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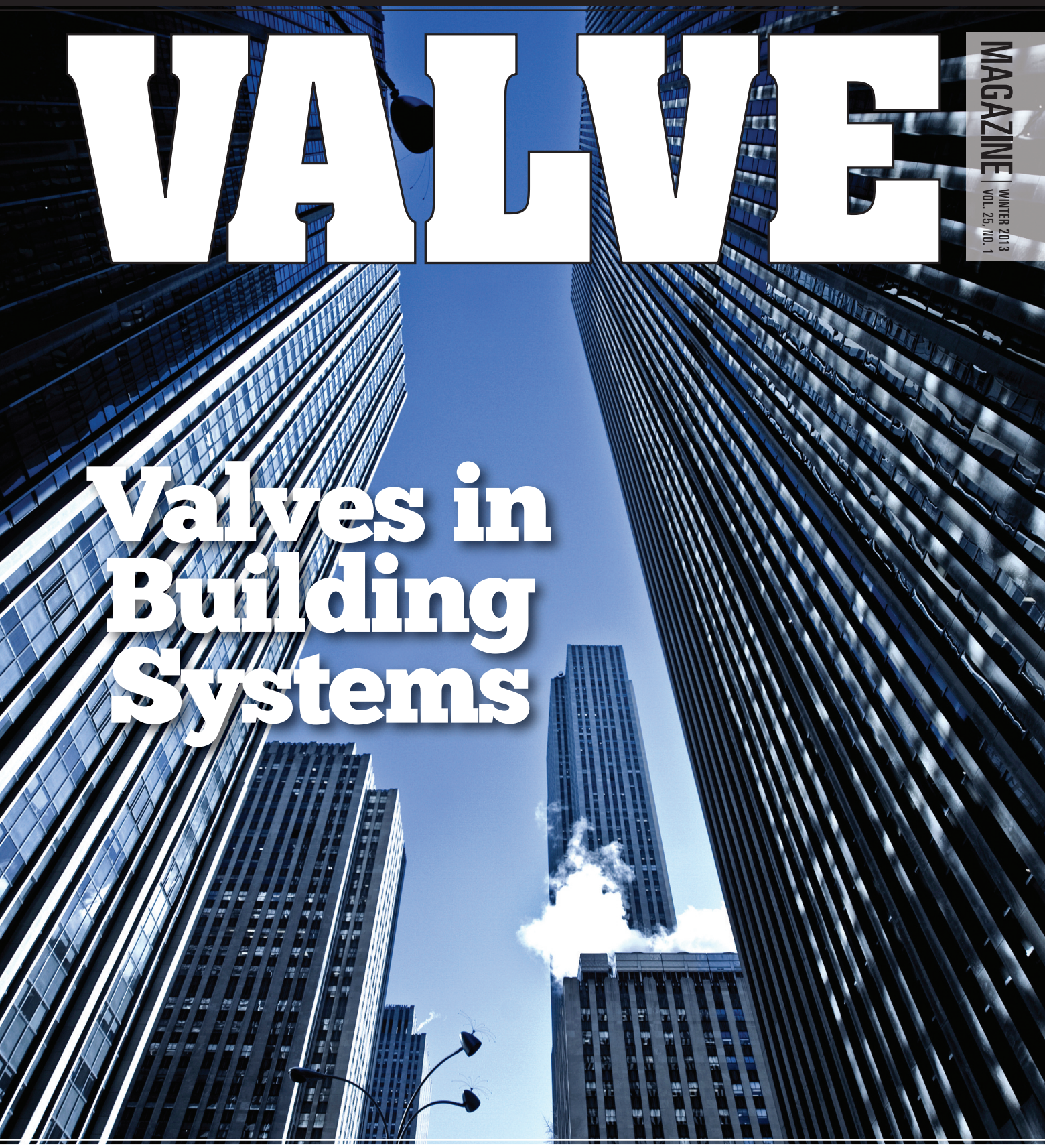
VALVE

MAGAZINE
WINTER 2013
VOL. 25, NO. 1



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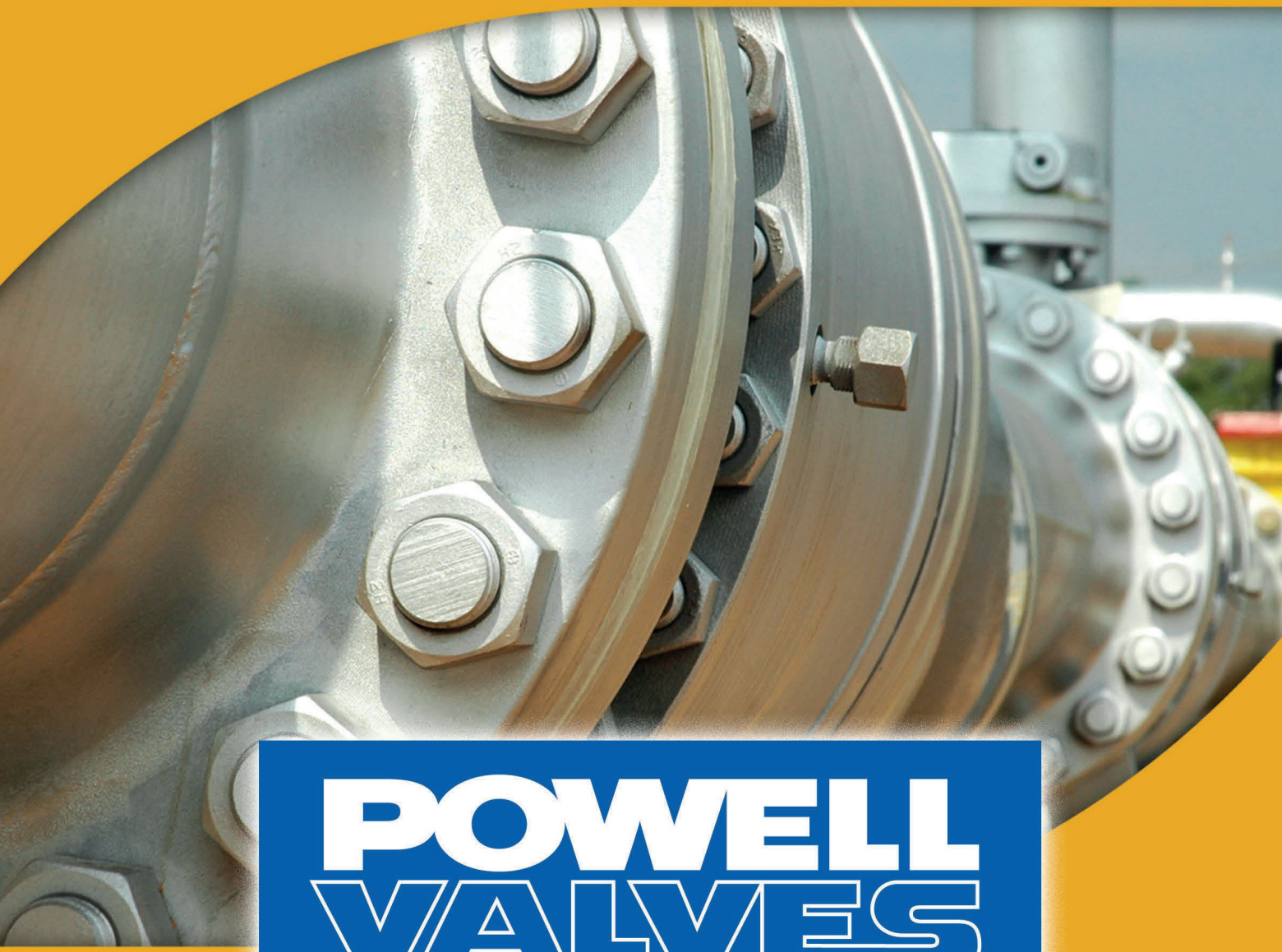

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VALVE MAGAZINE
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VMA 75 YEARS
VALVE MANUFACTURERS ASSOCIATION OF AMERICA
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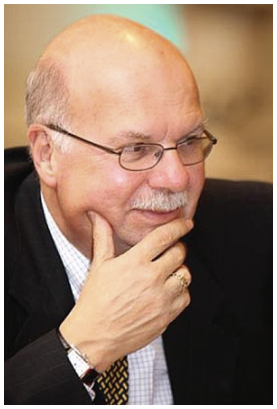
2013—Emphasis on the Next Generation



Since 2010, we have experienced continued growth, and indicators show we can expect more strong performance into 2013 and 2014.

To look further into the future, however, we need to consider the next generation of valve industry professionals. We know that a large chunk of expertise will be leaving the industry, so VMA and its members are preparing to replace that knowledge by reaching out to individuals new to the valve and actuator field. We need to address the gap we know exists between the knowledgeable and the novices.

As a first step towards narrowing this gap, the VMA Board approved an initiative on education and training in 2009 that is expanding every year. We have successfully published two compilations of articles from VALVE Magazine and we've provided highly successful seminars on the basics with attendance far exceeding all expectations. Our Basics-in-a-Box program has become a shining star. New products planned for 2013 include online education as well as continuation of basic seminars for new professionals in our industry. Plans are also in the works to expand these seminars based on comments from past attendees. We also have been approached by two groups to bring our basics seminar to their meetings in 2013.

This educational effort is highly supported by VMA 2012-13 Chairman Mark Cordell of Cameron Valves and Measurement, who suggested a new initiative for this coming year, a "young professionals" committee. VMA has taken the reins of this idea and put together a group of five industry up-and-coming professionals to share their thoughts on the direction of VMA over the next decade. Mark and I have asked VMA Vice President Marc Pasternak to be staff liaison to this new committee, and committee members have already had their initial conference call.

This year as VMA celebrates its 75th Anniversary, let us remember that we are not only celebrating the past, we are also looking into the future of our association and our industry.

As always, we are open to suggestions for other activities you may want to see. Please feel free to contact me directly at wsandler@vma.org. VM

Bill Sandler
President
Valve Manufacturers Association of America

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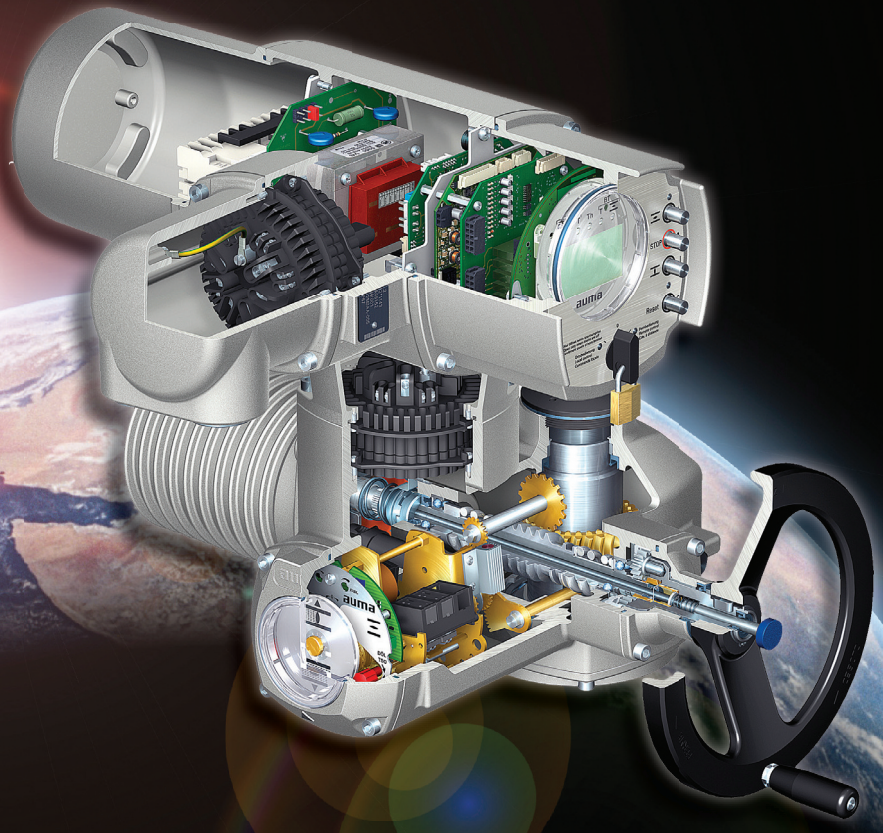

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Rotork Wins Third Landmark Judgment for IP Rights in China

With the award of another landmark ruling in the People's Court of China, Rotork has again successfully defended its trademarks. In the latest judgment, Shanghai Rotork Automation Instrumentation Co. Ltd. and Rotork Actuator Co. Ltd. (based in Zhejiang) were found to have infringed Rotork's English and Chinese trademarks. The court ruled those companies used the name Rotork either in English or Chinese on products and in advertising for goods not covered by their China-registered trademark, and as a result, created a misleading and undesirable influence in the market for Rotork's electric actuator products.

