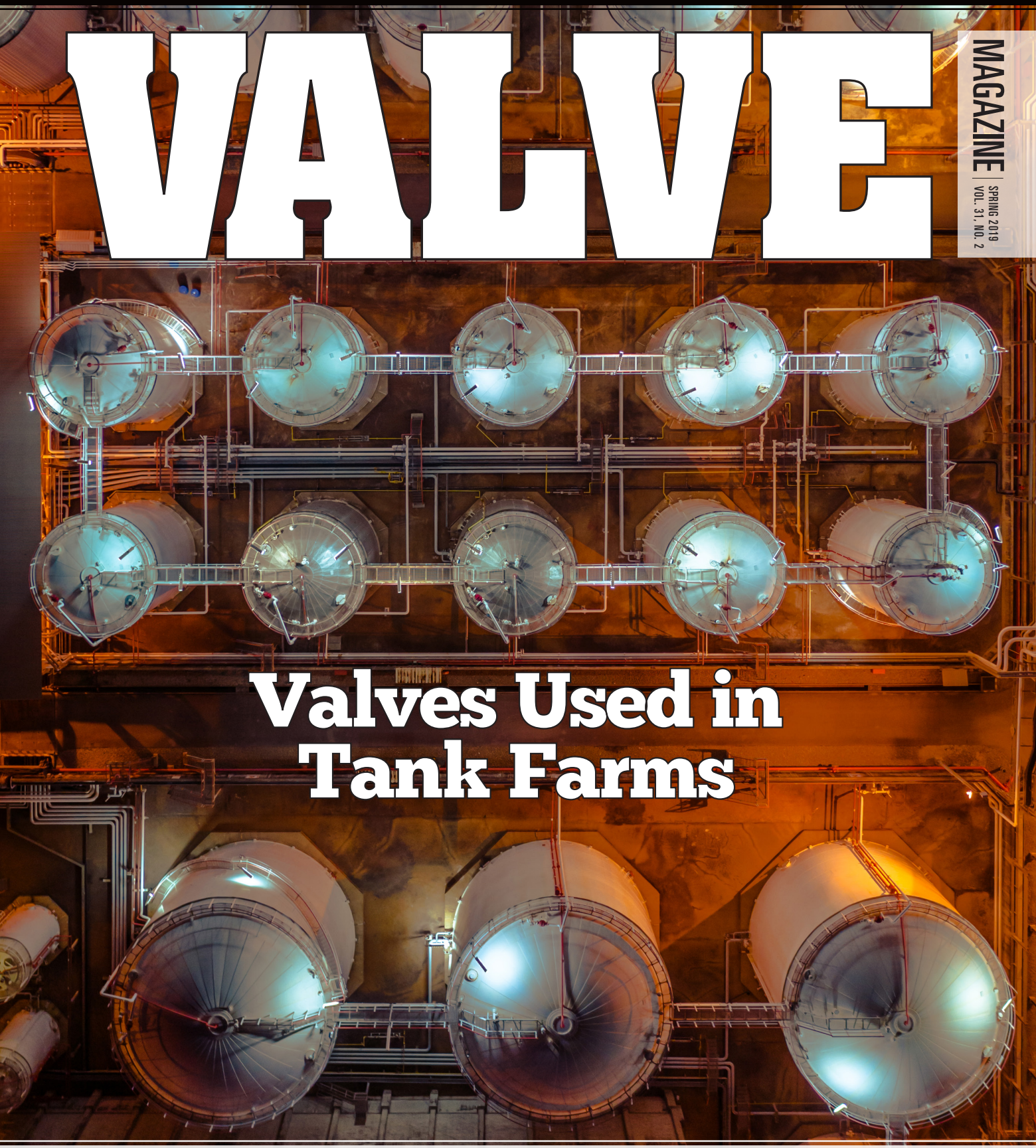
CHANGES COMING TO VALVE BASICS COURSES THIS FALL

VALVE

MAGAZINE
SPRING 2019
VOL. 31, NO. 2



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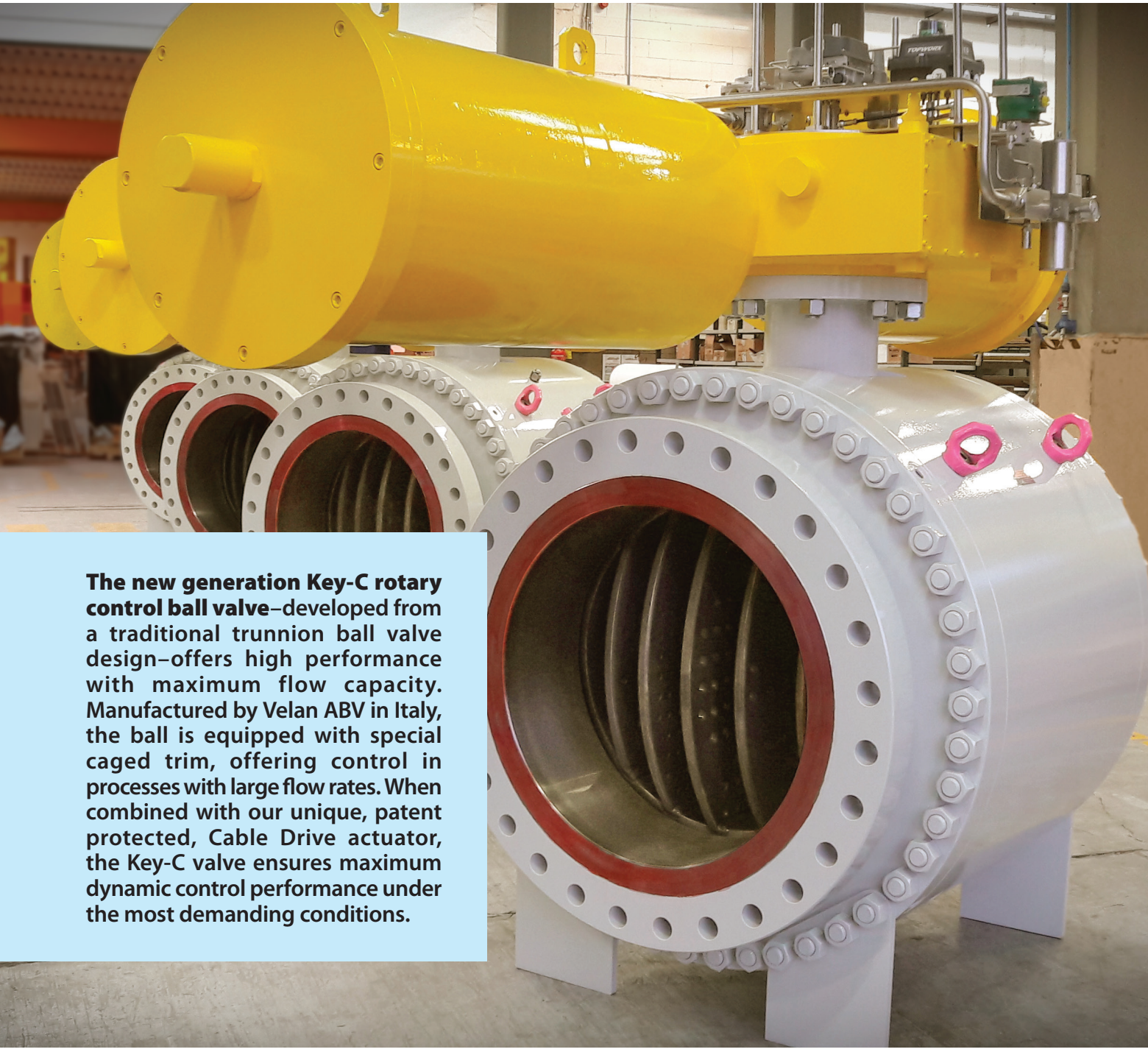

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VALVE MAGAZINE

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The voice of the flow control industry

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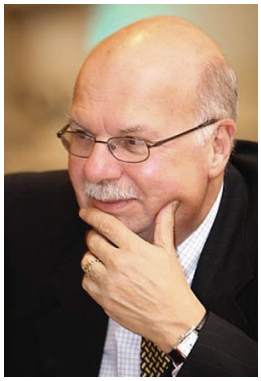
Saying Goodbye Will be Difficult



Last month at the VMA board meeting in Toronto, I announced my retirement effective at the end of 2019. It has been more than 42 years since I first walked into the VMA offices, which were in McLean, VA at the time (Jan. 3, 1977). This coming Aug. 18 also marks 21 years as the association's president.

In VMA's 80-year history, I am the sixth president to hold that slot, and I'm second only to founding leader George Cooper as far as longevity in the top position. At the same time, I also have the most expansive tenure of any VMA employee ever.

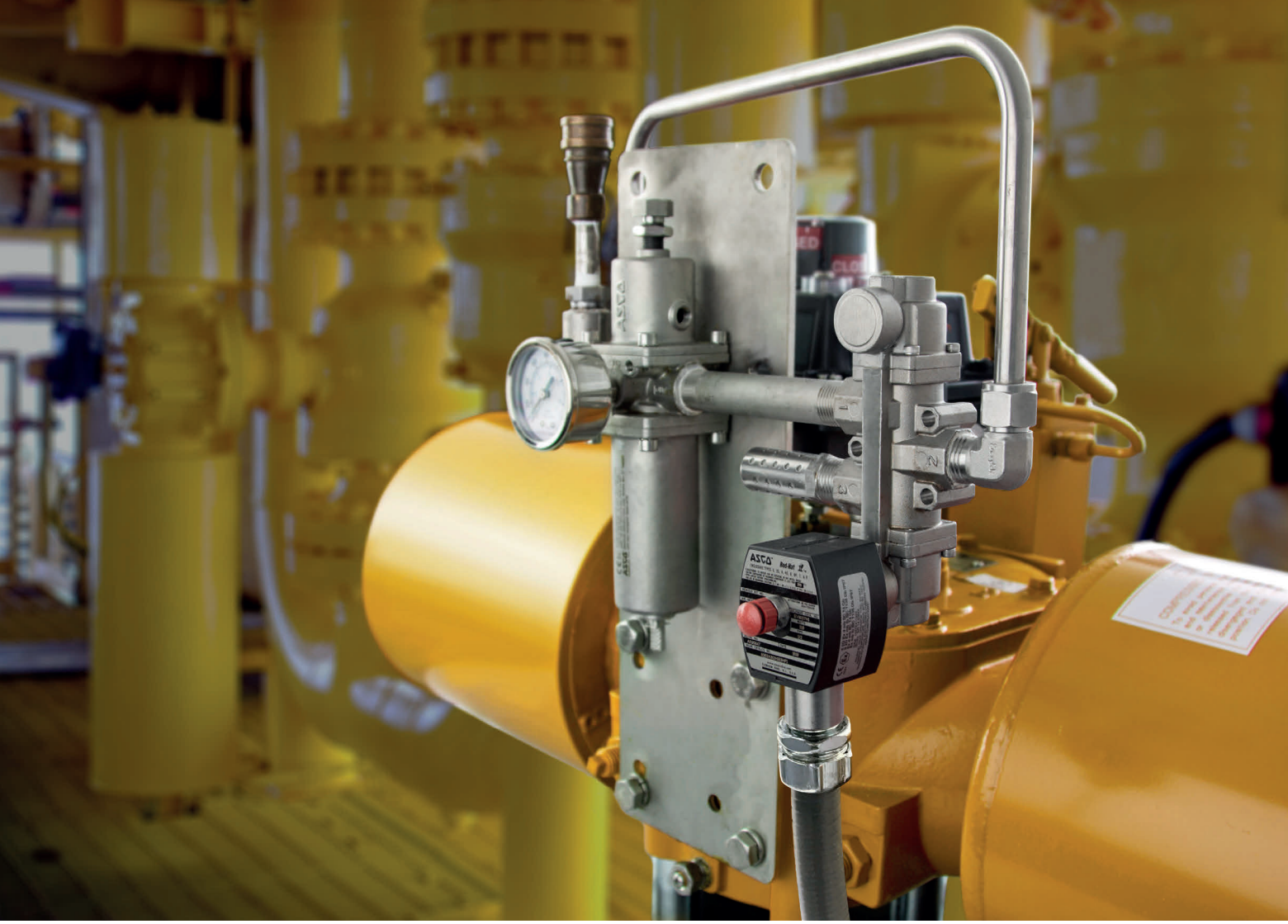
The road has been long, but as the phrase goes, "It has been a great ride." The friends I've made within the membership have meant much to me and will continue beyond my retirement.

During my time as president, a number of key changes have occurred that I consider the most significant, including:

- The introduction of a membership category for suppliers to the industry, which currently numbers more than 30 companies
- An expansion of the membership to include distributors/channel partners, which are another integral part of the valve industry
- Inauguration of an annual Valve Basics Seminar & Exhibits, which has become a mainstay for the industry
- The creation of new electronic newsletters and communications as well as a digital copy of our highly successful **VALVE Magazine** and a separate website that provides additional educational information on the industry
- The introduction of two new economic surveys, one by ITR Economics and the other by Oxford Economics
- Participation in global trade shows to bring the association and its products to international end users.

