 | Washington University in St. Louis

→ **Celanese Sponsored CCPS Student Process Safety Workshop**
September 18-19 | Florida A&M / Florida State University

→ **LyondellBasell Sponsored CCPS Student Boot Camp**
October 9-10 | Iowa State University

→ **Chevron Sponsored CCPS Student Boot Camp**
October 23-24 | University of California, Davis

→ **Chevron Sponsored CCPS Student Boot Camp**
November 20-21 | University of California, Davis



CCPS Faculty Workshops

Faculty Workshops, sponsored by CCPS member companies, show chemical engineering faculty how process safety is put into industrial practice and demonstrates the importance of process safety to the design and operation of a chemical plant. These events are part of AIChE's *Doing a World of Good* campaign.

Due to the pandemic, the Faculty Workshops were conducted virtually in 2021.

For more information: aiche.org/ccps/resources/conferences/events/faculty-workshops

→ **Dow Sponsored CCPS Faculty Workshop**
June 9-10, 2021

→ **BASF Sponsored CCPS Faculty Workshop**
July 28-29, 2021

→ **Bayer Sponsored CCPS Faculty Workshop**
October 20-21, 2021

→ **Chevron Sponsored CCPS Faculty Workshop**
November 14, 2021

Engineering Professionals early in their career find that Process Safety training and the understanding of practical aspects of day-to-day work are typically challenging. In July 2019, a subcommittee of Early Career Professionals (ECP) in Process Safety was established. The subcommittee's charter was to identify the needs of the ECP to execute their responsibilities in the Process Safety field. The subcommittee recognized the variations in the level of training ECPs receive, prior to starting their careers. The subcommittee has identified key focus areas that ECPs encounter, to determine the best in-class training available and where the gaps in knowledge can be found. For various topics in each area, the team defined the required curriculum depth from Basic Understanding to Working Knowledge, with a focus on making the ECPs independently productive. By using a variety of methods and techniques, CCPS intends to create a program to fill in these gaps with training geared to the target population.

For more information about the program, please contact ccps@aiche.org.

ADVANSIX

ARKEMA

BASF
We create chemistry

ECOLAB

ExxonMobil

FMC

Lubrizol

lyondellbasell
Advancing Possible

NOVA Chemicals®

PPG

Reliance
Industries Limited



AIChE® Academy

AIChE Academy continues to deliver training to chemical engineers and their organizations worldwide. In 2021, the Academy responded to the COVID-19 pandemic by adapting many of its in-person courses for online presentation.

Examples of new Academy offerings in 2021 included:

→ **2 New Courses from the Safety and Chemical Engineering (SAChE)**

- ELA998: RBPS Manage Risk - Asset Integrity
- ELA983: Hazards and Risk: Hazard Identification and Risk Analysis

→ **New eLearning Course Released this Year:**

- ELA306: Introduction to Process Safety for Process Intensification and Modular Chemical Process Intensification

→ **Sponsored**

- Don't be Blind 'Sited': Facility Siting Insights
- Improving Operations and Safety with Advanced Analytics
- Unraveling the Mysteries of AN Detonations: Why Beirut, Tianjin, and West Texas should not occur
- Explosion Prevention & Protection Options for Dust Collection Systems

→ **Non-sponsored**

- Global Hydrogen Safety Codes & Standards (CHS)
- Safety of Water Electrolysis (CHS)

Members and non-members alike use the Academy's live and archived courses, webinars, conference presentations, and other eLearning resources to improve their professional skills, train teams, and brush up on trending topics. Many Academy products offer continuing education units (CEUs) and professional development hours (PDHs).

AIChE
ACADEMY

aiche.org/academy



Process Safety Boot Camps

One of the most popular public course offerings is the Process Safety Boot Camp, which uses the Risk Based Process Safety (RBPS) approach and comprehensively covers the 20 elements of RBPS. The CCPS instructors use a variety of teaching tools, including case studies, CCPS Beacons, videos, and regular polling questions along with quizzes after each section. This course is now offered in an instructor-led virtual format that comes with a detailed Participants Guide. It can also be customized to be taught to any sized company's specific needs. If you're interested in the Process Safety Boot Camp, go to aiche.org/academy/courses/ch900/process-safety-boot-camp for more information.