ACQUISITIONS & AGREEMENTS

Curtiss-Wright Acquires Cimarron Energy, Inc.

Curtiss-Wright Corporation has acquired the parent of Cimarron Energy Inc.—Cimarron Energy Holding Company LLC, for about $135.1 million in cash. Cimarron is a manufacturer of customized and engineered energy production, processing and environmental solutions for the U.S. oil and gas industry. The business will become part of Curtiss-Wright's Flow Control segment.

Founded in 1976, Cimarron is headquartered in Norman, OK, and has 368 employees. Its 2012 sales are expected to be about $124 million.

Anvil International Acquires North Alabama Pipe

Anvil International, a segment of Mueller Water Products, has acquired all assets of North Alabama Pipe Corporation (NAP).

Founded in 1983, NAP is a manufacturer of fire sprinkler fabrication equipment, including automatic welders, plasma cut-off equipment, hole-cutting equipment, make-on machines and pipe threaders. NAP also manufactures outlets for the fire sprinkler market. NAP first made a name for itself when it developed the "Hole System" that allows a plasma cutter to make holes in pipe.

Curtiss-Wright Flow Control and Rosemount Nuclear Instruments Sign Agreement

Curtiss-Wright Flow Control Company's Scientech business unit recently entered into a Technology Assignment Agreement with Rosemount Nuclear Instruments, Inc. to establish a continued source of supply and support for the Model 710 Trip/Calibration System line of instrumentation products. Scientech took over all design, manufacturing and field support for the 710 product line as of January 1, 2013.

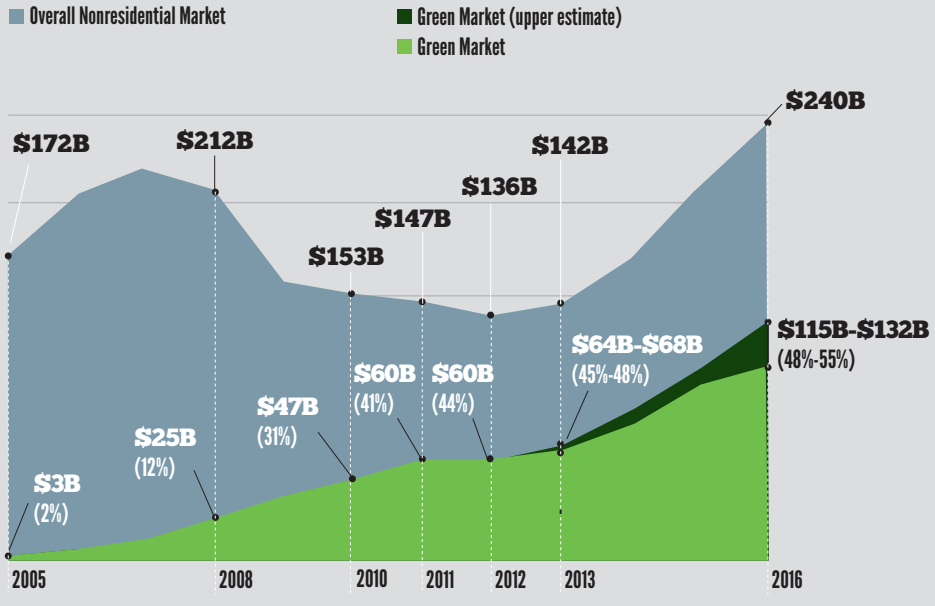
MARKET FOCUS: Green Construction on the Rise

The value of green building has grown to $78 billion (2011) from just $10 billion in 2005, according to McGraw-Hill Construction's 2013 Dodge Construction Green Outlook. Going forward, green is expected to represent 44% of all commercial and institutional construction in 2012 and up to 55% by 2016.

McGraw-Hill called green construction "a bright spot in a still uncertain economy" and said that by 2015, the total green building market (both non-residential and residential) will reach $204 billion to $248 billion (from between $98 billion and $106 billion in 2013).

Harvey M. Bernstein, vice president, Industry Insights and Alliances for McGraw-Hill Construction says, "Not only does this mean a strong outlook for green building, but also the benefits that go along with that: more jobs, greater financial benefits from green and high performance buildings, stronger competitive positioning for those firms that build green, and healthier work and learning environments for our population."

The outlook also says 81% of executive leaders in corporate America believe the public expects them to engage in sustainability—one of the key forces driving corporations to institutionalize some green efforts. Also, 30% of senior executive officers report that they are greening two-thirds of the buildings in their portfolio—with 47% expecting to do so by 2015.



Emerson Teams with Statoil to Provide Software for Oil/Gas Reservoirs

Emerson Process Management has teamed with Statoil to develop and test technologies for production planning and field management for oil and gas reservoirs. The technology improvement program is one of several projects Emerson is conducting for Statoil. Emerson recently signed agreements that position it to supply metering systems, as well as automation and safety systems, for Statoil production operations, and use of wireless technology on two offshore oil platforms.

AWARDS & MILESTONES

GE Energy Ad Campaign Takes Top Honors at BtoB Awards

A global ad campaign created by Eric Mower + Associates for GE Energy's Masoneilan and Consolidated valve solutions took top honors at BtoB magazine's Best Creative Awards competition. The "Valve Animals" campaign was named Best of Show at the award ceremony in New York City, edging out 45 other campaigns for brands including Xerox, H-P, Google and IBM.

The ads, which launched in September 2011, feature animal shapes formed out of control valves with witty headlines tied to each "animal."

ASCO Announces Winners of Industrial Automation Engineering Scholarships

The 2012 ASCO Numatics Industrial Automation Engineering Scholarships were awarded to Kelsey Johnson, Purdue University and Nathan Koetsier, Michigan Technological University.

ASCO Numatics awards the merit-based scholarships to U.S. engineering students pursuing careers in industrial automation-related disciplines. The company also makes $1,000 grants to the engineering department of colleges where the students are enrolled.

Victaulic Honored with Multiple Product Innovation Awards

The Victaulic Vic-Press system has been honored with two awards for product innovation. Vic-Press was selected as a bronze winner in *ACHR the News*' Dealer Design Awards and as the silver award recipient in the plumbing and water management category of Consulting-Specifying Engineer's 2012 Product of the Year Awards.

The Dealer Design Awards recognize contractor-oriented products with features that assist in installation, maintenance and service of installed products in the Heating, Ventilation, Air Conditioning (HVAC), Refrigeration industry.

The Consulting-Specifying Engineer Product of the Year Awards recognize new products in engineering markets such as HVAC, fire and life safety, electrical, and plumbing and water management, among others.

Emerson Process Management Reaches 1 Billion Wireless Hour Milestone

Emerson Process Management's technologies have clocked in more than 1 billion total hours of wireless operations across 10,000 systems. Since its release five years ago, Emerson estimates put the total installed savings resulting from smart wireless field devices at more than $350 million and reductions in commissioning and installation time totaling 16 man-years. The adoption of this technology has now spread to more than 120 countries.

NEW FACILITIES

Velan Opens New Offices and Plant in India

In December Velan Valves India Pvt. Ltd. (VVI) opened its new manufacturing plant in a special inauguration ceremony, presided over by Tom Velan, president and CEO of Velan. Stewart Beck, Canadian High Commissioner to The Republic of India, was the guest of honor and spoke about the tremendous growth in Indo-Canadian business.

The new 100,000-square-foot plant repre-

CONTINUED ON PAGE 8

CALENDAR 2013

JANUARY

28-30
AHR Expo
Dallas
www.ahrexpo.com

MARCH

7-8
VMA Technical Seminar & Exhibition
Charlotte, NC
www.vma.org

MAY

6-9
OTC 2013
Houston
www.otc.com

22-24
AFPM Reliability & Maintenance Conference & Exhibition
Orlando, FL
www.afpm.org

JUNE

9-13
AWWA's ACE 13 Conference & Exhibition
Denver
www.awwa.org

25-26
Valve World Americas Expo & Conference
Houston
www.valveworldexpoamericas.com

AUGUST

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

OCTOBER

3-5
VMA/VRC Annual Meeting*
Palm Beach, FL
www.vma.org

5-9
WEFTEC
Chicago
www.weftec.org

NOVEMBER

6-7
Valve Basics Seminar & Exhibits
New Orleans
www.vma.org

**Open only to VMA/VRC members.*

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

sents an investment of about $10 million for Velan and a growing commitment to serving the needs of the burgeoning industries in this important emerging country. VVI will begin producing small forged valves, and there are future plans to expand into other products that cater specifically to the Indian energy and fertilizer markets.

Pentair Expanding Minnesota Headquarters Following Merger with Tyco

Following the company's merger with Tyco Flow Control, Pentair will be expanding and adding jobs to its Golden Valley, MN facility. After signing a lease expansion in the Colonnade office tower, Pentair will increase its space to about 94,000 square feet, up 50% from the space it leased previously.

The company has more than 100 manufacturing facilities, which employ around 30,000. Minnesota itself accounts for about 2,000. Pentair has no immediate plans to close facilities as part of its cost-saving measures following the merger.

Victaulic Opens Facility in India

Victaulic announces the opening of its new facility and distribution center in Pune, India. The new 40,000-square-foot facility

includes extensive storage and local operations offices as well as visitor demonstration areas that will increase capabilities for customer demonstrations and installer training.

The Victaulic Mumbai branch will continue to handle other aspects of the business. The Pune facility is the most recent addition to Victaulic global investments and follows new locations in Dalian, China; Queretaro, Mexico; and Chihuahua, Mexico.

PEOPLE IN THE NEWS

CURTISS-WRIGHT... has elected **David C. Adams** to the new position of president and CEO, effective immediately. He'll report directly to Martin Benante, chairman of the board. Reporting to Adams will be the leaders of the three operating segments: Flow Control, Motion Control and Metal Treatment. Prior to joining Curtiss-Wright in 2000, Adams had 10 years' related industry experience with Goodrich and Lucas Aerospace. He serves on the board of governors of the Aerospace Industries Association.

CRANE CO... has appointed **Louis V. Pinkham**, group president, Fluid Handling. He's responsible for the leadership and management of the Fluid Handling businesses, which represent approximately 45% of Crane's revenues.

Pinkham was formerly with Eaton Corporation where his last role was senior vice president and general manager of the Critical Power Solutions Division, Electrical Group. Prior to joining Eaton, Louis held engineering and quality manager positions at ITT Sherotec Division, responsible for biopharm skid manufacturing.

QUADRANT... has named two industry veterans to key director level positions. **Ron Denoo** has been named global director of Research & Market Development. A mechanical engineer by trade, Denoo has spent his entire career in polymers, including 14 years as Quadrant's Global Market Development Manager.

In addition, **Kelly Edwards** is assuming the position of director of human resources for QEPP (Quadrant Engineering Plastic Products) Americas. Edwards has served Quadrant in a number of key positions within the HR department for more than 27 years.

ENERTECH..., a business unit of Curtiss-Wright Flow Control, has appointed **Bob Coates** as nuclear hydraulic service product manager. In this new role, Coates will report directly to Stan Miller, general manager, Enertech, based in Brea, CA.

Coate's responsibilities include enhancing field and factory service programs for Enertech legacy brand electro-hydraulic actuators. In addition, he will actively support global valve OEM customers in field commissioning of new equipment deliveries.

Valve Modification, Repair and Service

63,000 sq. ft. facility

Crane capacity up to 25 tons

For nearly a half century, United Valve has been serving customers on the Gulf Coast and around the world. To better serve these customers, we have moved to new, larger facilities in Houston, Texas. Our 63,000 sq. ft. plant features 5 bridge cranes with up to 25 tons capacity. Indoor storage space is provided for all critical components and sub-assemblies during repair or modification operations. Multiple dock-height doors and drive-in capability allow for rapid material loading and unloading.

Valve repair capabilities have been enhanced by creating generous-sized work areas for operations such as Coker ball valve repair and large diameter valve refurbishing. The spacious new plant also greatly increases valve modification workflow and provides space for 32 CNC and manual machine tools, eight welding booths and three heat-treat furnaces. In addition to the manufacturing space, the complex has a large conference room, training room, and 2,000 volume valve catalog and engineering library.

