

VALVE

MAGAZINE | SPRING 2014
VOL. 26, NO. 2



Tank Cars: Moving the Nation's Fuel

DBBS AND
DIBS
DIFFERENCES

SHALE
GAS DEVELOP-
MENTS

NEW GLOBE
VALVE
STANDARD

USING
WASTEWATER
FOR ENERGY

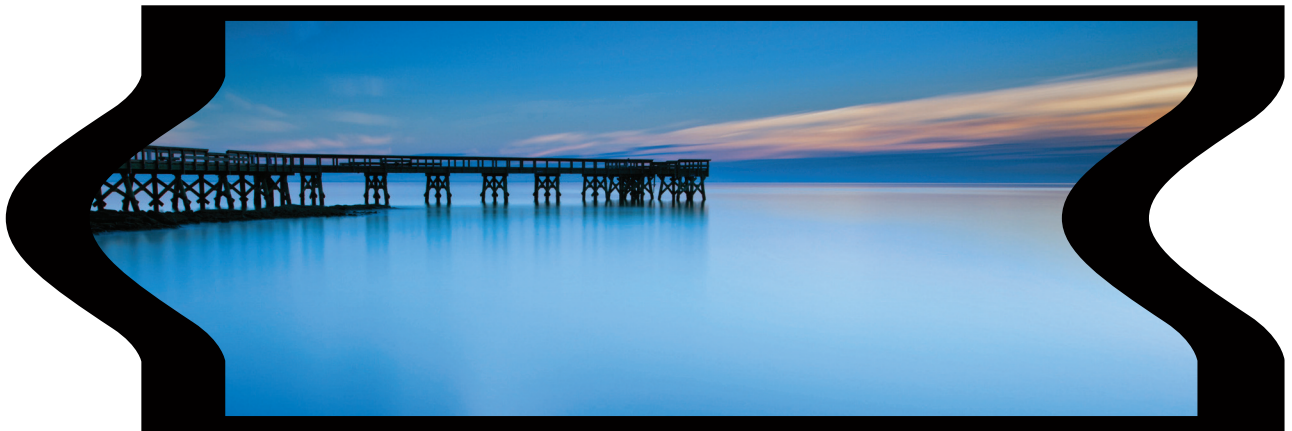
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Meet Christine Venditto, Director of Health, Safety, Security, and Environment at Velan. Having joined Velan almost four years ago, Christine has made the welfare of Velan's employees her number-one priority and reinforced this mandate worldwide through her global team.

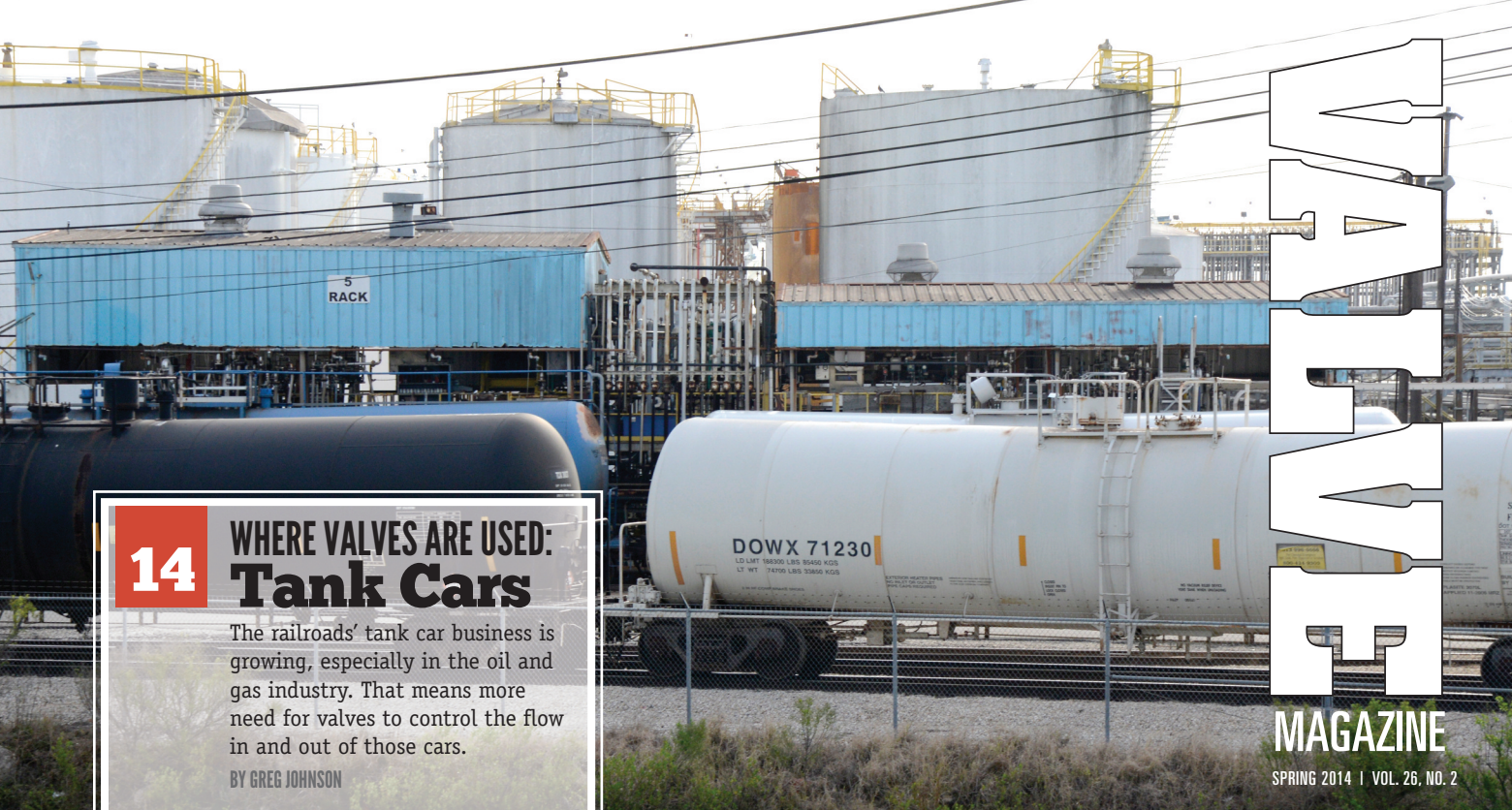
What you might not know about Christine is that she's also an enthusiast of *la cucina italiana*. Her latest infatuation? A new custom-built pizza oven tailor made for lazy summer backyard entertaining.

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VELAN



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The railroads' tank car business is growing, especially in the oil and gas industry. That means more need for valves to control the flow in and out of those cars.

BY GREG JOHNSON

20 DBB AND DIB: WHICH IS WHICH?

Many people find it hard to distinguish between double block-and-bleed and double isolation-and-bleed valves. The distinctions can be important when choosing the best valve for an application.

BY RON MANSON AND TASHIKA VARMA

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A historical perspective on how the Valve Repair Council came to be, what challenges it has faced and where it's headed.

BY GREG JOHNSON

Plus: *Special Directory of VRC Member Companies*

36 THE SHALE GALE IN 2014

The valve industry is tracking what's happening in the regulatory, legislative and legal arenas as far as new sources of oil and gas. Events surrounding the shale development marketplace are occurring at a rapid rate.

BY MAGGIE CLARKE, WAYNE D'ANGELO AND KATE KUNKEL

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- Globe Control Valve
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- PTFE-lined Butterfly Valve

NOW ON... VALVE



The Engineering Gap between Needs and Science

While the demand for new non-metallic solutions is growing or accelerating, standards and qualification criteria for polymers are weak. With better tools and advancements in modeling of non-metals, we can and should be more precise when defining suitability of material for a particular device or component as a function of temperature. BY TIM BREMNER

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- » Understanding Functional Safety Standards
- » Critical Control Valves for Cracked Gas Processing
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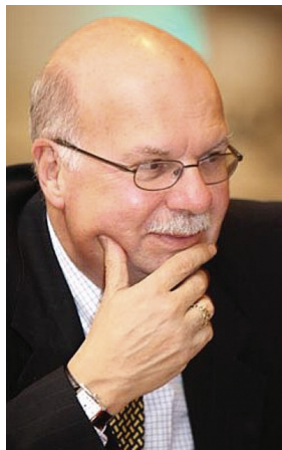
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The Slow and Steady Climb of Our Industry



One continued bright spot for manufacturers in the U.S. and Canada is international activity.

Based on our recently issued “Market Forecast of Industrial Valve Shipments in the United States for 2014,” I’m happy to report that our industry continues to surpass the peak levels of 2008 when shipments out of U.S. facilities reached the \$4 billion mark before a tumble in 2009. That means shipments have slowly risen each year, surely an excellent sign of our industry’s strong health. We climbed back up to the 2008 peak two years ago, surpassed it last year, and we forecast that shipments will rise again in 2014 by 2.2% to a new high level of \$4.366 billion.

VMA members have seen this growth both domestically and internationally over the past few years. They went into 2014 with backlogs of projects expected to materialize during the year. These projects are both new business and maintenance, repair and operations efforts here in the United States.

Meanwhile, our monthly internal economic report shows that over 35% of our members are once again adding personnel to production teams, yet another positive sign for our industry. In addition, no manufacturers are indicating layoffs, and 74% of reporting members forecast shipment growth in 2014. Another 21% indicate a status quo this year. All of this points to a positive outlook from members.

The annual market forecast also looks specifically at which end-user industries will benefit by growth in 2014. It appears growth will occur across the board with power showing slightly larger gains than the other industries (see Market Focus, page 6).

One continued bright spot for manufacturers in the U.S. and Canada is international activity; the forefront of growth there will be Asia and South America.

We also feel that industry growth is seen through the growing ranks of VMA. To date this year, we have nine new members and two applications pending. This includes five distributor/channel partner members, our newest category of membership.

Look for reports on how our European counterparts are doing in the next issue of VALVE Magazine. It will be published just after I return from the Annual CEIR Congress in Switzerland. Hopefully, I’ll bring good news with me from there as well. **WM**

Bill Sandler
President

Valve Manufacturers Association of America

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CONTRACTS



Flowserve Played Role in Snow for Sochi Olympics

Flowserve Corporation's products played a vital role in the snow-making efforts at the Sochi 2014 Winter Olympics.

The company began integrating its products into snow-making systems in the early 1980s and has an installed customer base at more than 500 ski resorts across the globe. During the games, it partnered with Torrent Engineering & Equipment, LLC to help with

the system that provided snow.

Metso Valves Selected for Chemicals Complex in Saudi Arabia

Metso has received significant orders for its Neles and Jamesbury valves from Sadara Chemical Company, a joint venture between Saudi Aramco and The Dow Chemical Company. The valves will be delivered for Sadara's fully integrated chemicals complex currently under construction in Al Jubail, Saudi Arabia. The complex will produce more than 3 million metric tons of high value specialty chemical products and performance plastics annually for use in a variety of industries.



Emerson's newest innovation center

NEW FACILITIES

Emerson Opens Third Innovation Center

Emerson Process Management recently held a grand opening for its Emerson Innovation Center Process Systems and Solutions in Round Rock, TX, near

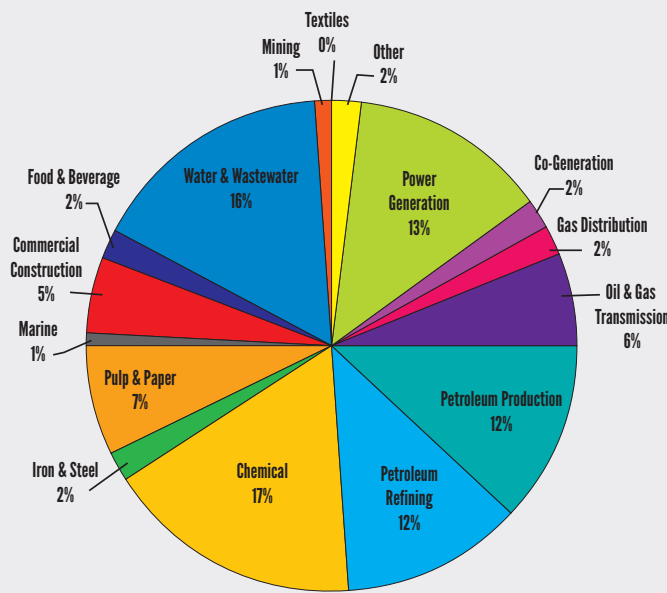
Austin. It joins two other global innovation centers.

The newest facility is 282,000 square feet, costs nearly \$70 million to build and will be the global headquarters for Emerson's automation systems and project services business, helping customers operate facilities in industries such as oil and gas; refining; chemicals; power; life sciences; food and beverages; and metals and mining.

MARKET FOCUS: Industrial Valve Shipments

The U.S. industrial valve industry is set to see its fifth straight year of increases in annual shipments during 2014, growing to a high level of almost \$4.4 billion in 2014, according to VMA's annual forecast. That strength has also been showing up in VMA's State of the Economy monthly surveys. For example, March's survey reported that shipping was up for 60% of participants over the previous month. What's more, 95% of survey participants said they expect shipments to be up for the second quarter of 2014 over the same quarter a year ago.

In the 15 end-user industries the association tracks for its annual forecast, growth is expected to be across the board: very few changes will occur in distribution among the markets. Chemical remains at the top of the market share with about 17% of the market. As far as type of valve, automated or actuated valves will be the most popular. Last year, such valves were about \$1.3 billion in shipments. All types of valves tracked saw increases in shipments from 2012 to 2013, the annual forecast found.



Distribution Forecast of End Users in the 2014 Valve Market

Val-Matic Opens New R&D Facility

Val-Matic recently completed a new 7,000-square-foot research and development (R&D) facility in its second manufacturing plant, located in Addison, IL. The R&D facility includes a materials lab with equipment for testing elastomers and metals. A flow lab equipped with a battery of water pumps will perform dynamic check valve tests and water flow tests to determine flow and torque characteristics of various valves. In addition, a 5,000-gallon air tank allows full-scale air flow testing of large air valves. The facility is also available for technical hands-on training of industry professionals.



□ GE's logistics base in Brazil

GE Oil & Gas Opens \$100 Million Logistics Base

GE Oil & Gas has announced the opening of a modern logistics base for the Brazilian oil and gas sector. With an area of 590,000 square feet and investments that exceed \$100 million, GE's base in Rio de Janeiro was designed primarily to load and unload installer ships.

The new base will serve NOC Petrobras, a strategic client and partner of GE Oil & Gas in Brazil. The base has a 320-ton capacity crane, the largest "hammerhead" in the world. The crane, which gets its name from its long arm and T-shape, cost \$7 million. It is 140 feet tall, equivalent to a 14-story building.

Metso Investing in South Korean Valve Technology Center

Metso will build a new greenfield global valve technology center in Chungju, South Korea. The new facility will be ready to begin global deliveries in September 2014. Metso operates similar industrial valve technology and supply centers in Brazil and Germany.

In addition to manufacturing, this new center will feature control valve testing facilities and engineering services. It will also house research and development, engineering and service support units for South Korean engineering, procurement, construction companies.

ACQUISITIONS & PARTNERSHIPS

GE, Chevron Form Technology Alliance

Chevron Energy Technology Company and GE Oil & Gas have created the Chevron GE Technology Alliance, which will develop and commercialize valuable technologies to solve critical issues for the industry.

The Alliance builds upon a current collaboration on

flow analysis technology for oil and gas wells and will leverage research and development from GE's newest Global Research Center, the first dedicated to oil and gas technology. This partnership also builds on an ongoing collaboration between Chevron and GE developing the GE Safire flowmeter, now being tested and deployed on Chevron land-based well production lines in the western United States.

AWARDS & HONORS

Victaulic Awarded Top Workplace Honor

Victaulic was named one of the Top Workplaces in Lehigh Valley (PA) by The Morning Call newspaper during an awards ceremony held on Feb. 25, 2014. The recognition is based on the positive responses of employees who work in Victaulic's Lehigh Valley facilities.

In addition to this honor, Victaulic was also presented with a leadership award for "direction." This recognition was given because employees believed their company was growing and going in the right direction.



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Emerson Process Management Acquires APM Automation

Emerson has acquired APM Automation Solutions, a developer of solids volume and level measurement instrumentation, which will become part of the Emerson Process Management business. APM Automation Solutions technology is used in food and beverage, metals and mining, power,

chemical, pulp and paper, and other industries. Emerson Process Management will add APM Automation Solutions technologies to its Rosemount portfolio of measurement technologies.