CCPS Process Safety Professional Certification

The **CCPS Process Safety Certification (CCPSC)** exam shows your employer and colleagues that you have the depth and breadth of experience needed to excel in your career. This rigorous certification process verifies your competency as an expert in the latest process safety tools and techniques.

Requirements to qualify for the exam include 5 years' experience and a degree in a STEM (Science, Technology, Engineering or Math) field, or 10 years' experience. References, academic and employment information, as well as an in-depth knowledge of the CCPS Risk Based Process Safety concepts and applications are also required. The annual renewal, which includes a continuing education requirement, serves to prove your ongoing proficiency.

For more information about the CCPSC certification program, please go to aiche.org/ccpsc



CCPS PROCESS SAFETY
PROFESSIONAL CERTIFICATION

The **CCPS Process Safety Fundamentals Certificate Program (CCPSf)** launched in 2021, and is designed for students and early career professionals who have taken the 24 Safety and Chemical Engineering Education (SACChE) courses in 5 categories: Process Safety Basics; Introduction to Hazards; Understanding Risk; Practical Applications for Managing Risk; and Risk Based Process Safety (RBPS) Pillars.

For more information about the CCPSf, please go to aiche.org/ccpsf



CCPS PROCESS SAFETY
FUNDAMENTALS CERTIFICATE

Global Events

NORTH AMERICA

17th Global Congress on Process Safety

was held virtually, August 17–21.

The Congress addressed the needs of process safety practitioners, with programming dedicated to loss prevention, plant safety, process safety management, and global perspectives.

aiche.org/spring



CCPS Canadian Regional Meeting

The sixth annual CCPS Canadian Regional Meeting held on September 9, 2021 was co-hosted by BakerRisk. The all-day virtual meeting was broken out into four components. The first featured updates from local Canadian organizations sharing a CIAC PSN/PRIM update, CSChE PSMD update, CSA Z767 update and concluded with information on Proposed Amendments to CEPA.

BakerRisk began the next segment with a presentation on 'Blast Resistant Buildings,' followed by the University of Alberta's Process Safety Education Workshop and Minerva's presentation on their company's Online Health and Safety modules.

Next, BakerRisk discussed PSM Program Development, which led nicely into representatives from ReVisionz, Rio Tinto, Suncor and CNRL sharing each of their company's challenges and best practices with managing process safety information.

The meeting concluded with multiple student presentations by those attending University of Alberta, Dalhousie University and University of Toronto, each shared their outstanding research initiatives.

ASIA PACIFIC/MIDDLE EAST

MEPSC

The 3rd edition of the Middle East Process Safety Conference was held virtually on October 24-26, 2021. During this 3-day conference, 24 technical presentations, five keynote addresses and two panel discussions were delivered on topics such as Process Safety Leadership and Safety Culture, Asset Integrity Management, Managing Process Safety Knowledge, Big Data and Digitalization.

The conference also held two insightful panel discussions on 'How Leaders Drive Process Safety in the Organization' and 'Drivers and Enablers for Excellence in Process Safety'. Industry representatives and students from more than 21 countries across the Middle East and Asia attended this conference. The conference was sponsored by S-Chem (Platinum), Sipchem (Gold), Siemens Energy and Acutech Group (Silver).

GSPS

The 6th Global Summit on Process Safety (GSPS) was held virtually on December 14-16 and shared innovations and best



practices in process safety. Industry leaders interacted with those in academia to provide guidance from a corporate perspective. The theme of this 3-day summit was 'CCPS' Vision 20/20' Framework and it featured 16 technical presentations around five industry tenets of Vision 20/20. The sponsors of the summit were Reliance (Diamond/Main event sponsor), Acutech Group (Gold), DNV, ENEOS and Idemitsu (Bronze).

REGIONAL MEETINGS & ROUNDTABLE DISCUSSIONS

South East Asia

This virtual meeting was hosted by CCPS Member company HMC Polymers on March 2, 2021. Along with the sharing of lessons learned by CCPS Member companies in the region, the meeting also showcased a panel discussion on 'How Process Safety was Managed during COVID-19.'