Look for more comments as I share my thoughts with you in the summer and fall issues of this magazine. I also look forward to hearing from you over the remainder of 2019. VM

Bill Sandler
President, Valve Manufacturers Association of America



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NEW CONTRACTS

AUMA Supplies to Arizona Treatment Plant

AUMA produced electric valve actuators with Ethernet/IP communications protocol for the Santan Vista water treatment plant expansion project in Arizona.

The Santan Vista plant is being expanded to provide water to the residents of Gilbert and Chandler, AZ. The project will double the plant's capacity to 48 million gallons per day.

Admiral Valve Announces Diekson Partnership

Admiral Valve, LLC d/b/a CPV Manufacturing appointed Diekson Valve and Diekson Industrial Co., Ltd. as its authorized representative in the country of Taiwan. Diekson will represent the entire CPV product line for the compressed gas industry, the petrochemical industry and the oil and gas industry.

Diekson Industrial Co., Ltd. is a professional trading company in Taiwan and China with a primary focus on petroleum refining, petrochemical processing, power generation, environmental protection and safety products.

VMA President Bill Sandler Announces Retirement

After more than two decades at the helm of VMA and 42 years as a VMA staff member, Bill Sandler announced he will retire at the end of 2019. The announcement was made at the VMA board meeting, March 27 in Toronto.

"Bill has been an outstanding leader of VMA for 21 years. Under his leadership, the organization has flourished," said David Hughes, VMA chairman and director, Global Accounts–Final Control, Emerson Automation Solutions.

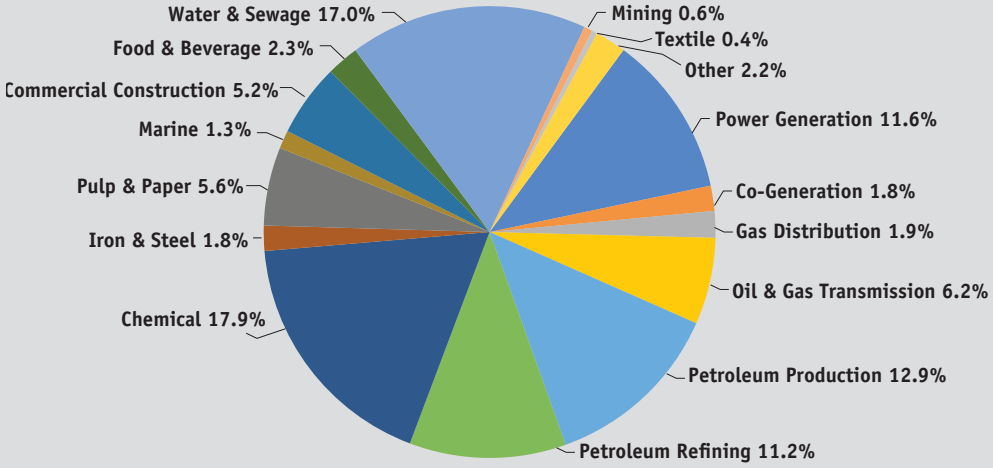
"Our members have great respect for his ability and his integrity. Both he and Ellen created many long-lasting relationships, and he will be sorely missed. However, he has earned his well-deserved retirement," Hughes added.

MARKET FOCUS: Forecast for Valves in 2019

The valve industry will see the best year it's had in a few years with an expected overall growth in 2019 of 2.5%, according to VMA's 2019 Market Forecast of Industrial Valve Shipments. That compares to 1.45% growth in 2018 and 1.89% in 2017.

Shipments of valves out of U.S. facilities will be $4.730 billion for the year compared to $4.615 in 2018 and $4.549 in 2017. Growth will be from end-user industries such as petroleum production and commercial construction, which both rose in dollar shipments (about $71 million for petroleum production and $12 million for commercial construction). Both those industries picked up greater market share for the year.

Other end-user industries saw a decline with the largest coming from the chemical and water and sewage industries. Still, chemical remains the largest end-user industry for industrial valves holding about 17.9% of the market (compared to 18.3% last year) and water/wastewater remains in second place with 17% of the market (compared to 17.7% last year).



Metso Signs Distributor in Denmark

Metso has signed a distributor agreement for its valve solutions with Grønbech & Sønner A/S in Denmark. The company will provide the entire breadth of Metso's valve products and related solutions as well as support services to customers all over Denmark.

Before the agreement with Metso, Grønbech & Sønner A/S acquired the Danish company Necon A/S, a Metso distributor for almost 20 years.

NEW FACILITIES

Emerson Opens Permian Basin Service Center

Emerson has opened a new $4 million Permian Basin Service Center to bring enhanced oil and gas technologies and services to the fast-growing region. Emerson's new center expands its longtime presence there to meet the growing demand for digital technologies to optimize production efficiencies and support producers facing labor and equipment shortages, and address workforce preparedness issues.

Flowserve Expanding Irving Headquarters

Flowserve decided to keep its global headquarters in Irving, TX after extending its long-term lease at The Towers at Williams Square. As part of an incentive deal with the city of Irving, Flowserve will receive $155,000 in job grants for retention of 310 positions and hire 75 additional employees.

Velan Consolidating Manufacturing Operations

Velan is taking measures aimed at improving its operational efficiency and optimizing its manufacturing footprint in North America. The company will consolidate valve manufacturing facilities in Quebec from three plants into two. The completion of the consolidation is scheduled for the end of 2020 or the beginning of 2021.

Velan also recently reorganized into strategic business units as part of its strategy to pursue additional efficiencies, decrease costs, upgrade systems, improve on-time delivery and maintain quality.

Garlock and Technetics Open Chinese Facility

Garlock and Technetics Group held the grand opening of a new manufacturing facility in Suzhou China. Over 100 guests from more than 70 enterprises attended the ceremony. Garlock and Technetics are sharing the facility with GGB and STEMCO.

Production was set up at the Suzhou facility in response to the increased demand for sealing and components throughout the Asia regions.

MUELLER SETS UP FUND FOR PRATT SURVIVORS

Mueller Water Products and the National Compassion Fund have created a fund to help the families of victims and employees injured during the shooting February 15 at the Henry Pratt Company, Aurora, IL.

Five employees at the Pratt plant lost their lives and many others were injured or traumatized.

The National Compassion Fund is a subsidiary of the National Center for Victims of Crime. Henry Pratt is a subsidiary of Mueller Water Products, a VMA member.

Donations can be made online at www.gofundme.com/auroraprattsurvivorsfund or checks can be sent to National Compassion Fund; ATTN: Aurora/Pratt Survivors' Fund; 1450 Duke Street; Alexandria, VA 22314.

The Dunham Fund, the largest private foundation in Aurora, also announced it will match the Pratt donations dollar for dollar up to $100,000.

Metso Breaks Ground on Chinese Technology Center

Metso announced a decision to invest in a new greenfield valve technology center in Jiaxing, China. The groundbreaking ceremony for the new plant took place on Jan. 9, 2019. The new technology center will start operations in spring 2020.

MERGERS & ACQUISITIONS

Weir Selling Flow Control Division

The Weir Group PLC entered into an agreement to sell its Flow Control division to First Reserve, a global private equity investment firm focused exclusively on energy. The transaction remains subject to certain regulatory and other approvals, with completion expected in the second quarter of 2019.

The plan to sell the division was first announced on April 19, 2018, alongside the acquisition of ESCO.

Spirax-Sarco in Negotiations to Acquire Thermocoax

Spirax-Sarco Engineering plc entered into exclusive negotiations with a view to acquiring Thermocoax Development and all of its group companies (Thermocoax) from Chequers Capital, TCR Capital and other minority shareholders.

Thermocoax is a designer and manufacturer of highly engineered electrical thermal solutions for critical applications in high-added-value industries.

Emerson Completes Purchase of GE's Intelligent Platforms

Emerson completed the purchase of Intelligent Platforms from General Electric. The addition of Intelligent Platforms programmable logic controller technologies will enable Emerson to expand its capabilities in machine control and discrete applications.

Intelligent Platforms is based in Charlottesville, VA with about 650 employees worldwide.

MAY

6-9
Offshore Technology Conference (OTC) 2019
Houston
www.otcnet.org

JUNE

9-12
ACE19 - AWWA Annual Conference & Exposition
Denver
www.awwa.org

19-20
Valve World Americas Expo & Conference
Houston
www.valveworldexpoamericas.com

AUGUST

8-9
VMA Market Outlook Workshop*
San Diego
www.vma.org/MarketOutlook

SEPTEMBER

21-25
WEFTEC 2019
Chicago
www.weftec.org

25-27
VMA/VRC Annual Meeting*
Palm Beach, FL
www.vma.org/AnnualMeeting

NOVEMBER

12-14
Valve Basics Seminar & Exhibits
Houston
www.vma.org/ValveBasics

19-21
Power-Gen International
New Orleans
www.power-gen.com

* Open to VMA/VRC members only. Visit www.VMA.org to learn if your company qualifies for membership.

VALVE MAGAZINE

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VALVE Magazine welcomes articles, proposals, manuscripts, photographs and ideas from our readers. For a copy of the magazine's Author's Guidelines, contact Genilee Parente, managing editor, at gparente@vma.org.

AWARDS & MILESTONES

Victaulic Celebrating 100 Years

Victaulic celebrates 100 years of existence in 2019. The company was founded in 1919. At a press conference held Jan. 15 at the AHR Expo in Atlanta, Victaulic executive vice president of product and technology development Rick Bucher said the company anticipates seeing more alternative piping materials and more building automation/modeling in its future.

Emerson Selected IoT Company of the Year

Emerson was named the "Industrial IoT Company of the Year" by IoT (internet of things) Breakthrough for the second year in a row. The awards recognize innovators, leaders and visionaries from around the globe in a range of IoT categories, including industrial, smart city technology, connected home and others.

Mueller Water Products Unveils New Identity

Mueller Water Products, Inc. introduced its new brand and refreshed logo at the 2018 Water Environment Federation Technical Exhibition and Conference in New Orleans. The new brand identity aligns with the company's focus on delivering value to its customers.

Solon Manufacturing Celebrates 70

In 1949, four engineering graduates of Case Western University in Cleveland joined together to form Solon Manufacturing Company. By the mid-1950s, Solon began developing products around requirements for Belleville spring washers.

Since moving to Chardon, OH in 1960 (from the original building located in Solon, OH, hence the namesake), Solon Manufacturing Co. has expanded its plant and facilities four times to encompass a total of 54,000 square feet of manufacturing and warehouse space.

ITT Engineered Valves Earns SIL 3 Certification

Select ITT Fabri-Valve knife gate valves and cylinder models, marketed by the company's Engineered Valves brand, have earned certification to International Electrotechnical Commission (IEC) 61508. The IEC listing for Engineered Valves covers knife gate valves and cylinder models that are manufactured at ITT's Engineered Valves' Amory, MS operation.

PEOPLE IN THE NEWS

VALVTECHNOLOGIES... appointed **Keith Whittaker** director of global quality management. Whittaker will be responsible for global quality standards, programs and systems. In this role, he will lead the development and continuous improvement of quality programs and processes to support the growth and globalization of the company.

The organization also appointed **Mark Abbott** director of engineering. Based in Houston, Abbott will have global management responsibility for all ValvTechnologies' engineering groups and activities worldwide.

FLOWSERVE... announced that **Tauseef Salma** will join the company as vice president, marketing and technology. Salma joins Flowserve from Baker Hughes, a GE Company, where she served as vice president, oilfield and industrial chemicals since 2017. She also held various roles of increasing responsibility, including vice president, enterprise technology.


Salma

VANAIRE... announced that **Steven Soderman** will join **Tony Lambert** and **Eric Miller** as an owner of the Gladstone, MI-based manufacturing company. Soderman is a 1998 graduate of Michigan Technological University and has been with the company since 2017 when he assumed the roles of CEO and quality manager.

The company also announced that **Bill VanDeVusse** will continue to serve the company as president.

VICTAULIC... chairman, president and CEO **John Malloy** was named to the Lehigh Valley (PA) Business Hall of Fame at an awards ceremony held at DeSales University on Dec. 4, 2018. The annual awards recognize the Greater Lehigh Valley's most dynamic businesses and business leaders who share a commitment to professional excellence, business growth and the community.

Valve World Americas Covers Expanse of Valve Topics

Many VMA members will be among exhibitors and speakers at Valve World America Expo & Conference. The event is June 19-20 at the George R. Brown Convention Center, Houston.

The conference is a biannual event attended in 2017 by more than 4,100 flow control professionals from North America as well as around the world. This year's exhibit hall has 324 companies showing off the latest innovations in technology and products.

Presentations on a number of hot topics in the valve industry are part of the general program, including the future of shale gas and the outlook for the energy industry. Informative workshops cover topics such as valve technology for cryogenic applications, testing for emissions, material specifications, asset management, control valve reliability, actuation and automation, maintenance and repair, and more.

Manufacturers, suppliers, fabricators and distributors are part of the large exhibit, which focuses on the expansive and important valve markets of North and South America.

VMA will be at the show, and attendees are welcome to stop by for the latest information on the association's programs including VALVE Magazine, educational offerings and more.

For information, go to www.valveworldexpoamericas.com.