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VMA NEWS

VMA is continuing its work in 2013 to reach global end-users and to exchange ideas with its counterparts in other countries. Shown here at the 2012 Valve World Expo are (l to r): Michel Monier, Director of Nuclear Projects in China, Velan; Bill Sandler, VMA President; Song Yinli, Secretary General, China Valve Industry Association; Sheng Qing of Velan China; and Heng Shengnan of China Valve Industry Association.

What's Ahead in 2013

The year 2013 is a landmark for VMA, representing 75 years since the association was founded. A year-long celebration of the anniversary will culminate with the 75th Annual Meeting, Oct. 3-5 at The Breakers in Palm Beach, FL. VMA President Bill Sandler says, "VMA has planned a number of special activities during the year as both a celebration of the rich history of the industry and a continuation of association goals."

Much of the celebration leading up to the annual meeting will be driven by a public relations and outreach campaign led by the VMA Communications Committee "to spread the word worldwide about the high-quality, engineered products manufactured by VMA's U.S. and Canadian membership," according to committee chairman Mike Rooney of Emerson Process Management, Valve Actuation.

VMA will release a video featuring members talking about their experiences with the association, the benefits of membership and why end users should consider working with VMA members. A "microsite" will be created on VMA.org, to include those interviews as well as spots with other key figures from the association's past, anecdotes and articles about VMA's history.

A special commemorative program will be published in the fall of 2013, featuring the history of VMA and profiles of long-time members, along with a special anniversary issue of VALVE Magazine.

EDUCATION AND ENGAGEMENT

VMA Vice President Marc Pasternak will head up a new Young Professionals Committee, which will be tasked with giving a fresh perspective to association activities. The committee will pursue new directives that can help the industry grow and prosper.

As 2012-2013 VMA Chairman Mark Cordell explains, "we need to appeal to the youth of our business because if we don't, no one will be there to take over as we retire."

Also, the highly successful series of basics seminars (more than 700 people to date have taken the Valves & Actuators 101 course) will be expanded in 2013. "Based on the feedback we've received, it's clear the industry is craving even more basic education," says VMA Education & Committee Chairman Greg Johnson of United Valve. A new 2-day Valve Basics seminar will include additional lessons on solenoids, limit switches, positioners and other valve accessories. The first expanded course will take place Nov. 6-7 in New Orleans.

Because VMA has been approached by other groups to bring the basics courses to their meetings, the association is now finalizing plans to present a 1-day course on May 21, prior to the start of the AFPM Reliability & Maintenance Conference in Orlando and the day before the official opening of Valve World Americas, June 24 in Houston.

The association is also developing an online educational program, scheduled for release later this year, as well as an update of the popular Basics in a Box onsite training program.

In addition to the Valve Basics Seminar & Exhibits, open to everyone in the industry, VMA offers another program that welcomes participants outside the association: the Technical Seminar & Exhibition (see full coverage of this year's March 7-8 event on the opposite page).

SPREADING THE WORD

One of Cordell's goals for the association is to address the best way to react to the challenges of globalization and the need to expand membership possibilities. Because of this, the association plans to deepen its membership by allowing distributors to become associate members and expanding VMA's international activities. The association is already represented at several major global valve and actuator events and is looking to further that representation. In May 2013, VMA will send a delegation to Belgium to the annual CEIR Congress, the association's counterpart for European valve associations.

As far as spreading the word from these shores, the coming year will be noteworthy for the communications arm of VMA.

A new look for the association website, VMA.org, will be unveiled in the first quarter of the year. The site will have abundant information about valves and actuators, membership information, upcoming meetings and educational products available for purchase. The website also has a listing of all member companies, supplier members and Valve Repair Council members. In addition, VMA.org contains a Product Finder for valves, actuators, controls and related accessories, making it easy for end users and others in the industry to locate VMA member companies.

A major change to the magazine website, VALVEmagazine.com, has already been launched. While the communications team at VMA has been expanding editorial content online for the last few years, much of that information was not visible. The goal of the new look is to make it clear to all visitors the abundance of information available on topics related to the valve and actuator industry, driving even more visitors to the site and providing more visibility to the U.S. and Canadian valve industry.

The year 2013 is also a milestone for the printed version of VALVE Magazine, which has grown from about 2,000 subscribers in its early years to 75,000. The magazine is celebrating its 25th anniversary through a new design and special editorial.

Also being introduced this year is the bi-weekly VALVE eNews for VALVE Magazine readers, which allows the editors to connect more frequently with readers by sharing the latest industry news and links to just-published articles. "As a result, we expect to see even more visitors to our websites and further expansion of both the magazine and the association's reach in the U.S., Canada and abroad," notes Editor-in-Chief Judy Tibbs. VM

VMA Technical Seminar & Exhibition: Trends in the Power Industry

Kevin Geraghty, vice president of Power Generation, NV Energy, Las Vegas, is the featured keynote speaker for the VMA 2013 Technical Seminar and Exhibition March 7-8, 2013 in Charlotte, NC. Geraghty, who spoke at VMA's Market Outlook last fall, will lead off a packed technical program devoted to "Valve and Actuator Trends for the Power Industry" by looking into the future at where the industry is heading.

Also featured on the technical program are:

- **David W. Gandy**, program manager, Technology Innovation, Electric Power Research Institute, who will talk about emerging technologies
- **Tom Love**, senior engineer, Duke Power, Oconee Station, who will address fossil power gas-fired plants, and **Bill Newell**, Euroweld Ltd., who will focus on fossil power in coal-fired supercritical plants
- **Neal Estep**, senior specialist & project manager, KALSI Engineering, Inc., who will address valve qualification and life extensions for nuclear power plants
- **Ken Juncewicz**, senior principal engineer, GE-Energy, who will speak on fabrications and hard facing required for performance of base material
- **Elaine Thomas**, director of metallurgy, Bradken Tacoma (Atlas), who will talk about C12A casting
- **Scott L. Smith**, senior vice president and general manager of CFM/VR-TESCO, LLC, who will address AE field welding/repair/failure.
- **Paul Major**, manager, design, nuclear, Velan Valve Corporation, who will discuss valve standards, specifications and codes in the power industry
- **Mark Buzell**, product manager, SMART products, METSO who will talk about diagnostic and predictive maintenance in the SIL/HART realm
- **Justin Ledger**, project manager, and **Bill Breitmayer**, national sales manager, power industry products, AUMA Actuators, Inc., who will present the latest design and technologies for actuation in power applications.

The technical program also includes panel discussions covering the topics addressed during the two-day event.

In addition, vendors to the power industry will be on hand March 7 to show off the latest and greatest products and services in a tabletop exhibition.

The event is located at the Hilton Charlotte University Place. For information, contact Angela Hingston-Oliver at ahingstonoliver@vma.org or go to www.vma.org.

WHERE VALVES ARE USED

Behind the walls: Valves in building systems

BY GREG JOHNSON

Commercial buildings are all around us, but unless we pay close attention during their construction, we have no concept of the multitude of fluid arteries hidden within the walls of masonry, glass and metal. Those pipelines carry everything from water to critical gases, and the buildings couldn't function without them.

The common denominator among buildings is water—all commercial buildings contain piping systems carrying many combinations of the hydrogen/oxygen compound in the form of potable water, wastewater, hot water, grey water and fire protection.

SAFE FROM FIRE

From a building's survival standpoint, fire protection systems may be the most important of the water systems. Fire systems in buildings are almost universally fed and filled with clean water. For these systems to be effective, they must be reliable, have sufficient pressure and be conveniently located throughout the structure. Two primary systems deliver this combustion-quenching liquid: sprinkler systems and hose connections.

The sprinklers are usually installed in the ceiling of each

Executive Summary

SUBJECT: Today's building systems move many types of fluids and gases through their lines to keep operations such as HVAC, fire protection, water and wastewater functioning. Valves play a key role in keeping those systems flowing.

KEY CONCEPTS:

- Fire protection
- Potable water systems
- HVAC
- Special needs of high rises
- Manufacturing facility needs

TAKE-AWAY: The complications of the inner workings of today's buildings present a number of opportunities for valve use.

☐ OPPOSITE PAGE: Equipment used in running modern office building water and air conditioning systems

floor. These systems are designed to automatically energize in case of a fire. Hose connections, which are called standpipes, exist at various locations in a multistory building and are designed to extend the reach of a fire department's hose without having to drag hoses up into tall buildings.

Design and installation of fire sprinkler systems, including valving, is directed by the National Fire Protection Association (NFPA) document 13, Standard for the Installation of Sprinkler Systems. Additional NFPA standards cover different aspects of fire protection piping.

The two water arteries of sprinkler and standpipe lines have to have sufficient water pressure to provide the necessary flow to fight a fire. For low-rise structures, the piping pressures are nominal, usually less than 100 psi, so many different materials of construction will suffice. However, ductile iron and bronze are the materials of choice because of their low cost and ease of manufacture.

In general, city water supplies are in the 40–100 psi range, which is sufficient for fighting fires in most low-rise buildings. But what happens when the building is higher than that? To answer that question, we need a little refresher on physics and gravity.

Each foot of height provides or consumes .43 psi of pressure, so an average pressure loss for a 12-foot floor is about 5.16 psi. For this reason, pumps have to be used to energize the lines and provide the minimum sprinkler operating system. Where these pumps are placed depends on the height of the building. In the case of very tall, high-rise buildings, pumps and related piping move into the 300–600 psi working pressure range. This higher pressure requires higher-rated piping components, including valves. In many older buildings, a water tank has been located on the rooftop to provide immediate water pressure for most floors. However, the water tank first has to be filled via a pumping system.

A man-made shake-up has occurred in the clean water industry recently in the form of an amendment to the Safe Drinking Water Act.

CLEAN WATER

While fire protection water may be the most vital water in a building's piping system for safety reasons, the buildings could not function without potable water. Clean water is used for drinking, restroom facilities and a host of other building needs. Piping for these systems follows the general tenants of firefighting piping, in that iron and bronze are used, and pressures are moderate. Both firefighting piping and water piping predominately use grooved mechanical connections on their pipes, valves and fittings. These mechanical joints, as they are sometimes called, have some flexibility, as well as the ability to adjust for small miscalculations in piping alignment. In areas that are earthquake-prone, the grooved piping also handles the shakes and sways so that pipes don't break.

LOW-LEAD REQUIREMENTS

Speaking of earthquakes, a man-made shake-up has occurred in the clean water industry recently in the form of an amendment to the Safe Drinking Water Act that limits the amount of lead in potable water piping systems components, including valves. Effective Jan. 4, 2014, the maximum allowable lead content in pipe, valves and fittings in drinking water components will be limited to .25% by weight. This has required a major change in the chemistry of the cast bronze material used to make valves. (The previous lead limit as listed in ASTM B61, Standard Specification for Steam or Valve Bronze Castings, was 3%.)

When a building's water system is connected with the city water supply, contamination is always a concern. The clean water in the mains can be at risk if contaminated or non-potable water in the building's water system is drawn back into the main. To prevent this, plumbing engineers resort to backflow prevention technology. These devices are usually made up of valves in series, including two check valves. The devices ensure that any downstream overpressure or upstream vacuum will not draw unwanted water back into the clean water stream. Nearly every plumbing code requires the use of such devices.

☐ Bronze is the material of choice for many of the low-temperature, low-pressure valve applications in building systems. Bronze is well-suited for lower temperature steam and water service.

HVAC

Although water systems are the main focus of general commercial piping, they are not the only fluid plumbing engineers must focus upon. The heating, ventilating and air conditioning (HVAC) side of buildings has its own complex piping system and valves.

The oldest HVAC fluid is steam, which has been used in heating systems for over 100 years and is still very popular in the northeast. Direct steam heating uses low-pressure steam provided by an in-house boiler or purchased from a municipality. The steam is piped throughout the building and regulated into radiators to disseminate the heat.

If steam is generated on site, the boiler and associated equipment is valve intensive. These boiler systems are treated just like their big brothers at the power plant so high-temperature steel valves and piping are normally used. Class 300 steel valves are very popular in this type of application.

As an alternative to steam heat, many facilities use hot-water climate control systems. The lower-than-boiling-point hot water systems require a much less robust piping system than what is used for steam. Elastomer-seated ball valves and rubber-lined butterfly valves are often used in this service, with bronze and iron the material of choice.

For large-scale commercial and industrial air conditioning systems, a central chilling unit often is employed. These central units distribute chilled water at about 40°F (4°C) to each desired location. An additional line returns the warmed water to the chiller to be re-chilled and used again. Valves for chiller applications are mainly quarter-turn types, with the butterfly valve being the first choice of HVAC piping engineers. A large central facility such as those found on college campuses or in medical complexes could contain miles of piping and hundreds of valves.