Middle East Roundtable & Panel Discussions

Two panel discussions and one roundtable were held virtually in 2021. The panel discussions were conducted in August and December and the roundtable was held in December. The meeting topics were i) Process Safety Competencies, Journey in the Middle East Region (August 25) ii) Contract Management for Effective PSM (December 7) and iii) Process Safety Metrics and API 754 Implementation (December 8). The panelists across the Asia Pacific and Middle East Regions shared their experiences as well as best practices on these topics.

India

Two India Regional Member Meetings were held virtually in 2021 (February and September). The objective of these meetings were to share knowledge and experiences about process safety among India's industries. The meetings covered a diverse range of topics such as 'Integration of Reactive Hazards Data into the Risk Assessment Program,' 'Contractor Management for an Effective PSM,' 'Digitalization of Process Safety Performance Indicators,' and 'Pitfalls in PHA Studies.'

Australia

The Australia Member Meeting was held virtually on September 15, 2021. The meeting agenda featured a panel discussion on 'Improving Process Safety with Near Miss Analysis' as well as experience sharing by member companies in the region on 'Predicting and Preventing Process Safety Events with Effective Leading Indicators,' and a session on 'API RP 754 Overview and Updates.'

LATIN AMERICA

Latin American Regional Technical Steering Committee Meetings

Virtual Latin American Regional Technical Steering Committee Meetings were held on March 25 and June 24, 2021, respectively. Latin America CCPS member companies such as Braskem, Usiminas, VALE, Petrobras, YPF, Saudi Aramco, Ecopetrol, Exida, and WSI, shared lessons learned on topics such as incident investigation, human factors and PSM Process.

Regional Roundtables on Process Safety

CCPS, with the help of Pluspetrol, organized roundtables on May 11-13 and July 27-29, 2021. The objective of each roundtable was to communicate member ideas and solutions about Management of Change (MOC) and PSM remote operations.

Workshops in Process Safety Management Topics

Organized by CCPS and subject matter experts from Siemens Energy, these workshops held on August 19 and October 12, 2021, provided applicable knowledge and tools for Management of Change (MOC) and Asset Integrity in a variety of industries.

Argentinian Event on Process Safety

Concurrent meetings held in April, June, September and October, 2021, provided Process Safety Professional topical knowledge in the field throughout Argentina.

2021 Virtual Latin American Conference on Process Safety

This virtual Conference, in its second year, held November 3-5, 2021, brought together industry, academia and association professionals, with the goal of improving industrial process safety to achieve overall process safety excellence. The Conference featured diverse topics in Process Safety such as Human Factors, Incident Warning Signs, Case Study/ Lessons Learned, PSM in COVID Times, Asset Integrity, and PSM in the Mining and Steel Industries.



AFRICA

The 2nd Virtual Africa Conference

was co-hosted with DNV, specifically DNV's Egypt regional partners. The meeting, held October 5, 2021, was a 2-hour conference focused on Culture, Knowledge Transfer and Asset Integrity Management throughout Africa. Highlights included presentations from Afrox/Linde 'African Culture as a Tool to Create Process Safety Culture,' 'Ambatovy's Leadership in the Field,' The Egyptian Ministry of Petroleum and Mineral Resources' presentation on 'Process Safety and Asset Integrity Capacity Building,' and Methanex Egypt's Process Safety Management from Vision to Reality,' just to name a few.

CCPS AFRICA
VIRTUAL MEETING



EUROPE

2021 Virtual European Conference on Process Safety and Big Data

The 6th conference took place October

13-14, 2021, and featured Big Data Analytics for Process Safety, Prediction of Maintenance and Operational Errors, Augmented Reality & Robotics, and Tools to Avoid Human Errors. This event provided a common platform to bring together industry, academia, governmental regulatory agencies and labor organizations, with the goal of improving industrial process safety and achieving process safety excellence. Big data, in relation to process safety, is an emerging subject that can deliver exceptional value to our key stakeholders. This Conference was jointly organized by the Center for Chemical Process Safety (CCPS) and the European Process Safety Center (EPSC).