ACE Brings Together Water Experts

Water/wastewater professionals from around the world will gather June 9-12 at the Colorado Convention Center, Denver, CO for ACE 19, the annual convention for the American Water Works Association. "Innovating the Future of Water" will center on new technologies and water sector innovations as far as asset management, utility risk and resilience, water quality challenges and other issues. Two new tracks of topics have been added to the schedule to cover smart water utility and potable reuse subjects.

Attendees come from a diverse group of global water professionals from across the entire sector, including utilities and municipalities, management, engineers, researchers, consultants, equipment manufacturers and more.

Keynote speakers will cover "Climate Action in the Real World" (Auden Schendler, Aspen Skiing Company), "Assessment for Climate Change Adaptation" (Monica Emelko, Department of Civil and Environmental Engineering, University of Waterloo) and "The Evolving Challenge of DBPs [disinfection by-products]," (Dave Reckhow, Department of Civil and Environmental Engineering, University of Massachusetts).

During the three days the exhibit hall is open, hundreds of vendors (which include valve manufacturers and suppliers) will show their wares and explain the latest in water/wastewater industry products.

For information, go to https://events.awwa.org.

NEW MEMBERS

Recently the Valve Manufacturers Association of America (VMA) welcomed these new members.

Joining as full members are:

Micromatic LLC (www.micromaticllc.com), which originated in 1929, manufactures and designs rotary actuators and automated assembly equipment. Its headquarters are in Berne, IN.

Valtorc International (www.valtorc.com), Kennesaw, GA, is a major supplier in the industrial control and valve market worldwide; a USA manufacturer of ball valves, control valves, butterfly valves, v-port ball valves, v-notch ball valves with over 30 years experience.

Joining as associate member/suppliers are:

alliantgroup (www.alliantgroup.com), Houston, is a consulting firm that advises U.S. companies and their certified public accounting firms on federal and state tax credits, incentives, and deductions.

The Eagle Group (www.eaglegroupmanufacturers.com), Houston, consists of four separately run companies: Eagle Alloy, Eagle Precision Cast Parts, Eagle Aluminum Cast Products and Eagle CNC Technologies. The group is headquartered in Muskegon, MI.

FCX Performance (www.fcxperformance.com), Columbus, OH, provides technical, mission-critical products and services to more than 15,000 end users, OEMs and EPC firms across a broad range of industries and markets.

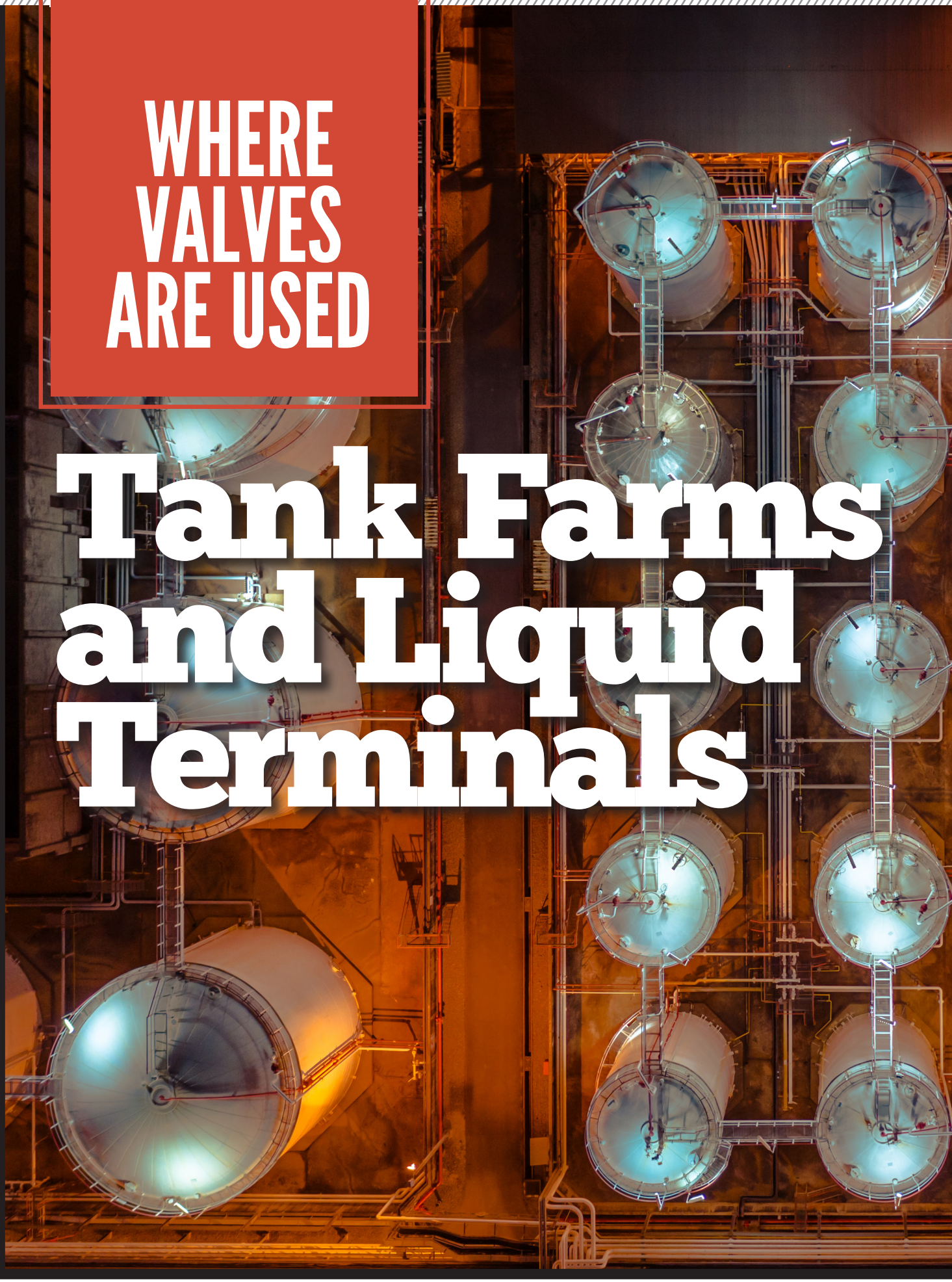
Joining the Valve Repair Council are:

Curtiss-Wright Industrial Group (www.cw-industrial.com), Brecksville, OH, offers aftermarket service and repair assistance services.

Chalmers & Kubeck (www.candksouth.com), Watkinsville, VA provides manufacturing maintenance and repair and is an authorized repair center with ISO 9001:2015 registration.

WHERE VALVES ARE USED

Tank Farms and Liquid Terminals



Executive Summary

SUBJECT: Equipment in the terminals that store petroleum faces gentler conditions than what's used in other segments of the oil and gas industry. However, the valves and the pipes they help are crucial and chosen for exactly what they can do.

KEY ISSUES:

- What's used
- Standards in the industry
- Safety issues

TAKE-AWAY: The growth in numbers of out-of-plant terminals offers increased opportunity for the valve industry.

BY GREG JOHNSON

You see them everywhere: acres of giant white cylinders—some rotund and some a bit slimmer—rising from the ground like a farmer's root crop ready for harvest. They are the liquid petroleum terminals that adorn energy centers and energy transfer points around the globe. Even some of the larger airports around the world have their own farms of tanks where jet fuel is piped to the airport directly from a producer's refinery.

These tank farms are home to large networks of pipe and the valves that help control the flow of what goes through those pipes into and out of the tanks.

THE EQUIPMENT

There are two types of tanks in these farms. The first is the traditional solid design with rigid sides and top. The second is the floating top tank, which has a cover that rides on the surface of the liquid and eliminates any void in the tank as it empties or fills. Floating top tanks are now usually built with geodesic dome covers to contain fugitive emissions that could leak around the floating top seal.

The original location for most of these farms was on the periphery of petroleum refineries where finished product was stored awaiting pipeline, rail or marine transport to its ultimate destination. The quantity of in-refinery tank farms has diminished greatly over the past few decades because producers do not want to hold onto all that costly liquid inventory. However, the overall quantity of outside-the-plant terminals has greatly increased. This equates to a good market for valves for this somewhat unique service.

The modern-day liquid petroleum terminal exists to perform vital functions in the hydrocarbon raw-material and finished-product supply chain. The tanks often are used to store extra product not needed yet at the refinery. Sometimes finished product is stored until it is needed by the pipeline operator and eventual end user. Also, some terminals use the tanks to store different blends of product that are then combined to create specific fuel formulas for different locales and markets. Another purpose of a

WHAT DOES FIRE-SAFE MEAN?

A valve is considered fire-safe when it can still retain some closure capability after it has been exposed to the high temperatures of a fire. These high temperatures would melt any elastomer or fluoroelastomer used to effect zero leakage in a valve. Metal-to-metal seated valves such as most gate and globe valves are inherently fire-safe. Metal-seated ball valves also fall under this category.

The fire-safe connotation is applied to a valve after its original design has gone through a special test protocol that mimics what can happen in a real fire—extreme heat, followed by quick cooling. The two most common fire test specifications used today are API 6FA: Standard for Fire Test for Valves and API 607: Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats. API 6FA is generally applied to midstream and upstream applications, while API 607 is used for downstream applications.

The two most common fire test specifications used today are API 6FA: Standard for Fire Test for Valves and API 607: Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats.

Passing of either of these two test procedures requires that the valve must be covered by flame at a particular temperature for a specific period of time and then cooled rapidly by a spray of water. The valve's seat leakage rate is then tested, with the requirement that the backup sealing mechanism must function somewhat effectively, even after the primary elastomer or fluoroelastomer seating mechanism has been destroyed by the high-temperature effects of the fire.

A tank farm under construction

terminal is to act as an ownership or "custody-transfer" point for product that is changing hands.

While this article only focuses on valves in ambient-liquid terminals, liquified natural gas (LNG) terminals and some other non-liquid storage facilities exist as well. However, their valve needs are different, especially the LNG facilities, which have cryogenic valve requirements.

THE VALVE ENVIRONMENT

Valves are specified by the function they are required to perform (on/off, regulating flow or preventing backflow), as well the service conditions for which they must function. Steam valves, for example, may see temperatures above 1,000°F (538°C), while critical refinery valves may see high temperatures and highly corrosive environments. Aside from valves in water service, tank farm valves function in one of the tamest environments that exist in the valve world.

Except for installations in the far northern climates, the operating temperature for liquid petroleum terminals is moderate (-20°F or -29°C to 120°F or 49°C) and the fluids are generally not that harsh unless hydrogen-sulfide-laced sour crude is involved. A third criterion for valve selection (beyond temperature and corrosivity) is operating pressure. For most tank farm/liquid terminal applications, the pressures are well below 200 psi. In terms of design requirements, the most predominant pressure class for valves in this service is Class 150 with its operating pressure around 285 psi, depending on the material of construction.

The material selected for valves in liquid tank farm applications is almost always carbon steel with a variety of valve trims based upon the exact fluid and operating conditions of the valve. In Canada, where the ambient operating temperatures can be much colder than -20°F (-29°C), special, low-temperature steels such as casting grade LCB are chosen.

Piping sizes in terminals have increased over the last 20 years or so. In the 1950s, 60s and 70s, Nominal Pipe Sizes (NPS) 12 through NPS 20 were considered the normal pipe sizes, while today, it is not uncommon to see piping of NPS 30 in these facilities. This is because the larger diameter piping offers faster throughput through a facility.

For over 100 years, the most popular valve in tank farm service has been the venerable gate valve. These common denominators of tank farm valving have functioned very well and been cost efficient. The torque-closure design of the wedge gate has performed well for so long because it is cheap and easy to maintain since it has a hearty design. For valves in crude oil service, the environment is especially good for the gate valve because it is operating in a gentle bath of lubricating oil.

THE EXPANDING PLUG VALVE

The gate valve has one disadvantage in that most designs are not guaranteed

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"zero leakage," especially if the zero leakage is required for both directions of flow. Some American Petroleum Institute (API) 6D resilient-seat expanding gate valve designs do provide zero-leakage. Zero leakage for both directions is needed in a terminal, however, to keep from cross-contaminating product as the tanks and their inputs and outputs are switched for various purposes. This simultaneous sealability in both directions is called double block & bleed (DB&B).

The need for a valve that could accomplish this was addressed over 75 years ago with the development of a valve design that specifically met and still meets the fluid control needs of the tank and terminal industry: the expanding plug valve. The design was originally developed by the General Valve Company in 1941, which called it the "twin-seal" because it sealed with zero leakage in both directions.