HEALTH CARE FACILITIES

Some of the more critical piping systems in buildings are found in the walls of hospitals and medical facilities. These buildings use numerous fluids and gases that all must be safely and securely handled. The NFPA 99 document, Health Care Facilities Code, is the guiding document for hospital and health care center piping systems.

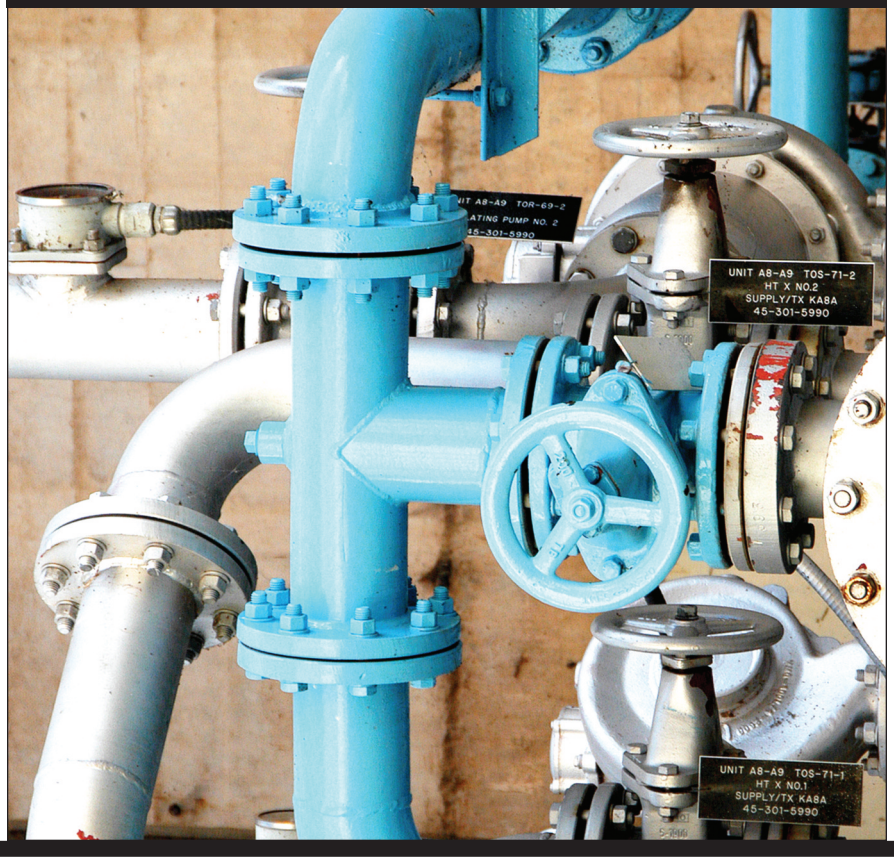
Virtually every room in a medical facility contains an oxygen source so the oxygen distribution system is extensive. The outlets are all fed from carefully designed distribution piping systems that are valve intensive. Because of its ability to support combustion, oxygen has to be carefully handled. It only takes a drop of oil and a spark in an oxygen line to cause a huge fire. For this reason, all valves and piping in oxygen lines have to be thoroughly cleaned and degreased before and after installation. The cleaning procedure is detailed in the Compressed Gas Association (CGA) document 4.1, Cleaning Equipment for Oxygen Service.

Most oxygen is stored on site in its cryogenic liquid state, which allows for more fluid in the same amount of space. Cryogenic compatible system piping is required for these applications. For valves, this usually means that the stems are extended so the packing will not freeze. Cryogenic ball valves also often require specially designed seats that will energize at the ultra-low temperatures. Other gases that require special piping systems include medical air and nitrous oxide.

Beyond gas piping, hospitals also have vacuum systems with outlets in most rooms. These require special vacuum piping systems. Vacuum piping and valves are usually cleaned prior to installation to remove any contaminants. All of these medical gas and vacuum systems use materials such as bronze and stainless steel, with quarter-turn valves being the valve type of choice.

Medical facilities also require the usual water and fire piping systems, although the requirements are tighter and more detailed. Additionally, many medical facilities require "pure water" for many processes. This is water that is free from particulate matters, minerals, bacteria, pyrogens, organic matters and dissolved gases, all of which can be found in common potable water. The pure water piping system requires cleaning similar to what is required for oxygen service. Many different materials are used for pure water piping

☐ Chiller systems for HVAC applications often contain many valves. This image shows part of the piping system on an industrial chilled water system.



including stainless steels, aluminum, polyvinyl chloride (PVC) and acylonitrile butadine styrene (ABS).

MANUFACTURING PLANTS

Manufacturing facilities and assembly plants have their own unique requirements for piping systems. Some of these on-site plants have all the piping complexity of a small-town utility company.

The usual fire and water systems are required and depending on the products and processes involved, these systems may need to be more robust than those found in general commercial structures. On-site industrial boilers are often required to meet hearty steam requirements.

A common need in manufacturing is compressed air for powering equipment. Compressed air lines are fed from compressors, which are usually mounted in the ceiling area with drops at convenient points throughout the facility. These lines require a multitude of low-pressure valves to close off different areas for safety or expansion purposes. The bronze gate valve is still the first choice for this service.

Plants that perform precision painting and finishing activities, such as automotive industry facilities, require clean, silicon-free air for spray painting. Even a minute amount of silicon in the paint mix can ruin the paint. Valves and piping used in this service must be specially prepared, with valves cleaned in accordance with MSS SP-140, Quality Standard for Preparation of Valves and Fittings for Silicone-Free Service.

Although usually not piped facility-wide, pressurized hydraulic fluid often is used when high energy is required. These piping systems operate at working pressures up to 10,000 psi, so piping and valves must be carefully chosen to handle the high pressures.

GREENER SYSTEMS

Although green has become a religion for some people and political groups, the principles of green design in most cases are based on common sense, especially when you define "green commercial plumbing systems" as those designed to save energy and materials. In fact the concepts of energy savings are old school. One of the best ways to green success is tapping into under- or unused energy sources. The most successful of these so far has been geothermal, where ground-source heat pumps use the earth as a heat source in winter and as a heat-sink in summer.

In this typical sprinkler system valve installation in an industrial building, the piping includes iron and bronze, gate, globe and check valves. The main isolation valve is interlocked with the fire-alarm system and is activated when the valve is opened.

These systems are similar in concept to hot-water or chilled water systems in that they are considered hydronic systems, which means they use water to distribute or transfer heat through the piping system. An example of a green hydronic system besides geothermal would be using solar collectors to directly heat water in a piping system.

Geothermal systems require a quantity of piping, pumps and valving to function properly. High temperature is not an issue, and corrosion is minimal, so the popular water systems use piping materials of bronze, copper and PVC or chlorinated PVC, depending on the actual ground temperature. If size is an issue, butterfly valves are the best choice. For smaller diameter lines, ball valves or bronze gate valves work well. Control valves for this service are usually made of bronze.

Recycling, which traditionally meant collecting aluminum cans or scrap automobile, has been expanding into the reuse of water. This involves a separate piping system for grey water or reclaimed water, which is used for non-potable inside applications such as toilet flushing and outdoor applications such as landscaping. The two sources for this type of water are the drain lines of showers, washing machines and sinks, as well as the newest source, which is municipal or institution-wide grey water distribution systems.

Costs for creating dual water supply systems, potable and grey, are involved, but the increased plumbing system cost to the high-rise builder has been estimated at only 9%. Meanwhile, the addition of a second supply system means more pipe, valves and fittings.

CONCLUSION

When we consider the scope of piping systems in commercial buildings, we tend to think in terms of spigots and taps. But as this article has shown, from basic manual on-off valves to exotic HVAC control systems, those walls hide a lot more of the valve industry than what is needed for simply moving water through pipes. VM

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BACK TO BASICS

Steam Traps

BY TERRY ACERS

The Industrial Revolution of the late 1800s brought about widespread use of steam as a means of generating power, performing work and delivering heat to industrial process systems. While an effective and efficient means of providing heat and power, steam use brought several challenges, one of which is the effective removal of condensate to ensure thermal efficiency and prevent mechanical damage inside of piping, turbines and process equipment.

To meet this challenge, the steam trap was born. Today, as in its early days, the steam trap is the device primarily responsible for automatic discharge of condensate from steam systems. Effective use of these traps can ensure that maximum thermal efficiency is maintained at the same time that mechanical damage to equipment is avoided. Ineffective use of steam traps, however, can lead to accidents, reduced process capabilities and significant energy losses throughout a plant.

Steam traps are automatic valves that differentiate between steam and condensate. Their primary function is to discharge condensate from collection points in distribution piping and process equipment, and then close tightly on steam to prevent unnecessary energy loss. As the steam space in most systems is full of air at ambient temperatures, a secondary function is to vent air during startup.

STEAM TRAP APPLICATIONS

Steam trap applications can be understood best by dividing them into three broad categories: distribution drainage, forced heat process and steam tracing. By understanding the operating characteristics of each of these applications, proper steam trap selection and sizing can be performed.

Distribution Drainage

Distribution drainage refers to intermediate drain points between a boiler and equipment that uses steam within a plant (Figure 1). These drain points are known by many names, including drip legs, steam mains, manifold drains and risers.

For saturated systems, steam will always be condensing as it flows through the piping, resulting in condensate collecting at low points in the system. These low points must be drained to prevent condensate from building up and eventually joining the steam flow, which would cause waterhammer, a very dangerous condition resulting from condensate traveling at high velocities within a steam system. Waterhammer occurs when the high-density water meets a restriction in the piping—such as a control valve, an elbow or tee—creating violent pressure shocks. Many of the accidents involving steam systems result from piping or valve failure due to water-

Executive Summary

SUBJECT: Steam traps play a vital role in many of today's industries as they control steam and condensate levels, which affect performance and safety.

KEY CONCEPTS:

- The steam trap defined
- Where it's used
- What it does

TAKE-AWAY: Good choices depend on the challenges the trap will face, where it is in the plant and how long it must last. Bad choices could lose a plant millions.

A number of steam traps are installed on this condensate manifold in an oil refinery.

hammer. Effective drainage of distribution lines will ensure that only dry steam reaches critical points.

Distribution drains require steam traps to vent large amounts of air at startup, discharging high initial condensate loads resulting because steam piping is at ambient temperatures followed by low, hot-running condensate loads. After startup, steam pressures tend to be stable until a system shuts down.

Forced Heat Process

Forced heat process applications encompass most of the heating and process applications in industry, including air coils, unit heaters, shell and tube heat exchangers (Figure 2), absorption chillers, platen presses and autoclaves. These applications are characterized by elevating the rate of heat transfer to above that of simple convection by forcing product across one side of a heat transfer surface with steam occupying the other side. Forced heat process equipment has large internal steam spaces that are full of air at startup and must be purged for heat transfer rates to reach

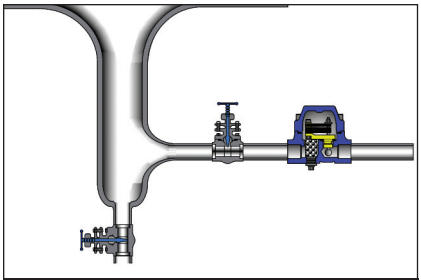


Figure 1. Steam drip leg on distribution system

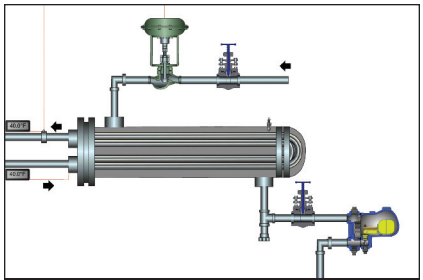


Figure 2. Shell and tube heat exchanger

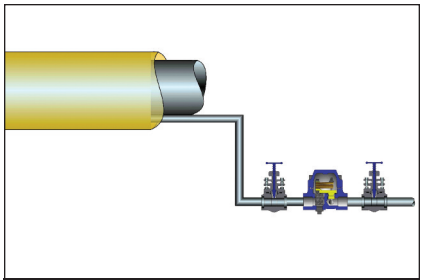


Figure 3. Steam tracing system on process piping

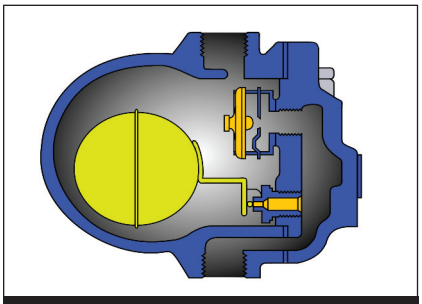


Figure 4. Float & thermostatic steam trap

their maximum. After the initial warm up, condensate loads can fluctuate rapidly as the forces driving the heat transfer rate will change due to product temperatures and flow rate. Steam supply is typically regulated by modulating control valves, resulting in changes to the differential steam pressure the trap is exposed to throughout the heating cycle.