KITZ Purchases Indian Valve Manufacturer

KITZ Corporation has entered into a share purchase agreement to acquire

a 99% share of Micro Pneumatics Private Limited in India. The purchase of Micro Pneumatics is part of KITZ's effort to further expand in Asian markets.

Micro Pneumatics, which develops, manufactures and sells industrial valves, has capacity to supply quality products to main markets in India through its sales network.

PEOPLE IN THE NEWS

VALVTECHNOLOGIES... Gary Marler is the company's new vice president of sales and marketing. Based in Houston, Marler will be responsible for all ValvTechnologies' sales, marketing and service activities worldwide. Marler served at ABB, Inc. for more than 25 years, most recently as vice president of its U.S. Process Automation Systems business.

VELAN... Rob Velan has rejoined the company as vice president, distribution. In this new position, he will be responsible for the company's North American distribution business and will report to Ivan Velan, executive vice president.

Velan ABV S.p.A. has appointed Paolo Ranieri as its new managing director/chief executive. Ranieri has over 25 years of experience in the oil and gas industry, including GE Oil & Gas as chief engineer of design and R&D. Most recently, he was plant manager at Ring-O Valves, a division of Cameron.

POWELL VALVES... Willard Painter has joined as corporate quality director. He has been a part of the valve manufacturing industry since 1982. Also, Matt Shambo will assume the position of regional sales manager responsible for Ohio, Kentucky, Indiana, Illinois, Michigan and Wisconsin.

VAL-MATIC... has announced personnel changes and promotions that became effective Jan. 1, 2014. Patricia A. Nuter, previously president and CEO, assumed the role of board chairman.

Ted Makowan will take over as president and CEO. Ted has been with Val-Matic from its inception in 1966 as co-founder and most recently served as executive vice president and COO. Replacing Ted as executive vice president and COO will be John V. Ballun, who previously served as vice president of engineering.

SIEMENS INDUSTRY... has appointed Ralf Hanneken as Metals Technologies lead for North America. He has experience in multiple leadership roles, including director of project operations for Siemens Energy & Automation. He most recently was a senior director in Metal Technologies. Hanneken succeeds Albrecht Neumann, who has been nominated as the global head of Metal Technologies.

CAMERON... John Carne, a former VMA chairman, has retired as CEO of OneSubsea. Carne served Cameron for over 40 years in several roles, including COO. Scott Rowe, president, production systems for OneSubsea, will succeed Carne. Rowe joined Cameron in 2002 and previously served as president of Cameron's Engineered and Process Valves business in the Valves & Measurement Group.

SAMSON CONTROLS... President and CEO Bob Urbanowicz retired in January. He has been an active member of the VMA Board of Directors since 2009. Since joining Samson Controls in Canada in 1985, Urbanowicz has held various positions, including president of Samson in Canada. He assumed his current position in 2002.

ROTORK... Chris Warnett has retired after 37 years with the company. He started with Rotork in the U.K. as a design engineer in 1976, and then moved to the U.S. in 1980. For the last six years he has been the international sales director for the Process Controls division. Chris served as chairman of the VMA Communications Committee for many years and is a recipient of VMA's highest award, "Person of the Year."



Rob Velan

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Second Valve Repair Conference Approaches

The Valve Repair Council will hold its second Valve Repair Meeting & Exhibition June 5-6 at the Marriott Houston South at Hobby Airport Houston. The event will celebrate the council's 25 years of existence.

VRC was formed in 1989 to encourage the use of the OEM approach to repair and maintenance and to promote safety, best practices, the exchange of ideas and discussion among members.

"Although our council governing body has met continuously over the two-and-a-half decades of existence, this is a special conference for the entire valve repair and maintenance industry," says Cliff Smith, VRC chair and vice president of Automation Services for Metso Automation.

"The VRC is dedicated to providing value to its membership, not only by creating networking opportunities with valve manufacturers, but also by creating opportunities for members to participate in events that will help them to develop their own service capabilities and differentiate them in a market full of competitors. This event focuses on some of the issues specific to repairing valve assemblies and keeping them operating at peak efficiency," he adds.

The Valve Repair Meeting and Exhibition will address high-level concerns about what is happening in the



"Although our council governing body has met continuously over the two-and-a-half decades of existence, this is a special conference for the entire valve repair and maintenance industry."

— Cliff Smith, VRC chair and vice president of Automation Services for Metso Automation

industry, what pressures it faces and where it is headed. It also will focus on specifics such as:

- **Bill Wall** of Granite will talk about safety and proper hoisting methods.
- **Judi Camerano**, PETEX, will present a valve repair training overview.
- **Jamie Latshaw**, Farris Engineering, will bring attendees up to date on smart wireless pressure relief valves and what monitoring can be achieved.

- **Scott Boyson and Rodney Roth**, Chesterton, will address the complex issues surrounding fugitive emissions.
- **Greg Johnson**, United Valve, will address the standard, API RP 621, Reconditioning of Metallic Gate, Globe, and Check Valves.
- **P.J. Gallo**, CFM/VR-Tesco, will give a valve repair demonstration.

There also will be sessions on ball valve grinding, coating and lapping and on the Manufacturers Stan-

dardization Society Valve Modification Standard.

A special highlight of the conference will be tours of three facilities: Furmanite, Pentair and United Valve. In addition, a table-top exhibition will be open during the day so that attendees can find the latest information on products and services available to valve repair shops.

The event is also designed to encourage attendees to network and learn by interacting with their peers. Special social events are planned throughout the two-day event. **VM**

For questions on the program, contact Marc Pasternak at mpasternak@vma.org.

For questions on registration or exhibit opportunities, contact Malena Malone at mmaloneblevins@vma.org.

MAY

5-8
2014 Offshore Technology Conference

Houston
www.oftnet.org

20-23
AFPM Reliability & Maintenance Conference and Exhibition

San Antonio
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JUNE

5-6
Valve Repair Meeting & Exhibition

Houston
www.vma.org

8-12
ACE Conference & Exhibition

Boston
www.awwa.org

AUGUST

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www.vma.org

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18-20
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27-Oct. 1
WEFTEC 2014

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OCTOBER

30-31
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DECEMBER

2-4
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Düsseldorf, Germany
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*Open only to VMA/VRC members



Offshore Technology is May 5-8

Some of the newest technologies for drilling, exploration, production and environmental protection of the oil and gas industry will be spotlighted during the 2014 Offshore Technology Conference (OTC) May 5-8 in Reliant Park, Houston. More than 80,000 people are expected to attend from 120 countries.

The conference is sponsored by 13 industry organization and societies that work cooperatively to

develop a technical program that covers topics that range from new kinds of methods such as gradient drilling to new tools such as underwater monitoring to challenges such as drilling in new deep water to economics, international issues and the many regulatory considerations with offshore efforts.

Special events such as topical breakfasts and luncheons that cover broad issues (Russia and Mexico,

deep-water brownfields, etc.) and networking events (e.g. women in industry, meet the expert) are designed to broaden the technical sessions.

OTC presents the largest exhibit of its kind with 2,500 vendors of equipment, services, consulting, financial, data and other resources featured in the 600,000-square-foot hall. VM

For information, go to www.otcnet.org.

Uniting the World of Water

ACE14, the annual conference of the American Water Works Association is June 8-12 in the Boston Convention & Exhibition Center, Boston.

The event brings together thousands of people who build, operate or regulate the water utilities industry to discuss the broad and more specific issues of water in five plenary session and 18 new and emerging tracks. This year's keynote speaker is former New York City mayor Rudy Giuliani who



will share his insight on the challenges facing today's municipal leaders.

During four of those days, hundreds of vendors

will display their wares in the exhibit hall. VM

For information, go to awwa.org.

VMA Elects its First Leader from a Canadian Company



The Valve Manufacturers Association welcomed its first chairman from a Canada-based company at last Fall's 75th annual meeting—Ivan Velan, executive vice president of Velan, Montreal.

Velan brings to the table a long and strong background in a family-led business begun in 1950 by his father A.K. Velan, current chairman at Velan, and headed by his brother Tom Velan, CEO and president. Ivan has been with the company since 1970 when a third brother Peter, who is still a board member, convinced him to join the family company instead of taking offers from several major food companies.

"Even though I hadn't intended to go into the business, I quickly saw both the opportunities and how complicated and dynamic the industry is," he says.

He says that the most significant change he's seen in his 40-plus years is that there are many new levels of complexity involved in making a sale and running the business. "In this day and age, it takes far more than a good valve design that is made the right way in a good machine shop," he says.

"We have to think about fluctuating currency exchange rates, export controls, conflict minerals, foreign corrupt practices, safety integrity level (SIL) programs, codes of conduct, corporate social responsibility practices, fugitive emissions guidelines, terms and conditions for contracts—all in an environment that is very litigious, especially in the U.S.

"Because of globalization, you have a wide range of valve standards that affect design and the ability to sell—from the Manufacturers Standardization Society to American Petroleum Institute to International Standards Organization to the different European and even Russian standards," he adds.

HEADING UP VMA

Velan's main priority as new chair of VMA will be to optimize the existing programs.

"VMA is well known in the valve industry, and we are at the forefront of some important developments. I don't intend to have an agenda much different from the previous chairmen, but I'm open to new ideas and hope members will let us know new directions where we should go."

The association is a venue for networking and sharing war stories, a voice for the valve industry to government bodies and a

conduit for information through its meetings and VALVE Magazine, he says. Most recently, it has taken an initiative to meet an immediate need: replacing the aging management of members and customers.

"Despite automation and globalization and all the complexities, this is still a people business. The industry needs to replace those skilled individuals who are getting ready to retire. Programs such as Valve Basics and the educational arm of the association are helping to do that."

OTHER KEY ISSUES

Opening membership to the distributors is also a key effort right now and Velan hopes that by Fall there will be a dozen to two dozen distributors who are members of VMA.

"As we did in the past when we added actuator manufacturers, then valve repair shops, and then associate [supplier] members, adding distributors is a logical step as they are an integral part of the supply chain."

The other issue Velan sees as important in the immediate future is that the international picture is showing signs of bringing more production back to North American shores. Many valve users are realizing that initial cost savings from purchasing valves from low-cost countries does not translate into low total long-term cost of ownership.

"We are hoping that the historical trend that occurred with Japanese competition and the yen will occur in places such as China and India so we will have more onshoring than offshoring going forward. The tide may turn to bringing jobs and production back to North America," he says.

For the full version of this story, go to www.VALVEmagazine.com. **VM**

VMA recently added four new companies to its new distributor/channel category of membership.

MRC Global, Inc., is a distributor for numerous VMA members. Founded in 1921, the company is the largest distributor of pipe, valve and fitting products and services to the energy and industrial markets.

Setpoint Integrated Solutions is a subsidiary of PON Holdings B.V. of the Netherlands. Setpoint has provided integrated solutions for difficult industrial valve, instrument, filtration and analytical applications since 1959. The company is also a member of the Valve Repair Council.

DistributionNOW provides pipe, valve and valve automation, fittings, mill and tool supplies and safety products to the energy and industrial markets.

RES Energy Solutions offers a

VMA, VRC Membership is on the Rise

variety of products and services for the oil and gas, natural gas, pipeline, power generation, and marine markets. Based in Houston, the company has facilities in Texas and surrounding states.

Joining as an associate member is **DuPont - Krytox Lubricants**. Krytox is the DuPont brand name for a range of clean, specialty synthetic lubricating materials for a wide range of applications.

Also joining as an associate member is **Quaker City Castings**, Salem, OH. Quaker City is a steel and iron foundry.

The Valve Repair Council has added **Allagash International** and **Watson Valve Services** to its member roster. Allagash International is a longtime VMA member, while Watson Valve is affiliated with VMA associate member Watson Grinding & Mfg. Co.

SIEMENS



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WHERE
VALVES
ARE USED



□ The lines of tanks cars are getting longer and longer.

Tank Cars

BY GREG JOHNSON

The next time you're stopped at a crossing waiting for a mile-long train you think will never pass, take a good look at how many of those cars are tank cars. Doesn't it seem like many more tank cars are riding the rails these days?

If that's your reaction, you're right on the mark: Tank cars today are in a renaissance created by the abundance of rail-borne petroleum transport. The numbers today have not been this high since the U-boat threat of World War II pulled oil transport from open sea tankers onto the rails. In 2013, over 400,000 carloads of oil were shipped. Add to that the steadily increasing traffic on the railways and car-loadings of other types of fluids carried by railroad tank cars, and you can see the market is booming.

All this traffic is carried by a tank car fleet that currently numbers about 350,000 cars, and new cars are added every day. For example, Valero Energy, the largest domestic oil producer, is investing nearly a billion dollars in doubling its tank car fleet from 5,325 to nearly 10,000 cars.

Every one of those tank cars is equipped with valves and fittings that are critical to the safe loading, transport and unloading of the products they carry.

Even though the tank car industry has had bad press over the past couple of years, brought about by a few catastrophic accidents, for the most part, the statistics back up the reality the tank cars are

Executive Summary

SUBJECT: The railroad industry is booming, helped along by the need to transport new sources of oil. Each tank car on the rails today needs valves for onloading and offloading cargo.

KEY CONCEPTS:

- What today's cars carry
- The valves used
- Industry standards and regulations
- New types of cars

TAKE-AWAY: Tank car numbers and the need for valves will continue to grow, and new types of valves are being proposed in the push for safer transport.

safe: 99.998% of all tank cars make the trip from producer to ultimate user without incident.

The tank car's promise as a method of transport for oil is not perceived to be short-lived, either. Some people have speculated that once new pipelines are built, the tank cars will go away. But the industry has two strong points in its favor. First, the cars can go anywhere there are rails, while a pipeline's location is fixed. This is important because, if a loading opportunity occurs 200 miles away in two to three years, it is easy to move the loading point. Pipelines underneath six feet of earth don't move too easily.

Second, the transport of crude oil from Canadian tar sands offers additional opportunities for tank car transport. The bitumen from which the Alberta tar sands is composed is so thick that, in order to get it to flow through a pipeline, it must be diluted with distillate. The flow is then 72% bitumen and 28% diluent, which makes the efficiency of the pipeline just over 70%. Using ordinary tank cars requires a mix of 83% bitumen to 17% diluent for loading and offloading. Also, the 83% mixture is carried in standard tank cars built with steam-heating coils (and more valves, by the way), which allow the bitumen to be unloaded with relative ease. Raw 100% bitumen can even be carried in tank cars; however, the contents must be heated to 200 degrees to get non-diluted contents to flow out of the car.

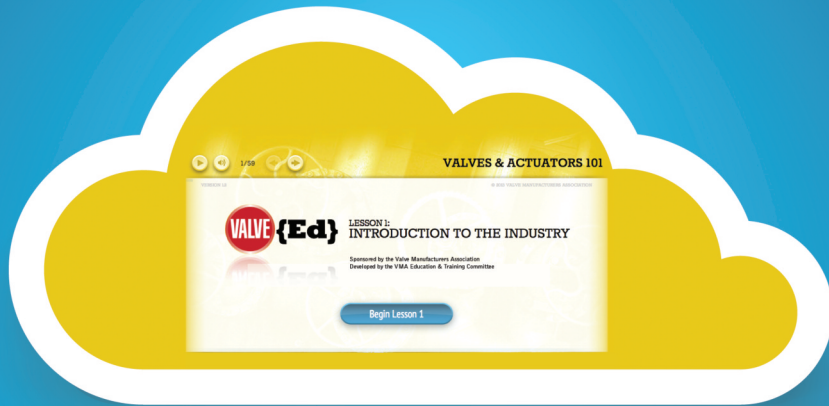
One transportation economist has stated that rail-shipping this heavy, sour mixture to Gulf Coast refineries, which are well-equipped to handle sour crude, presents a savings of three dollars a barrel over the pipeline route. Another advantage over pipelines is that the tank cars are available right now, while the Keystone XL pipeline and others may remain political prisoners for years.

THE VALVES

There are three types of tank car designs: low pressure, high pressure and cryogenic. These can be further differentiated as insulated and non-insulated types.

Each tank car has at least two valves—an inlet/outlet valve and a

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□ Tank cars generally have at least two sets of valves: inlet/outlet and a pressure relief valve.

pressure relief valve (PRV). These valves are located either on the top center of the car or, less frequently, on the bottom center.

The need for a basic inlet/outlet valve is obvious; the fluid needs to be contained after filling the car. The relief valve is necessary because, like any other vessel filled with fluid, over-pressurization can occur if the fluid expands because of temperature changes. Sometimes a vacuum relief valve is needed to keep the tank from imploding as it is emptied. While relief valves are most common for this use, rupture discs or rupture pins are also sometimes employed.