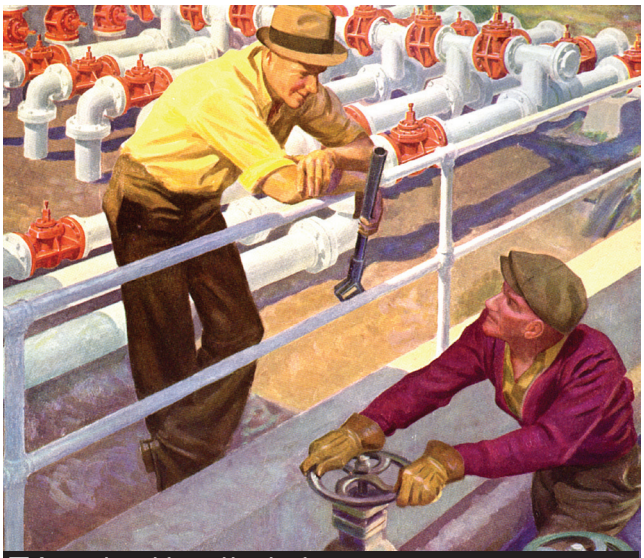
The expanding plug design is unique in the valve world because of how the sealing system functions inside the valve. When closed, the tapered O-ring fitted steel sleeves are snugly pushed into both seats simultaneously by the internal plug. Then, as the valve is opened, a sealing-surface-saving process takes place: As the stem is rotated open, the plug's seals (often called slips) initially move away from the body seats in the valve. Next, the entire plug assembly rotates to the open position as the handwheel is turned. This sequence eliminates any potentially damaging rubbing action on the seating surface slip O-rings, which are the key to zero leakage sealability in the valve.

For applications where the piping size is small to moderate (up to about NPS 16), the expanding plug valve is the valve of choice today for DB&B terminal service applications. The primary reason that these valves are not specified more often in larger sizes for terminal installations is purely cost-related.

When using DB&B valves, a possibility of overpressuring the body cavity exists if the internal temperature rises since the valve is seating simultaneously in both directions. A thermal relief system is required to alleviate the overpressure, usually venting to the upstream side of the valve.

Virtually all hydrocarbon service valves inside a terminal are required to be fire-safe. While the wedge gate valve is inherently fire-safe because of its metal-to-metal seating, the DB&B expanding plug valve, with its O-ring slip inserts, must be tested and confirmed to be fire-safe. (See "What Does Fire-safe Mean?").

The choice between using the guaranteed DB&B sealing of the expanding plug or the sealing of wedge gate valves is a decision left up to the purchasing team at each facility. The wedge gate valve may not seat quite as tightly, but its simple design makes it almost maintenance free, especially in a sweet crude environment. The more complex, expanding plug valve requires a bit more upkeep and may cost more to actuate. Since the profit margins of these facilities are traditionally thin, initial valve cost is very important in the decision-making process.



An operating tank farm and its valves from years past

DESIGN STANDARDS

Because most tank farms and terminals are storing hydrocarbon-based liquids, it is natural that, as far as applicable, API standards be followed in the design. The overall design guidance requirements for these facilities are covered in API Standard 2610: Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities. While this document is extensive, the subject of valves is only briefly mentioned and is in fact deferred to the American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME) B31.3 piping design standard, Process Piping.

Within B31.3, the valve design requirements are further relegated to fall under the auspices of common API valve standards such as 600, 608, and 6D. In API, standards fall under different umbrellas based on whether the valves are used in upstream, midstream or downstream service. Since the tank or terminal facilities can be considered both midstream and downstream—depending upon the location of the tank farm and its piping—both downstream (API 594, 599, 600, 602, 608, 609, 623) and API 6D valve designs are acceptable.

It's possible also that more requirements such as additional radiography or other testing requirements imposed in ANSI B31.3 could be required of valves in tank and terminal service.

Although gate and expanding plug valves are the primary valves in tank farms and terminals, other valve types are used. Since pumps are involved in creating the pressure necessary to distribute the liquid throughout the facility, automatic back-flow protection for these pressure-generating devices is required. This means check valves will be installed downstream of their output to protect them from backflow damage. The most common styles of check valve for this application are either the wafer or spring-assisted, center-guided check valves.

In these facilities, a need also exists for positive and quick line closure in case of a mishap such as a fire or overfilling. Emergency shutdown valves (ESDs) fill that need. Frequently, ball valves are used in this service since

A tanker docked at a petroleum terminal

their quarter-turn actuation cycle is very fast compared to the actuation motion of a multi-turn valve. Except for ESD service, ball valves have been slow to gain acceptance in tank farms and liquid terminals. One reason is the possibility that entrained solids in the fluid could damage soft seats.

The high-performance butterfly valve is used in tank and terminal service more and more, but terminal operators and facility designers still seem to fall back on what has worked well in the past: the gate and expanding plug valves. However, the future could see an influx of metal-seated ball and triple offset butterfly valves taking market share from the currently popular multi-turn products.

FACILITY CONTROL SYSTEMS

Once upon a time, terminal and tank farm piping manifolds and shut-off valves were operated by a burly, big-biceped tank farm employee with a valve wrench in his hand. This worker would open and shut the valves as required to direct the flow to and from the proper tank or tanks. Today, however, most of these systems are automated; all the key valves are now actuated and controlled either onsite or offsite from a safe and secure control room.

The actuator controls are interfaced to a computer or programmable logic controller in the control room, along with outputs from tank level gauges, pressure gauges, flow meters, temperature sensors and other data inputs. This data, along with incoming liquid data from the supply-side pipeline, are combined to assess the status of the facility and provide information so the operator can adjust any final control elements that feed the tanks in real time as needed.

These control systems also benefit custody transfer, where different entities are providing product that is gathered at the same terminal facility and accurate liquid inventory accounting is critical.

SAFETY SYSTEMS

Three main safety concerns are involved in tank/terminal facilities: overfilling of tanks, lightning and fire. With all that flammable and inflammable potential energy present, an important need is fire suppression systems in the terminal/tank farm. The design of these systems falls under the purvey of National Fire Protection Association (NFPA) standards and recommendations. The dominant NFPA standard applied is NFPA 30, Flammable and Combustible Liquids Code. Included in recommendations are designs for the dissemination of firefighting liquids and foam.

These systems, which are almost always separate from the main fluid piping system, also include valves. A system may have automatic and/or manual nozzles or deluge installations to direct fire suppression liquid or foam to the fire. An additional safety requirement is that all tanks be contained in earthen or concrete dikes to retain the liquid in case of disaster.

Some facilities also have a unique interface between the main fluid piping system and the firefighting system. An inlet to the main fluid piping network can be used to pump foam or another fire-suppression fluid directly into the burning vessel through the supply piping. This requires either automatic or manual closure of valves and redirection of firefighting fluids to only the affected tanks by the terminal control personnel.

The possibility of tank damage by overpressure or underpressure (vacuum) is usually handled by a pressure relief or vacuum relief/vent system attached directly to each tank. Additional pressure relief valves (PRVs) are installed in the main pump-powered product piping system and are generally set at about 110% of the pump output pressure. These PRVs follow the same material and pressure class requirements of the rest of the piping system.

Tank farms and terminals are key elements within the petroleum supply chain, and efficient valves and piping systems are the vital arteries of each system. Although the pressures and temperatures seen by these valves are not extreme, the service they perform is critical to the successful and safe operation of the terminal or tank farm. VM

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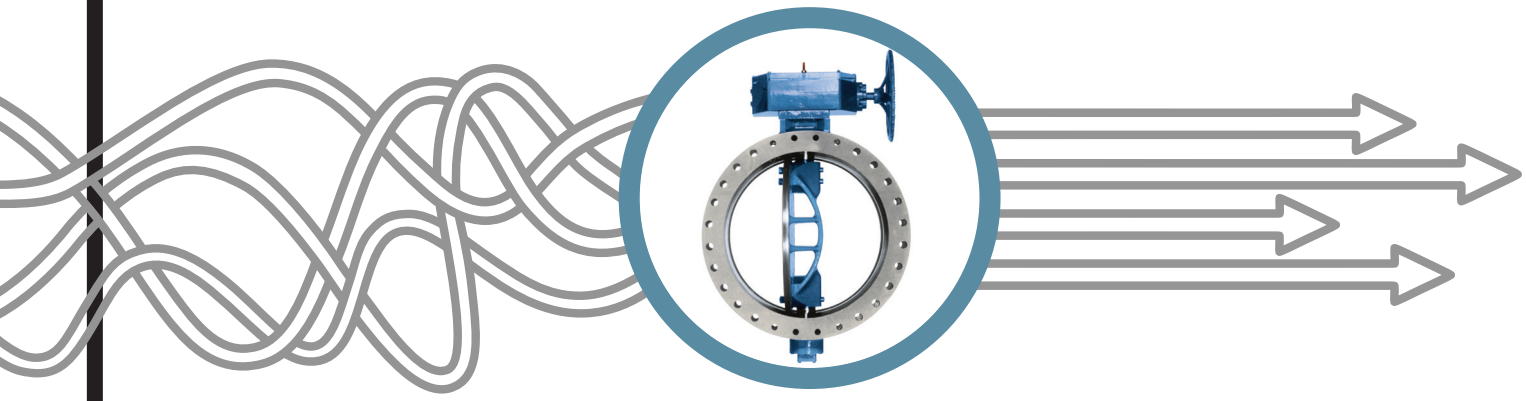
Standards Clarification:
Pressure Rating Standards for Flanged Valves



BY TIM FALLON

In any industry, one of the most challenging tasks is keeping up to date and compliant with complicated and changing sets of performance standards. In an ideal world, these standards serve a vital purpose by guiding employees and end users to the most efficient application of their equipment.

Unfortunately, good intentions can turn into overzealousness, creating a situation in which performance standards create as many problems as they solve. To make matters worse, many industries face competing sets of standards from multiple agencies and advocacy groups, making it even more difficult to understand and employ suggestions and guidelines. An ideal set of performance standards would be unambiguous and easy to interpret, leading industry stakeholders to proper decision making. But that's not usually the case.

In waterworks service, pressure rating standards are used to define the acceptable use of flanged valves. However, because of the many variables involved in using flanges, these standards can be complicated and difficult to interpret. Compounding the issue is the fact that workers in the water service industry must contend with standards issued by several organizations including the American Society of Mechanical Engineers (ASME) and the American Water Works Association (AWWA). The complex and often contradictory standards issued by these two organizations, in addition to manufacturer literature that can muddy the waters further, can lead to misunderstandings or improper application.

HIGH STAKES

For a pipe system to perform reliably and successfully, each of its component parts must function properly. Any weakness or improper application of equipment can result in higher construction and maintenance costs as well as decreased efficiency. Those responsible for specifying, constructing, maintaining and assuring performance of pressurized systems must have a complete grasp on the pressure ratings of every component in their system to ensure they perform their intended function safely.

DECIPHERING THE STANDARDS

In considering pressure rating standards for valve flanges, a broad range of factors must be understood. Each of these factors (e.g. material, size, temperature) impacts the resultant pressure rating (measured in pounds per square inch gauge or psig).

Valve flanges are constructed of different materials, including steel, stainless steel, gray iron and ductile iron. These materials have different mechanical properties, and because of this, they are assigned different pressure ratings. Ductile iron, for example, has a higher rating than gray iron, while the rating for steel is considerably higher than either iron alloy.

Executive Summary

SUBJECT: In waterworks applications, understanding pressure rating standards for acceptable use of flanged valves is challenging because of the many variables involved.

KEY ISSUES:

- The different standards
- The roles of classes and ratings
- Matching them up

TAKE-AWAY: A good place to begin is to develop a solid understanding of the applicable codes and standards, as well as the jurisdictional, specification and/or procurement document requirements that apply.

Flange sizes are measured by the size of the pipe and expressed as nominal pipe size (NPS). This measurement does not correspond precisely to the size of the pipe in inches; rather, the measurement is a dimensionless reference to the nominal diameter (DN) in inches used in international standards. DN standards are also dimensionless. The relationship of NPS to DN can roughly be calculated as DN = NPS x 25. As NPS increases, the pressure rating of the flange decreases.

In addition to flange sizes as measured in NPS, flange thickness also must be taken into account. Flange gaskets are found in one of three variations: smooth gasket, flange-type gaskets and triple-seal gaskets. (For a comprehensive report on these factors, consult AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.)

Temperature is the final factor in determining the pressure rating of valve flanges. Because metals are weaker at higher temperatures, for a given material, pressure ratings decrease as temperature increases. The noticeable disparity in ratings between high-temperature situations and low-temperature situations is what prompted AWWA to issue its own set of standards specific to cold water service.

☐ 42-inch rotary cone valves and metal-seated ball valves are used in a raw water pumping station, San Vicente, CA.

The different standards and what they deal with include:

ASME Standards

ASME recognized the importance of reliable standards and were first to create a set of performance standards for valves, flanges and fittings in 1920. Three relevant sets of ASME standards for flanged valves and

Table 1. Applicable Flange and Fitting Standards

Standard	Construction Material
ASME B16.1	Gray and Ductile Iron
ASME B16.42	Ductile Iron
ASME B16.5	Steel and Stainless Steel
AWWA C110	Gray and Ductile Iron
AWWA C207	Steel

☐ High-pressure hydraulic units control 10-inch and 12-inch high-performance ball valves in an aquifer recharging application, San Antonio, TX.