Forced heat process applications require steam traps with large air-venting capacity, the ability to handle fluctuating condensate loads and the ability to handle fluctuating differential steam pressures.

Steam Tracing

Steam tracing is a method of providing freeze protection and maintaining temperature inside product distribution piping, instrumentation and storage vessels (Figure 3). Steam tracing consists of small-diameter tubing or piping, installed against the exterior surface of a product pipeline or vessel with insulation encapsulating both pipes. The tracing line is connected to a steam source at one end and a steam trap at the other. The heat from the steam tracer is transferred into the product pipeline, maintaining its temperature and/or preventing freezing. As steam temperature is determined by pressure, achieving the desired tracing temperature is simply a matter of controlling the steam supply pressure.

Most steam tracing applications require low-condensate capacity at relatively stable saturated steam pressures. However, steam tracing on high-temperature process piping can result in superheated steam being produced and reaching the trap, a factor that should be taken into account when selecting the proper steam trap.

TYPES OF STEAM TRAPS

Steam traps manufactured today fall into three major categories based on operating principles: mechanical, thermostatic and thermodynamic. These operating principles tend to determine the applications for which the steam trap is most appropriate.

Mechanical Steam Traps

Mechanical steam traps operate because of the difference in density between a liquid and gas. The most common types of mechanical steam traps in use today are float & thermostatic (Figure 4) and inverted bucket (Figure 5).

Float steam traps consist of a cast iron or steel body containing a sealed float connected to a valve mechanism. When condensate enters the trap body, the float becomes buoyant, opening the valve and releasing the condensate to the discharge side of the trap. When all condensate has been drained and the trap body fills with steam, the float keeps the outlet valve closed, preventing the loss of live steam. Since the float mechanism responds in the same way to air as it does to steam, by keeping the valve closed, a separate thermostatic element is often added to the steam trap to control the discharge of non-condensable gases. These thermostatic elements consist of either liquid-filled bellows or bimetallic plates. With the addition of such elements, the trap becomes a float & thermostatic (F&T).

F&T steam traps are most appropri-

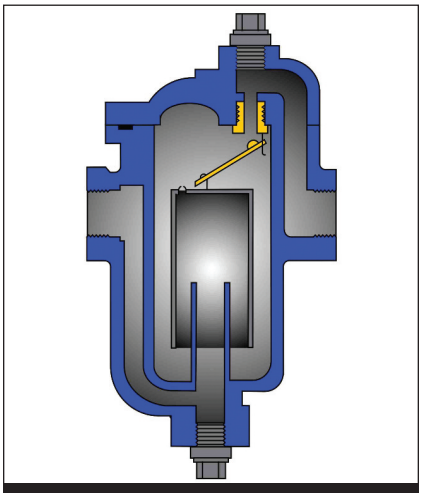


Figure 5. Inverted bucket steam trap

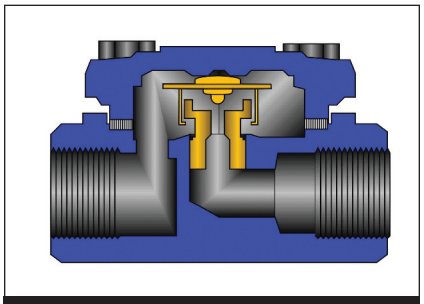


Figure 6. Thermostatic bellows steam trap

ate for low-pressure distribution drainage applications as well as forced heat process applications at low to medium pressure. By discharging condensate at steam temperatures, these devices ensure efficient drainage of process equipment. However, the thermostatic element tends to make them susceptible to damage by superheated steam as well as waterhammer. F&T traps can fail in both the open and closed position. Failure in the closed position can lead to significant damage to process equipment from freezing.

Inverted bucket steam traps consist of a cast iron or steel body containing a bucket, open on the bottom, connected to a lever valve located in the top of the trap (Figure 5). When condensate is present, the bucket sinks to the bottom, opening the lever valve and allowing free discharge of condensate. When steam or air enters the trap, the bucket becomes buoyant, floating upwards and closing the lever valve. Air is vented continuously through a small hole in the top of the bucket. However, when all air has been purged from the system, steam is continually lost through the air vent hole and periodically discharged through the lever valve as the bucket loses buoyancy.

Inverted bucket traps can be installed on both distribution drainage and forced heat process applications. These devices discharge condensate at steam temperature, making them well suited to draining process equipment. However, the limited air-venting capacity requires that a secondary air vent be installed in parallel on equipment that has large air-venting requirements or frequent start-up and shut-down cycles. Inverted bucket traps should not be installed on superheated steam applications because the excess heat

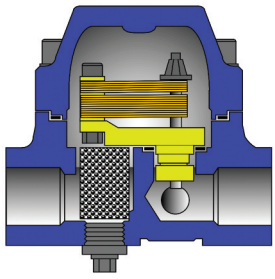


Figure 7. Thermostatic bimetallic steam trap

will cause the internal water prime to be lost, resulting in the frequent and premature failure of these valves.

Thermostatic steam traps

Thermostatic steam traps operate through a temperature difference between steam and condensate. While steam and condensate can exist at the same saturated temperature, the thermostatic trap takes advantage of the tendency of condensate to rapidly lose temperature when it collects in dead legs off of the main flow path of the steam line.

Thermostatic steam traps employ two different mechanisms for sensing condensate temperature: liquid-filled bellows and bimetallic plates. Bellows-type steam traps (Figure 6) use hollow metallic bellows filled with a liquid that has a slightly lower boiling point than pure water. When the system temperature reaches the flash point of this liquid, the bellows expands, closing the valve before steam reaches the trap. As the temperature drops, the bellows contracts, opening the valve and allowing condensate to be purged.

Bellows traps tend to be suitable for low- to medium-pressure distribution drains and tracing. They can only withstand a small amount of superheat in the steam. Failure can be in either the open or closed position.

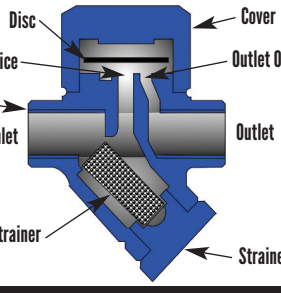


Figure 8. Thermodynamic disc trap

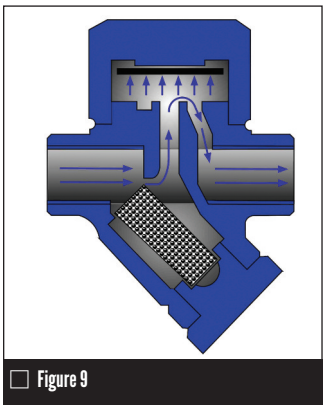


Figure 9

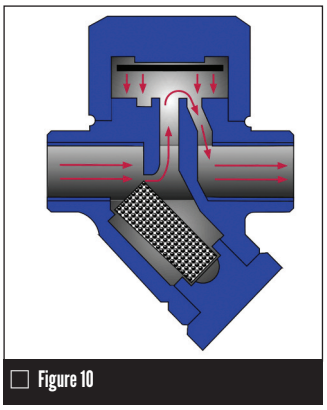


Figure 10

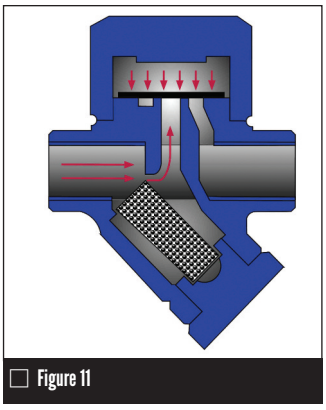


Figure 11

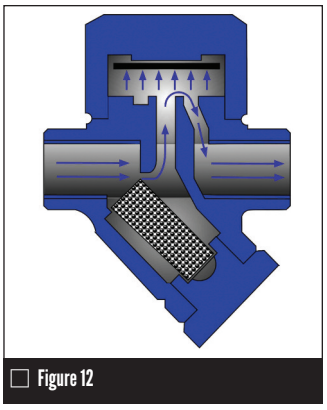


Figure 12

Bimetallic steam traps (Figure 7) employ a bimetallic plate or stack of plates to sense condensate temperature and actuate the discharge valve. Bimetals consist of a cohesive plate made from two metals having a different coefficient of expansion. When exposed to temperature changes, the plate bends or deflects in a predictable way.

Bimetallic designs are suitable for distribution drainage and steam tracing at low, medium and high pressures. The inherent durability of bimetallic plates make them ideal for superheated steam applications as well as use on saturated systems where waterhammer may occur. Although sub-cooling requirements vary from one bimetallic design to another, bimetallic steam traps are not generally thought to be the best choice on forced heat process applications where condensate discharge at steam temperature is required. Because the valve resides on the downstream side of the orifice, bimetallic steam traps incorporate a built-in check valve and tend to fail in the open position.

By discharging condensate at temperatures below that of steam, thermostatic steam traps typically maintain higher operational efficiencies than steam traps of other designs.

Thermodynamic steam traps

Thermodynamic steam traps are cycling devices that operate on the difference in flow velocity between liquid and gas. The most popular style of this type is the thermodynamic disc trap (Figure 8) or TD trap. TD traps consist of a cast or forged-steel body and cover with a free floating disc resting on the top of both the inlet and outlet orifices (Figure 9).

Upon startup, the differential pres-

sure across the trap pushes the disc off the seating surfaces and flow begins. When the condensate is evacuated from the system, steam flows through the trap, increasing the flow velocity (Figure 10), creating a low-pressure area below the disc, pulling it onto the seating surface. As the disc seats, the greater surface area of the disc stops the flow.

The steam trapped above the disc keeps the disc seated (Figure 11). As radiant heat loss from the cover and body of the TD trap causes the steam trapped above the disc to condense, the disc lifts off of the seat and flow commences, causing the cycle of discharge and shutoff to continue (Figure 12).

Despite some manufacturers' assertions that flash steam is responsible for the closing of the TD trap, testing demonstrates that live steam loss is necessary for the cycling action of the TD trap to occur. This steam loss has been found to be, on average, 0.032 pounds of steam per cycle. At current energy rates, and a cycle rate of 6 times per minute, the steam loss necessary to operate a TD trap is more than $1,000 per year.

TD traps are widely used on distribution drains and steam tracing for low-, medium- and high-pressure systems. Their compact size and relatively low price point make them attractive to plants that have large populations of steam traps. Failure mode of the TD trap is in the open position.