Many tank cars are supplied with heating coils that allow the temperature of the tank to be raised before unloading to make the removal of viscous/semi-solid materials much easier. These coils are usually heated via steam at the unloading site, and these cars require additional inlet and outlet valves to control the steam flow.

If the fluids transported are cryogenic, the valves need to be suitable for cryogenic temperatures. This would require extended bonnet gas columns and sealing materials, and designs that function properly at super-cold temperatures.

Aside from the PRVs, today's tank car valves are either ball or angle-globe types. In a few cases, plug designs also may be employed, although their usage has greatly decreased over the past few decades. Because of the compact design of the ball valve, such valves are com-

monly used on tank cars, but they have some unique design requirements. Two-piece, threaded body designs must have the tailpiece secured to the body. Also, the overall end-to-end dimensions of a railroad-use ball valve are generally shorter than those used in other service. The angle valve, however, is still specified for some service requirements, such as chlor-alkali transport.

TANK CAR VALVE STANDARDS

Many of the variety of fluids carried by the tank cars that crisscross the country every day are hazardous and/or combustible. To maintain a high level of design integrity, tank car valves are built in accordance with standards that address those risks. The most common are those of the Association of American Railroads (AAR). Basic tank car specifications are detailed in AAR's M-1102, Manual of Standards and Recommended Practices and Specifications for Tank Cars.

□ A high flow PRC used in transporting crude oil and ethanol



Approvals of tank car valve designs are done by the AAR tank car committee. Existing approved valves are also reviewed every 10 years. This includes PRVs, vacuum relief valves, and liquid and vapor loading/unloading valves.

Approval of a valve for one commodity does not necessarily approve it for other commodities. The commodity types are:

- Compressed gases
- Corrosives
- Solids requiring heat to solidify
- Products with special temperature requirements

The AAR tank car valve requirements are detailed in Appendix A of the AAR M-1102 document. One requirement that separates tank car valves from their stationary cousins is the need for heartiness. For example, a PRV for tank cars not only has crack and flow requirements, it "must be designed to withstand horizontal acceleration of 20 times the force of gravity without causing the valve to fail or to not comply with the start-to-discharge and vapor-tight pressure requirements, and without stressing any parts beyond the yield point of materials used in their assembled condition."

Specific materials of construction must be resistant to corrosion or solvent properties of the fluid to be carried at rated service temperatures. Stem materials for PRVs set at 75 psig or more must not be free machining, cold drawn (unless stress relieved) or made from cast materials.

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- Alternative trim materials
- NACE service
- Special cleaning for applications such as oxygen or chlorine
- Other options available as specified

Each valve has a unique certification number that is traceable to the valve certification sheet, which includes MTR data, pressure-test report, inspection report and certificate of compliance.



POWELL VALVES

CHLOR ALKALI SERVICE

Tank car valves in chlor alkali service are described in the detailed specifications published by the Chlorine Institute (CI). Chlor alkali valve commodities include chlorine, sodium, hydroxide, potassium hydroxide, sodium hypochlorite and hydrogen chloride. These highly corrosive chemicals require valve designs and materials specifically designed and built to handle the rigorous requirements imposed by chemicals.

The most useful CI valve standards relating to tank cars are:

- Pamphlet 6, Piping Systems for Dry Chlorine
- Pamphlet 98, Recommended Practices for Handling Hydrochloric Acid in Tank Cars
- Pamphlet 166, Angle Valve Guidelines for Chlorine Bulk Transportation
- Pamphlet 168, Guidelines for Dual Valve Systems for Bulk Chlorine Transport

The CI has an approved manufacturers list for valves. The approved designs are published in pamphlets 166 and 168 and include detailed cross-sectional OEM drawings of each valve.

The angle valve is still the first choice for loading and unloading valves in chlor alkali service. The basic angle design is hearty and works well in the man-way atop each tank car. Because these valves handle highly corrosive media, design features include Hastelloy and Monel trim components and Teflon packing. For even higher integrity and control of fugitive emissions, CI also has approved a bellows-sealed bonnet design.

While CI-approved valves are highly engineered products, they also are designed for ease of field or shop repair, which is appreciated in the field because oftentimes, basic valve repair work is handled by tank car repair firms, not in valve service facilities.

The repair of tank car valves also must be performed by an AAR-certified facility. AAR has a variety of certification levels for the tank car industry ranging from A through L. For companies that only repair tank car valves and not the cars themselves, an AAR Class F certification is required.

PROPOSED TANK CAR UPGRADES

The catastrophic accidents of recent times have directed much scrutiny to

the ubiquitous tank car. Part of the reason for an increased frequency of incidents is because the railroads have created virtual pipelines via tank car "unit trains." These special, all-tank car trains make economic sense for the railroads, but they increase the safety risk because they mean that over 100 tank cars may be carrying the same hazardous cargo on the same train.

Also, the huge upturn in shale oil and the rail-borne transport of that oil have vastly increased the need for tank cars. Yet the bulk of the North American tank car fleet was built using a 1960s design called the "DOT 111." These older, DOT 111-designed cars are perfectly suited for handling many materials, but some need improvements to better handle the increased volume of highly hazardous flammable ethanol and sweet crude products that dominate the tank car transport market today.

While most proposed tank car improvements are shell and coupler upgrades, valve improvements have not been overlooked. Such improvements focus mainly on tank car relief valves. One proposed change would be to eliminate rupture disc, rupture pin or other one-time-use pressure relief devices,

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□ Although railroad transport has received bad publicity from a few incidents, tank car transport is statistically very safe.

replacing them with standard PRVs. Another upgrade would mandate using high-flow-rate PRVs.

While all proposed upgrades make safety sense, the problem with implementing them is logistics. Of the current tank car fleet, about 78,000 cars require upgrading or replacement. Meanwhile, the pressure from the general public and government does not balance out with the industry's capacity to upgrade or manufacture new cars in the record time that would be required.

THE END PICTURE

Tank cars have always been a viable option for bulk liquid transportation in the United States. The renewed popularity of these pipelines on wheels offers many challenges and opportunities for both the rail car manufacturer and those who make the valves used in those cars. **VM**

GREG JOHNSON is president of United Valve (www.unitedvalve.com), Houston, and is a contributing editor to VALVE Magazine. He serves as chairman of VMA's Education & Training Committee, is a member of the VMA Communications Committee and is president of the Manufacturers Standardization Society. Reach him at greg1950@unitedvalve.com.

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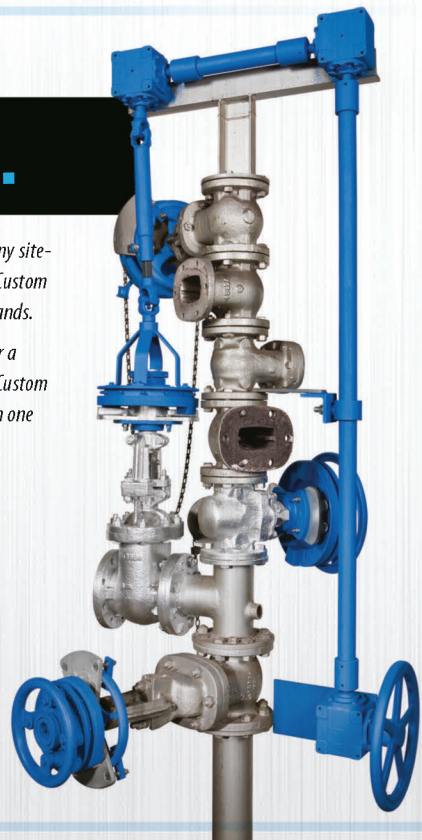


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DBB

AND

DIB

Which is which?



Executive Summary

SUBJECT: When end users ask for a double block-and-bleed (DBB), they are basing the request on their particular application and their past experience with what they consider DBB valves to be. But much confusion exists over the terminology and the differences between these valves and double isolation-and-bleed (DIB) valves.

KEY CONCEPTS:

- The difference between DBB and DIB
- What the guidelines and regulators say
- What choice is right for what type of application

TAKE-AWAY: Understanding the differences allows an end user to select, based on their valve type and application, the types of ball, gate or expanding plug valve options with the right isolating capabilities.

BY RON MANSON AND TASHIKA VARMA

The term “double block-and-bleed (DBB)” carries a lot of misconception when it’s used to describe valve functionality. Every valve buyer and manufacturer seems to have a different idea of what the term means for valve selection, which can result in misguided specifications or the wrong choice of valve type. In the oil and gas industry, some of this confusion stems from the fact there are two credible sources that define the term differently. Another point of confusion comes because many people using the term double block-



□ A double block-and-bleed plug valve with provable zero leakage can be used for pipelines, liquid bulk terminals, aviation fueling, refining, oil/gas production and custody transfer applications.

and-bleed really want a valve with double isolation-and-bleed (DIB) capabilities. However, the differences in definitions and terminologies involved are important when it comes to determining which valve capability is needed for what type of system.

DBB AND DIB DEFINITIONS

The most basic thing a user is looking for when they specify a double block-and-bleed valve is a compact valve or valve system that provides more reliable isolation in critical areas than a standard, single valve would. This smaller system or single valve unit serves to reduce the installation footprint, saves on extra piping requirements and reduces weight in critical areas. All of this saves space, time and cost.

Two entities in the United States define DBB—the American Petroleum Institute (API) and the Occupational Safety and Health Administration (OSHA). API, as a trade organization, acts as an advocate as well as researcher for America’s oil and natural gas industry, outlining many industry guidelines for safe operation. OSHA, as a branch of the U.S. Department of Labor, is charged with enforcing health and safety legislation and outlining regulation that protects both people and the environment. The two group’s guidelines reflect these two purposes.

According to API 6D, Specification for Pipeline Valves, a double block-and-bleed valve is a “single valve with two seating surfaces that, in the closed position, provides a seal against pressure from both ends of the

valve, with a means of venting/bleeding the cavity between the seating surfaces.” API notes in the definition that this valve does not provide positive double isolation when only one side is under pressure.

In contrast, OSHA regulation describes DBB as “the closure of a line, duct or pipe by closing and locking, or tagging, two in-line valves and by opening and locking, or tagging, a drain or vent valve in the line between the two closed valves.”

API’s DBB definition does not achieve the same level of isolation as OSHA’s definition. API allows DBB valves to be one single valve with two unidirectional seats, while the OSHA standard can only be achieved through two separate valves with a method to bleed pressure in between. Some valves use a twin valve design. By combining two valves into one body, a twin valve design reduces weight and potential leak paths, while meeting the OSHA requirements for double block-and-bleed.

Valve associations usually choose to follow either the API or OSHA definition, and some have created their own handbooks with definitions for industry terms, including DBB. For example, the British Valve and Actuator Association (BVAA) defines double block-and-bleed as “a manifold that combines one or more isolation valves, usually ball valves, and one or more bleed/vent, usually a needle-style globe valve, into one assembly for interface with other components (e.g., pressure measurement transmitters, pressure gauges and switches).”

BVAA, like API, says that for DBB capabilities, only one valve is required, not a system. According to BVAA, “DBB valves replace the previous traditional technique employed by pipeline engineers to create a double block-and-bleed configuration in the pipeline, usually by fabricating three valves using flanges, ‘Tee’ pieces and associated bolting.”¹

Double isolation-and-bleed confuses the debate about DBB. API defines DIB as a “single valve with two seating surfaces, each of which, in the closed

¹Greenhalgh, Martin. *Valve and Actuator Users’ Manual*. 6th ed. Oxfordshire: British Valve & Actuator Association, 2010. Print.

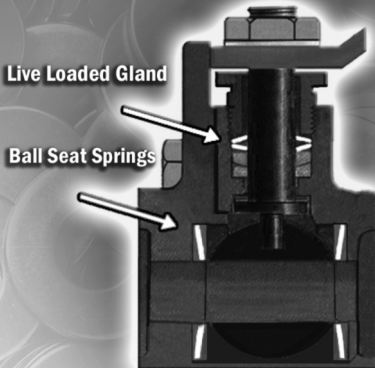
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WEIGHING THE CHOICES

Since DBB and DIB have become such generic terms in the industry, it is important to take into consideration the application, media and various environmental challenges when choosing the appropriate solution and valve type.

The following table will be part of an Informative Appendix in the next edition of API 6D, which is currently out for ballot. The table has been augmented with a column showing where the valve types comply with OSHA regulations.

VALVE TYPE	SEALING ARRANGEMENT
Two block valves with bleed between	Any valves with bi-directional sealing
Slab and/or through-conduit gate	Pressure energized—downstream sealing only/fixed seats ¹
Slab and/or through-conduit gate DIB-1	Pressure energized—upstream and downstream sealing ¹
Trunnion mounted ball valve	Upstream sealing, pressure energized seats, both self-relieving ¹
Trunnion mounted ball valve DIB-1	Upstream and downstream sealing, pressure energized, example, two bi-directional sealing seats ¹
Trunnion mounted ball valve DIB-2	Upstream and downstream sealing, pressure energized, example, one bi-directional and one unidirectional sealing seat ¹
Floating ball valve	Pressure energized
Plug	Pressure energized, downstream sealing ¹
Expanding plug DIB-1	Mechanically energized
Expanding gate DIB-1	Mechanically energized

position, provides a seal against pressure from a single source, with a means of venting/bleeding the cavity between the seating surfaces.” This feature can be provided in one direction or in both directions.

The difference between API’s DBB and DIB, then, is that a double block-and-bleed valve seals against pressures from both sides of the valve, while a double isolation-and-bleed valve provides an additional seal against pressure from only one side. For applications that require an additional pressure barrier that seals separately from the main pressure barrier, it is important to use a DIB valve instead of a DBB to fulfill operational safety requirements. It’s also important in reference to the nature of the service, such as when low tolerance for leakage or the cleanliness of the fluid is in question.

Another big difference between DIB and DBB is based on the ability to relieve pressure. Usually with a DBB valve, there are two unidirectional self-relieving seats. These seats do not rely on an outside mechanism to relieve pressure. On the other hand, a DIB valve uses one or two bidirectional seats. The valve provides double isolation from pressure at both ends of the valve. However, there is an operational drawback: A DIB valve cannot relieve body cavity pressure past the seats, meaning its seats are not self-relieving. When using a DIB valve, then, an external relief system is needed to relieve pressure buildup.

A DBB or DIB valve can provide isolation in both upstream and downstream directions, even in high-pressure or high-temperature situations.

CONTINUED ON P. 24

¹ The terms upstream and downstream refer to the pressure source and open end/equipment respectively and do not refer to flow direction.

² Not possible to bleed from valve body, but bleed may be in downstream pipework/pipeline

³ Depending on detail design of the valve, some valves can have preferred sealing direction and/or a specified sequence of operation.

⁴ Depending on detailed design

⁵ Downstream seat can provide a second barrier at pressures below the cavity relieving pressure, but will not provide a high-pressure barrier.

⁶ Depending on detailed design and ability to achieve testing per section D13

BLOCK-AND-BLEED	DOUBLE BLOCK-AND-BLEED	DOUBLE ISOLATION-AND-BLEED	OSHA DOUBLE BLOCK-AND-BLEED
Yes	Yes	Yes	Yes
No ²	No	No	No
Yes	Yes ³	Yes ³	No
Yes	4	No ⁵	No
Yes	4	6	No
Yes	4	Only if the bi-direction seat is on the downstream side ⁶	No
No ²	No	No	No
No ²	No	No	No
Yes	Yes	Yes	No
Yes	Yes ³	Yes ³	No

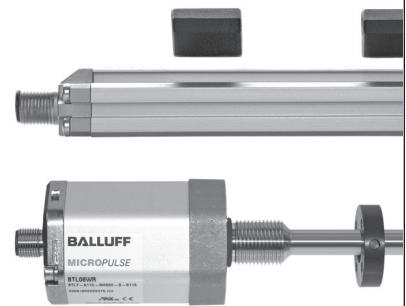
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□ Gate valves with through-conduit and double block-and-bleed features along with fully protected seat faces work well for liquid pipeline applications.

This isolation is critical in cases where leakage through a valve could have major consequences.

Once the fluid is isolated, the bleed mechanism can drain the area between the two valves or two seating surfaces. This is important for maintenance or for integrity check situations where leakage can be monitored.

APPLICATIONS AND BENEFITS

Both DBB and DIB valves save space, reduce the need for costly multivalve

systems and provide zero leakage capabilities from upstream to downstream. Such valves also allow for an integrity check of seat seals. In the oil and gas fields, both double block-and-bleed and double isolation-and-bleed valves can be used in a variety of applications and markets, such as liquefied natural gas, petrochemical, transmission and storage, natural gas industrial processes, mainline and manifold valves in liquid pipelines, and refined products transmission lines.