Table 2. Flange Pressure Ratings According to ASME/ANSI Standards (psig)

	Gray Iron ASME B16.1				Ductile Iron ASME B16.42			
	Class 125		Class 250		Class 150		Class 300	
Max. Temp.	NPS 1-12	NPS 14-24	NPS 1-12	NPS 14-24	NPS 1-12	NPS 14-24	NPS 1-12	NPS 14-24
100° F	200	150	500	300	250	250	640	640
200° F	190	135	460	280	235	235	600	600
300° F	165	110	375	240	215	215	565	565

Table 3. Flange Pressure Ratings According to AWWA Standards (psig)

	Gray Iron AWWA C110		Ductile Iron AWWA C110		Steel AWWA C207				
	Class 125		Class 125		Class D		Class E		Class F
Max. Temp.	NPS 3-12	NPS 14-24	NPS 3-12	NPS 14-24	NPS 3-12	NPS > 12	NPS 3-12	NPS > 12	NPS 4-48
100° F	250	250	350	350	175	150	275	275	300

fittings exist and each of them corresponds to construction material. Gray iron flanges and fittings correspond to ASME B16.1. Ductile iron flanges and fittings correspond to ASME B16.42. Steel flanges and fittings correspond to ASME B16.5. (See Table 1, page 19.)

AWWA Standards

AWWA then issued its own set of standards specifically for cold water service. AWWA C110 applies to ductile iron and gray iron flanges and fittings. AWWA C207 was developed more recently and applies to steel flanges and fittings. Because these standards are designed for cold water service, their pressure ratings are higher than ASME ratings for fittings of similar size and material. This is due to the fact ASME fittings are expected to deal with more hazardous service situations.

Classes

The most outwardly confusing aspect of pressure rating standards is inclusion of classes. These classes are designations based on a specific pressure and temperature for saturated steam. Pressure classes are not based on pressure ratings from the flange—a reality often misconceived. (The determination of pressure classes was described in a November 2014 VALVE Magazine article, "Understanding and Selecting Valve Flanges, Pt. 1: Design and Standards.")

In all sets of standards, as the class rating increases, the pressure rating increases. As observed in the ASME standards found in Table 2, class rating never corresponds exactly to pressure rating at temperatures of 100°F, 200°F or 300°F (38°C, 93°C, 149°C).

An important note is that Class 125 and Class 150 flanges use the same bolting pattern and can be bolted together despite the fact they have different pressure ratings. The same principle holds true for Class 250 and Class 300 flanges. Gray iron flanges are flat-faced, while ductile

☐ A tilting disc check valve is used at a raw water pumping station in Bakersfield, CA.

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Table 4. Flange Compatibility

Class of Flange	Flange Material	Pressure Rating	Compatibility
ANSI B16.1 CI. 125	ASTMA A 126 CI. B Iron	1"-12" 175 psi; 14"-48 150 psi	AWWA CI. B, D, E; ANSI B1 6.5 CI. 150, ANSI B16.42 CL. 150
ANSI B16.1 CI. 250	Same as above	1"-12" 400 psi; 14"-48 300 psi	AWWA CI F, ANSI B16.42 CI. 300
ANSI B16.5 CI. 150	Carbon or Stainless Steel	175 psi @ 100° F	AWWA CI. B, D, E; ANSI B16.1 CI. 125, ANSI B16.42 CL. 150
AWWA CI. B	Carbon Steel	86 psi	AWWA CI D, E; ANSI B16.1 CI. 125 B16.5 CI. 150, ANSI B16.42 CL. 150
AWWA CI. D	Carbon Steel	1"-12" 175psi; 14"-144 150 psi	AWWA CI B, E; ANSI B16.1 CI. 125 B16.5 CI. 150, ANSI B16.42 CL. 150
AWWA CI. E	Carbon Steel	275 psi	AWWA CI D; ANSI B16.1 CI. 125, ANSI B16.42 CL. 150
AWWA CI. F	Carbon Steel	300 psi	ANSI B16.2 CI 250, ANSI B16.42 CI. 300

iron flanges are typically flat-faced and steel flanges can have either raised or flat faces. Because of this potential incongruity, gray iron flanges can only be bolted to ductile iron or steel flanges if the raised face of the mating flange is removed or if the mating flange is also flat-faced. This precaution prevents the breaking of a gray iron flange when tightening the bolts.

Tables 2 and 3 (page 20) provide reference for the various pressure rating standards assigned by ASME and AWWA. ASME B16.5 prescribes several tables for different materials and temperatures, the details of which are beyond the scope of this article. To ensure compliance, the tables found in the published standard should be consulted. It is important to note that the AWWA standards are only listed with a maximum temperature of 100°F (38°C) because of their exclusive design for cold water service.

Valve Pressure Ratings

Complicating the issue further is the fact that, even when there is a clear understanding of the ASME/ANSI and AWWA pressure-rating standards for flanges, the reality is that the flange is not the only part of the piping system that must be acknowledged. Just as crucial is the valve itself, and unfortunately, valve pressure ratings can differ entirely from the pressure ratings of a flange in the same class.

The issue of valve pressure ratings is complicated even more than flange ratings because there are significantly more variables involved. The prescribed standards of the ASME and AWWA for flanges are based on standardized dimensions. However, waterworks valves differ considerably in size, shape and design depending on the manufacturer, making it impossible to come to such a relatively concise set of standards.

AWWA has issued standards for many of the valves used in water service, but users must be cautious when using these standards in combination with AWWA pressure-rating standards for flanges. The pressure ratings often differ within a given class, and a responsible service provider must understand these differences to prevent accidents. The key factor to understand is that a piping system is only as strong as its weakest component; all decisions related to pressure should be built around the pressure rating of the system's weakest link. (Table 4)

Table 5. Minimum Wall Thickness Standards According to AWWA

Size (in.)	AWWA C509 – Gray Iron	AWWA C515 – Ductile Iron
	Minimum Wall Thickness (in.)	Minimum Wall Thickness (in.)
3	0.37	0.30
4	0.40	0.31
6	0.43	0.32
8	0.50	0.34
10	0.63	0.36
12	0.68	0.38

MINIMUM WALL THICKNESS

In addition to ASME and AWWA standards applicable to pressure ratings, one other set of standards that deal with these issues are those relating to the minimum wall thickness of resilient gate valves. AWWA Standard C509 was created to cover resilient seated gate valves made of gray cast iron, the most common metal used at the time the standard was published in 1985. As manufacturers turned to ductile iron, Standard C515 was issued to compensate for the higher strength of the new material. Table 5 defines the applicable wall thickness standards.

STANDARDS AS THEY APPLY

While we can clearly identify and define the ASME and AWWA standards germane to the use of flanged valves in waterworks service, the simplest way to determine which standards are applicable to specific equipment is to consult the manufacturers' recommended standards for individual products. This can be cross-referenced with Tables 1, 2, and 5 to determine the figures relevant to that equipment to ensure the best match. VM

Tim Fallon is product line leader for Mueller Water Products (www.muellerwaterproducts.com). Reach him at tfallon@muellerwp.com.

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Figure 1. Using a hand-held reader, a technician can identify plant assets such as a control valve equipped with an RFID asset tag simply by pointing.

The Case for RFID in Process Plants

BY SHANNON JELKEN

Today, much of the information regarding the status of components installed in the field is housed in paper files, posing problems for technicians and engineers. For example, on weather-battered platforms in the North Sea, technicians walk around with "big pieces of paper in the rain and wind," says Claire Day, a BP operations engineer.[1] "It is not an ideal way to work."

Compare that with a modern scenario, where a technician points a radio-frequency identificaton (RFID) reader at a valve (Figure 1), obtains the valve's serial number and can later access all the data needed from a handheld mobile tablet or smartphone. With a network connection, the user could access information onsite.

This article explores the use of RFID as an asset management and maintenance tool.

THE PAPER TRAIL

Today, most maintenance departments deal exclusively with

Executive Summary

SUBJECT: Newer ways to track assets can reduce costs for process plants and lessen the chance for errors.

KEY ISSUES:

- Traditional methods
- Newer ways to track
- What RFID requires

TAKE-AWAY: RFID tracking can save industrial companies hundreds of thousands of dollars per year.

paper records regarding valve maintenance, parts lists, service, repairs and other data on a valve's history. Some of these papers reside at the project site in the maintenance shop while others are kept at a central office. Some operators rely on component vendors to keep records.

Significant effort is required to manually maintain these files, and they often are not properly kept up to date. A high cost is associated with the time involved in these practices, and errors with manual data entry are common.

Given the inefficiencies, deficiencies and costs associated with manual asset management systems in place today, is there a better, more seamless and automated solution? Looking at industries such as retail, warehousing and discrete manufacturing reveals better methodologies are out there. But are the technologies used in these environments adoptable to the process industry world?

Here are some of the technologies available for identifying assets, with pros and cons of each:

Figure 2. Checking the tag on the valve at top left center requires scaffolding or a ladder.

- **Barcode and 2-D (QR) barcodes**—Technicians need to manually align the barcode and laser. The method is not durable, but costs are low. These barcodes work well in retail applications.
- **Near Field Communications (NFC)**—This method offers improved durability over barcodes, but has a very short read range of one inch.
- **Bluetooth/bluetooth low energy**—This has a long read range making precise alignment not as necessary. The method can be used to automate tasks and it offers the capacity to receive large amounts of dynamic data at high speeds. The cost is low compared to RFID. Power is required for operation.
- **UHF RFID (ultra-high frequency radio-frequency identification)**—This method offers a long read range, and precise alignment is not necessary. It

can be used to automate tasks and can easily be retrofitted to a large installed base. No batteries are required, and it offers sufficient memory for local data storage. The method is higher in initial cost than some other options, but has lower total cost of ownership in most industrial applications.

This comparison indicates that UHF RFID may be the best choice for asset monitoring in demanding applications.

Figure 3. This asset management tag has a metal bracket that amplifies the RF signal, providing a read range of up to 25 feet.

FLYING HIGH WITH RFID

Since 2011, Delta Air Lines has installed more than 240,000 RFID tags on oxygen generators, life vests and cabin emergency equipment on its aircraft. The result is that the airline can now check the expiration dates of all oxygen generators aboard a 757 in less than two minutes—this compares to about eight man-hours that it takes to do this manually.

Also, Delta can perform predictive maintenance and order new oxygen canisters only when it needs them, then store them in locations where they will be available to be put on aircraft when canisters require replacement. Such visibility into which canisters will expire also benefits the suppliers that make the canisters since they can better plan and procure parts and materials.

Delta is also using RFID to track passenger luggage with UHF RFID tags attached and is sending updates to customers via a smartphone app. The industry is also moving toward using the technology to track parts used for maintenance.

Although an airline operation is not a process industry application, the requirements are similar to many industrial situations so this shows the potential worth for dealing with critical assets.

Still, for every successful RFID implementation project such as Delta's, there have been many failures, and it's not the size of the company that determines success. Starting up an RFID program because it is a new technology with so many possibilities is insufficient. What sets successful implementation apart is the value of what's provided. The workflows and automation processes must be thought out, and solid plans must be put in place to implement those processes.

In others word: "I just want to find someone to do it for me" would be a dangerous attitude. A Feb. 3, 2019 article in RFID Journal,[2] addressed the topic of bar code integrator companies learning about RFID processes at the customer's expense. It's better to carefully evaluate all the alternatives and develop a thorough implementation plan before proceeding.

RFID AND THE PROCESS INDUSTRIES

So, if RFID offers so much, many people wonder why it hasn't been adopted by the process industries already. Here are a few reasons:

- No company exists that is dedicated to RFID for the process industries; therefore, companies can't buy a turnkey solution (tag, reader, software) meeting industry requirements. It can even be difficult to buy off-the-shelf components that can be assembled into a solution.
- RFID manufacturers generally don't understand the requirements for process industries because they are mainly focused on retail or discrete manufacturing applications.
- RFID is more than a tag. It includes fixed readers, mobile readers, software and databases. These are often separate offerings from multiple vendors with little or no coordination.
- RFID in the process industries is not a guaranteed win for established RFID manufacturers. They have little to no expertise in the valve industry, and the barriers to entry are high.

Despite these difficulties, there are successful industrial applications that can provide guidance and solid reasons why it's a good choice for tracking.

INDUSTRIAL RFID TAGS

One example where RFID shines is accessibility.

Valve manufacturers can populate data on a valve through a bar code or some other type of nameplate tag. However, if the valve is in a difficult area to reach by a technician, this may require erecting scaffolding (Figure 2) to positively identify the asset.

This would require obtaining a permit for scaffolding, scaffolding erection and locating the assembly nameplate. It also might involve scraping paint, corrosion (rust), or dirt; use of a mirror to see behind the valve; manual note-taking with a pen and paper; and scaffold disassembly. All of this could consume a field technician's workday.

This compares to the process shown in Figure 1, where a technician with an RFID reader can identify the valve in less than five minutes.

As far as the tag itself, an industrial RFID must be rugged, have hazardous area certifications and resist harsh environmental conditions such as chemicals, dust, particulates, moisture, ultraviolet light, vibration and temperature extremes. It should have high memory capacity to store critical data about the asset and should have a read range of at least 10 feet in a high metal environment.

Information from the tag collected by an RFID reader can automatically and securely link to an external database. If a wireless connection to an external database from the reader is not available, the tag will have enough memory to store critical data until such a link can be established. Alternately, the reader software can store information from multiple tags for later download to a database via a hardwired connection.

