Harmonization in Focus

A Harmonized Approach to the Safe Operation of Hydrogen Plants

Interview with Tom Hannigan, Manager of Process Engineering for HYCO Operations at Air Products and former Chairman of the CGA’s HYCO Committee

Tom has been with Air Products for 29 years and, over the last decade, has held leadership roles in engineering support for the company’s HYCO (hydrogen, carbon monoxide, syngas) facilities operating around the world. He was the inaugural chair of CGA’s HYCO Committee and led the International Harmonization Council (IHC) joint working groups that developed the first two documents published by the IHC Associations. Tom holds a BS degree in Chemical Engineering from Drexel University (Philadelphia, PA, USA) and an MBA degree from Louisiana State University (Baton Rouge, LA, USA).

As someone who has led multiple harmonization efforts, what do you see as the key factors for successful harmonized projects?

Successful harmonization efforts start with senior leadership within member companies – leaders who believe in the value of consistent, strong safety practices and standards. They recognize the benefits these collaborative efforts bring to our industry, regulatory agencies, employees, customers, shareholders, and our operating communities, and they make the right resources and expertise available.

Each effort then needs to begin with a clear objective and defined scope – agreed to by the IHC, the individual regional associations and the joint working group. Finally, industry experts must commit their time and knowledge and collaborate effectively towards completion and implementation of the final product.

What was the motivation to create a committee and pursue harmonized publications addressing hydrogen plant safety?

Hydrogen is essential to a number of processes, including enabling refiners to process crude oil into cleaner burning transportation fuels and other products. Significant quantities of hydrogen are required to accomplish this globally, and large-scale hydrogen plants process high volumes of flammable and hazardous gases – often at high pressures and temperatures. This poses unique operational challenges and makes the safe operation of these plants critical.

Through the IOMA Global Committee and the IHC, the leaders of the major industrial gas companies recognized the need for a set of documents that would provide consistent guidance – standards and practices that would be globally harmonized. There was a commitment to apply the best knowledge and understanding and align on best-in-class, safe operating practices, which are to the benefit to everyone in the industry.

How were the content of the projects and publications decided?

The industry’s global experts started their work in 2007 by prioritizing areas of operations that could provide the most positive impact on facility safety. For example, the initial focus was on the steam reformer – an operating unit that is subject to very high temperatures with complex combustion control equipment. They also prioritized where mechanical integrity was most important, such as the steam reformer outlet piping. From that point, the list of topics prioritized to ensure that the most impactful and useful publications would be completed first so the guidance and best practices could be implemented.

What projects have been completed to date and what topics might be covered in the future?

The regional associations (CGA, EIGA, AIGA and JIMGA), through the efforts of the Joint Working Groups, have published three safety guidance documents. These include: Combustion Safety for Steam Reformer Operation, Safe Startup and Shutdown Practices for Steam Reformers, and Mechanical Integrity of Syngas Outlet Systems. As the titles suggest, these publications address some of the most critical aspects of hydrogen plant operating safety.

A document covering the mechanical integrity of operating vessels in Pressure Swing Adsorption (PSA) service is nearing the final review process. Additionally, in March 2016, a new Joint Working Group began a project on gas leak detection and response.

What aspects of the committee’s work have provided the greatest sense of satisfaction?

I am particularly proud of the productivity of our joint working groups – the development and publication of three new harmonized documents in approximately seven years. That is an impressive pace, as publication of one globally harmonized document can sometimes take several years. That level of accomplishment is a testament to the hard work of our joint working group members and our ability to effectively use online tools, such as web conferences, to supplement face-to-face meetings and enhance the pace of our collaborative work.

I am also gratified knowing that the information in these documents is being used by employees who are operating our hydrogen plants around the world. The real value of the committee’s work is in seeing the industry best practices go from a publication to being put into actual use by the professional operators who run the plants with confidence, every day.
Planning is now under way for IOMA’s 2016 Annual Meeting in Del Mar, located in sunny Southern California, just north of San Diego. We hope you are planning to join your IOMA family October 23–27 (Sunday–Thursday) to celebrate IOMA’s 73rd Annual Meeting, to be held at the beautiful Fairmont Grand Del Mar Resort. Please note that this year’s meeting will begin with our traditional Welcome Dinner on Sunday night, rather than on Saturday night. And it will end with our Farewell Breakfast on Thursday morning, rather than Wednesday morning.