2021 EUROPEAN CONFERENCE
ON PROCESS SAFETY & BIG DATA



ACHEMA Pulse – Digital Live Event

The ACHEMA Pulse digital live virtual event, organized by the DECHEMA House on June 15-16, 2021, featured a panel discussion on the 'Process Safety Perspectives during the Pandemic.' CCPS' North American, Latin American, Asia Pacific and European Regions all participated. Speakers from the United States and Latin America covered topics on remote studies, operational discipline, and process safety culture.

The Asia Pacific region focused on the 'Asia Pacific Perspective on Process Safety Challenges During and Beyond Covid.' Representatives from Petrochemical Corporation of Singapore (PCS), Petronas, Wanhua Chemical Group and Reliance Industries Limited presented their views and experiences.

Europe Regional TSC Meeting

The 6th Europe Regional TSC Meeting took place virtually and was hosted by Repsol on March 10, 2021. European member companies covered topics on process safety with respect to incident investigation, reviewed process safety training for the chemical industry and shared lessons learned.



2022 Meetings, Destinations and Global Offices

NORTH AMERICA

- February 9, 2022
Technical Steering Committee Meeting via WebEx
- March 23, 2022
CCPS Advisory Board Meeting Dinner, New York City (in person)
- March 23-24, 2022
CCPS Advisory Board Meeting, New York City (in person)
- April 10-14, 2022
18th Global Congress on Process Safety, San Antonio, TX (in person)
- April 13, 2022
Technical Steering Committee Meeting Dinner, Baker Risk Host
- April 14, 2022
Technical Steering Committee Meeting
- May 11-13, 2022
2022 Diers Virtual Spring Meeting
- June 29, 2022
Technical Steering Committee Meeting via WebEx
- September 8, 2022
Canada Regional Meeting, Calgary (in person)
- September 22, 2022
Technical Steering Committee Meeting via WebEx
- November 2-3, 2022
Technical Steering Committee Meeting, Houston, TX (in person)

EUROPE

- March 17, 2022
Europe Regional Meeting (virtual)
- August 22-23, 2022
ACHEMA CCPS Process Safety, Digitalization and Cyber Security - Frankfurt am Main, Germany, Frankfurt Fairgrounds (hybrid or in person)
- September 15, 2022
Europe Regional Meeting – Basel, Switzerland – Syngenta Host (in person)
- October 11-12, 2022
Global Process Safety & Big Data Conference – Frankfurt am Main, Germany, DECHEMA House (in person)

LATIN AMERICA

- April 12, 2022
Latin America Regional TSC Meeting - San Antonio, TX (hybrid)
- June 30, 2022
Latin America Regional Meeting – Lima, Peru (hybrid)
- November 7, 2022
Latin America Regional TSC Meeting – Lima, Peru (hybrid)
- November 8-9, 2022
9th Latin America Conference on Process Safety (LACPS) – Rio de Janeiro, Brazil (in person)

GLOBAL TECHNICAL STEERING COMMITTEE WEB CONFERENCES

- February 9, 2022 – TSC Meeting via WebEx
- June 29, 2022 – TSC Meeting via WebEx
- September 22, 2022 – TSC via WebEx

All Web Conferences are from 10:00am-12:00pm EST



CCPS OFFICES

- New York, NY
- Houston, TX
- Frankfurt, Germany
- Mumbai, India
- Qingdao, China

Please note that any meeting that is designated with a face-to-face location in 2022 can be changed to Virtual if deemed unsafe to meet due to COVID-19.

Look for upcoming events on our website – aiche.org/ccps

Organizational Structure

Technical Steering Committee (TSC)

The Technical Steering Committee (TSC) is the main body of CCPS, with one representative from each CCPS member company. The key functions of the TSC are to assist the CCPS Executive Director & CEO in:

- Developing an overall multi-year program for CCPS
- Defining the priorities for project selection
- Selecting specific projects for CCPS

- Defining and reviewing the scope for these specific projects
- Suggesting membership for the Project Subcommittees
- Reviewing the status of project programs.