Both DBB and DIB are used in applications for which critical isolation is needed to ensure that leakage does not occur. The choice of what type depends on the application and type of service. For example, in liquid service near waterways or municipalities, double-expanding gate valves with DBB capabilities are preferred for critical isolation because they provide a tight mechanical seal, upstream and downstream simultaneously, which is normally unaffected by pressure variations or vibrations.

Another application in which DBB and DIB valves are used is meter calibration. Every closed valve in a meter system must seal drop tight. Even a small leak will cause errors in the meter calibration, and the incorrect meter factor will persist until the next proving operation. This can cost end users huge sums of money. Choosing the correct API-verified DBB or DIB valve can help ensure correct calibration almost every time.

The mechanical wedge action of a double block-and-bleed plug valve compresses both the upstream and the downstream seals firmly against the valve body, which means no help is needed from the line pressure to affect a positive seal.

CONCLUSION

Double block-and-bleed plug valves, which are heavily used in the transmission and storage markets, provide consistent and provable zero leakage of various fluids. When determining whether to use a DBB or DIB valve and which definition to follow (API or OSHA), it is important to have a clear understanding of the similarities and differences. It is also vital to take into account the specific application for the valve and ensure that the features required for isolation are fully tested during factory acceptance testing of the valve. **VM**

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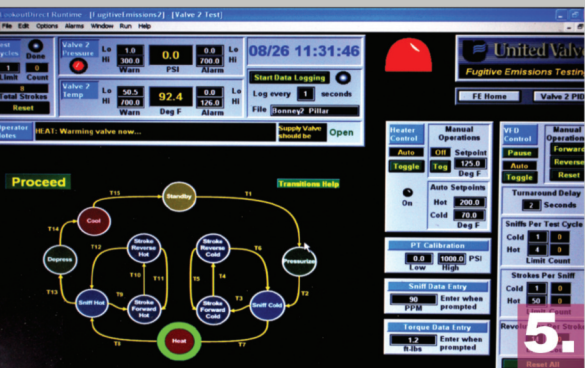
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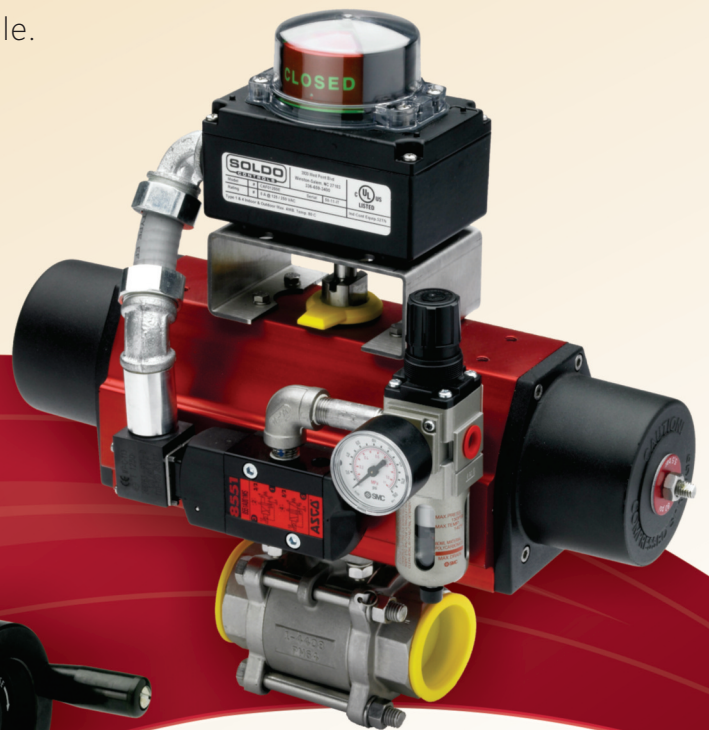
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A typical repair is shown here. New gaskets, packing and bolting have been installed in this valve, and it is now being assembled prior to hydrostatic testing.

SPECIAL ANNIVERSARY SECTION

**25
YEARS**

VRC

Valve Repair Council

In 1989, VMA formed the VRC to create a way for facilities that have good quality control procedures, use quality parts and have access to OEM specifications a way to band together to reach common goals.

The council was formed to promote safety, establish proper repair and rebuild methods, facilitate the legal exchange of information and best practices, address the issues that OEM repair shops face and to cooperate with standards bodies and regulators in developing the right guidelines.

This year, VRC is celebrating 25 years of existence.

VALVE Magazine created this special section to review the VRC's history, to address current trends in valve repair and rebuilding and to create a directory of the growing list of companies that belong to the council.

VRC also will commemorate its proud heritage and accomplishments when it gathers in Houston for the second Valve Repair Meeting and Exhibition June 5-6.

Many changes have occurred in both the industry and the council over the 25 years, but one constant remains: VRC exists to bring quality, best practices and legitimacy to the companies that repair and rebuild using OEM procedures.

VRC Yesterday & Today

BY GREG JOHNSON

In the mid- to late-1980s, VMA began discussions on how to create a special council to counter a huge increase in the frequency and intensity of spurious valve work, most notably, the supply of bogus valves to nuclear power plants.

The valve service industry at the time was trying to regain momentum following the lean beginning of 1980s. The industry was also facing the not-so-above-board group of usual suspects who took advantage of the lean times to resume performing poor, and in some cases illegal, valve refurbishments. One of the most significant concerns for valve manufacturers were companies that sold rebuilt valves as new, complete with forged valve tags. This situation resulted in law suits filed against a variety of valve rebuilders from New Jersey to California, as well as general bad publicity for the repair industry.



The increase in OEM liability these bogus valve companies created spurred VMA to form a committee to look into the feasibility of forming an association-sponsored valve repair organization. Although the problem was primarily in the gate, globe, ball and check valve arena, control valve and pressure relief valve manufacturers were also paying close attention to the problems and became involved in forming the organization.

At the VMA board meeting in April 1989, plans for the Valve Remanufacturers Council (VRC) were finalized. The first VRC executive director was Bill Sandler, who scheduled the first official meeting for May 24, 1989 in Houston. Twenty-five companies were represented at that first

gathering, and 11 of them applied for membership in the organization. The first chairman of the VRC was Myles Sweeny of Durco.

At the time the VRC was started, another group of valve rebuilders, known as the National Association of Valve Rebuilders (NAVR), was active. That group was formed in 1980. The biggest difference in the organizations was that VRC had OEM participation, while NAVR did not. NAVR would slowly fade away and disappear entirely by the turn of the century.

The first annual meeting of VRC took place in February 1990. Among the speakers at this first gathering were Fred Harrison of the National Board and Rudy McDonald, valve engineering specialist from Exxon, Baton Rouge. Harrison became a staple presenter at VRC meetings for more than 15 years.

EARLY CHALLENGES

When VRC was first formed, meetings were held twice a year. The format of these meetings was to have about six seminars of interest to the valve service community along with a number of vendor exhibits.

In 1992, the VRC faced its first bit of controversy when its board voted to change the bylaws to exclude member companies that were involved in the purchase and resale of surplus valves.

"It was felt [at the time] that this practice did not promote the true purpose of the VRC," according to a joint VMA/VRC communique. The resulting change in bylaws meant the loss of a few members. Ironically, the latest bylaws change (2001) reversed that trend and made membership possible for some of those who left the fold in 1992.

The VRC's second bit of controversy occurred in 1994 when the VMA Board of Directors suggested that the name Valve Remanufacturers Council be changed to Valve Repair Council as a means of further distancing itself from the valve rebuilding and surplus valve-selling world.

In 1993, the VRC discontinued the practice of holding an annual meeting in conjunction with VMA. Meetings during the 1993-2001 time period were usually held in cities such as Houston, New Orleans and San Antonio to attract the



A chrome/moly block valve is disassembled in a VRC member company repair facility. Larger, higher pressure gate valves and alloy valves are still economical to repair, rather than replace.



Specialty valves, such as this metal-seated coker ball valve are very expensive so end-users and owners of these high-ticket items have them repaired as many times as possible before replacement.



Workers disassemble a refinery valve prior to initial pre-repair inspection.



Repairing highly engineered valves, such as this high-temperature service, hydraulic-actuated catalyst control valve, require a variety of skills and expertise. That expertise can be found in today's VRC member facilities.

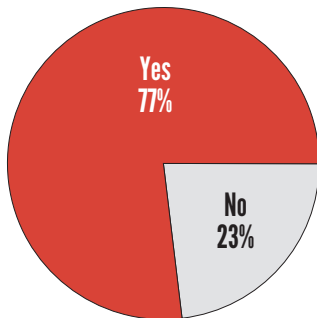
many Gulf Coast members.

During the late 1990s, many members of VRC felt that the relationship between VRC and VMA could use some rejuvenating. Independent members felt not enough support was given by VMA. This led to a series of meetings between groups from both the VMA and VRC, which brought up these hot button topics:

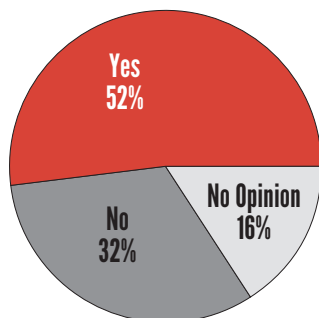
- More support of the overall mission of VRC by VMA
- A requirement that all OEM-authorized facilities be members of the VRC
- Access to OEM parts by VRC members
- Review of the VRC constitution in light of business practice changes by OEM-owned valve shops (e.g., selling rebuilt and/or surplus valves)

At one of the next VMA meetings, a VRC-requested poll was taken to answer two questions posed by VRC:

1) Are you familiar with the VRC?



2) Would your company be willing to cooperate with VRC members in providing timely and preferred engineering and parts replacement support on an "as needed" basis?



No opinion means either a) not familiar with the VRC, or b) ambivalence regarding the question



Control valve repair today involves skills and expertise that did not exist 20 years ago. VRC member companies have advanced their capabilities to meet the requirements of today's control valve repair.

Needless to say, the results of the poll were less than exciting to many VRC members. As a result of the meetings and poll, a decision was made that VRC and VMA should have more interface and get better acquainted. It was also decided that VRC annual meetings would again be held in conjunction with the VMA annual meeting (starting in 2002). Additionally, virtually all VMA activities (meetings and seminars) would be opened up to VRC members. This gave VRC members an opportunity to interact with VMA counterparts.

MEMBERSHIP

Despite adding new companies each year, membership in VRC hovered at about 25-28 up until 2010. This was because of mergers and acquisitions prevalent in the industry during this time. However, the past three years have seen VRC's membership rise to a record 39 members.

One of the assets of the VRC is also one of its biggest challenges—the diversity of its membership. This diversity comes in many forms: There are OEM-owned shops as well as independently owned and operated shops. There are shops that only work on control valves and shops that only work on safety relief valves. Some shops work on every type of valve. Each of these groups has a unique set of interests and concerns. Likewise, each individual representative has different areas of concern, interests, management philosophy and authority. This rainbow coalition sometimes makes it difficult for everyone's voice to be effectively heard.

As Y2K appeared in the rearview mirror, some traditional OEM profit

streams became leaner, and a push was made to regain lost revenues through expanded OEM repair programs and in some notable cases, through the sale of rebuilt valves, both the OEM's own brands as well as other manufacturers. This situation resulted in the VRC changing its bylaws in 2001 to allow such activity for its members—activity that just 13 years earlier was specifically banned.

As a result of the success of the American VRC, the British Valve & Actuator Association (BVAA) created a similar repair group a few years ago. The make-up of that association's repair sub-group is similar to VRCs and its goal of OEM-focused repair is just as strong.

The most recent exciting event is that VRC held its first Valve Repair Conference in 2012. The initial meeting brought together valve repair professionals from all over the United States. The event will be repeated this year in Houston June 5-6. This event, which will honor the 25th anniversary of the organization, will include seminars, vendor exhibits, social events and shop tours of some of the repair facilities in Houston.

VRC's first 25 years has been an interesting journey. The prime goal of legitimizing the valve service industry has been attained and the stature of VRC member companies has definitely been raised. Many companies, particularly the independents, have become go-to organizations lending the expertise and knowledge they've gained from years of valve service experience. Programs such as VRC charter member Southern Valve Service's valve data

acquisition program have been instrumental in helping end users determine the total cost of ownership of their valve assets. These data acquisition programs as well as asset management systems are now standard fare for all quality valve service facilities.

The current upsurge in the U.S. oil and petrochemical industry has

created more opportunities and much optimism for the fraternity of valve service companies. End-users and OEMs alike can also feel much more comfortable that VRC members are filling a very valuable role of quality valve repair that will meet both the opportunities of today and the challenges of tomorrow.

GREG JOHNSON is president of long-time VRC member United Valve (www.unitedvalve.com) in Houston, and is a contributing editor to VALVE Magazine. He is a past chairman of the VRC and a current board member. He also serves as chairman of VMA's Education & Training Committee, is a member of the VMA Communications Committee and is president of the Manufacturers Standardization Society. Reach him at greg1950@unitedvalve.com.

TRENDS IN VALVE REPAIR

Today's top-notch valve repair facilities look much different than they did 25 years ago. Walking through one of these facilities is very much like walking through a valve manufacturer's plant. You will see the latest machine tools, including Computer Numerical Control turning centers and milling machines. The testing department will be outfitted with several testing machines that can handle the largest valves, including butt-weld end types. Non-destructive inspection capabilities in these facilities include magnetic particle, hardness testing, positive material identification, dye penetrant examination and in some cases in-house radiography. The shop will also feature computer screens everywhere, loaded with the latest enterprise resource management software.

All this equipment and the matching expertise that goes with it is in direct response to the current needs of the end-user repair customers. No longer is the repair process just a basic mechanical repair exercise. Today's valve repair customers demand a high level of expertise, experience and technology. That is primarily because most of the valves repaired today are of the engineered, critical path or large-diameter type.

The previous paradigm in the repair industry was that nearly every valve was repaired during an outage or turnaround. Today, the economics of inexpensive imported commodity valves, along with the economic savings of the run-to-failure mode of maintenance, have drastically reduced the quantity of valves repaired during these outages.

Most refiners will not even repair plain carbon steel valves that are less than size 12. Some users even raise this no-repair bar to size 24, class 150, further reducing the quantity of valves needing repair. The reason is simple: The cost of a new valve makes it uneconomical to repair these valves, so they are just scrapped. Cost additions such as high-pressure classes, higher-cost materials and actuation causes the repair/scrap formula to lower the repairable valve size considerably.

Although there are fewer commodity gate and globe valves repaired, because of the economics, the metal-seated ball valve has created a strong and lucrative market for the repair industry. There are not as many of these ball valves, which have taken over a good portion of the multi-turn



Large valve repair takes the right mixture of skill and materials handling capabilities. This 48-inch pipeline gate valve under assembly weighs in at just under 20 tons.

valve's market share, but the expertise needed to repair them is greater, as is the price charged by the repair facility.

The control valve repair industry has seen technology needs increase geometrically with the influx of so much digital control. Electronics and strong computer knowledge, along with specific OEM training, is now a requirement to work on these 21st century final control elements.

Safety relief valve repair has not changed as much over the past 25 years. For the most part, the products are still built similar to the designs of 40 years ago. What has changed is the additional focus on these sentinels of safety

and the need to absolutely confirm their operability at all times. This has resulted in increased scrutiny by the National Board in the form of tightened repair requirements.

NATIONAL AGREEMENTS

Another factor that has entered the economics of valve repair are national repair agreements where one service facility bids on the repair of valves from multiple plants. These bids require base pricing for most general valve repair, but out-of-scope repairs and the repair of non-agreement valves are separate. The base repair margins in the national agreements are often so low the only profits to be made are in the non-agreement valves and out-of-scope added repairs.

Actuator repair has continued to grow in volume and sophistication. As more and more processes are automated and the requirements for remote control and monitoring increase, so does the number of actuated valves. The control systems of many of the actuated valves require greater expertise than in years past so the skill-set of the actuator repair technician today is broader than it used to be.

Like many other technical jobs, there is a need for more trained valve repair technicians. Except for a few notable exceptions, the only way new valve technicians are trained is by on-the-job training. A broad focus, valve-training curriculum, including hands-on applications, would be very welcome in the industry today. As a way to begin that process, the board of the Valve Repair Council recently awarded a grant to the Valve Manufacturers Association to create a Valve Repair module as part of its Valve Basics education & training program. Plans call for the new module to be released in early 2015.