The Annual Meeting Program Committee, led by IOMA Vice President Clas Palmberg (Oy Wöikoski Ab), is busy developing this year’s theme and speaker program. IOMA also is in the process of planning several special events which are sure to be memorable. On Monday night, the reception and dinner will be held at the Scripps Seaside Forum for Science, Society and Environment at the Scripps Institute of Oceanography. This beachfront location with magnificent ocean views provides a stunning backdrop to catch up with your IOMA friends and colleagues.

Our traditional President’s Banquet is scheduled for Tuesday, and this year you can leave the tuxedos and evening dresses at home since we’re at a more casual resort location.

Events in Del Mar, La Jolla, and San Diego area
IOMA is planning several optional tours and activities that will give you an opportunity to network with your fellow IOMA members and experience much that the area has to offer. If you’re a golfer, it’s time for another IOMA Golf Tournament! We’ll keep the golfers on-property at the beautiful Grand Golf Club at the Fairmont Grand Del Mar. This is Phil Mickelson’s favorite practice course. We also are planning some tours to the quaint seaside town of La Jolla, called the “Jewel by the Shore”, including a visit to the Museum of Contemporary Art; a tour of a local brewery and distillery; a tour of the giant and fascinating aircraft carrier, the USS Midway Museum docked in San Diego Bay; and, for the adventurous, a Kayaking and Sea Cave Tour in La Jolla Bay, and a Safari Park Tour which is part of the world-famous San Diego Zoo.

Additional information on the program will be available soon and registration materials will be distributed to all members in June. Until then, please save the date!

Del Mar, also referred to as California’s Coastal Gem, is a beautiful small beach town located in San Diego County, just north of downtown San Diego along the Pacific Ocean. It is best known for its beaches and boasts beautiful sandstone canyons interspersed with hillsides of beautiful homes, and astonishing sunsets.
IOMA Board and Global Committee to Meet in May

The IOMA Board of Directors will hold its next regular meeting on Tuesday, May 17, 2016. Under the leadership of IOMA President Tom Thoman (Airgas, Inc.), the Board will discuss all business necessary for the continued successful operation of the Association. The Board also will review any new membership applications received since the last Board meeting in October. Please consider suggesting IOMA membership to any company that may qualify for a Voting or Associate membership.

IOMA's Global Committee also will conduct their next meeting on Tuesday, May 17, 2016. Committee Chairman Scott Telez (Praxair, Inc.) will lead the Committee as it discusses the standard harmonization projects underway by the association members of the International Harmonization Council, which includes the Compressed Gas Association (Chantilly, VA, USA), the European Industrial Gases Association (Brussels, Belgium), the Japan Industrial and Medical Gases Association (Tokyo, Japan), and the Asia Industrial Gases Association (Singapore).

Members who have matters that they would like brought to the Board or Global Committee for discussion and potential action should notify IOMA Executive Director, David Saunders by April 15, 2016.

Thank You for Your Prompt Payment of Annual Dues

We would like to thank all IOMA members who have promptly remitted their 2016 annual membership dues, which cover the fiscal period from January 1, 2016 through December 31, 2016. Members who have not paid their dues should have received an emailed reminder invoice recently. To remain a member in good standing each member company has until March 31 to pay its annual dues. If dues are unpaid following March 31 and after at least two invoices and a written notice of warning have been sent, the member may be dropped from IOMA's membership rolls. We appreciate your cooperation and continued support.

2016 Membership Roster in Progress

The 2016 IOMA Membership Roster is in progress. In December, IOMA emailed an information verification form along with the 2016 dues invoice to the primary representative of each member company, with a response deadline of January 31. Recipients were asked to either indicate any changes to their company listing or confirm that the information is correct. Members who have not responded are urged to act now so that accurate information is published in the 2016 Roster.
EIGA Documents

The European Industrial Gases Association (EIGA) (Brussels, Belgium) has made the following publication available. These and other documents are available at www.eiga.eu.