SUPPORTING SOFTWARE

A smart tag also should have supporting software that allows a technician to quickly access any information needed in the field (Figure 4). The data on the tag should be accessible by software platforms used for maintenance management, historization, diagnostics and other tasks. With such access, both asset management and maintenance automation become much easier, less costly and more accurate than manual methods.

With data from a valve collected from an RFID tag and reader, asset management software can:

Figure 4. With supporting software, a valve can be identified, then a technician can access data from a mobile device such as a smartphone.

- Automate field maintenance tracking and updates
- Provide the information required for predictive spare parts ordering
- Facilitate cross-facility spare parts inventory
- Provide real-time asset location and status
- Optimize operations planning with data-driven decisions

Maintenance automation software can allow:

- Real time equipment location and mobilization
- Work order automation
- Inspection validation
- Contractor access control
- Automated equipment check-in and -out

The data residing on the tag provides value to field personnel, but the ability to automatically complement tag data with rich contextual information in real time greatly increases the utility of an RFID system. A mobile device can provide data of interest to a field technician such as repair history, recommended spares, product documentation, walkdown results, links for ordering online, service requests and more.

ACCESSING ALL ASSETS

One of RFID's main uses in industrial plants is to automate processes including updating systems when assets have been moved, received or serviced.

For complete adoption, asset tags need to be available for all products and systems critical to the customer facility. Different types of assets will have different critical information associated with them. Because of this, the tag's memory map needs to be adaptable, and the associated software needs to be able to handle the variations.

This type of standardization is analogous to instrument communication protocols such as Foundation Fieldbus, which started with a single vendor and is now available to all at no cost.

If RFID was adopted across the industry in a similar manner, the savings to end users would be immense.

VALUE AT AN EXAMPLE PLANT

Consider the case of a typical process plant (Figure 5) with 16,000 assets and RFID tagging on the 60% involved in an active reliability program (about 10,000 of the assets.)

Savings begin before construction when new equipment arrives, after construction when finding missing assets, then continuing through start-up, commissioning and maintenance activities.

- Before construction: Savings at our typical plant would be $100,000. This is through the timesaving process of scanning incoming assets directly into digital receiving software instead of locating the nameplate, searching through the associated paperwork and manually entering the data. The savings is based on an average of five minutes per asset @$120/hour for labor (equating to $100,000 in savings for 10,000 assets).
- Finding assets: This would result in $60,000 in savings. About 5% of assets get missed in the receipt system because no one is available to check them in when received, or because the assets are simply overlooked during the check-in process. The locate functionality of an RFID reader allows personnel to scan a yard and quickly locate an asset instead of spending an hour searching the yard. This saves one hour per asset for 500 assets @$120/hour or $60,000.
- Startup and commissioning would experience savings of $120,000. Operators typically locate an asset by manual inspection. The ability to scan and positively identify the asset being commissioned in real time provides significant benefits. A mere 10% savings in this process for 10,000 assets would be $120,000.
- Maintenance activities would see a savings of $480,000 per year. As illustrated above, this is based on saving 10% of the time required by scanning an asset as compared to an operator manually entering data, but it's performed four times per year during walkdowns, inspections and maintenance activities such as calibration, repair and diagnostics. Savings are therefore 4 x $120,000 or $480,000.

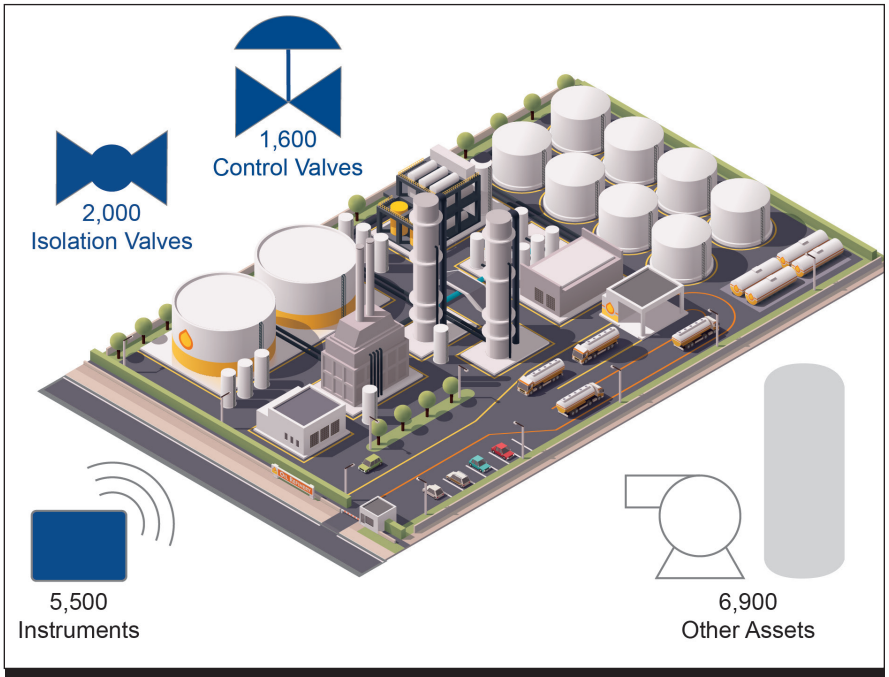

Figure 5. Typical plant with RFID tagging

All of this totals to $760,000 in savings during the first year alone, with ongoing maintenance activity savings of $480,000.

While some may argue about the exact amounts of each number above, few would dispute that having RFID tags on all assets could save a considerable amount of money.

SUMMARY

Paper-based maintenance and asset management is less safe, expensive, time-consuming and error-prone. It also inherently requires plant personnel to spend time in potentially dangerous situations. Of the modern technologies available as a viable replacement, UHF RFID may be the best option. VM

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VMA's Valve Basics course has now been divided into two 1.5-day programs to better serve attendees' needs.

VALVES 101

Industrial Valves & Materials
Nov. 12 - 13 (AM)

VALVES 201

Control Valves, Automation & Special Applications
Nov. 13 (PM) - 14

Why two courses? If you need just an introduction to valves, choose the 101 course. If you'd like to delve into the world of controls, automation and other advanced topics, attend the 201 course. Looking for a soup-to-nuts experience? Take both!

Also included: A tabletop exhibit and additional networking opportunities

And, yes, our popular hands-on learning experience—the "Petting Zoo"—is still a major part of the program, with even more products covered.

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Questions? Contact Abby Brown (abrown@vma.org)

Actuators on site and in operation at a tank farm

Electric Actuators in the Oil and Gas Industry

BY GUENTER HUBER

In the oil, gas and petrochemical industry, precision control of the flow of product through valves in the system is vital, and modulation of that flow depends on the valve actuator. These critical pieces of equipment must perform reliably and safely under the most extreme conditions: very high and low temperatures, drought or high-rainfall environments, remote situations in deserts or the arctic, and the corrosive effects of chemicals, high humidity or salinity for extended periods. In potentially explosive atmospheres, explosion protection is required; and in some applications, fireproof operation is critical.

In addition to the core function of opening and closing the valve, the actuator forms a crucial interface between the process and the supervisory control system, providing seamless integration into whichever distributed control system (DCS) is used in the plant network. Moreover, where the Industrial Internet of Things (IIoT) plays a role, electric actuators equipped with powerful electronics must serve as information hubs, providing direct access to a wide variety of both process and diagnostics data.

Executive Summary

SUBJECT: Actuators in the oil and gas industry operate many types of valves, and they must do so with great precision and accuracy.

KEY ISSUES:

- The challenges for actuators
- Different types used
- The role of technology

TAKE-AWAY: Electric actuators will be key enablers in the data revolution to come.

Low cost of ownership for operation and low maintenance is an important factor for distributed systems in plants or along pipelines. Electric actuators are ideal in many industrial applications. The power supply is easy to install and independent of temperature. The actuator is virtually maintenance free. The user interface for the electrical operation of the valve is either remote control through a programmable logic controller/supervisory control & data acquisition (PLC/SCADA) system or is easily accessible using local controls at the actuator. In the case of power failure, a hand wheel is an emergency backup.

ADVANCED ACTUATION

Plant and pipeline operations depend on a high degree of valve automation for fundamental functions. The complex processes involved with the flow of material, pumping stations, compressor stations, etc., require the valve positioning to be accurate and extremely reliable.

Actuators must operate the full range of valves—from ball valves, butterfly valves, gate valves to others—to control the flow of both gas and liquids. Typically, ball or butterfly valve actuation requires part-turn actuators that provide a swivel movement of generally 90 degrees for full travel. Gate valves, on the other hand, typically need multi-turn actuators that provide a high number of turns to operate the valve from open to close and vice versa.

Another differentiation is the type of duty the actuator has to perform, whether that's open/close or modulating. Actuators used to isolate a segment, allow maintenance or interruptions in the process, or in worst case stop a leak, are required to operate infrequently to open or close shut-off valves.

Modulating actuators, on the other hand, provide enhanced positioning accuracy for control valves to precisely modulate the flow within pipes. In the upstream segment, this is for the flow of crude oil and natural gas; in the midstream segment, it's for the storage and transportation of resources. In the downstream segment, this is for the refining process

☐ System integration with intelligent actuator controls

of crude oil, as well as the sale and distribution of both the refined product (i.e., gasoline, fuel, asphalt, etc.) and to feed raw materials to a variety of petrochemical industries that use petroleum-based products to make plastics, fertilizers, pharmaceuticals and more.

MODULAR ACTUATOR APPROACH

It is not unusual for different automation processes to require different actuation solutions, and consistency in user and human interface for installation, commissioning, operation and maintenance is desired.

A modular actuator concept meets these varying demands with a number of standard components. A wide range of multi-turn and part-turn actuators would be available to be configured for different torque values, power supply sources, types of valve attachments, etc. At the control level, the choice may be between basic or intelligent actuator

☐ Modulating actuators in operation

controls based on what provides the most cost-efficient solution for simple to the most complex process control challenges.

Modular design, combined with flexible actuator geometry, allows easy onsite adjustment of mounting positions. This ensures the operating elements such as local controls and display are always easily accessible, even in tight spaces.

As an additional benefit, a modular concept dramatically reduces the number of spare parts. Only a few standard, core components and interchangeable parts need to be kept by the end user for a quick turnaround and short downtime.

Pipeline applications often involve opening and closing large valves, which requires very high torque. Combining actuators with a complement gearbox portfolio addresses this need: These solutions achieve torques of up to 500,000 foot-pounds (675,000 Nm).

ESSENTIAL CORROSION PROTECTION

In the oil and gas industry, it's highly important that valves operate reliably regardless of process conditions. From coastal areas to the tropics and deserts to the arctic regions, harsh environmental conditions and corrosion can cause significant downtime and serious cost. Humid or salty atmospheres are damaging environments. Ambient temperatures can easily range from -76°F to 150°F (-60°C to 70°C) so it is vital that electric actuators selected for this service can resist these environmental conditions. Enclosure protection (NEMA 4X/6P [National Electrical Manufacturers Association] and IP68 [Ingress Protection] in compliance with NEMA 250 and EN 60529) is a key requirement for actuators to resist humidity and dust.

In coastal areas and offshore applications, actuators should meet the requirements for the highest corrosivity categories C5-M long, in accordance with EN ISO [International Organization for Standardization] 12944-6 (Paints and Varnishes–Corrosion Protection of Steel Structures by Protective Paint Systems). This is especially essential for subsea pipelines where the compressor stations on both ends of the subsea portion are exposed to a highly saline atmosphere.

One feature used to meet these challenges is advanced powder coatings, which can be applied to the individual housing parts before assembly. The coating also can be used on the output flange and extend beyond the sealing edge of the joints. This means that the coating would remain intact even if the actuator is removed from the valve or if the housing is opened during installation or commissioning.

Where cathodic protection is in operation, an additional cathodic insulator can be added to the actuator housing such as integrated laminated fabric components between the actuator and the valve, so the cathodic current flow does not reach the actuator housing.

CLASSIFIED, HAZARDOUS AREAS

Handling combustible gases, vapors or dusts requires the utmost caution and safety features to avoid hazards for people and assets. Electric actuators used in these areas must be certified. The oil and gas and petrochemical industries are a global market with various certifications, depending on the country or region (Examples are FM in the U.S., CSA and ATEX in Europe, IECEx in several areas, etc.) For maximum safety, plant engineers specify devices that provide explosion protection in compliance with the standards and directives for the final location of the installation.

Explosion-proof actuators are designed so they will not become an ignition source for a potentially explosive atmosphere. They will neither generate sparks nor hot surfaces. All the electrical, mechanical

A pumping station in the oil and gas industry

and electronic components of the actuator are integrated into a single housing, providing an internationally approved solution for maintaining the proper separation from potentially hazardous parts and an explosive atmosphere, using a flameproof enclosure. If a combustible gas or vapor would penetrate the enclosure, that enclosure must be able to withstand the pressure that can develop during an internal explosion.

OPERATION IN CRITICAL SITUATIONS

Additional requirements in the oil and gas industry may be called for such as fireproof versions of actuators that reliably maintain all functionality even during the direct impact of fire. In the event of a fire, the enclosure absorbs the heat and ensures reliable actuator operation ensuring that the valve still functions.