The CCPS Technical Steering Committee meets face-to-face two times a year and by web conference three times a year.

CCPS Governance

Activities are monitored and directed by the

- Managing Board
- Advisory Board
- Project Planning & Operating Committee
- Technical Steering Committee

Additionally, members of the Technical Steering Committee and other member company representatives serve on subcommittees that oversee CCPS projects.

The Managing Board has a fiduciary responsibility for CCPS' operations. The Advisory Board has strategic responsibility for CCPS. Board members review CCPS' mission and strategies and recommend new initiatives. The Planning and Operations Committee is responsible for evaluating opportunities and gaps in CCPS programs relative to its strategy and generating potential initiatives to address them.

2022 CCPS Managing Board

June Wispelway
AIChE Executive Director & CEO
(Chair)

Barbara Valentine
AIChE Chief Financial Officer

Shakeel Kadri
CCPS Executive Director & CEO

Christine Grant
AIChE President

Billy Bardin
AIChE President-Elect

Deborah L. Grubbe
AIChE Past President

Pete Lodal
AIChE Director

Anne O'Neal
AIChE Director

Elsa Reichmanis
AIChE Director

Kathy Lee
AIChE Secretary

Wendy Young
AIChE Treasurer

Sincere gratitude to the outgoing 2021 Managing Board Members

Monty Alger
AIChE Past President

Ana Davis
AIChE Director

Joseph Smith
AIChE Secretary

Advisory Board

Shakeel Kadri <i>CCPS</i> <i>(Chair)</i>	Viveca Fairbanks-Henderson <i>Ecolab</i>	Senyo Opong <i>DuPont Company</i>	Sincere gratitude to the outgoing 2021 Advisory Board Members
Khaled KAA Alalyani <i>SABIC</i>	Dave Greganti <i>DOW</i>	Mark Patterson <i>BASF</i>	Beth Ballard <i>Ecolab</i>
Bob Bahr <i>ExxonMobil</i>	Karen Koster <i>Honeywell</i>	Richard Pawulski <i>Air Liquide</i>	Kuddallur Seshadri <i>Reliance Industries, Ltd.</i>
Garry Bryan <i>Bayer</i>	Yatendra K. Lodha <i>Reliance Industries, Ltd.</i>	Mike Snyder <i>DEKRA Insight</i>	John Wnek <i>Evonik Corporation</i>
Michelle Caveness <i>Eastman Chemical</i>	Perry W. Logan <i>3M</i>	Ian Tinegate <i>BP</i>	
Yong Sai Chung <i>PETRONAS</i>	Shawn Marsh, PE <i>Evonik Corporation</i>	June Wispelwey <i>AIChE</i>	
Ana Davis <i>Syngenta Corporation</i>	Anne O'Neal <i>Chevron</i>	Masahiro Yoshizumi <i>Mitsubishi Chemical Company</i>	

Project Planning Committee

Fred Henselwood <i>NOVA Chemicals</i> <i>(Chair)</i>	Vivek Bichave <i>Reliance Industries, Ltd.</i>	Greg Horton <i>SABIC</i>	Cathy Pincus <i>ExxonMobil</i>
Chris Aiken <i>Cargill</i> <i>(1st Vice Chair)</i>	Gustavo Correa <i>YPF</i>	Shakeel Kadri <i>CCPS</i>	Jatin Shah <i>BakerRisk</i>
Jerry Forest <i>Celanese Chemicals</i> <i>(2nd Vice Chair)</i>	Tony Downes <i>Honeywell</i>	Gregg Kihne <i>BASF</i>	John Wincek <i>Dekra Insight</i>
Abdul Aldeeb <i>Siemens Energy</i>	Eric Freiburger <i>Linde plc</i>	Pete Lodal <i>Emeritus</i>	
Todd Aukerman <i>LanXess Corporation</i>	Anil Gokhale <i>CCPS</i>	Jack McCavit <i>Emeritus</i>	
	Cheryl Grounds <i>Emeritus</i>	Louisa A. Nara <i>CCPS</i>	