- Prevention of Excessive Pressure during Filling of Cryogenic Vessels - EIGA Doc 151/15 (revision of Doc 151/08)
- Harmonisation of Information for Poison Centres - BN 15/15 (revision of October 2013 edition)
- Training Package TP 44/15 - Recent Incidents in the Industrial and Medical Gases Industry (SAC 141)"
- The Calculation of Harm and No-harm Distances for the Storage and Use of Toxic Gases in Transportable Containers - EIGA Doc 189/14 Corrigendum
- Code of Practice - Silane - EIGA Doc 160/15 (revision of Doc 160/10)
- Safe Design and Operation of On Site Generation of Oxygen 93% for Medical Use - EIGA Doc 195/15
- Training Package TP 43/15 - ADR 2015 - Main changes linked to Class 2 transport"
- Safe Design and Operation of On-site Nitrogen Generators for Food Use - EIGA Doc 194/15
- Calcium Carbide Storage and Handling - EIGA Doc 196/15
- EIGA Safety and Environmental Award Schemes - EIGA 903/15 (revision of EIGA 903/09)
- Training Package TP INC 22/16 - Recent Incidents in the Industrial and Medical Gases Industry (SAC 145)

EIGA Life Saving Rules Campaign Website

In September 2015, EIGA launched the “Life Saving Rules”, a set of life saving rules which can be used in the industrial and medical gas industry to mitigate risk and reduce fatalities and serious injuries. Life Saving Rules are intended to remind workers of the hazards and to refer to their local risk assessments. The rules were developed from knowledge of accidents and incidents, especially those particular to the gas industry.

The launch was accompanied by the publication of the Life Saving Rules document (Doc 924) accompanied by a brochure, a poster and an introductory presentation published as Safety Leaflets and an EIGA Training Package.

EIGA now has developed additional material to support the implementation of the Life Saving Rules in Member Companies. The new information can be found under the Campaign section on the Member’s only area of the EIGA website.

The new web pages provide a summary of the EIGA Life Saving Rules, why they are important to continuous improvements in safety and guidance on how they may be implemented in an organisation. They cover in more detail the following areas:

- Summary of Life Saving Rules.
- Why do we need Life Saving Rules?
- Implementing Life Saving Rules.
- Lessons learned in rules implementation.
- Communication materials and pictograms.
- Life Saving Rules in other European languages.

Links also are provided to the materials that are available to support the introduction of EIGAs Life Saving Rules. The Life Saving Rules Campaign website can be accessed through the EIGA website. Please note that you first have to login in as a Member as this publication is restricted to EIGA Members only. You can view or download this and many other publications at www.eiga.eu.

We’re moving!

Effective MAY 1, 2016, IOMA will relocate to new offices.

Please make a note of our new address (phones numbers stay the same):

1000 Potomac Street, NW • Suite 108 • Washington, DC 20007

IOMA PAST ANNUAL MEETING PRESENTATION SLIDES ARE ON THE WEB

A comprehensive archive of speaker presentations from past IOMA meetings, including the 2016 Annual Meeting in Rome, Italy, last November, is available for members only at www.iomaweb.org.
Shareholders Approve Air Liquide’s Acquisition of Airgas

Airgas, Inc. (Radnor, PA, USA) shareholders, during a special shareholder meeting held on February 23, 2016, voted to approve the previously announced acquisition of Airgas, one of the leading suppliers of industrial gases and associated products and services in the United States, by Air Liquide S.A. (Paris, France). 75.9% of the total outstanding shares of Airgas common stock and 99.5% of the total shares voted were in favor of the transaction. The affirmative vote of a simple majority of outstanding Airgas shares was required to approve the merger. Once the acquisition is completed, the combined entity will be the largest industrial gas company in the world with leadership in North America complementing its positions in Europe, Africa/Middle East and Asia-Pacific.