Assessment of possible risks emanating from a process can lead to the implementation of safety instrumented systems (SISs) fulfilling high functional safety requirements. Electric actuators that accomplish safety functions such as safe emergency shutdown and safe stop are frequently used in such systems. Today, actuators are available that are TÜV-certified for safety-related applications up to a safety integrity level (SIL) of SIL 3, according to EN 61508 (Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems).

INTEGRATION WITH INTELLIGENT CONTROLS

In most cases, electric actuators are equipped with intelligent integral controls, which communicate between a supervisory control system (e.g. PLC or SCADA) and the actuator. Controls are available with various interfaces, allowing both parallel signal transmission and fieldbus communication. Examples of supported systems include Foundation Fieldbus, HART, Profibus DP, Modbus RTU, and WirelessHART. Embedded advanced diagnostics functions enable preventive maintenance and integration of actuators into asset management systems.

The latest developments also include interfaces for the Industrial Ethernet Standards Profinet and Modbus TCP/IP. Thanks to an unprecedented connectivity and real-time data transmission, these standards are especially suitable for integrating actuators into IIoT [Industrial Internet of Things] applications. Electric valve actuators can play a key role in these systems. On the one hand, they operate remotely, opening and closing valves. On the other hand, other, powerful electronics allow electric actuators to act as information hubs for both process-related data (i.e. valve position feedback), and actuator-related data, based on advanced self-diagnostics. For instance, intelligent algorithms monitor actuator characteristics to indicate when maintenance should be carried out.

☐ This shows a modular actuator approach.

Plant-wide asset management based on device-specific data can boost reliability and reduce unexpected downtime. All information is directly available on the network and can be used for process visualization, statistics, advanced modeling or simulation to improve process performance.

OPTICAL FIBER COMMUNICATION

To manage long distances between devices, data transmission via optical fibers can present a viable solution. There is low attenuation of signals in optical fiber cables and, unlike copper cables, optical fiber is immune to electromagnetic interference so separate installation of signal and power cables is not needed.

INTERNATIONAL PROJECTS

For international projects, cooperation between major stakeholders (including national governments, international businesses, and engineering, procurement, construction firms) means projects are specified in one country, but actuators are mounted to valves at the valve supplier's workshop in a second place, and then installed in a third location. Because of this, it is vital that local support be available for global projects.

THE FUTURE FOR PLANT MONITORING

The challenges and opportunities presented by IIoT and big data are complex, but at their heart lays a simple truth: The flow of oil and gas, and the processes along the way will all be expressed as data with ever-increasing granularity. Where there is data, that data can be used and manipulated.

Once everything is measurable, and data security and internet reliability issues are fully addressed, new ways of using that data and instrumentation integration will emerge. Actuators, because they are present throughout any distributed flow process, will be key enablers in the data revolution to come. VM

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Traceability

BY JAMES G. DAVIS

Traceability and testing of digital positioners (including the valve) is a key to process control accuracy, reliability and safety. By providing this traceability, costs are reduced and flow control systems are made safer.

Today, many devices are designed to provide the feedback needed to make the valve truly traceable, including portable control valve diagnostic tools.

PROCESS CONTROL LOOPS

Process control can be broken down into three groups: the controller, the feedback and the control valve. Until now, the control valve has always been the most troublesome of the three groups because of variability within each valve. This variability comes from continually moving components, which creates wear. But all devices within the loop, including the control valves, need to be evaluated or calibrated regularly to ensure compliance and provide traceability.

The National Institute of Standards and Technology (NIST) specifies that: "Traceability of measurement requires the establishment of an unbroken chain of comparisons to stated references, each with a stated uncertainty."

In process control loops, the 4-20 mA signal to the control valve is calibrated and traceable and the feedback from the flowmeter has been calibrated and is traceable so the loop can be closed. However, the control valve has never been traced because the mindset for years has been that to do so would be extremely difficult. That means a third of the system is not being traced.

Manufacturers of digital positioners have tried to make valves traceable by including pressure and position feedback inside. However, this creates a problem because the sensors need to be calibrated to ensure accuracy and to provide the traceability. This is where the need for a portable diagnostic control valve test system becomes crucial.

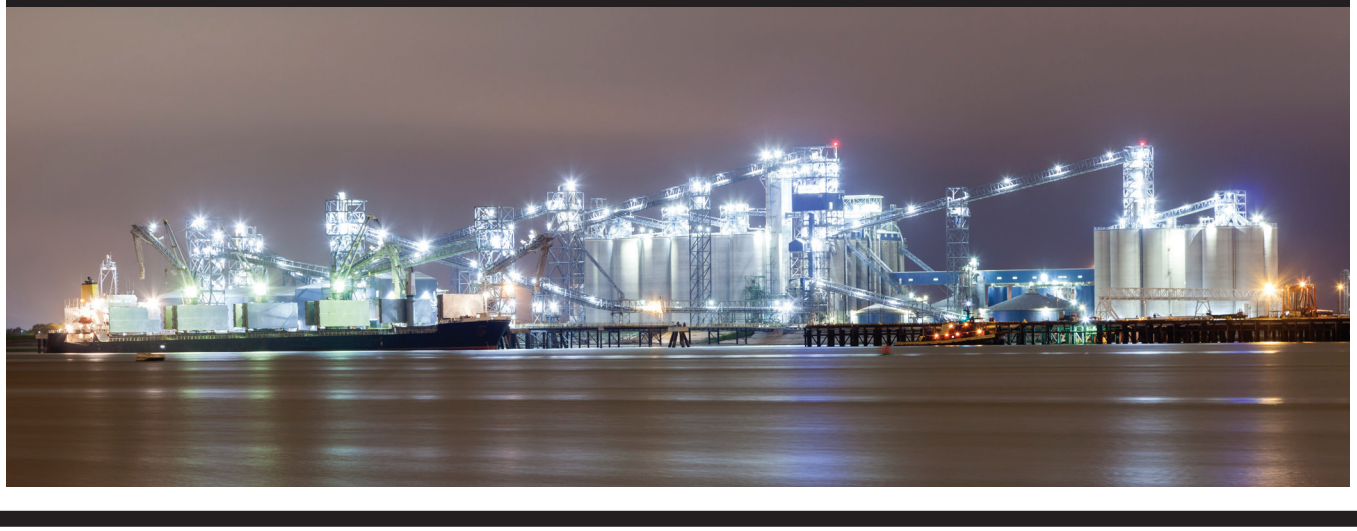
DIGITAL POSITIONERS

Plants continually push the engineered limits of control valves, trying to get more out of processes. Digital positioners are designed to help with this process. These positioners use inexpensive, mass-produced sensors on a 12- or 14-bit device to keep costs as low as possible. The positioners have now become instruments with sensors inside that provide information back to the control room. Because they fall within the instrumentation mandates, they must be calibrated annually to ensure they are sending accurate information.

Positioners have three components that need annual calibration: the 4-20 mA input to the positioner, the pressure sensors and the actual stroke length or displacement of the valve (inches, millimeters or degrees).

Once a digital positioner is installed on a control valve, an automatic calibration routine begins. The valve strokes up and down, which completes the calibration; however, the digital positioner is only detecting endpoints (saturation or positioner stops), which creates several possible problems. Because the feedback from a digital positioner is in percentages, no actual displacement is measured in inches, millimeters or degrees. This causes the positioner to possibly overstroke, creating a dead flow or understroke and not achieving the full flow or Cv that the valve was designed to meet.

Digital positioners were designed to gather information from the process control loops, information that can then be analyzed to make improvements in the loop including maintenance requirements and safety protections. Portable diagnostic systems can determine that positioners and valves are functioning within engineered parameters. They can then communicate with all protocols. This improves processes, ensures safety and increases output while working towards implementing a predictive and preventative



Refinery at the Mississippi River in Baton Rouge illuminated at night

maintenance program. However, this is only possible if the data gathered is from a traceable source.

PREDICTIVE AND PREVENTATIVE MAINTENANCE

Once a valve is tested and verified, it becomes traceable. If future problems arise, processing plants now have a record of previous tests, calibrations and repairs. Routine testing and maintenance help end users increase valve performance and longevity and reduces issues between planned plant shutdowns.

True performance testing corresponding with flowmeter feedback can only occur when attaching a traceable transducer to the stem (linear) or shaft (rotary). Using such test methodology, changes in flow can be detected. If the stem or shaft are moving, the flow is changing, which is where profits are made or lost.

This shows the difference in positioner diagnostics (from positioner feedback) and complete valve diagnostics (from stem and shaft feedback).

Three types of testing are used:

- The profile test checks the overall health of the valve (friction, loading, calibration, dynamic error, bench set, stroke length)
- A test for sensitivity and resolution simulates how the valve will control the process (small stair stepping in percentage and reverse direction—the smaller the step the valve can make, the tighter the process control.)
- Stroke speed verifies how quickly a valve can open or close, preventing trip conditions within loops that could cause safety issues and possible plant shutdown.

When these tests are run on a scheduled time frame, they provide the detailed information for decision-making on when and what to repair. This creates a cost-effective way to keep plants running longer between scheduled shutdowns.

Only by verifying that control valves and positioners are working correctly, calibrating accurately and ensuring the right configuration can predictive and preventative maintenance be truly implemented into a facility.

Test system attached to a control valve

PORTABLE DEVICES

Portable control valve devices can calibrate the entire positioner as well as test the control valve, which makes that valve a traceable device. By providing a traceable signal, the valve can be verified as performing according to its original design specifications. Yet all too often what a valve was designed to do 10 or 20 years ago is not what it's being tasked to do in the present. Because plants are trying to get more out of their processes, pressures and flow have changed over the years, which means actuators are pushed to their limits. This is why control valves must be tested to ensure they're working correctly.

Until plants implement testing of all control valves and ensuring they're correctly calibrated and traceable, those plants may be blindly searching for process solutions. Using a portable control valve diagnostic device can verify all plant control valves (linear, rotary, analog, digital and on/off solenoid valves) are working the way they should, which reduces downtime and expense as well as assuring that only necessary repairs are made. Valve diagnostics provide plants with a tool for determining the proper valves to put into specific control loop situations, verifying that those loops are safe and accurate, and alleviating trip conditions.

By using portable control valve diagnostic devices, the unbroken chain of comparisons referenced by NIST is established, providing performance testing that is truly complete valve diagnostics instead of simply positioner diagnostics. VM

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Valve Basics New Format Offers Options

BY JUDY TIBBS

If there is one thing those involved in developing and running the Valve Basics program have come to understand, it's that the term "basics" means different things to different people. VMA has taken that reality into consideration in designing a new format for the Valve Basics course.

HOW MUCH DO I NEED?

For an employee just starting to work with valves and related products, the ideal basics course would answer questions such as: "What is a valve? What are the main types? How do these different types work? Where are they used? What are they made of?" Some of the advanced concepts covered in VMA's program are beyond the scope of this group's everyday jobs or may simply not be what they're looking for at this point in their career.

Those who can already answer the questions above, however, need something else from a basics course. They may be seeking to increase their understanding beyond valves to actuation, automation, controls, technology and other specialized topics. For this second group of people, they may not need to attend three days of education when they're only interested in half of what's covered.

Then there's the third group of people—those who want the whole picture of the valve world in one intensive course.

Because of these different needs, VMA is introducing a new format at the next Valve Basics Seminar & Exhibits, Nov. 12-14 at the Houston Area Safety Council in Pasadena, TX. Attendees can choose to take the complete 3-day course (and VMA suspects many will do so), or they now have the option to take just one of the courses. Each is a day-and-a-half in length. They include:

- Valves 101: Industrial Valves & Materials—Nov. 12 (full day) through Nov. 13 (a.m.)
- Valves 201: Control Valves, Automation & Special Applications—Nov. 13 (p.m.) through Nov. 14 (full day)

TELL ME MORE

Valves 101 and 201 provide entry-level industry knowledge coupled with real application examples and give valve professionals the opportunity to examine many different products used in industry. It's suitable for all types of entry-level positions from sales, to engineering, service and maintenance, and some levels of management. VMA also has many attendees who already have a deep level of experience but seek a refresher on the fundamentals or a glimpse into new areas because their jobs have expanded into new arenas. The universal comment the association gets is that, no matter the level, those who attend always say they learned something new.

BASICS COURSE LESSONS

Valves 101: Industrial Valves & Materials

- Introduction to the Industry
- Linear Valves
- Check Valves
- Quarter-turn: Plug and Ball Valves
- Quarter-turn: Butterfly Valves
- Pressure-relief Valves
- Materials

Valves 201: Control Valves, Automation & Special Applications

- Fluid Powered Actuators
- Electric Actuators
- Solenoids
- Control Valves
- On/Off Panels for Fluid Powered Actuators
- Electric Actuator Asset Management, Feedback & Monitoring
- Severe Service Valves & Applications

Attendees also may run into senior-level engineering students from local colleges, who are invited to attend at no cost. Another common comment VMA receives comes from students close to graduating who say the lessons are particularly valuable because there are so many valve and other equipment subjects addressed that have never been taught in school.