CCPS Staff



Shakeel Kadri
Executive Director &
CEO



Gary Amideneau
Lead Process Safety
Engineer



Jennifer Bitz
Lead Process Safety Engineer /
Project Manager



Vishal Chavan
Asia Pacific
Project Manager



Jing Chen
Senior Engineering
Specialist



Umesh Dhake
Asia Pacific and Middle East
Regional Manager



Anil Gokhale
Senior Director of Projects



Michele Horwitz
Membership Manager



Horst Massong
European Project Manager



Willi Meier
European General Manager



Louisa Nara
Global Technical Director



Christa Pennino
Engineering Specialist



Marvin Szoychen
Latin America Regional
Manager



Bruce Vaughn
Lead Process Safety Subject
Matter Expert

Updates and Impact

WHERE WE ARE TODAY

 **765**
UNIVERSITIES
PARTICIPATING
IN UNDERGRADUATE
PROCESS SAFETY
LEARNING INITIATIVE
CURRICULUM

 **216,284**
SAFETY CERTIFICATES
AWARDED TO STUDENTS
WORLDWIDE

 **724**
NEW FACULTY
MEMBERS
EDUCATED ON
PROCESS SAFETY



FOUNDERS' CIRCLE

Changemaker
\$5M and up



Benefactors
\$750,000 - \$1,999,999



Visionaries
\$2M - \$4,999,999



Underwriters
\$500,000 - \$749,999



Patrons
\$250,000 - \$499,999



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AIChE
The Global Home of Chemical Engineers