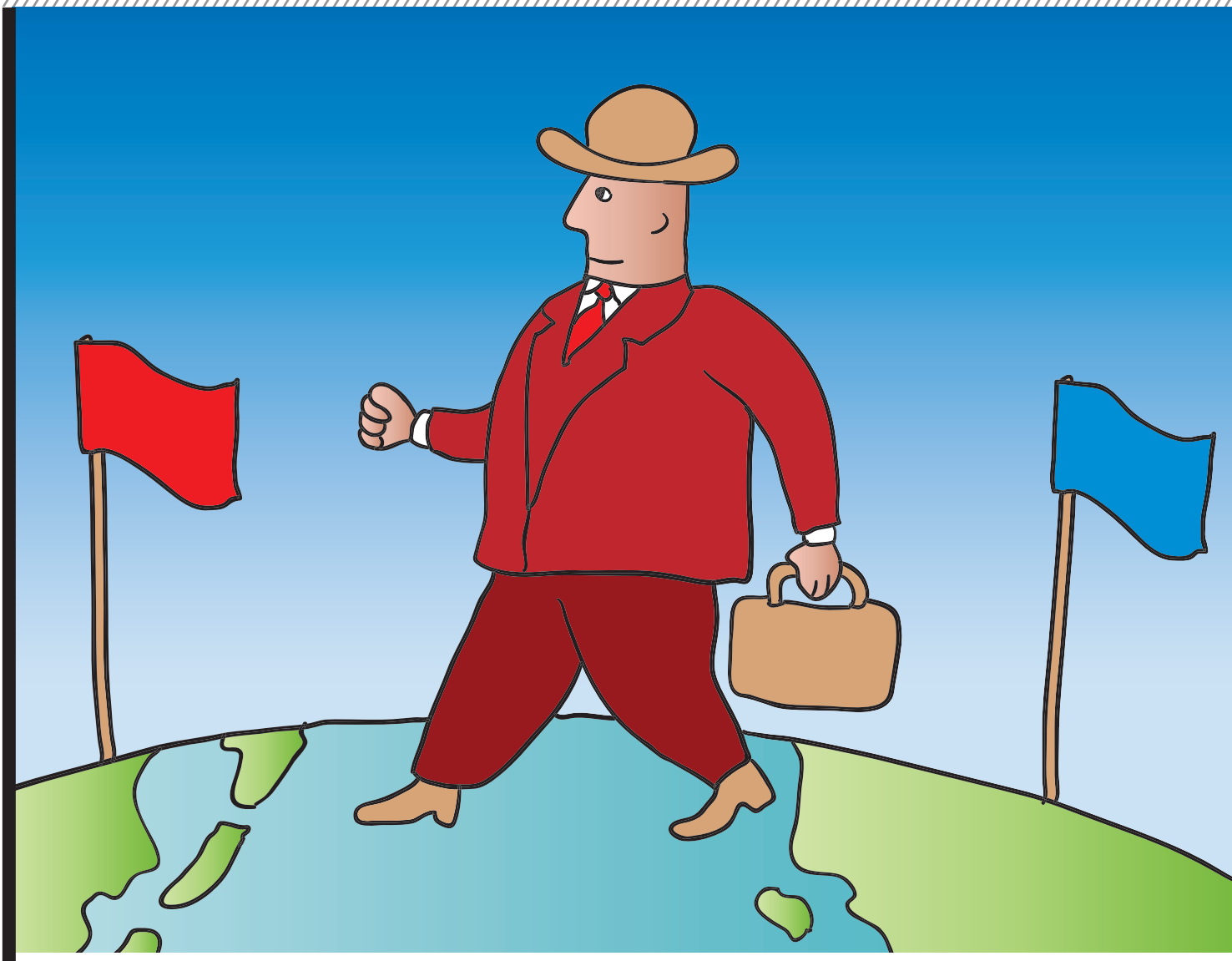
ENERGY CONSIDERATIONS

As with all mechanical equipment, steam traps are subject to wear and failure at any point in their life cycle. However, steam traps present a much larger potential to produce energy losses than many other types of valves. Many steam traps fail in the open position, resulting in large and unrecoverable losses of steam. Consider that a steam trap with a quarter-inch orifice installed on a 100 psig system can lose up to $15,000 per year if not repaired. This can be a very expensive prospect in most plants where steam trap populations can sometimes number in the tens of thousands. Also, failure rates can typically reach 10% annually, underscoring the need for a comprehensive testing and repair program for traps. Many companies provide steam trap testing and diagnostic services. Facilities that do not currently conduct an annual steam trap audit or have a testing and repair program, should contact their steam trap vendors, who can point in the right direction for getting trap failures under control.

CONCLUSION

The commercial landscape of steam traps around the world is populated with many choices. Because of the varied requirements of different applications in industrial plants, regional preferences, or sales and marketing history, plant engineers today are faced with a wealth of options for meeting their condensate drainage challenges. The success or failure to choose the right steam trap depends on the ability of the design-maker, who must meet the requirements of specific applications and match those requirements to the capabilities of different steam trap technologies. VM

TERRY ACERS is vice president of the James D. Acers Company, a master distributor for Velan Steam Traps. Reach him at tacers@velansteamtraps.com.



Reshoring movement builds momentum

BY HARRY MOSER AND MILLAR KELLEY

This article is a follow-up to the VMA & VRC 2012 Annual Meeting presentation by Harry Moser, founder and president of the Reshoring Initiative. The non-profit Reshoring Initiative is dedicated to helping companies understand the true cost of offshoring by using Total Cost of Ownership (TCO) analysis. The initiative provides free TCO estimator software, as well as a database of more than 300 reshoring articles and case studies where companies can share their experiences with reshoring.

Executive Summary

SUBJECT: Reshoring is based on the economic logic of producing near the customer. This logic applies to valve manufacturers and end-user companies in their own sourcing decisions and in their sales efforts vs. offshore competitors.

KEY CONCEPTS:

- Total cost of ownership
- Reshoring considerations
- Cost reductions
- Local sourcing

TAKE-AWAY: Companies can use total cost of ownership as a tool for showing that outsourcing may no longer be the way to save money and may instead be holding them back from efficiencies born from closeness.

As companies adopt more comprehensive total cost analyses, they are finding that offshore labor rates have risen enough that the "hidden costs" of offshoring often counterbalance savings from lower pricing. China is a good example since labor rates have been rising there at about 18% per year. Because of those rates, as well as other reasons, a new trend in sourcing decisions for U.S. manufacturers is emerging: reshoring or returning to local sourcing.

This shift in understanding and approach has major positive implications both for individual companies and the national economy. Reshoring can improve the bottom line for many companies while it also brings jobs back to the nation and makes the U.S. more self-sufficient.

Some analysts also say Americans increasingly prefer American-made products. If this is true and the resurgence of American sourcing continues, this nation may well see a large reduction in imports, which could be the most efficient way to lower the trade deficit, and thus the budget deficit and unemployment.

Analysis of user data shows that using TCO instead of price in sourcing decisions makes a difference in 41% of cases, and that about 25% of what has been offshored would come back if all companies used TCO instead of price for decision making. Figure 1 shows how the initiative came to that conclusion. It is based on the most recent 27 cases of China vs. U.S.

From this data, we concluded that the use of TCO instead of price could change the sourcing decision on 41% of the cases. The initiative uses a more conservative figure to say we believe it would change the decision in about 25% of cases.

Based on analysis of articles in our Reshoring Library, the initiative calculates that about 50,000 manufacturing jobs have been reshored in the last three years, representing about 10% of the total increase in manufacturing jobs since the low of January 2010. If the current trend of increased TCO use is paired with other favorable trend factors, the potential for reshored jobs is estimated at up to 6 million (Figure 2).

Figure 2. Potential for Reshored Jobs

Scenario	Manufacturing Jobs*	Total Jobs**
Today: If all companies used TCO (Reshoring Initiative)	~500,000	1,000,000
By 2015: If Chinese wage trends continue (~BCG)	1,000,000	2,000,000
Better U.S. training, process improvement, automation, tax rates (~Advanced Manufacturing Partnership)	2,000,000	4,000,000
End of offshore currency manipulation	3,000,000	6,000,000

Number of jobs and scenarios are cumulative. Assumes a low 1.0 multiplier effect*

For this potential to be realized, however, more companies must adopt TCO analysis.

In its March 12, 2012 "Made in America" report, the Boston Consulting Group (BCG) identifies seven industry sectors as being at or near the tipping point, where it will make economic sense for sector production to return to the U.S. if companies look at TCO. Several of those sectors are relevant to valve manufacturing and use. Those industries are:

- Transportation goods
- Computers and electronics
- Fabricated metals
- Machinery
- Plastics and rubber
- Appliances and electrical equipment
- Furniture

REASONS FOR RESHORING

TCO analysis helps to objectively identify, forecast and minimize total cost, including rising costs of wages and currencies in countries with low labor costs and low energy and transportation prices. However, other factors, such as risks of supply chain shocks and disruptions caused by natural disasters and political instability, also play a role in the current shift back to this shore. Figure 3 shows the frequency of reasons cited for reshoring.

How to Calculate TCO

To determine the TCO with the initiative's TCO Estimator, users assign a value to each factor that is relevant to that specific case. The tool then accumulates a single cost value for a product sourced from a particular supplier. Users repeat the process for each of their vendors, and can then objectively

Figure 3. Distribution of Reasons for Reshoring

Reason	Cases Cited
Wage and Currency Changes	54
Quality, Warranty, Rework	41
Delivery	38
Freight Cost	32
Travel Cost/Time or Local Onsite Audit	27
Inventory	25
Total Cost	20
Intellectual Property Loss or Risk	20
Communications	14
Image/Brand (prefer U.S.)	12
Loss of Customer Responsiveness	9
Emergency Airfreight	9
Difficulty of Innovation/ Product Differentiation	6
Natural Disaster Risk	4
Price	4
Green Considerations	4
Burden on Staff	3
Product Liability	2
Personnel Risk	1
Regulatory Compliance	1

Source: Reshoring Library 9/16/12

Figure 1. Summary of Users' TCO Results China vs. U.S.

Comparison Basis	U.S. % of China Price or TCO, average	% of cases where U.S. has the advantage
Price	169%	15%
TCO	96%	56%
Difference	73%	41%

compare the TCO for the same type of product from multiple vendors, whether that vendor is local or offshore. The costs addressed in the TCO Estimator, beginning with "hard cash" costs and progressing to more subjective measures, are:

1. **Cost of goods sold or landed cost** includes price, packaging, duty and planned freight such as surface shipment, fees and insurance.

2. **Other "hard" costs** are those that can be calculated and are highly likely to occur, including:
   - *Carrying cost for in-transit product.* Payment for foreign products often occurs prior to shipment whereas domestic shippers are paid after shipment. In-transit times are longer.
   - *Carrying cost of inventory on site.* On-site inventory will be dramatically higher for products shipped by ocean freight than for shipments from a local, just-in-time supplier. Large inventories associated with offshoring also are a risk in the next business downturn.
   - *Prototype cost.* Sourcing prototypes locally allows engineers and marketing organizations to work more effectively with suppliers during product development. Local suppliers typically charge less for the prototype if they also receive the production orders.
   - *End-of-life or obsolete inventory.*
   - *Travel costs.* Ongoing auditing and problem solving can have a notable impact on a product's total cost.

3. **Potential risk-related costs.** High-frequency risks, such as emergency airfreight, scrap and rework, to name a few, can be calculated based on past experience with an existing supplier. New products or new

HOW YOUR COMPANY CAN HELP

During the Sept. 22, 2012 presentation at the VMA & VRC Annual Meeting, the Reshoring Initiative learned that VMA members would buy more valve castings in the U.S. if the domestic castings industry could meet demand for size and delivery. The initiative has connected the American Foundry Society (AFS) with VMA to initiate discussions of how to bring back the casting sourcing, benefiting valve makers, foundries and the country. VMA will be communicating with members on how to participate in this effort.

In the meantime, here are some ideas for helping in the reshoring effort:

- ☐ Use the free TCO Estimator for more objective sourcing decisions and as a sales tool to convince customers to buy domestically instead of offshore. Contact the initiative for free help if needed in this area (harry.moser@ReshoreNow.org).
- ☐ Take advantage of webinars to educate staff and customers on reshoring. Archived webinars from the initiative are always on the website, but check the site also for live webinars.
- ☐ Submit reshoring case studies on the Reshoring Initiative's website at www.reshorenow.org.
- ☐ Check the Reshoring Library to see if any of your customers or prospects are reshoring.
- ☐ Post a link to the Reshoring Initiative website to help promote the trend.
- ☐ Participate in the AFS/VMA project.

suppliers will require estimates. Such risks include:

- *Rework*
- *Quality*
- *Product liability*
- *Intellectual property risk.* Approximately 5% to 7% of world trade consists of counterfeit or pirated goods.
- *Opportunity cost*
- *Brand image.* Consumers increasingly are buying locally made goods as a way to help the economy and their neighbors.
- *Economic stability of the supplier*
- *Political stability of the source country*

4. **Strategic costs** that may have an impact on strategy are considered as well. Such "costs" include:
   - *Impact on innovation.* Separating manufacturing from engineering degrades the innovative effectiveness of a company and its home country. Conversely, there is a large advantage for innovation that can be done within "clustering"—having suppliers, research universities, manufacturing, development and production located near each other.
   - *Product differentiation and mass customization.* It is easier and less costly to make the move to mass customization with short, tightly clustered supply chains.

5. **Environment.** Finally, for each product source, some companies measure the cleanliness of production. "Green" quantification will be added to a future version of the TCO Estimator.

MAXIMIZED STRATEGY

When it becomes clear that considering TCO carries little or no penalty for domestic sourcing, it is easier for a company to justify the reality that more emphasis and resources can be placed on strategies for product differentiation or product innovation because they can be maximized via local sourcing. A company might pursue local cost-reduction programs, for example, such as lean, theory of constraints, design for manufacture and assembly, quick response manufacturing, automation or training—programs that might seem insufficient with a 40% price gap but easier to justify at a 10% TCO gap.