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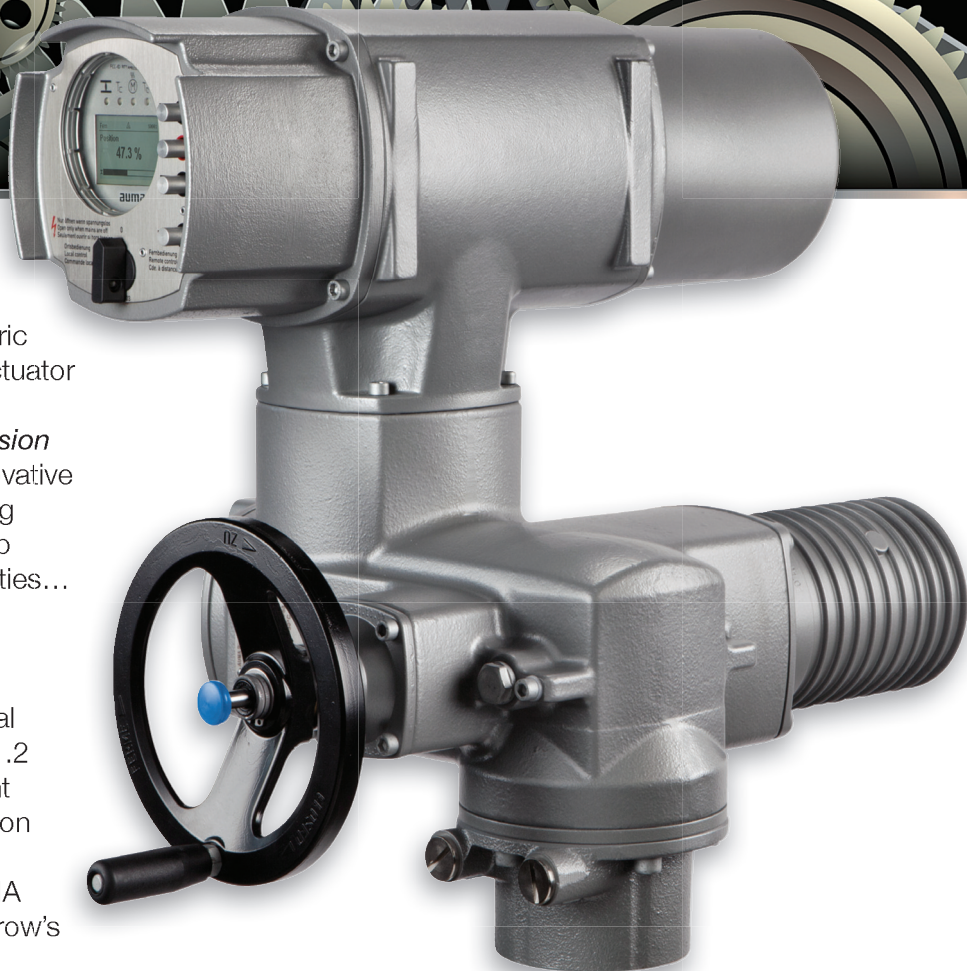
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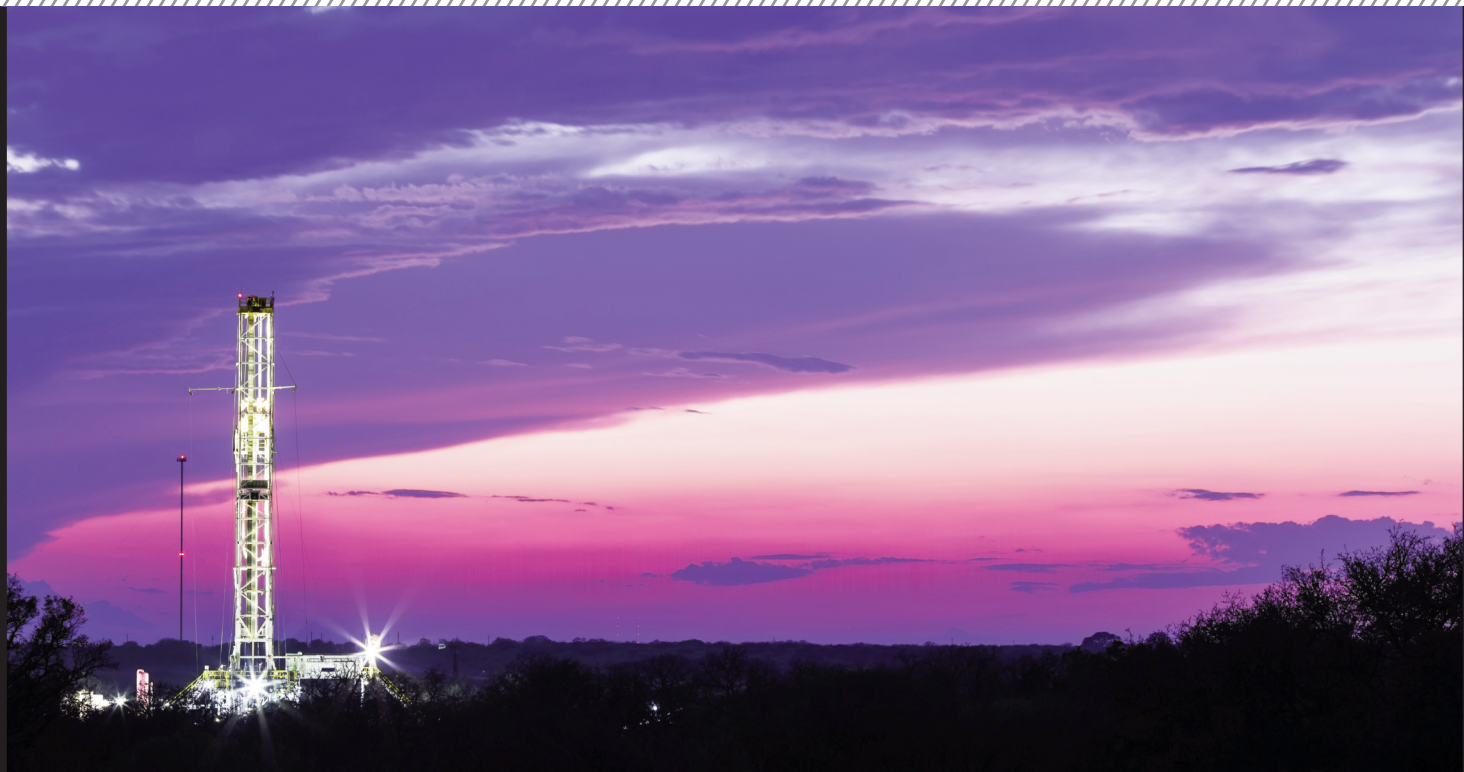
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The Shale Gale in 2014

Winds from Regulatory, Legislative and Legal Fronts

BY MAGGIE CLARKE AND WAYNE D'ANGELO

Last year, domestic energy production crossed an important milestone when oil production surpassed crude imports for the first time in two decades. By the end of 2013, increased production of both natural gas and oil from shale made the United States the top producer of hydrocarbons in the world, surpassing both Saudi Arabia and Russia. The result is that a whole new host of issues has come to light both in discussions on the possibilities and in recent action by legislators and regulators.

THE ISSUES

Hydraulic fracturing and horizontal drilling—the techniques that allowed this unprecedented production of natural gas and oil from low-porosity rock such as shale—have reversed the course of energy production in America and transformed the fates of many manufacturing industries that are both major suppliers to the oil and gas industry and heavy consumers of energy. One need look no further than President Obama's 2014 State of the Union address to understand the importance of this broad economic transformation:

"Now, one of the biggest factors in bringing more jobs back is our commitment to American energy. The all-of-the-above energy strategy I announced a few years ago is working, and today, America is closer to energy independence than we've been in decades.

"One of the reasons why is natural gas—if extracted safely, it's the bridge fuel that can power our economy with less of the carbon pollution that causes climate change. Businesses plan to invest almost \$100 billion in new factories that use natural gas."

Executive Summary

SUBJECT: The hottest debate on the domestic energy front is whether the ban against oil exports, put into effect in the 1970s embargo years, should be lifted. Before that can happen, much has to be addressed in the halls of Congress and the nation's state and federal regulatory agencies.

KEY CONCEPTS:

- The issues under debate
- State actions
- Federal actions
- What to expect

TAKE-AWAY: Whatever happens, the results will have a profound effect on the makers and users of valves that deal with fuel extraction and production.

The regulatory, legislative and legal framework under which this "Shale Gale" continues is profoundly important to key suppliers and end users in the energy industry as well as the consumers of energy. This article provides an overview of the framework as well as key issues to watch in 2014.

THE STATES

States are the primary regulators of the oil and gas industry. In 2014 (in a process that began in 2013), many states will update their oil and gas regulations and statutes to account for and regulate the increased use of hydraulic fracturing. State regulations of hydraulic fracturing cover a wide variety of issues including siting, permitting, disclosures, water withdrawals, fluid storage, water disposals, casing and other well-integrity standards.

An important aspect of many state oil and gas laws is that they are generally designed to "pre-empt" the imposition of a patchwork of inconsistent local regulations and bans. Courts are challenging this issue, however. For example, in late 2013, the preemptive portion of Pennsylvania's oil and gas law was struck down by the Pennsylvania Supreme Court. In 2014, we expect more state preemption laws to be challenged by activists and strengthened by lawmakers seeking to avoid the fate faced by Pennsylvania's oil and gas law.

Meanwhile, California will likely have one of the most watched regulatory processes in the country as what's happening in oil and gas development is a hotly debated issue in that state. Such development was the subject of more than a dozen unsuccessful bills in 2013. Although California is home to the very important Monterey shale formation, the state does not presently have hydraulic fracturing-specific regulations.

Colorado also will be closely-watched because the state is the first to propose regulating methane, which is both a valuable

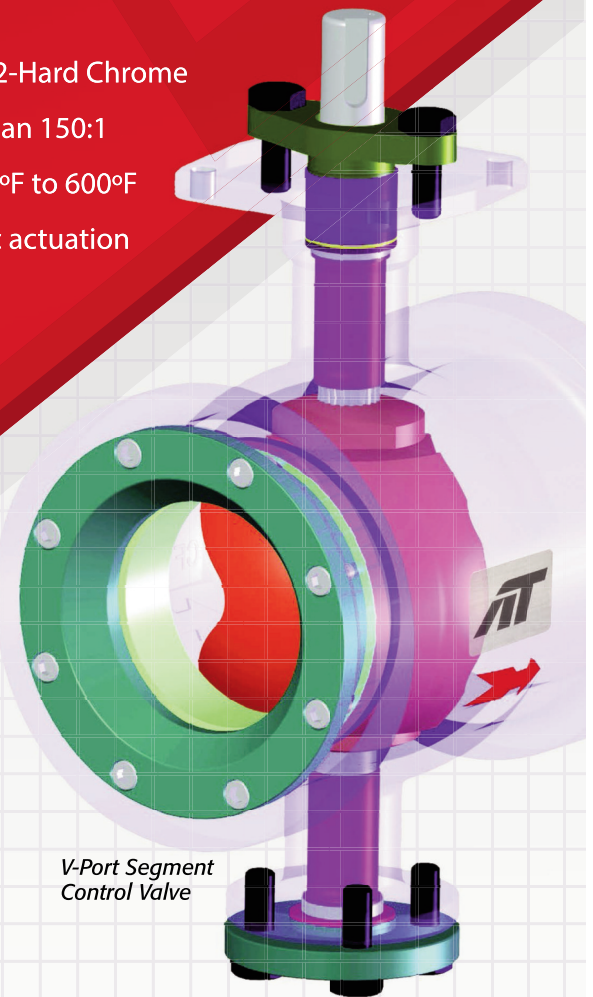
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commodity and a greenhouse gas (GHG). Methane is already controlled under the federal Clean Air Act.

THE FEDERAL GOVERNMENT

In light of a divided Congress and legislative calendar truncated by midterm elections later this year, the nation is unlikely to see enactment of any major legislation on oil and gas development. The issue will be the subject of many hearings and bills moving through committees of jurisdiction, however. Given the limited prospects for any meaningful legislative changes, the focus on oil and development throughout 2014 will continue to be in the regulatory arena. Among the types of decisions that can impact the Shale Gale are the direct regulation of oil and gas industry processes under environmental, health and safety statutes, public land access and demand-side issues.

The foremost demand-side regulatory activity relates to exports (see sidebar). There is some irony here. For many years, Congress was focused on curbing our nation's dependence on foreign energy. Now, the tables have turned and the country has begun to

more closely examine energy export policies. Already, the Senate Energy & Natural Resources Committee held a hearing on crude oil exports, which have been banned since the 1970s. Also, while natural gas exports are not banned, shipping product to countries that don't have a free trade agreement with us requires approval by the Department of Energy, a process that can be overly time-consuming. Some parties advocate a cautious approach, expressing concerns this nation might export its new-found competitive advantage. Expect continued discussions, studies and issue papers focused on the pros and cons of modifying the country's energy export policies. While legislative action this year is unlikely, Congress may begin to lay the groundwork for future action.

WHAT MAY GET DONE

We anticipate a variety of federal environmental health and safety regulatory activity in 2014, including:

- Finalization of the Bureau of Land Management rule to further regulate hydraulic fracturing on federal land
- Finalization of Environmental Pro-

tection Agency (EPA) guidance on the regulation of hydraulic fracturing that uses diesel under the Safe Drinking Water Act

- Hearings and comments on the Occupational Safety and Health Administration's proposal to further regulate silica exposures across industries, but with particularly significant impacts on the hydraulic fracturing industry's use of silica sand as a proppant
- Potential further EPA regulation of air emissions from hydraulically fractured natural gas wells
- Completion of EPA's study of the potential impacts of hydraulic fracturing on drinking water, which is viewed by many as a prerequisite for potential regulation under the Clean Water Act, as well as regulations regarding the treatment of wastewaters associated with oil and gas development
- Issuance by EPA of an advanced notice of proposed rulemaking to increase reporting requirements under the Toxics Substances Control Act for chemicals used in hydraulic fracturing
- Continued use of the Endangered Species Act by some environmental groups to block or constrain development within critical oil and gas basins and of pipelines and other energy infrastructure
- Continued aggressive use by EPA of its enforcement and emergency response powers under multiple statutes

While the fortunes of geology and innovation make it likely that the Shale Gale will storm onward, the cumulative impact of these potential regulatory changes will be closely watched throughout 2014. Stay tuned to VALVE Magazine and VMA's other resources for updates on how this will happen. **VM**

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The Shale Gale Debate

BY KATE KUNKEL

As Wayne D'Angelo and Maggie Clark point out, there is much speculation about the possibility of the U.S. one day being a net exporter of energy. To accomplish this will require major legislative, regulatory and legal action because crude oil exports have been banned since the 1970s.

Discussion is already well on its way, however, as evidenced by the January 2014 hearing within the Senate Energy and Natural Resources Committee. But none of what is to come will happen overnight. There is too much resistance from some refiners and manufacturers that could benefit from cheaper supplies as well as opponents that play the patriotism card by saying American crude should be used to ensure the nation's energy security.

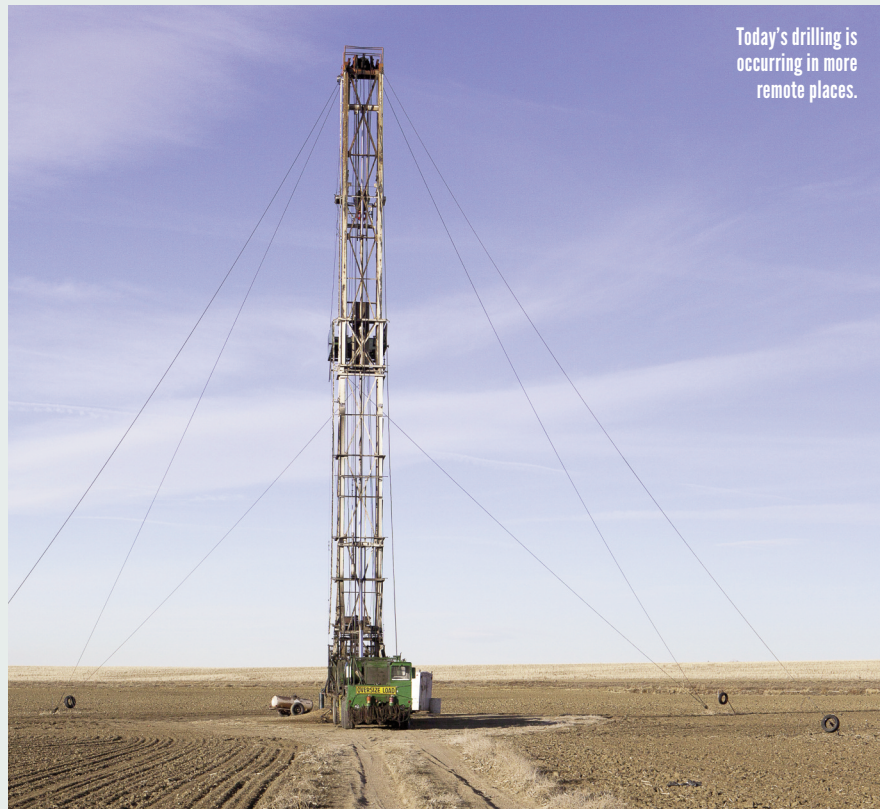
Still, prominent politicians such as Alaska's Republican Senator Lisa Murkowski and some producers such as Exxon Mobil Corp. are urging an end to the prohibition with arguments that are multiple and complex.