2022 Global CCPS Members

3M Company	Canadian Natural Resources, Ltd.	Formosa Plastics Corporation	Corporation	Scientific Protein Labs
ABIQIM - Associação Brasileira da Indústria Química	Cargill	Future Fuel Chemical Company	National Grid	Shell
ABS Group	Celanese Chemicals	Galaxy Surfactants Limited	New Jersey Dept of Environmental Protection	Shenyang Research Institute of Chemical Industry Co., Ltd.
Abu Dhabi National Oil Co. (ADNOC)	Cenovus Energy	Gateway Consulting Group, Inc.	Newcrest Mining Limited	Sherwin-Williams Company
AC&S Inc.	CF Industries Inc.	Gerdau Aços Longos S.A	Nghi Son Refinery and Petrochemical LLC	SI Group
ACM Facility Safety	Cheniere	GOARC	North West Redwater Partnership	Siemens Energy Inc.
AcuTech Consulting Group	Chevron Corporation	GRACE	NOVA Chemicals Corporation	SimTech (Beijing) Engineering Software Co.
ADAMA	Chevron Phillips Chemical Company LP	Gulf Petrochemical Industries Co.	Nuclear Fuel Services	SIS-Tech Solutions
AdvanSix	China Chemical Safety Association	Hengyuan Refining Company Berhad	Nutrien	Solano County: Department of Resource Management
aeSolutions	Cholamandalam MS Risk Services	HMC Polymers	Occidental Chemical Corporation	Solvay USA Inc.
AIG	CNOOC China National Offshore Oil Company	Honeywell	Oil Industry Safety Directorate	Southern Company Services, Inc.
Air Liquide Americas	Contra Costa Health Services	Hunt LNG	Olin Corporation	Sphera
Air Products and Chemicals Inc.	Coogee Chemicals Pty Ltd.	Huntsman	ONGC Petro Additions Limited (OPAL)	Starr Technical Risks Agency Inc.
Albemarle Corporation	Corden Pharma Colorado	Idemitsu Kosan Co. Ltd.	Optima Chemical Group, LLC	State of California - PSM
Ambatovy	Corteva Agriscience	Incitec Pivot Limited/Dyno Nobel	OQ	Stepan Company
American Refining Group, Inc.	Cosmo Oil Co Ltd.	India Glycols Limited	Oxiquim	Strem Chemicals Inc.
Americas Styrenics	Covestro LLC	Industry Risk Control, Ltd.	Oxiteno	Syngene International, Ltd.
Amgen	CPKelco	Ingevity Corp.	Pan American Energy LLC	Syngenta
Amplify Process Safety, LLC	Croda	Intel Corporation	Parkland Refining (BC) Ltd.	Taiyo Oil Co., Ltd.
Aon Energy Risk Engineering	DASIS Corp	Inter Pipeline	Petro Rabigh	TATA Steel Limited
Aperam Inox America Do Sul SA	Deccan Fine Chemicals (I) PVT. Ltd.	Iomosaic Corporation	Petrobras	TC Energy
Archer Daniels Midland	DEKRA	IRESC Inc.	Petrochemical Corporation of Singapore (Pte) Ltd.	Teijin Aramid B.V.
Arkema Inc.	Dexco Polymers LP	Jay Chemicals	Petronas	The Bahrain Petroleum Company (BAPCO)
Arlanxeo	DNV	Jensen Hughes	Phillips 66	The Chemours Company
ARPEL	Dorf Ketal Chemicals (I) Pvt. Ltd	Johnson & Johnson	Phoenix Park Gas Processors Ltd.	The Dow Chemical Company
ARPV Asesores en Riesgos de Procesos Cia Ltda.	Drew Marine	Jordan Engineers Association	Pluspetrol S.A.	The Lubrizol Corporation
Ascend Performance Materials	DuPont	Kaypear Engineering LLP	Point Lisas Nitrogen Limited	The Mosaic Company
Ash Stevens	Eastman Chemical Company	KBR Energy and Chemicals	PPG	The National Gas Company of Trinidad and Tobago Ltd.
Ashland	Ecolab	King Industries Inc.	Process Improvement Institute, Inc.	TotalEnergies
Astron Energy	Elanco Animal Health	Koch Industries	Process Safety Core Consulting, LLC	TPC
Baker Hughes, Inc.	Eli Lilly and Company	Kraton Corporation	Procter & Gamble	Trans-Northern Pipelines, Inc.
BakerRisk	Emerson Automation Solutions	Kuraray America Inc.	PSRG Inc.	Trinseo
BASF Corporation	ENEOS	Kuwait Oil Company	Qatar Energy	Tronox
Bayer Corporation	Engineers India Limited	L&T Hydrocarbon Engineering Limited	Reliance Industries Ltd.	TÜV Rheinland (Taiwan) Co., Ltd.
Beijing Strong Information System Co., Ltd.	Engro Polymer and Chemical Ltd MS	LanXess	REPSOL	Unwin Company
Berkshire Hathaway Specialty Insurance	Engro Powergen	Linde plc	Resolver Consultoria	US EPA / OEM
Bharat Oman Refineries Ltd.	Equate Petrochemical Company	LiquidPower Specialty Products	ReVisionz	Usiminas
BHP	EuroChem	Lummus Technology	Rio Tinto	Vale, Brazil
BP Corp North America	Evonik Corporation	LyondellBasell	Risk Alive Analytics	Vertellus Specialties Inc.
Braskem	Exida	Mallinckrodt	SABIC	Wanhua Chemical Group Co., Ltd.
Brunei-Methanol Company	Exponent Inc	Map Ta Phut Tank Terminal	Sadara Chemical Co.	Wesfarmers Chemicals Energy and Fertilisers
Buckeye Partners, LP	ExxonMobil Chemical Co.	Massy Energy Engineered Solutions	Sahara International Petrochemical Co. (SipChem)	Western Midstream
Buckman North America	Fauske & Associates, a Division of Stone & Webster, LLC.	Merck & Co., Inc.	Sajjan India Limited	WSI Ingneria
Burns and McDonnell	Fluor Corporation	Merck KGaD Darmstadt, Germany	Saudi Aramco Oil Company	Yashashvi Rasayan Pvt. Ltd.
Cabot Corporation	FM Global	Michelman, Inc.	Saudi Aramco Total Refining & Petrochemical (SATORP)	YPF - Yacimientos Petrolíferos Fiscales
Calumet Specialty Products Partners, L.P.	FMC Corporation	Mistras Group, Inc.		
CAMBREX		Mitsubishi Chemical		



Center for Chemical Process Safety – An AIChE Technology Alliance

New York (home office), Frankfurt, Houston, Mumbai, and Qingdao

Tel: (+1) 646.495.1371 • aiche.org/ccps • Email: ccps@aiche.org