TCO use and industry awareness of the potential benefits of reshoring are essential components of rebuilding the U.S. industrial base. When companies understand the total cost of ownership, they offshore less and reshore more. This is one reason why individual companies, educational institutions, Wall Street and consumers are starting to embrace reshoring. The White House is also taking note: In January 2012, the Administration hosted an "Insourcing Forum" (the initiative was on the agenda) and President Obama summarized in his 2012 State of the Union that, "…We have a huge opportunity, at this moment, to bring manufacturing back. But we have to seize it."[1]

TCO is showing more companies they can help both themselves and America by bringing back production. VM

Harry Moser is founder and president of the Reshoring Initiative. **Millar Kelley** is research analyst at the Reshoring Initiative. Both can be reached through www.reshorenow.org.

[1] "Management: How to Make It in America," Quality Magazine, April 6, 2012

Challenges and new solutions in the dry chlorine industry

BY BERT ELFERS

Dry chlorine gas is found within chlorine production, storage and transfer facilities, as well as in downstream processes such as production of vinyl chloride monomer (used in making polymer polyvinyl chloride) or phosgene (used in applications such as pharmaceuticals and organic compounds). Dry chlorine is generally understood to have less than 150 parts per million (PPM) water containment.[1] Moisture contamination in any of these dry chlorine service areas, however, can result in the formation of dendrites, crystal-like masses that can cause problems.

For example, research shows that dendrite formation on critical sealing surfaces, such as valve seats and packings exposed to extremely harsh operating conditions, leads to a significant increase in potential leak paths because of erosion of seal surfaces that come into contact with the dendrites. Dendrites can also form on contacting or sliding surfaces, causing valves to freeze or to become abrasive to the soft seat, which can lead

[1] The qualifying reading may not always be 150 PPM because chlorine at this and lower readings can become "wet" in sufficiently cool or cold conditions.

Executive Summary

SUBJECT:
Moisture contamination in dry chlorine service can result in dendrites, which can contribute to leaks. New high-performance valves can greatly lessen the potential for problems.

KEY CONCEPTS:
- Challenges of dry chlorine and dendrites
- Recommended materials
- Recommended design

TAKE-AWAY: In cooperation with end users, manufacturers have researched and developed new solutions.

☐ OPPOSITE PAGE: A dry chlorine application

to severe seat damage. In fact, any amount of moisture can lead to dendrite formation and rapid corrosion of moving valve parts.

Recent collaboration between valve manufacturers and end users has led to a clearer understanding of the factors that cause valve failure under these circumstances and factors that can increase service life of those valves. As part of that collaboration, researchers investigated construction materials that could combat moisture contamination and provide enhanced performance in harsh operating conditions, looking at each component of the valve for dendrite susceptibility. Suitable materials were identified, leading to designs that incorporate the appropriate combination of super alloys and stainless steel to allow for a cost-effective solution to these issues.

This article discusses the relationship between dendrite formation and valve life, and provides an overview of shortcomings that are now being overcome with these new designs and materials. Coincidentally, the improvements in design that resulted, combined with best practices for specifying features, has contributed to lower total life-cycle costs in the critical applications in dry chlorine services.

THE ISSUES INVOLVED

To understand the newer solutions and how they were derived, it is important to look at critical valve performance and maintenance issues that end users encounter in applications involving dry chlorine. Understanding the factors that can contribute to valve failure enables valve manufacturers to make corresponding design improvements, and the end user can use this knowledge to extend valve service life.

For these dry chlorine applications, end users articulated that real world applications were less than ideal—that these applications posed challenges that were too often severe and unforeseen, and that the end users could save money if they had access to valves that would tolerate the varied and harsh conditions involved. The consensus vision for an optimal design was that it would take into account demanding material requirements, ease of cleaning and packaging, and that external seals would limit emissions under severe conditions. Double packing and a monitoring port also were considered preferable.

BASICS OF DRY CHLORINE

Chlorine Cl2 (Dichlorine)
Molecular weight: 70.9
Boiling temperature: −34°C (-29°F)
Detectable by smell: 3 PPM
Coughing and vomiting: 30 PPM
Lung damage: 60 PPM
Fatal after a few breaths: 1,000 PPM
Expansion ration : ~460 (Liquid to Gas)

By working through both typical and more unusual critical pain points, it became evident that dendrites often formed on the surface of Monel discs, causing damage to the soft seats. When such crystals form on frictional surfaces, they cause binding and seizing of mating parts. An example is simple components such as disc spacers that keep the disc centered. The shaft turns inside the bearings and packing so any crystal formation quickly deteriorates these critical components. When these crystals form on hard surfaces that make contact with soft seals, they erode the seals (working like sandpaper).

Furthermore, while Monel performs well in dry chlorine service (when temperatures stay high enough to preserve chlorine's "dry" form), any amount of moisture can lead to rapid corrosion of moving parts. For these two reasons, engineers settled on HastelloyC as the preferred material for disc and stem construction.

For the valve body, CF8M stainless steel has been identified as the new standard, but all other valve components (pin, gland, bolts, etc.) were also studied individually to determine the optimal choice of material. Using Hastelloy for key parts enables the valve to tolerate moisture. Using CF8M stainless steel for the body, meanwhile, also makes the exterior visibly cleaner and provides visual confirmation that the device is robust.[2]

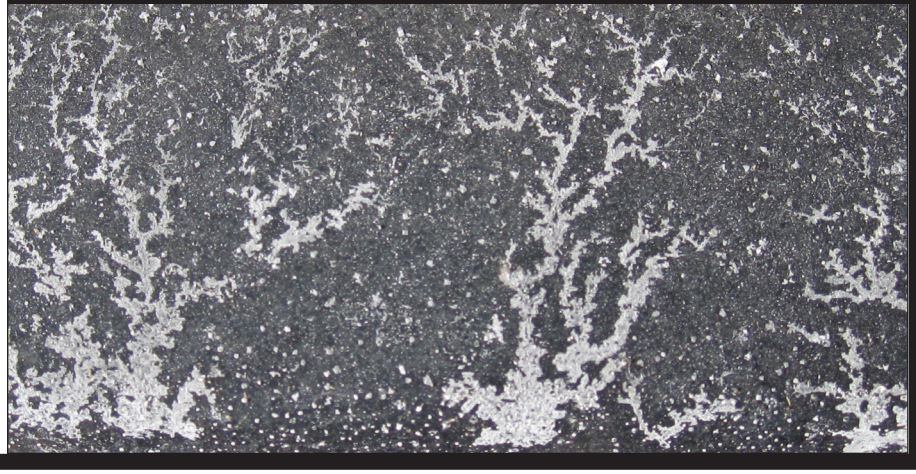
DESIGN REALIZATION

Pamphlet 6 of the Chlorine Institute (page 5 of the May 2005 edition), recommends the use of carbon steel for piping for handling dry chlorine. Monel bodies and internals are recommended for dry chlorine, but on page 20, it suggests that consideration be given to materials suited for both wet and dry applications if there is a chance that moisture contamination could be present. For wet chlorine, HastelloyC internals are specified by The Chlorine Institute (note that dry chlorine can become "wet" through moisture contamination, or by sufficiently reduced temperatures).

Research indicates that even in dry chlorine service, systems are prone to moisture contamination during installation or whenever connections are made. Such contamination reacts with the chlorine and forms hard, micro-

[2] For reference about recommended materials for valve components, please see the Valve Materials Selection Guide provided by The Chlorine Institute: www.cl2.com/index.php/.../139-pamphlet-6-edition-15-may-2005 table 4.8).

☐ Figure 1. Dentrite formations



scopic metallic chloride crystals on metal surfaces. This occurs even on Monel surfaces, which are considered acceptable with perfectly dry chlorine.

To combat corrosion, the use of HastelloyC is the better option for dynamic surfaces that form between metal and soft parts. This is a very hard, resilient material that is more costly and more expensive to machine. However, it is indispensable for longer product life and reduced total lifecycle costs—reduced in-service operating costs (replacement, maintenance, spill/leak cleanup, emission/environmental hazards, etc.) more than compensate for higher up-front costs.

WCB valve bodies are normally recommended for dry chlorine since stainless steel is susceptible to chloride stress cracking. CF8M bodies have demonstrated exceptional endurance in corrosive environments, while being structurally resilient against stress-cracking.

End users also showed interest in valves featuring live-loading, double-packing with monitoring ports and Inconel spring (Belleville washers). Ideally, the packing gland is made from HastelloyC to prevent freezing in the packing bore, which would disable live loading. The packing gland is a simple part on the outside of a valve that might not appear imperiled by possible contamination. Experience indicates, however, that it can be exposed to considerable moisture and minute traces of chlorine vapor emanating or permeating from the system, often causing the gland to seize. Once this occurs, it no longer serves its function of pressurizing the packing, and leakage may result.

Because of these risks, Alloy 20 bolting can be used for packing gland studs and nuts to minimize corrosion

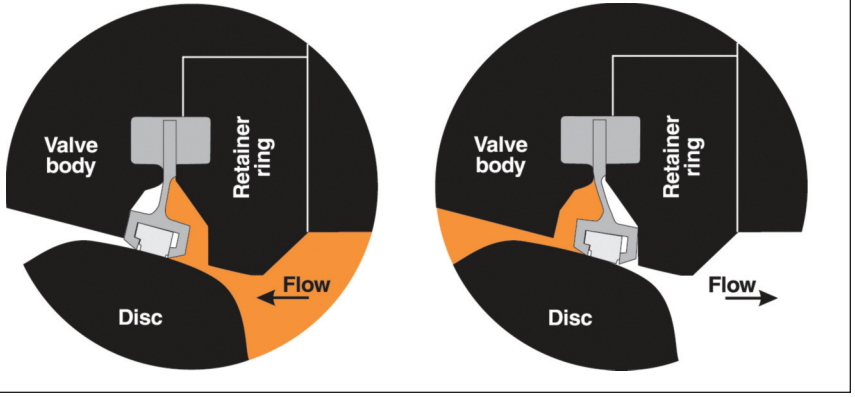
Figure 2. Dendrites can form on sliding surfaces such as those on this double pack HPBV.

on these stressed parts. At the same time, this mitigates stress cracking concerns that arise when stainless steel is used.

A lantern ring between the series of packing allows leakage from the flow path to accumulate in an area adjacent to the second packing. A small sampling valve can be threaded to a monitoring port channeled to this area so it can be periodically checked for early signs of weakening. The lantern ring should be made from HastelloyC to ensure long term operation.

For seating, the use of Teflon provides a compliant, inert seal that provides bubble-tight shutoff. An axially pliant seat allows the use of

Figure 3. Bidirectional Sealing: At left, valves are closed, with right to left flow. At right, valves are closed with left to right flow.



reinforced PTFE seats to maximize resistance to abrasion while maintaining the chemical compatibility of the Teflon. This axially pliant seat flexes but is not subject to hoop stretch. Since Teflon does not have "memory," it is important to avoid stretching the material.

Chlorine systems often encounter rust or scale so valve seats must be impurity-tolerant. Molecularly enhanced PTFE (TFM) has the disadvantage of performing poorly at low temperatures whereas the R-PTFE ensures valves perform well during temperature cycling and in cold environments.

Systems often require bidirectional sealing as well as the ability to be used in end-of-line service with pressure contained behind a closed valve without the concern of which side will remain exposed to the medium being processed (which is accompanied by pressure from the piping system).

Because minimizing the potential for leak paths is essential in controlling fugitive emissions, using a closed bottom design is a good choice for inhibiting leakage that might occur if the shaft bore protruded through the bottom of the valve. This is the acknowledged best design for valves 12 inches and under. For larger valves, where it is not practical to bore the bottom shaft hole from the top of the valve, a bolted plate with a static PTFE seal is preferred over a threaded plug because a threaded plug tends to grab a seal and twist it during assembly.

☐ Figure 4. Closed bottom design

CONCLUSION

With the foregoing realities in mind, valve manufacturers are either developing solutions or have already succeeded. The culmination of those efforts is a valve made with materials designed to withstand and be impervious to the effects of dendrite formation. Such is the case with some high-performance butterfly valves, which have incorporated the advances mentioned here in efforts to meet the needs of dry chlorine service. Such valves represent a breakthrough in design, as they specifically address the requirement of preventing valve damage from both moisture contamination and abrasion or erosion. VM

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REFERENCES

1. *The Chlorine Institute, Inc. Pamphlet 6* – Piping Systems for Dry Chlorine (Edition 15)
2. *Xomox Manufacturing Control Manual* – Level III Cleanliness Requirements: Chlorine, Food, Std. Oxygen, and Vacuum Service Valves

First Valve Repair Event Shows Depth of Today's Issues

BY KATE KUNKEL

Repair and maintenance is one of the most critical areas of today's valve world and attendees at the Valve Repair Council's first Valve Repair Meeting & Exhibition last fall found out why. From the value of radio-frequency identification (RFID) tagging to the latest proposed standards, speakers brought their audiences up to date while vendors to the industry showed the latest in products and services that can keep this nation's facilities in tip-top shape.