Peter McCausland, Executive Chairman of Airgas, said: “I thank our shareholders for their trust and support. The transaction with Air Liquide is very compelling and we are excited to move forward with the process to create the largest industrial gas company in the world. The combined company will improve existing offerings and open new markets, benefiting both companies’ customers and employees. We look forward to continuing to work closely with Air Liquide to complete the transaction and achieve a smooth transition.”

Benoît Potier, Chairman and CEO of Air Liquide, said: “This approval is a significant milestone as we move closer to completing our acquisition of Airgas. The transaction will deliver substantial benefits to both companies’ stakeholders and will further solidify our ambition to be the leader in our industry, delivering long-term performance and acting responsibly. We look forward to a successful future with Airgas.”

Assuming timely receipt of the necessary antitrust and other regulatory approvals, and satisfaction of all closing conditions, the parties continue to expect completion of the merger in the second or third calendar quarter of 2016.

Airgas files annual, quarterly and current reports, proxy statements and other information, including the principal documents relating to this transaction, with the SEC. Such filings are available to the public free of charge from the SEC website at http://www.sec.gov/edgar/searchedgar/webusers.htm.

Linde Selected by Gazprom for Russian Project

The Linde Group (Munich, Germany) has been selected by Gazprom, Gazprom Pererabotka Blagoveschensk and its general contractor NIPGas as the licensor for cryogenic gas separation technology at the Amur Gas Processing Plant (Amur GPP), located in the far east of Russia. Linde will engineer and supply units for ethane and natural gas liquids (NGL) extraction and nitrogen rejection, as well as for helium purification, liquefaction and storage. The plant is part of Gazprom’s project for the supply of Russian gas to China via the ‘Power of Siberia’ pipeline from eastern Siberian gas fields, and will be built in five phases ending in 2024.

In late December 2015, Linde and NIPGas entered into a binding engineering and supply contract with respect to the above-mentioned units for all five construction phases of the Amur GPP. Phase one consists of two ethane and NGL (propane, butane, pentane, hexane) extraction and nitrogen rejection units, as well as one helium production unit. Related engineering works are in progress. When completed, the Amur GPP will be one of the largest gas processing plants in the world with a capacity of up to 49 billion cubic meters of natural gas per year. The cooperation agreement covers process technologies, engineering and services related to the treatment and liquefaction of natural gas, as well as localization of the respective equipment production in Russia. The agreement also addresses the field of helium production, including the investment in, production and operation of helium plants.

Air Liquide Opens New Research Facility in China

Air Liquide S.A. (Paris, France) inaugurated its new Shanghai Research and Technology Center (SRTC), located in the Shanghai Xinzhuang Industrial Park, in the city’s Minhang District. This new center will ultimately host 250 employees, including researchers, experts in customer applications and business development teams. It will become a major center for the Group’s innovation in the Asia-Pacific region. The SRTC will help Chinese customers and consumers benefit from Air Liquide’s innovative solutions and global innovation network to tackle environmental and societal challenges. The center will address issues such as energy transition, CO2 emissions reduction, wastewater treatment, urban air quality, food safety, and healthcare. The building is designed in compliance with LEED certification (Leadership in Energy and Environment Design), a global standard in sustainable building that factors in efficient water management, good use of energy, and the reduction of emissions. The inauguration follows the celebration of the 20-year anniversary of Air Liquide Engineering & Construction in Hangzhou.

The Engineering & Construction site in Hangzhou is specialized in designing, manufacturing and constructing leading-edge air separation units, syngas purification units and other industrial gas plants, operated in China and abroad. Founded in 1995, the site has grown to be a major manufacturing and engineering center of the Group with nearly 700 employees.

Air Products Extends Relationship with Unipetrol

Air Products and Chemicals, Inc. (Allentown, PA, USA), and Unipetrol RPA, part of the leading petrochemical and refining group – Unipetrol, have signed a new long-term agreement extending their successful relationship. The contract, which will run until 2027, sees Air Products continuing to supply industrial gases from its existing air separation unit (ASU) to meet Unipetrol’s needs. The contract also includes the provision of operational and maintenance services on industrial gas production equipment in Litvinov. Located on Unipetrol’s manufacturing site, Air Products’ ASU will also continue to supply additional liquid capacity produced to meet the industrial gas needs of its other customers across the Czech Republic and Central Europe.