Meanwhile, conservation and economic factors have decreased energy demands so domestic oil producers want to diversify their markets and gain greater access to foreign buyers. At the same time, a geographic mismatch exists in the U.S. between producers and consumers because of a limited pipeline system for delivering U.S. crude to the coasts. Finally, many U.S. refiners, after making huge investments to handle heavier crude such as diluted bitumen from Alberta's oil sands, are ill-equipped to process the growing supply of domestic light oil.

But biggest among the issues right now is: how much oil can actually be produced? Can U.S. oil production ever exceed U.S. consumption?

SUPPLY

In December, the U.S. Energy Information Administration (EIA) released a report projecting that American production will peak at 9.6 million barrels per day (bpd) in 2019; but, as wells



Today's drilling is occurring in more remote places.

age, production will slowly decline. Demand is also expected to fall after 2020, but not as quickly as production. EIA also projects that imports will decline to 25% of use in this country by 2016, but should rise up again to 32% by 2040.

This indicates the possibility that the U.S. simply cannot produce enough to meet its own needs, let alone generate enough to export without endangering its own supply. However, some analysts say a vibrant export market would spur production and make North America essentially self-sufficient in oil. According to a 2013 report from the EIA¹, the United States has 58 billion and Canada has 9 billion barrels of technically recoverable tight oil.

Some analysts would say that's enough to eventually create a surplus for possible export. Turner, Mason & Co., a consulting engineering firm based in Houston, projects that, with a

¹June 2013 EIA Report: Technically Recoverable World Shale Oil and Shale Gas Resources

best-case, high-growth scenario, American production could climb by 2022 to 12 million bpd and Canadian production could increase to 5.5 million bpd. This scenario takes into account only 1.5 million bpd of imports from offshore against roughly 3 million bpd of exports from North America.

Many who oppose lifting the ban say allowing crude exports would decrease energy security and create higher gasoline prices. Other analysts and some economists say it would have little or no effect on prices because the U.S. already exports a great quantity of gasoline and diesel, which are finished products that are not restricted. That quantity was about 2.6 million bpd in 2012.

According to independent producers, this current state of affairs benefits only major refiners, which are processing lower-priced crude and selling record amounts of finished products overseas. At the same time, Graeme Burnett, senior vice president for fuel optimization at Delta Airlines, which

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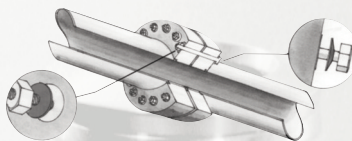
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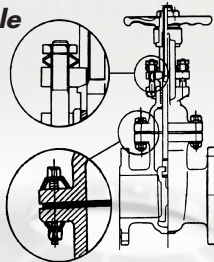
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owns the former Phillips 66 Trainer refinery, said lifting the ban would benefit only oil exploration and production companies.

Obviously, the opinions are varied depending on viewpoint and perspective. Sen. Ron Wyden (D-OR), the chairman of the committee that held the hearing, said that for him, the "litmus test is how middle-class families are going to be affected."

TRANSPORT AND PRICE ISSUES

One obstacle to exports is the issue of transporting crude. With the dearth of pipelines in areas where the oil is extracted, a significant concern is how the crude will get from the isolated plays to its ultimate markets. Recent disasters have made the option of transporting by railcar less attractive, and increased regulatory requirements will also make that more expensive.

Transport problems also impact the price of refined products domestically. Amy Myers Jaffe, executive director for energy and sustainability at the University of California, Davis, calls this problem the "tyranny of geography." The big differences in pricing of refined products such as gasoline result from supply bottlenecks created by absent pipelines or regulatory policies. Jaffe suggested during the Senate hearing that, if the ban was lifted, the nation could moderate gasoline price swings by mandating stockpiles, a tactic that Japan and Europe have adopted.

IS IT ALL A MOOT POINT?

The debate over whether exports are feasible or beneficial could rage for years. In fact, some say that this discussion could last longer than the alleged oil surplus.

Daniel Weiss, a senior fellow at the Center for American Progress, points out that soaring domestic production may not last forever. If production in operational wells declines faster than anticipated, producers may cap capital expenditures to avoid losing more on decreasing crude harvests. As a result, "This energy abundance could be a temporary phenomenon," he said. ■

KATE KUNKEL is senior editor of VALVE Magazine. Reach her at kkunkel@vma.org.

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Disruptive Forces Changing the Roles

BY STEVE BASSILL

Historically, the distributor was considered an extension of the manufacturer's organization—certainly, they have always been customer advocates. However, disruptive forces in the marketplace today are making it necessary for distributors to get even closer to their customers. In many instances, this is transforming distribution companies into service businesses that also just happen to provide products.

By understanding the forces that have made this shift necessary, manufacturers can successfully adapt to new realities, thereby improving their offerings and strengthening their relationships with distributors. The five

disruptive forces and how they impact the business of distribution follow.

1. ORGANIZATIONAL DISRUPTION

The greying of the industrial workforce is a huge factor that has had a dramatic impact on the effectiveness of manufacturer marketing systems. For example, look at new product cycles. The cycle starts with the manufacturer designing products and putting together a marketing program. The next step is that products get handed off to the sales and marketing team of the manufacturer, which promotes or sells to management at a dealer to get the distributor's commitment. The

dealer management gets its organization on board and educates and incentivizes its sales force, which then works with customer purchasing and specifying departments to sell the product. Finally, the user customer is trained to use the product.

This is just the new product cycle; there still is the ordering and invoicing, inventory management and post-sales support. Each of these steps involves hundreds, if not thousands of people. As these people leave, years of institutional knowledge that helped to launch new products, set inventory levels and service products is lost.

CONTINUED ON PAGE 44

PARADIGM SHIFTS IN DISTRIBUTION

	Historic Paradigm	Paradigm Shift
Paradigms	Distributor is an extension of manufacturer	Distributor is an extension of customer
Customer Window	Assess customer window through capability to sell manufacturers' products	Assess customer window through nature of relationship with customers
Market Life Cycle	View marketing across the life cycle of a product	View marketing through the life cycle of customer relationships
Cost Transfer	Transfer marketing costs from manufacturers	Transfer operations costs from customers
PST	Focus of product marketing (PST) and competition	Focus on ecosystem marketing and competition

The historic paradigms that have led our thinking about distribution strategy for the last 30-plus years are shifting; the changes coming about are because of changes in the marketplace. This is a picture of what's occurring:

Historically the distributor was considered an extension of a manufacturer's sales and marketing organization. This role is now shifting to one in which the distributor is more of an extension of the customer's organization by providing services that integrate into the customer's business.

The second paradigm, "A distributor's window," was a concept to help define how a distributor fit into a market and a manufacturer's go-to-market strategy. Going forward, it seems more advantageous to pay much greater attention to the nature of a distributor's relationships with the customer.

The third paradigm, the "market life cycle," was a concept that helped manufacturers determine what type of marketing support and, therefore, channel organization was needed for success as the market evolved. This paradigm is also evolving to consider the nature of the relationship between the customer and distributor

and how that is changing.

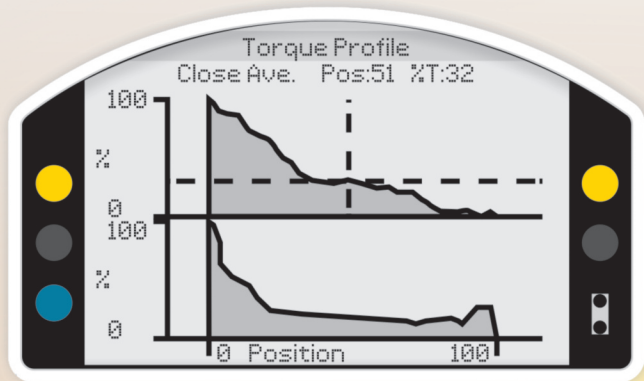
The fourth paradigm, "cost transfer," was a model of the distributor's economic role in the market, which was transferring costs out of the manufacturer's business. Today, the cost the distributor is transferring out of the customer's business also needs to be considered. How much and what type of cost is the distributor transferring from the customer?

The final paradigm—"Primary, secondary and tertiary products (PST)"—was a model of how distributors marketed specific product lines in their businesses. This may be the biggest change of all because competition is moving from a product basis to an "ecosystem" basis (see definition above).

The ecosystem will be different from company to company based on strategies and desired market role.

Those who are effective in building and managing value-creating ecosystems will be the eventual market leaders. Those who are not in a position to build an ecosystem will need to learn how to thrive in new ecosystems that are based on effective information sharing.

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2. TECHNOLOGY

Three dimensions of technology are affecting valve distribution. They are:

Information technology: This has been evolving since the days of the mini-computers in the 70s, accelerating with PCs and now with smart phones and tablets. New developments have made it possible to completely computerize inventory and logistics management, increasing inventory returns and reducing inventory investments. Information technology also increases the flow of information between manufacturers and distributors as well as distributors and customers.

Web technology: The Internet and the “cloud” have greatly expanded the ability to interact electronically. In industry, the net effect is that it makes it easier for customers to connect directly with manufacturers. The question is: does this development erode the value of the distributor as a source of information? The answer may be yes to some extent, and this access to information has resulted in some customers who are less willing to spend

time talking to manufacturers or distributors. Some manufacturers worry that the Internet is basically turning everything into commodities.

But customers may simply be saying “don’t waste my time. Tell us only what impacts our businesses.” Thus, distributors that bring customers more services and are willing to spend more time helping them solve problems are moving closer to those customers. The Web has displaced the old manufacturer-to-distributor-to-customer flow of spec sheets, but opens new opportunities for the manufacturer, distributor and customer to share information in new ways.

Product technology: Smart connected products comprise the third layer of technology by providing information about product status and use, and improving productivity and product life. Because we now have the data that allows us to talk about the specific performance of an individual valve or positioner, such as the number of cycles it has opened, we can make maintenance recommendations based on these measured values rather than industry averages. The result is that

these smart products will have a significant impact on customer value by enabling customers to extend product life or catch problems before failure, while creating new linkages between customers and suppliers to manage this information.

The impact on distribution is that the channels now must understand software, diagnostics, wireless networks, communications protocols and how to get information out of the system.

3. THE CHASE FOR VALUE

Every business wants to increase margins, so solution selling is on every marketer’s radar. Manufacturers are looking to sell broader solutions and are expanding to provide a larger piece of the bundle while distributors are providing baskets of solutions from technical support to integrated supply, project support and fabrication. They are developing marketing units to chase value propositions.

This could be an area open to potential conflict because the role of manufacturers and distributors could overlap.

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4. MARKET CHANGES

Customers are going global, consolidating and shrinking work forces, and facing increased pressure to reduce costs. These market changes definitely present challenges for manufacturers and distributors, but good news counteracts those challenges. While multiple forces push markets further offshore, the North American markets have exploded in oil and gas, leading to a renewed interest in manufacturing in the U.S., particularly in the process industries. Overall, this points to more growth in U.S. markets, but also offers global growth as industries grow in other countries. This means the need for effective distribution in multiple markets will continue to provide distributors with opportunities to invest in growth outside of North America.

5. CONSOLIDATION

Consolidation is occurring among both manufacturers and distributors. Manufacturers are growing the breadth of their product offerings by acquiring other manufacturers. Distributors are acquiring other distributors to expand market coverage, both geographically and in terms of service capabilities. All of this is in reaction to customers pushing for higher value from their suppliers. Customers are looking to reduce cost and streamline operations, resulting in more outsourcing of functions they consider low value. To do this, they are increasingly leveraging their suppliers' technical and logistical capabilities.

Both manufacturers and distributors see this as an opportunity to expand what they offer. Distributors, who are often closer to their customers both geographically and relationally, are leading the way by expanding the services they provide and capturing additional margins from these services.

THE RESULTS

The five disruptive forces that are moving distributors closer to their customers as service relationships intensify are also challenging distributors and manufacturers to deal with the rapid rate of technological change. These same forces are driving marketers away

from the traditional distribution role to new marketing paradigms (see "Paradigm Shifts in Distribution," page 42).

Manufacturers can successfully adapt to new realities by redesigning ecosystems (the entire network of organizations and relationships that impact a business) to provide greater value and to strengthen their relationships with distributors. Distributors can successfully adapt to this reality by increasing their level of engagement with their key suppliers while intensifying their customer service relationships.

The accelerating rate of technologi-

cal change will continue to challenge manufacturers and distributors to build business models and relationships that provide value to their customers and each other. This technological acceleration will also accelerate the rate of change in the distributor's role as well as manufacturer/distributor relations.

For more detailed information on successfully adapting to these changes, read the exclusive Web feature at VALVEMagazine.com. **VM**

STEVE BASSILL is president of QDI Strategies, Inc. Contact him at sbassill@qdistrategies.com.

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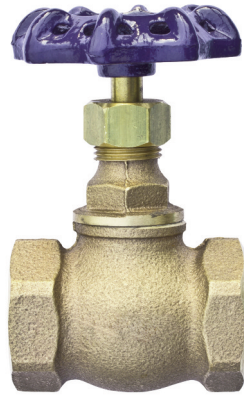
New API Standard for Globe Valves

BY JAVIER VERGARA

While the American Petroleum Institute (API) and other organizations published a variety of valve standards covering gate, ball, check, butterfly and plug valves for decades, the first for globe valves came out in 2013. It is API 623, Steel Globe Valves—Flanged and Butt-welding Ends, Bolted Bonnets. The size range covered by the valves in this standard is 2-24 inches, and the standard covers ANSI classes 150 through 2500.

API 623

Gate valves are governed by API 600 while check valve design is covered in API 594. Before the new standard API 623, it was common practice in the refining and petrochemical industries to see API 600 wall thicknesses referenced for a globe valve on a specifica-



tion sheet even though API 600 only covers gate valves. Wall thickness was really the only portion of API 600 requirements that could be applied to globe valves. (The other requirements of API 600, which govern stem diameters, packing sizes and gasket styles and design, did not apply.)

However, one of the biggest concerns facing the API 623 task force was with the issue of stem diameters. Since the force required to close a globe valve is much greater than a gate valve, the globe valve stem diameter requirements are often much larger. While each manufacturer had its own design requirements, an industry standard minimum for stem diameters of globe valves did not exist. API 623 has set that standard.

Additionally, globe valves are often

provided with stems made of austenitic stainless steels (i.e., 304ss, 316ss, 347ss). These materials are not as strong as the standard 410 stainless-steel stem material, so when the austenitic stems are specified, they must be larger in diameter or they can bend or buckle. The new globe valve standard addresses this concern by including minimum stem diameters that will work with austenitic stainless steels.