The course is developed and overseen by the VMA Education & Training Committee, most of whom serve as presenters, along with other members of the association. These subject matter experts are dedicated volunteers whose aim is to provide attendees with a complete educational experience. Another frequent comment in the past is that the information is presented in an educational vs. proprietary manner.

CONTINUED ON P. 44

OEM Support Services

United Valve offers a unique package of services for the valve manufacturer. Our machining and welding capabilities allow us to perform any type of modification or after-market upgrade. A 104,000 sq. ft. shop with 40-ton overhead crane lifting capacity and 35 ft. hook height make easy work out of large valve handling. Valve repair is handled by a team of experienced valve technicians, ready to apply their skills on all types of valves either in-house or in the field.

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- *API 607*
- *API 6FA*

Fugitive Emissions Testing
- *All valve sizes and types*
- *ISO, MSS or customer specifications*
- *Helium or Methane*

API RP591 Testing
- *Gate, globe, check & ball valves*
- *Manufacturer evaluation*
- *Subcontractor evaluation*

Cryogenic Testing
- *All sizes and valve types*
- *Testing at -320°F, -150°F & -50°F*

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Elastomer and Plastic Materials

BY JESSE STUDER

Q: WHAT IS THE DIFFERENCE BETWEEN PLASTIC AND ELASTOMER?

A: A common misconception is that the terms polymer, elastomer (rubber) and plastic are interchangeable. Although they have commonality, they are not necessarily synonymous with each other.

Plastic and elastomer are types of polymers. On a broad scale, polymers are described by molecular characteristics to include the repeat unit composition, chain shape (coiling, twisting, etc.), molecular weight and structure. Plastics and elastomers have overlapping molecular characteristics but are further defined by their response to mechanical stress, temperature and chemical structures.

Polymers are made of repeating units of atoms that are structured in a long, chain-like manner to form a very large molecule. The smallest repeating unit of the polymer chain is a monomer, also referred to as a mer unit. Polymers can be created with a single type of monomer (i.e., polyethylene [PE] or several, such as ethylene propylene diene monomer [EPDM]). The characteristics of the individual monomer will be reflected in the polymer, and the useful properties of multiple monomers in a copolymer can be applied to engineer a more robust material.

The process for making monomers into polymers is known as polymerization. The degree of polymerization (often referred to as molecular weight or MW) is the number of repeating units in the chain. As the degree of polymerization increases, the material properties change. Generally, as MW increases the density, melting and boiling points also increase. Many polymers with a very low MW will be a gas at room temperature. An intermediate MW polymer will consist of a wax-like solid, liquid or grease. At room temperature, most load-bearing applications will require a polymer

with a high MW for good mechanical strength. To put MW into perspective, an ultra-high molecular weight polyethylene (UHMWPE) has millions of repeat units.

Polymer classifications were established prior to a thorough understanding of microstructure or intermolecular forces. One classification is based on the polymers' reaction to temperature change. The two categories of this classification are thermoplastic and thermosetting polymers. Thermoplastics are polymers that will flow under an applied stress when heated. On a molecular level, secondary forces, i.e., relatively weak interatomic and intermolecular bonds diminish as the temperature of the polymer increases. The weakening of these forces results in a softer and eventually liquified material. If the temperature of the material is raised too high, irreversible degradation of the thermoplastic can result. If the temperature is sufficiently lowered, the polymer will return to a solid. Commercially relevant thermoplastics include polyethylene (PE), polyvinyl chloride (PVC), polypropylene (PP) and polystyrene (PS).

Thermosetting polymers, or thermosets, are cured into a permanent shape through an irreversible process. In addition to the secondary bonds mentioned for thermoplastics, thermosets have covalent bonds that crosslink the polymer chains. These covalent bonds are of considerably higher energy and will not break when heated, which in turn, prohibits the polymer chain from moving. Excessive heating of a thermoset will cause thermal degradation. When enough heat is applied to break the crosslink bonds, the backbone of the polymer will also start to break. A few common thermosetting polymers include phenolics, epoxies and polyesters.

A second way to classify polymers is their response to mechanical force. By definition, plastics are polymer materials that have structural

Elastomers, commonly known as rubber, differ from plastics in the fact they have a great capacity for large elastic deformation under an applied stress. In other words, they can be stretched over 100% of their original length with no permanent deformation.

integrity (shape) under a load. A plastic material's ability to maintain its shape under a load depends greatly on the arrangement of its polymer chains. The arrangement of the chain can take on an amorphous shape or varying degrees of crystallinity, which play a role in the properties. To be considered a plastic, the material must operate below the glass transition temperature (if amorphous), below the melting temperature (if crystallin) or have a crosslink density that is sufficient to maintain its shape. Plastics encompass many different polymeric materials including polyamide, polycarbonate, vinyl, among others. Plastics can be a thermoplastic or thermoset.

Elastomers, commonly known as rubber, differ from plastics in the fact they have a great capacity for large elastic deformation under an applied stress. In other words, they can be stretched over 100% of their original length with no permanent deformation. Deformation is accommodated in the elastomer material through the molecular structure and arrangement of the polymer chain. The long polymer chain is highly twisted, coiled and interwoven when at rest. When a stress is applied, the chain will uncoil and become linear. Once the stress is relieved, the chains revert to their original unstressed state. To ensure the chain is in the highly unorganized state when at rest, the molecular structure of the elastomer must not be allowed to align itself and create a crystalline structure.

A common way to prevent crystallinity and regular alignment of the chains is to add side groups on the chain or use more than one monomer. The final component to an elastomer is crosslinking. In crosslinking, adjacent polymer chains are connected by chemical bonds. The bonds restrict movement and increase strength. Generally, elastomers are classified as thermosets. However, there is a subgroup of thermoplastics called thermoplastic elastomers that have rubbery characteristics at ambient temperatures but are still thermoplastic in nature.

Elastomers by themselves have bounded commercial application because of limited properties (depending on use). Compounding the base elastomer by adding different materials can increase strength, decrease degradation, improve processability and lower cost. Selection of the proper elastomer prior to compounding is the key to success. The properties that are inherent to the base elastomer will determine appropriateness for an application. Compounding can improve an elastomer but will not completely overcome its inherent characteristics. The high formability characteristic of elastomers make this material good for sealing components but limit use in applications where maintaining shape is crucial.

Although this article is not a comprehensive review of polymers, a general idea of how polymers are classified can be drawn from their response to the application of heat, mechanical load and molecular structure. A handful of other ways to characterize polymers exist, but this is a good starting point for many professionals in the valve industry. VM

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Optimation Technology released Process Monitor, a manufacturing shop floor tool for production operators, process, product and maintenance engineers, and operations managers to identify and quantify process and product variability. The tool allows order-based viewing and analysis to complement the more typical date/time schema and provides calculating functions, statistical process control charts, user-generated analysis scripts and modeling functions.

Val-Matic's VaultSafe family of products (FloodSafe Inflow Preventer, FrostSafe and VentSafe) are designed to protect potable water systems from contaminated flood waters, freezing temperatures and intentional harmful contamination. A flood preventer keeps contaminated water from passing, thereby preventing it from entering the air valve outlet and compromising the water system. The frost protection minimizes thermal exchange of cold and warm air in and out of a vault. The vent tool safeguards vent pipes against nesting animals and intentional harmful activities.

Conval offers Clampseal Blowdown Service Valves to provide necessary control for continuous or tandem boiler or turbine blowdown and bottom blow-off service.

The blowdown valves are available in ¾-inch through 4-inch sizes with butt or socket weld and flanged ends in ASME/ANSI Class 900 through 4500. Standard materials are Low Alloy SA 182-F22, SA-182-F91 or SA-105.

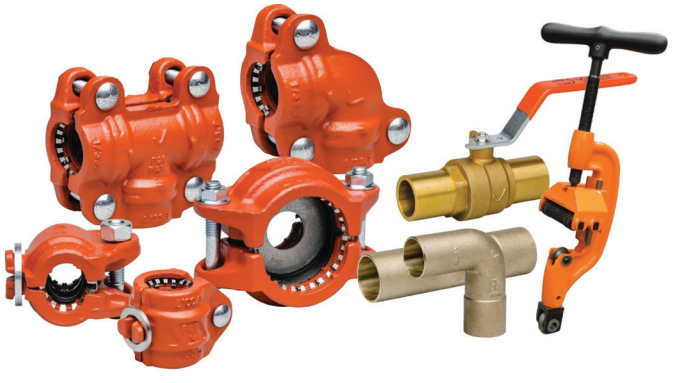
Crane ChemPharma & Energy's latest solutions include the Saunders P345 compact polymer pneumatic actuator. Designed to operate at 4.5 bar while maintaining closure performance of up to 10 bar at 100% pressure drop, the actuator will simplify plant infrastructure and provide a lower total cost of ownership compared to existing technologies. This performance is achieved within a highly compact dimensional envelope and at a 30% lighter weight compared to typical stainless-steel variants.

Emerson has enhanced its DeltaV Mobile application to ensure plant personnel have faster access to process information and to help organizations tailor the notifications. The app provides read-only access to a plant's distributed control system and operation data and now offers improved customization and access to third-party systems.

Metso delivered the first valves with 3D-printed parts from its Helsinki plant. The valves include metal components that allow the valves to perform in a particularly demanding application where they need to withstand numerous fast, open-close cycles without maintenance.

The 3D printed parts and related methodological investigations are part of a broader digitalization project at Metso, which is already using 3D printing to additively manufacture tools for making minerals consumables parts.

Victaulic launched QuickVic SD Installation-Ready System, a plain-end pipe joining technology designed for use on carbon steel HVAC systems in size 2-inch/DN50 and down. The economical and efficient pipe joining solution is for small-diameter commercial and industrial HVAC applications. The product line offers significant total installed cost savings when compared to current pipe materials and installation methods.



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EDUCATION & TRAINING *(continued from p. 36)*

Attendees travel from locations throughout the U.S. and Canada. They represent a variety of industries including oil and gas, chemicals/petrochemicals, water/wastewater, power generation, valve manufacturing and more.

HANDS-ON ROCKS!

Despite how much attendees appreciate the book learning, without the unique hands-on experience built into the program, the Valve Basics course would just be another seminar where attendees sit in chairs and try to stay awake. In too many educational environments, there's a huge disconnect between what people see projected and what they understand.

This is where the Valve Petting Zoo is invaluable. This part of the program allows attendees to better understand the material taught during the lecture portion of the program. During these learning sessions, everyone can sit down with the experts at tables covered with product samples. Each table has a product type displayed, and the presenter helps attendees make the connection between what they heard and saw in the classroom and what they hold in their hands. Questions can be targeted as products are examined, resulting in elevated understanding.

WHAT'S NEXT?

Head to the Valve Basics homepage on VMA.org (vma.org/valvebasics) for more information. Online registration opens in July 2019. Those with questions about the program should contact Abby Brown, education & training coordinator (abrown@vma.org). VM

Judy Tibbs is VMA's director of education and editor-in-chief of VALVE Magazine. Reach her at jtibbs@vma.org.

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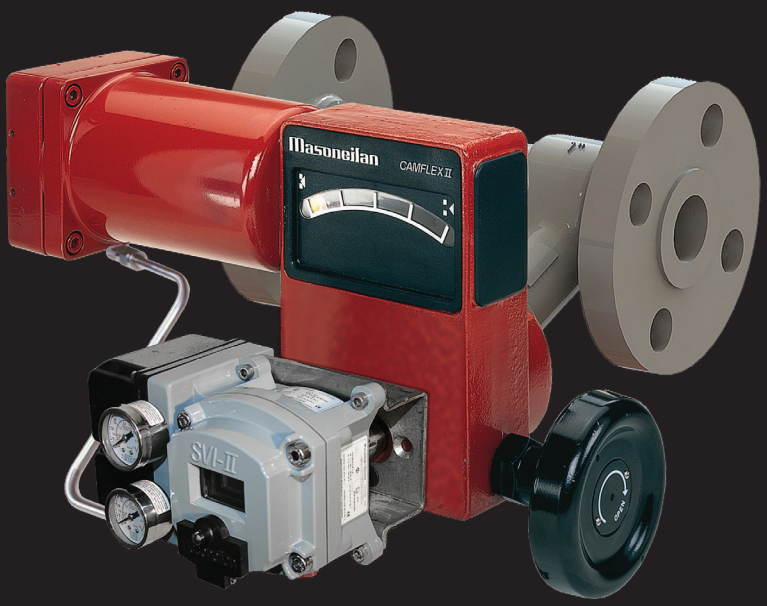

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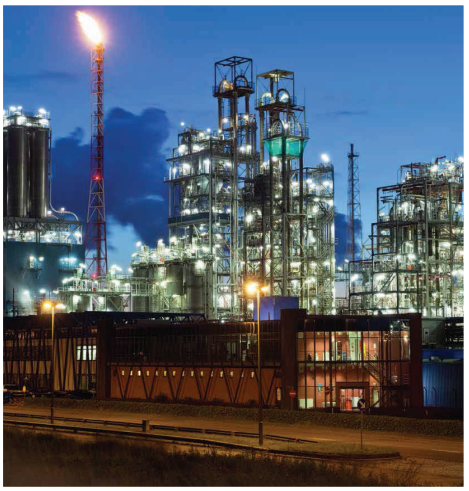

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