Unipetrol and Air Products have been collaborating for over 20 years and this brings many commercial advantages. Both companies continually optimize processes and drive performance based on existing and future needs. This mutually beneficial approach also creates value for customers in the Czech and broader Central European market.

Linde Subsidiary Lincare Completes Acquisition of American HomePatient

Lincare Holdings Inc., a U.S. subsidiary of the technology company The Linde Group (Munich, Germany), announced the successful acquisition of U.S. company American HomePatient, Inc. The intent to acquire American HomePatient was announced in early December 2015. U.S. regulatory authorities have issued all requisite approvals. The acquisition strengthens Linde’s...
growth in the promising homecare market and reinforces the company’s position as global leader in this area of healthcare services. American HomePatient will be recognized in the consolidated balance sheet as of 1 February 2016.

American HomePatient is headquartered in Brentwood, Tennessee, USA and will be integrated into Lincare, expanding Lincare’s patient base beyond the 1 million mark. In fiscal year 2014, American HomePatient generated revenue of around EUR 260 million (USD 280 million). The company employs approximately 2,700 people in 220 branches across 38 states and is mainly active in the eastern United States. The company specializes in respiratory therapies to serve the needs of patients with COPD (Chronic Obstructive Pulmonary Disease) and OSA (Obstructive Sleep Apnoea).

**Praxair Expands Presence in South Carolina, USA**

**Praxair, Inc.** (Danbury, CT, US) announced it has signed a long-term contract to provide nitrogen to Toray Carbon Fibers America, Inc., a U.S. subsidiary of Toray Industries, Inc. Praxair will build, own and operate an air separation plant that will supply Toray with nitrogen for use in manufacturing carbon fiber at its new Spartanburg County, South Carolina, USA facility. The carbon fiber will be used by aerospace, automotive, sporting goods and other manufacturing customers regionally and internationally. Praxair’s plant is expected to start up in 2017.

**Linde Completes Agreement with Celanese in Singapore**

Linde Gas Singapore, a subsidiary of The Linde Group’s Gases Division (Munich, Germany), and Celanese Singapore (Celanese) today announced a new agreement that strengthens the existing relationship between both companies. Under the exclusive agreement, which came into effect on 1 January 2016, Linde Gas Singapore will continue to supply carbon monoxide to Celanese’s operations on Jurong Island for the production of acetic acid. The agreement enables both parties’ sustainable future operations in Singapore.

Linde Gas Singapore operates one of the largest gasification plants in Asia Pacific, producing gaseous hydrogen and carbon monoxide, as well as a high performance air separation unit. Celanese began its Singapore acetic acid operations in 2000, and has been supplied by Linde since 2004 when Linde acquired the gasification facility and the air separation unit from a multinational energy company.

**In Memoriam**

Mr. Massimiliano Spada, president of VRV S.p.A. (Ornago, Italy), passed away peacefully on 14 November 2015, surrounded by his family. IOMA sends its most sincere condolences to Mr. Spada’s loved ones.

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**IOMA & Industry Events Calendar**

- **APRIL 24–28**
  - CGA Annual Meeting
    - St. Petersburg, Florida, USA

- **MAY 10–12**
  - CGA Safety Seminar: Cylinder Requalification Operations
    - Columbus, Ohio, USA

- **MAY 17**
  - IOMA Board & Global Committee Meetings
    - Philadelphia, Pennsylvania, USA

- **JUNE 2–6**
  - EIGA Summer Session
    - Berlin, Germany

- **OCTOBER 23–27**
  - IOMA 73rd Annual Meeting
    - The Fairmont Grand Del Mar
      - Del Mar (San Diego), California, USA

- **NOVEMBER 11–15**
  - IOMA 74th Annual Meeting
    - The Ritz-Carlton Dubai
      - Jumeirah Beach, Dubai, UAE