MINIMUM WALL THICKNESS

Before API 623 was created, the minimum wall thickness for globe valves was based on recommendations in the American Society of Mechanical Engineers (ASME) B16.34 standard. The minimum wall thickness specified in the new globe valve standard mirrors API 600 specifications and is greater than ASME B16.34. This additional wall thickness produces a heavier globe valve pattern and provides additional

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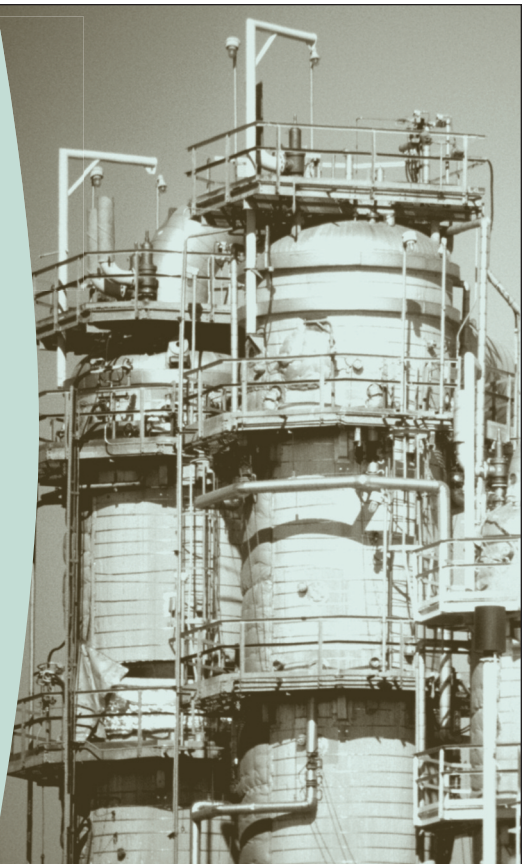
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corrosion and erosion resistance. The added wall thickness also helps to avoid deflection in the bonnets of larger-diameter globe valves, a phenomenon that often causes globe valve leakage because of the disc rising off the seat as the bonnet expands upward.

The new heavy-pattern globe valve will be useful in a variety of industries, including refineries, power generation and the chemical industry. In this era of less-than-optimal casting quality, the extra wall thickness will be appreciated by many end users.

The standard is applicable to a variety of body materials as selected from ASME B16.34 Groups 1 and 2. These material groups include plain carbon steels, stainless steels and chrome-molly alloys. The standard does not apply to ductile or cast iron valves.

SEATS AND SEATING REQUIREMENTS

As a valve design standard, API 623 affects all aspects of the globe valve. Since these valves are used primarily for throttling and regulating flows, the flow rate of various manufacturers should be close to API 623 globe valves. Although globe valves have a convoluted, restrictive flow path that affects fluid friction and flow rate, minimum seat diameters have been established that will standardize one of the key variables in the flow rate equation.

TRIM MATERIALS

Like in other API valve standards, there is a table of trim materials for API 623. This trim chart is similar to the one found in API 600. Materials include, but are not limited to, 410, 316, 304, Alloy 20 and others.

GASKET MATERIALS

There are several options for gaskets and gasket materials including:

- Metal ring joint
- Spiral wound gasket with filler
- Corrugated metal with graphite facings

One of the more popular valves found on the output side of steam boilers is the stop-check valve, which combines the operations of both a globe valve and check valve in one valve body. Stop-check and angle valves are within the scope of API 623 and are included in this new standard. However, pressure-seal valves are not.

Creation of any standard is a uniquely exacting process, one that takes the input of many people. It took about three years and countless hours from the standards team, which was led by Steve McJones of BP Global, to publish API 623.

However, the result provides a first-of-its-kind guidance that should be appreciated by anyone who wants the best-designed globe valves for the job. **VM**

JAVIER VERGARA is director of global quality at Industrial Valco, and was actively involved in the creation of this new standard. Contact him at jvergara@industrialvalco.com.



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Smaller Electric Actuators Fulfill Expanded Needs

BY CHRIS WARNETT



□ Oil and gas wells in remote locations often use the gas produced to power valves and equipment. Smaller electric actuators are a viable alternative.

The conventional perception of a motorized valve is one of a large isolating valve with a heavy-duty valve actuator, usually powered by a three-phase electrical supply. However, many processes require smaller valves, and those valves often call for small electric actuators for isolating and modulating applications. As a result, the number of these smaller actuators is steadily growing.

The HVAC industry has used small electric actuators on valves and dampers for some time. However, the increased need for smaller size automation for heavier industrial applications that operate in hazardous or hostile environments has created an additional need.

In recent years, valve actuator manufacturers have improved small electric actuators' performance. Part of the reason is that new technologies in electric motor design and more robust micro control circuitry make those improvements possible. As a result, reliability has increased and costs have decreased.

These improvements allow the demands of some applications to be met with both a commercially attractive and practical solution using motor-operated valves (MOVs), sometimes controlled from a considerable distance.

The higher efficiency of these actuators also means less power is needed to operate the valves. This is particularly important for applications in remote areas where the power distribution lines may not stretch. Even where power is available, it is often significantly less expensive to run low-voltage, single-phase or DC power lines compared to higher voltage, three-phase lines.

OIL AND GAS PRODUCTION

As energy and raw materials take on increased significance to the global economy, the search for new sources has spread into more remote locations. Oil and gas production and other industries are employing new technologies to exploit these less-accessible resources, and all of this has a direct impact on the production facilities and their associated control and instrumentation.

The rapid development of unconventional oil and gas sources also means more wells drilled in areas where there is no infrastructure to support conventional technology. These areas may be a considerable distance from a conventional electricity supply grid.

Previously, oil and gas well heads could use the gas produced from those wells to provide a power source to operate chokes and shutoff valves. However, environmental and economic concerns have decreased this practice. The environmental issues arise because the venting of natural gas is severely restricted in many countries to reduce greenhouse gas emissions. As for eco-

nomics, vented gas has a commercial value, so using it for power at the well site represents lost revenue to the producer.

Some installations have used solar-powered instrument air systems so they could avoid the use of gas. This has met with varying degrees of success, however.

Remote installations have been capable of control from a distance using telemetry powered by solar panels for some time because the power demand of the remote terminal unit is low enough to make this practical. However, to maintain continuous control of well-head pressure and flow rates, regular adjustment of the control choke valve is often required, which necessitates the use of an actuator.

Several companies manufacture small electric actuators that can be powered by a solar power pack. These actuators are DC-powered and can operate many different types of control chokes and other valves.

In applications where many sites are spread over a wide area, each site

□ The nation's water infrastructure is in need of immediate help. Smaller electric actuators allow responsive centralized control to manage pressure in the distribution pipework for leakage mitigation.



requires its own solar power pack. The larger the solar pack, the more expensive it is. For this reason, equipment that has a relatively high power demand carries a high commercial penalty.

The key constraint for these applications is efficiency of the power source available. This means that low-power-draw actuators are almost a necessity.

Two main factors impact the power draw of the MOV assembly: the force demand of the valve and the efficiency of the actuator. Some members of the control choke valve industry (which is centered in North America with a majority of manufacturers in the Gulf region) are currently developing control chokes that require less torque to operate. This allows a smaller actuator to be used that not only reduces the power usage, but also the cost of the actuator.

WATER DISTRIBUTION

Existing infrastructure often can be retrofitted to improve or extend its operating life. While this reality applies to any of the individual industries that make up this infrastructure, one place where inexpensive compact actuators are making a difference is with old plants and the power and control mechanisms that run them.

For example, in many cities around the world, water distribution systems have been in place for many decades. Leakage is inevitable and rampant with many of these systems, and as systems age, the leakage rates increase. In fact, estimates are that over 1 million miles of leaking water distribution pipes in the United States need replacing. The problems associated with these leaking systems are not limited to the loss of water but also include wasted energy and physical damage from erosion.

Leaks can be mitigated by reducing pressure during off-peak, low-demand hours. By reducing system pressure, the rate of flow through a leak can be reduced. To orchestrate this pressure management, close control of the multiple regulating valves in a system is required.

Here's where compact electric actuators come into play. These smaller actuators are ideal for precisely controlling the pilot pressure activation of larger pressure-reducing valves in the distribution system. The physical constraints of

sub-surface valve pits, as well as the damp environment, combine to require robust, compact electric actuators that can operate frequently and reliably to adjust the main valve position. These valves then can be controlled from a central location to reduce leakage in an entire municipal area.

Ultimately, the best way to reduce leaks is to repair or replace the miles of leaking distribution pipes. But this requires time and resources. Meanwhile, the control of pressure in the system can be implemented relatively quickly and cheaply. By using centralized control of hundreds of pressure-regulating

valves, a municipality can implement leak mitigation in a shorter time frame.

As these two examples of industry use show, there are many processes and places today where smaller electric actuators are coming into play. To respond to those needs, manufacturers are using new technology to develop actuators that can make a difference. **VM**

CHRIS WARNETT is the principal of CPLloyd Consulting Inc., providing marketing and applications expertise for the valve and automation industry. He has over 37 years of engineering, sales and marketing experience in valve automation. Reach him at chris@cplloydconsulting.com.

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The Case for Magnetostrictive

BY CHRISTIAN DOW

Today's petrochemical and process industries increasingly depend on higher levels of automation, which in turn require enhanced monitoring and control of valve position and operational readiness. In the past, many valves were deployed without any monitoring devices; however, today's processes require feedback not only for valve position monitoring but also for remote or automated control of valve actuators. In addition to new valves with feedback installed on projects, existing valves are being retrofitted with feedback devices or upgraded with more modern feedback technology. One of those is Magnetostrictive Linear Displacement Transducers (MLDTs).

SHORTCOMINGS OF TRADITIONAL TECHNOLOGIES

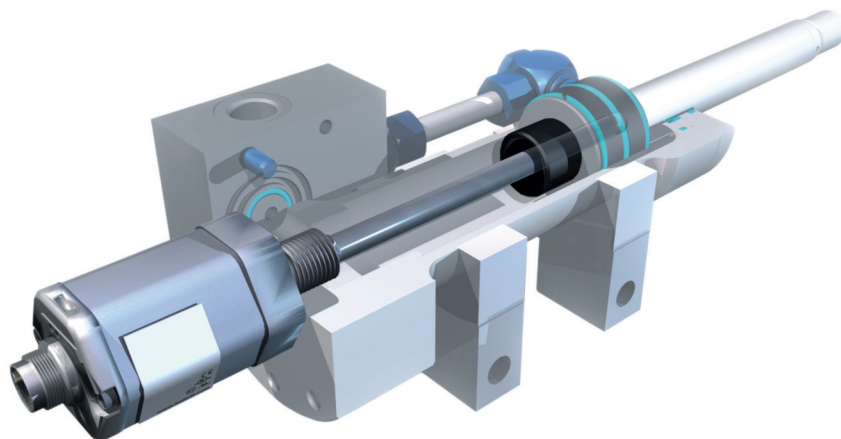
Many basic valves employ simple end-of-travel detection with low-cost, electro-mechanical switches and magnetic reed switches. In the case of automatic control valve actuators, a wide variety of position feedback devices are typically used. Some actuators incorporate conventional position measurement technologies such as geared rotary potentiometers, string potentiometers or Linear Variable Differential Transformers (LVDTs).

Magnetic reed switches can break, seize or have contacts that stick together because they hold residual magnetism or become welded in the closed condition by arcing or overload.

Mechanical switches often use an extended lever arm, which is vulnerable to bending or breaking. Also, internal moving parts eventually break or seize, and the contacts may become welded from arcing/overload. Precise adjustment of the switch point can be time-consuming and frustrating.

LVDTs provide absolute position measurement. Although rugged, they often require external processing electronics and are expensive or become technically unfeasible as measured lengths increase.

Geared rotary potentiometers (pots) and string cable-pull pots (encoders)



□ Illustration of MLDT inserted into a gun-drilled cylinder.

are absolute position-indicating devices. Mechanical and electric wear issues may occur over time, which can lead to noisy intermittent signals or mechanical operational failure.

SHIFT TO MAGNETOSTRICTIVE TECHNOLOGY

MLDTs can serve as an upgrade for traditional devices, providing longer life and more reliable sensing. As a result, MLDTs are becoming more and more popular in valve position feedback applications. These hardy and reliable position sensors have been commonplace in manufacturing and energy production since the 1960s, in a diversity of industrial applications such as plastic injection and blow molding, tire manufacturing, forest products, hydropower, wind power, conventional utilities, petroleum storage and refining, and oil and gas pipelines.

There are many reasons the devices are increasingly being selected for demanding industrial applications. They are wear- and maintenance-free because of their non-contact operation, and they are insensitive to extreme environments that may include shock, vibration, temperature swings, contamination, moisture and electrical noise. The absolute output signal does not require homing, even after power interruption, and they come in a wide range of measurement lengths from 1-300 inches (25.4-7,620 millimeters (mm)).

HOW MAGNETOSTRICTIVE WORKS

MLDTs are essentially a time-of-flight device. Using the magnetostrictive principle, a momentary pulse of electrical current is applied to a copper wire that runs the length of a waveguide. The electrical current pulse sets up a temporary magnetic field around the waveguide, which interacts with a permanent magnet acting as a position marker. A phenomenon called the magnetostrictive effect causes a deformation of the waveguide and produces a mechanical wave that travels at a constant ultrasonic speed.

When the wave reaches a signal converter, it is changed from a mechanical deflection to an electrical signal. Precise measurement of the time (down to the picosecond) between the initial pulse and the converted signal reveals the calculated distance to the permanent magnet to a high degree of position accuracy, typically 0.001 inch (25.4 μm) with resolution as fine as 0.0004 inch (1 μm). The update rate is typically 0.5 millisecond (ms) to 1.0 ms depending on the total stroke length (shorter lengths can update faster).

VALVE POSITIONING APPLICATIONS

A common application for MLDTs is with cylinder position feedback for a valve actuator. These transducers can be inserted into a pneumatic or hydraulic cylinder that has a gun-

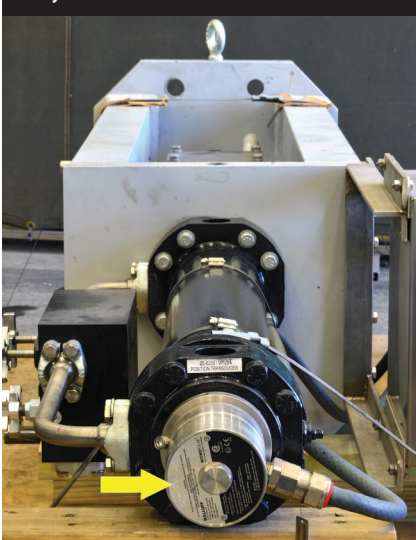
drilled rod. The permanent magnet would be attached to the moving piston. In this application, the MLDT would provide absolute feedback of the piston position inside the cylinder. Cylinders are often applied for linear valve applications for gate or globe valves, but also in quarter-turn rotary applications for ball and butterfly valves that employ actuators to turn linear motion into rotary position (e.g., scotch yoke, helical, and rack and pinion actuators.)

MLDTs also can be mounted externally to the actuator cylinder with a hovering or floating magnet slaved to a moving component on the mechanism. Depending on the application, the gap between the magnetic target and the MLDT sensing element can vary (even during operation) anywhere from 0.00393 inch (0.1 mm) to 0.59 inch (15 mm) without affecting the accuracy of the position reading.

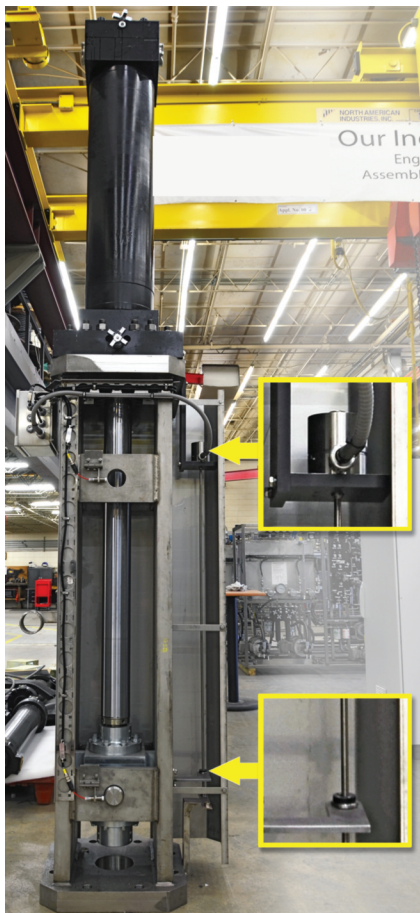
PARTIAL-STROKE TESTING

Partial-stroke testing allows an end user to test emergency shutdown valves while the valve remains in service. Exercising the valve using partial-stroke testing at regularly scheduled intervals allows longer periods of continuous operation between mandatory out-of-service testing. Using an MLDT, the valve can be tested by cycling it momentarily to any position from fully closed to fully open. The MLDT can also provide additional diagnostics such as velocity of the valve actuation. Data logging of the speed of valve move-

An MLDT is inserted into the end of a hydraulic cylinder in a valve actuator.



COURTESY OF BLAC, INC.



COURTESY OF BLAC, INC.

A second MLDT used for redundancy is mounted outside the actuator. The top arrow is pointing to the MLDT head and the bottom arrow is pointing to the magnet that is slaved to the valve actuator.

ment over time can help detect wear, corrosion or debris in the valve that could affect the fully open or fully closed positions, or cause delayed or slow operation in an emergency.

MLDTs FOR TOUGH APPLICATIONS

MLDTs provide a reliable method for position sensing. There are versions that can survive particularly tough applications from hazardous explosion proof with global certifications to severe wash down with globally rated IP69K (ingress protection rating) requirements. There are many different outputs ranging from fieldbus networks, analog (with voltage and current in various ranges), quadrature, CANopen protocol and more. Few technologies exist that can compete against the hardness and accuracy of these devices. **VM**

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Tapping into Wastewater Heat

BY LYNN MUELLER

Anyone who plans, builds or operates water distribution systems attaches great importance to efficiency as well as the reliability of system components. Today's pipes, valves and taps have been engineered to efficiently control the flow of water into our cities and our homes, and we depend heavily on those components to keep the systems running right.

As a result of this efficiency and dependability, hot and cold water is easily accessible in almost every American household and commercial building today. But after the dishes are washed, the clothes are cleaned and our hands or bodies are clean, the leftover warm (and sometimes hot) water flows equally efficiently right out of our homes and buildings and into our sewers.

What isn't so efficient about the system is that valuable heat energy exits along with the used water.

According to the U.S. Department of Energy, U.S. households flush 350 billion kilowatt hours of energy down the drain every year. Considering that Americans pay an average of 12 cents per kilowatt hour, this equates to \$42 billion dollars in wasted heat energy per year. This wasted heat also accounts for roughly 9% of U.S. residential carbon dioxide emissions.

For these reasons, it may be time to rethink the vision of what it means to plan, build and operate efficient wastewater systems to include sewage heat recovery (SHR).

RECOVERING ENERGY

As energy prices rise and solutions to mitigate climate change are sought, the interest in the concept of SHR has grown. Such systems apply currently available technologies to capture up to 95% of the heat in wastewater and recycle it back into buildings.

These types of operations have already been used in Norway, Japan



Raw sewage enters the system in the background and exits a filter in the foreground.



Sewage heat recovery system valves

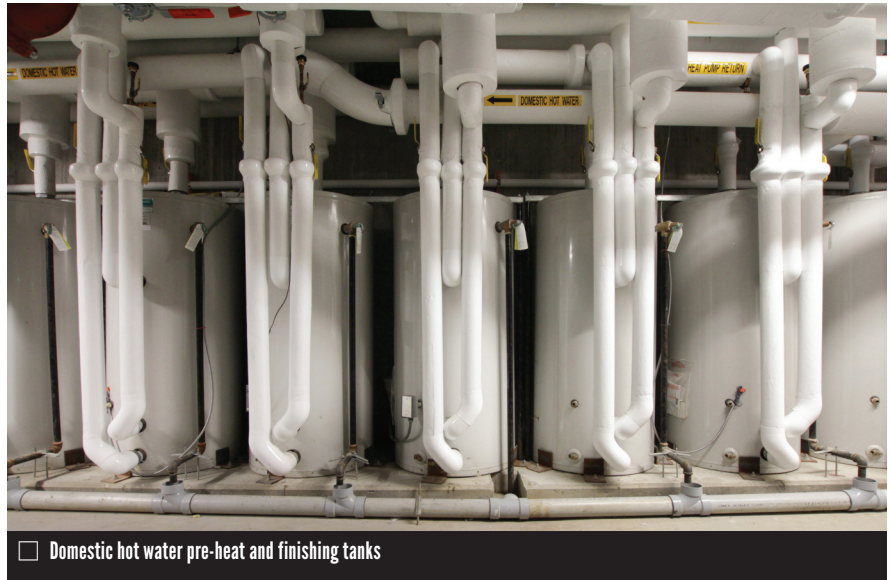
and China. In North America, forward-thinking cities such as Vancouver, Seattle and Philadelphia have also begun implementing SHR.

The simple fact is that water enters our buildings at 40-50°F (4-10°C) and leaves at 66-77°F (18-25°C). If this heat can be captured, it can be used to fulfill 40-50% of our buildings' energy requirements.

The technology is not complicated. First, a filter is used to separate out solids, which make up about 2-3% of sewage. Then, with the help of a heat pump and heat exchanger, the heat from the sewer water is transferred to clean water, and this warm, clean water is sent back into the building.

At the end of this cycle, the clear sewer water picks up the solids that were extracted at the start and flushes them back into the municipal sewer system.

In the summer, buildings with SHR systems can reverse their heat pumps and use the waste water to reduce a building's air-conditioning costs. In this scenario, the heat pumps extract heat from the building and transfer it through the exchanger into the sewer water.



VALVES USED

Generally, SHR systems use manual butterfly valves. Typically these valves are 4-6 inches but some are larger depending on the size of the piping, which is dictated by flow rates. These butterfly valves are designed for pressures ranging from vacuum to 300 psi/2065 kPa.

The valves feature a narrow profile disc design with a smooth, coated inner body for superior flow characteristics. This combination results in low

break-away torque, which reduces the gear operator and actuator sizing and costs. A standard polyphenylene sulfide blend (PPS) coating accommodates a wide variety of severe services. The dual-seal disc provides bubble-tight sealing in both directions without added valve modifications or cost. The piping material is stainless steel schedule 10.

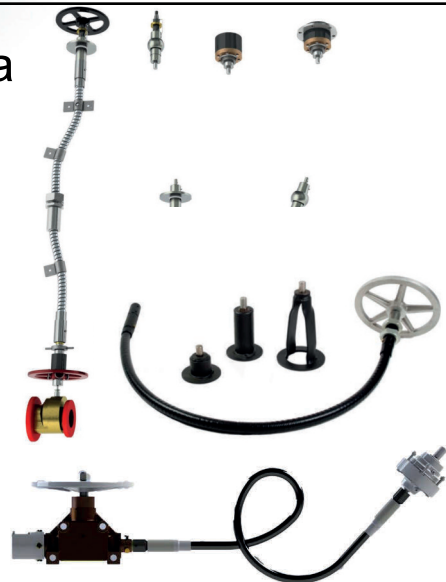
An automatic reverse flush addition uses a number of automatic butterfly

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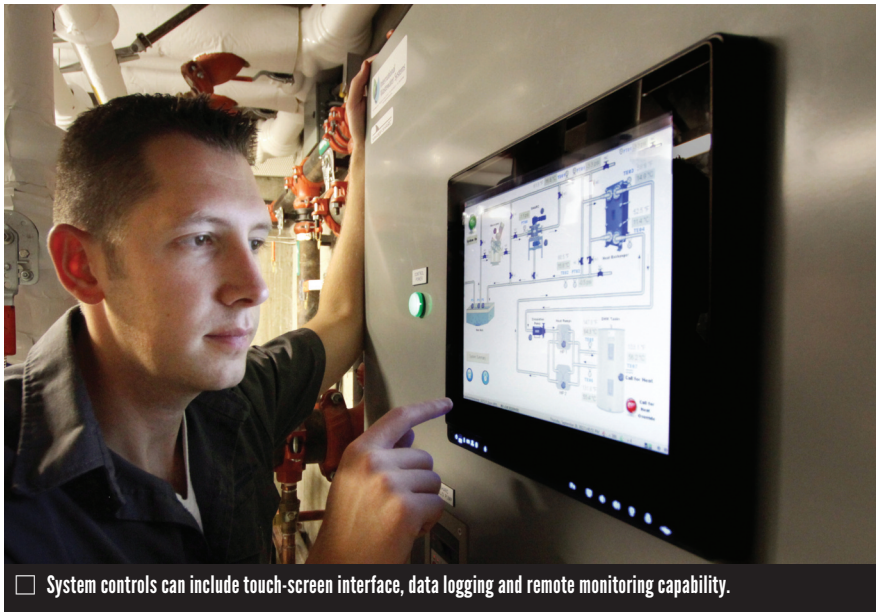
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□ System controls can include touch-screen interface, data logging and remote monitoring capability.

valves to control the reverse flush. This system can use as little as two, 3-way valves or four, 2-way valves, but for larger systems with multiple heat exchangers, there may be dozens of valves.

Actuators are electronic for these systems. At any given time, if a system senses blockage in the heat exchanger or if the pressure sensor shows elevat-

ed levels, the system will reverse flush out and then go back to normal. This can also happen automatically every three to four months, as specified by computer monitoring systems.

The heat pump-based water heaters use the same operating principles as an air conditioner or a domestic refrigerator. The pump gathers heat from

the warm water source, and through the refrigeration cycle, deposits the heat into clean water at a useable temperature.

Moving heat with a heat pump is best for conservation purposes because the heat is not generated by burning fossil fuel (i.e., natural gas) or by electric resistance. Water can be heated using one third to one fourth of the energy required by electric resistance or gas, depending on the temperature of the heat source supplied to the heat pump.

These systems can be highly efficient, operating at energy savings of 76% and operating at efficiencies of 500-600%, meaning that for every dollar spent on operations, \$5 worth of heat could be recovered.

INFRASTRUCTURE POSSIBILITIES

While sewage may seem like a dirty subject, it is quickly gaining the attention of clean energy specialists, partly because of SHR. The fact that SHR has a payback period of two to five years makes it attractive to building owners and managers.

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□ System components include the filter, heat exchanger and a control panel.



□ Quarterly maintenance is performed on this sewage collection wet well.

Meanwhile, progressive cities worldwide are exploring the concept of district-wide energy systems, including SHR, which can easily plug into this level of infrastructure. District energy systems are large-scale, multi-building heating projects that can supply energy over a large area using either recovered energy from other buildings, industrial sources, waste or by burning carbon-neutral fuels.

The beauty of SHR systems is they don't require a quantum shift in everyday lives or operations. Humans will

continue to take showers, wash their hands, do the laundry, flush the toilet. They might even leave the hot water tap on by mistake while running to grab a phone. Sewage heat recovery simply captures this wasted heat and reprocesses the energy to maximize benefits.

At the 32nd Annual Valve Industry Leadership Forum in January of 2014, Scott Graham from the global investment banking firm Jefferies noted that the water and wastewater sector accounts for 18% of the world valve

market, and he predicted steady growth in this sector over the next 20 years.

That means innovative solutions such as SHR could contribute significantly to future demand for valves in the water and wastewater industry. **VM**

LYNN MUELLER, an advocate of sustainable space conditioning energy systems for 25 years, recently started International Wastewater Systems (www.sewageheatrecovery.com). Formerly, he was president of Earth Source Energy Inc. and president of WaterFurnace Canada. Reach him at lynn@sewageheatrecovery.com

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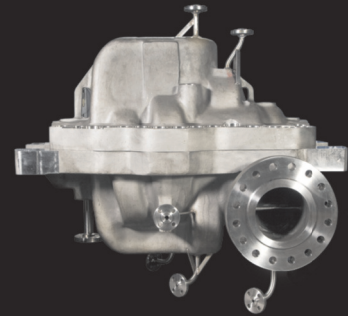
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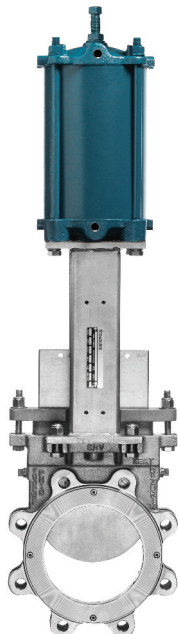
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FLOWSERVE introduces the Valtek GS globe control valve, a fully integrated valve package for general service continuous process control throughout the plant. The Valtek GS is an environmentally friendly control valve that complies with the latest standards for controlling fugitive emissions requirements (ISO 15848). The GS is based upon simple design philosophy of building an instrumented control valve package by providing automated calibration and some of the highest flow rates in a general service globe valve package—over 55 Cv in a 2-inch valve and nearly 150 Cv in the 3-inch model. The Valtek GS also accommodates a range of sizes and pressure classes.

DEZURIK announces the availability of the new KGC-MD maximum-duty cast knife gate valve, designed to provide the shearing and sealing capabilities needed in demanding services such as cyclone separators, recycle high-density cleaners, recycle detrashers or sand cleaners. The valve can be used in many applications in the pulp and



paper, mining, chemical, petrochemical, power, steel and food processing industries.

The KGC-MD knife gate valves are available in 3-24 inches (80-600 millimeters) sizes with metal or dual metal and resilient seats. To withstand highly abrasive media, the valves are available with a replaceable hardened seat, hardened gate, full 100% port opening, high-performance packing system with wire scraper rings, and heavy-duty superstructure.



CONVAL offers Clampseal throttling valves for severe service applications that require repeatable flow control and dependable shutoff. The valves are available in 1/2-inch through 4-inch sizes through ASME Class 4500. Standard forging materials include SA 105, SA 182-F22, SA 182-F91, SA 182-F92 and SA 182-F316.

The venturi is an integral part of the removable seat. Both the seat and the stem assembly are easily changed in-line should a change in flow characteristics be required or replacement necessary from excessive corrosion or erosion. The orifice is sized to keep fluid velocity across the seat below damaging levels. The exit orifice angle is designed to minimize downstream piping erosion and noise.

METSO's Neles ceramic E-series control valve line has been expanded to NPS 08 (DN 200) in pressure Class 300 (PN40).

The E-series valve works in many



energy and hydrocarbon processes, as well as in mining and minerals processing, where metallic materials and coatings fail due to high erosion. With the E-series control valve, plant runtime can be extended and lifecycle costs minimized. Pulp mills with capacities of up to 1.5 million tons have been able to use this new valve size to meet the demand for severe control applications and to reach larger dimensions. The Neles ceramic control valve series E2/E6 uses a field-proven design with solid ceramic trim components to cover the whole wetted flow passage.



VAL-MATIC's newly acquired Quadro-Sphere ball valve line has a unique contoured ball featuring four recessed surfaces creating additional paths that allow the flow and particulates to move freely above, below and around the sides of the ball when moving from closed to open position. Seat ring contact to the ball has minimal contact area, which reduces wear and operating

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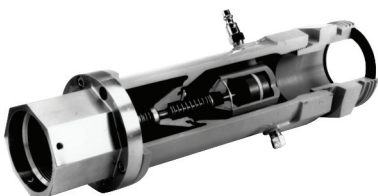
torques. With a fraction of the resistance across the seating surfaces when cycling, wear is reduced up to 70%, which improves the performance life of the ball and seats. It is available in sizes 2–24 NPS and in ASME pressure classes 150–2500.



UNITORQ introduces the new UT-ZM declutchable gear override available in torque outputs ranging from 1,770 to 61,995 inch-pounds.

An Isolation Safety Option provides internal porting that automatically blocks and releases air from the actuator, making operation of the gear safer and easier. Internal porting also eliminates the need to assemble extra tubing, tees, valves and fittings, making installation easier and safer.

All overrides feature a corrosion resistant housing that conforms to IP67 protection standards, sturdy die cast aluminum hand wheels, stainless steel declutch bars, and spring-loaded pins that lock the unit into position.

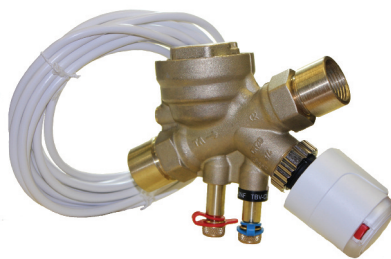


EMERSON PROCESS MANAGEMENT has released the new Fisher Type N863 *Snappy Joe* emergency shutoff railcar valve with up to twice the flow rate of the previous N562, offering a significant reduction in propane railcar loading/unloading time.

The Fisher railcar valve was originally developed more than 30 years ago and is the first and only emergency shutoff Valve (ESV) specifically designed for railcars in the propane

industry. It can be used with most compressed gases such as propane, anhydrous ammonia, natural gas liquids, aerosols, etc.

The new N863 design greatly increases flow capacity, up to 413 gallons per minute, depending on system piping and flow capabilities.



VICTAULIC announces availability of the industry's first pressure independent balancing and control valve from Tour & Andersson. For the first time when commissioning and balancing a building, mechanical contractors can take direct flow measurements, which allows for on-the-spot diagnostics and problem solving.

The TA Series TCP PIBCV outperforms traditional PIBCV products as the balancing and control valve functions are separate with full stroke EQM modulation, providing control valve authority regardless of preset position.



GARLOCK recently made available in the U.S. a line of valves based on the company's original PTFE-lined butterfly valve design. The line includes four valve designs for high-volume flow management and shut-off applications in the chemical and petrochemical processing industries, and in other markets where caustic, toxic and abrasive media must be controlled. All four Garlock butterfly valves feature a new ultra-low fugitive emission design, compliant with ISO 15848-1 Leakage Rate A, as well as TA-Luft, and are certified as suitable for use in an SIL 3 environment.

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