The November 2012 event took place in Houston. Here are some highlights from the presentations made at the conference:

PRV RELIABILITY

To keep the nation's industries running smoothly requires a way to test and assure that valves and other equipment are operating like they should. The presentations began with Joseph F. Ball, P.E., director of the Pressure Relief Department at the National Board of Boiler and Pressure Vessel Inspectors, who presented findings from a survey of nearly 22,000 tests of reliability for pressure relief valves (PRVs). The sample included data from the national board's test lab and other accepted test labs and started from the year 2000. The standards for testing come from the ASME pressure vessel code. To ensure that facilities meet those standards, inspectors check out the manufacture and assembly process, then test valves chosen from stock. The valves in this sample of 22,000 reliability studies were tested with air, steam and water.

While about 85% of tested valves passed (figures that look positive), Ball pointed out that this means a 15% failure rate (Figure 1).

He also said that, while not all failures are critical, those that fall into the critical range include those with set pressure higher than 116%, valve capacity less than half of what the valve is rated, and rupture disc failures to open. He stressed that the codes and standards are vital and that it is important to recognize the value of ASME Code/NB Certification and Repair Certification. These tight requirements provide extra margins for safety, and the test issues cause suppliers to be more vigilant than might otherwise be the case. He also said it's important for valve users to provide feedback on any issues they have come up against, and if there is any suspicion about the validity of certification, they should go to the national board.

Figure 1. Raw Results (all tests)

Test Outcomes	Percent (%)	Amount
Pass	84.9%	18,538
Fail Set Pressure	7.1%	1,541
Fail Blowdown	1.8%	383
Fail Capacity	5.4%	1,186
Fail Operation	0.2%	43
Incorrect Lift	0.1%	19
N/A	0.5%	113

QUALITY, RISK AND BRAND

In his work conducting performance evaluations and failure analyses, Vinod Sharma, senior managing engineer, Mechanical Engineering, at Exponent is called upon to address questions of liability, product recall, economic and market due diligence, technology assessment, business process improvement and intellectual property. From that perspective, Sharma pointed out that only a small percentage of valves are a problem, but those that are can create catastrophic failures and losses. While everyone in the industry focuses on safety as well as making and saving money, Sharma said it is important to set up procedures and practices within your company to protect against potential charges of liability for catastrophe.

CRITICALITY OF BOLTING

Jon Gans, Ph.D., technical training manager at Granite Services, Inc., condensed the information he usually presents during a one-day course into a well-received hour-long presenta-

CONTINUED ON PAGE 31

□ Bolts are tightened with a hydraulic torque wrench.

tion on the criticality of torque and load in bolted joints.

He explained how critical the common bolt can be.

"Bolts are really the only way to join big pieces of equipment, which allows you to take them apart to maintain the equipment, but there are many factors that must be considered," Gans said. "Bolted joints must stay together until a decision is made to take them apart. It is inexcusable for a joint to fail because we have the tools available to calibrate and make them 100% fail-safe," he said.

"What we do not have are the people trained to meet the requirements," he added. While welders have to be certified, anybody in a plant can pick up a tool and close a joint, he explained. This is despite the reality that there are so many considerations, including enough but not too much tension and the fact the three component groups of a joint, which are flanges, fasteners and gaskets, must operate together as a system. The bolting sequence is critical, he added. Each part must be right to obtain a seal, and you can't compensate for a problem in one part of the system by overcompensating on another part of the system.

It is absolutely critical that flanges be aligned properly, and even though a system can get up and running, radial or lateral misalignments in that system create the chance for leaks or huge problems later on. Bolts are not flange alignment tools and the proper torque is absolutely essential, he said.

RFID

RFID technology holds much promise for the valve industry and is especially promising in maintenance and repair. Brent Scheps, president, and Cory Foster, sales representative at IDS Tag enumerated the benefits RFID technology has for the valve industry and explained how such technology is used during a repair.

While RFID technology has been around since the 1960s, it recently became sophisticated enough to provide valuable information far beyond the number of widgets in a warehouse, in both active (information can be sent and received) and

□ Bolting

passive (for tracking) forms, he pointed out. Tags are just a computer chip and an antenna that can be housed in anything: a steel container, pipes, anywhere. Even with a passive tag, as long as that tag is intact, it is readable, he said.

RFID tags, which are custom fit to a facility and its needs and are designed for maximum accuracy, reliability and durability, are becoming increasingly important in all industries, including valves. The technology provides a unique number that prohibits counterfeiting and any purchaser can find out if it's a valid piece of equipment by tracing that number. RFID also makes it much easier to track the history of the equipment throughout the supply chain. Additionally, all of the documentation for the repair or replacement of any asset, such as a pressure relief valve, can be housed in the chip. That means maintenance turnaround times and the costs associated with them are greatly reduced. Information can also be added in the field to the "file" that is in that tag so that maintenance and repair can be updated.

FUGITIVE EMISSIONS

Rich Davis, business development manager at Flexitallic Sealing Technologies, has been involved in the creation and implementation of test standards covering fugitive emissions since 1990. He shared insights on those standards with attendees at the conference. One of those standards is API 622, which establishes requirements and parameters for tests of fugitive emissions, corrosion and packing material composition and properties. The test methods apply to valve packing for use in on-off valves with rising stems and rotating stems. Davis pointed out that this standard is not intended to replace type testing of valve assemblies or valve production testing, and that valves can no longer be tested to API 622—the test applies only to packing. For packing, the test means that a test fixture is subject to a total of 1,510 mechanical cycles and five thermal cycles over five days.

Davis also talked about API 624, a

CONTINUED ON PAGE 32

□ Pressure relief valve repair

new standard currently under development for type testing of rising stem valves equipped with flexible graphite packing for fugitive emissions. The standard specifies the requirements and acceptance criteria (100 parts per million by volume) for fugitive emission testing of rising and rising-rotating stem valves equipped with packing previously tested in accordance with API Standard 622. The standard is key "because now you know that the packing that goes into the valve must have already been tested by 622," Davis said. "This reinforces the fact that the packing manufacturers must be doing the testing. It is not the valve or refurb or repair companies [that must test]—it is the packing companies."

□ Testing for fugitive emissions

The test is only 310 mechanical cycles and three thermal cycles.

For extensive information on the specifics of presentations, refer to VALVEmagazine.com. Key points the presenters brought out are:

- **PRVs have a critical role in maintaining safety and protecting life and property.**
- **Know applicable codes and standards.**
- **Seek expert assistance when sizing and selecting valves.**
- **Manage the lifecycle costs to reduce maintenance and associated operating costs.**
- **Take no shortcuts and follow manufacturer's recommendations when repairing valves. Experience is critical.**
- **Reduce maintenance costs by managing parts and spares.**
- **Implement an asset management program to improve uptime, optimize planning, resourcing and spend.**
- **Communication is key. Best results are achieved when operators, valve manufacturers and service providers work together for a common goal.**

BEST PRACTICES

In their presentation, Bob Donalson, operations manager, North America Oil and Gas Service, and Kevin Simmons, global service and aftermarket manager, Pressure Management Group at Pentair, discussed maintenance and repair programs for pressure relief valves, pointing out that much goes into the true cost besides the initial product cost.

Be sure to check VALVEmagazine.com for more in-depth coverage of some of the presentations from the 2012 Valve Repair Council Repair Meeting & Exhibition. VM

Kate Kunkel is senior editor of VALVE Magazine. Contact her at kkunkel@vma.org

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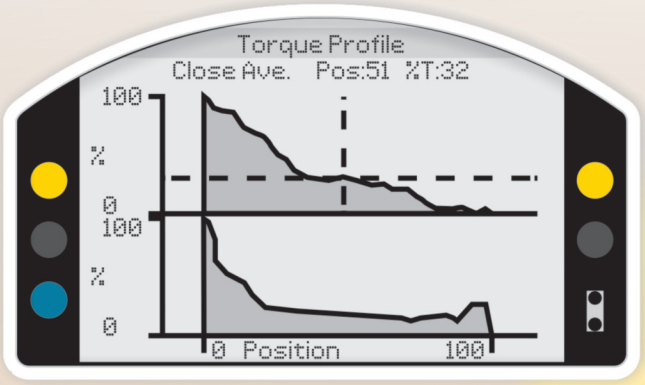

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Redefining Flow Control

Leveraging Quick Shipment in the Fluid Automation Supply Chain

BY MARTY MINCEVICH AND STEVE SICK

When it comes to getting automation parts shipped, everyone in our industry wants to receive those parts as quickly as possible—it's a natural inclination. But often, speed is more than nice—it's critical.

There are many components in fluid automation where the rate of access counts. Those components include fluid control elements such as solenoid valves, angle body piston valves, redundant control systems and linear position indicators. They also include fluid power products such as valve manifolds, filters, regulators, lubricators, cylinders, grippers, slides and gantries.

For original equipment manufacturers (OEMs), such parts are often one of the last pieces added to a new equipment design. Thus, ready availability can become an important gating factor in timely delivery of the equipment to customers. For end users, such availability is just as vital: being forced to wait for a component can bring an entire process or plant to a standstill.

This article addresses leveraging supplier quick shipment throughout an operation and demonstrates how, when it comes to fluid automation, using the right quick-ship program in the right way can have a significant impact on business, as well as the bottom line.

AVOIDING UNPLANNED SHUTDOWNS

For end users who run processing operations, accelerated delivery schedules provide risk prevention. For today's time-crunched businesses, long lead times are not only unacceptable, but sometimes not survivable. Downtime for a single piece of equipment can mean unexpected shutdown of an entire operation, with consequent crippling costs, schedule disruptions and

deeply dissatisfied customers.

Planned deployment of qualified supplier quick-ship programs can eliminate or greatly reduce the risk of catastrophic shutdowns for machines, processes and plants.

Express shipment can also be factored into maintenance arrangements to shorten the intervals allotted for planned shutdowns. In this case, production lines can be engineered with greater efficiencies, and processors have an opportunity to get plants up and running sooner, saving money and precious time.

SLASH MRO INVENTORIES

Excessive parts inventories for maintenance and repair operations (MRO) often represent a serious waste of space in warehouses, supply rooms and service vans. Increasingly, businesses realize too much inventory also can represent a drag on profitability. Such excesses tie up trade working capital that could better be invested elsewhere.

Relying on a quick-ship program with a wide product range means end users can obtain part replacements and rebuild kits on an expedited basis. The result is reduced MRO inventory for maintenance departments. This lower inventory, as well as the quick turnover time, can substantially cut inventory cost.

A critical element here, however, is choosing a supplier with a shipping program that covers the exact products and parts needed, not just a few of the more popular models. If a supplier makes a necessary part but doesn't quick-ship, that puts the company in need back to keeping extra parts for the long term *just in case*.

ENSURE GREATER ASSET AVAILABILITY

In recent years, plant executives that regularly engage in high-level planning put more and more emphasis on the importance of maximizing the availability of critical process assets. Simply put, a plant can be more profitable if the equipment is up and running as long as possible.

At this level, we are not talking about one or two emergency calls for quick shipment. The goals here are a combination of minimizing both planned and unplanned downtime, reducing maintenance efforts and costs, optimizing process performance via increased process efficiency and extending the lifetimes of associated process equipment.

SLASH DEVELOPMENT/BUILD CYCLES

On many projects, it makes sense for OEMs to establish quick or just-in-time shipment of fluid automation components as a standard—not only for prototype part procurement, but for beta and pilot phases as well.

These pneumatic or valving components are often added to an equipment assemblage relatively late in the phase, so any delay in supplying them can prove fatal to timely delivery of the finished machine. At the opposite end, leveraging shipping of critical parts available through accelerated scheduling can have positive effects across the board.

Experience shows that strategic quick shipping may sometimes cut days or even weeks from OEM development and production cycles.

LAST-MINUTE CHANGES

Optimization adjustments, new feature sets and numerous other tweaks to an original design—whether that design originates internally or by customer request—are the bane of many OEM development projects.

Good quick-shipment programs provide ready solutions by allowing OEMs to purchase fluid automation components to make critical last-minute engineering changes without disrupting production or product delivery schedules.

MINIMAL TIME TO MARKET

All too often—and sometimes regardless of technical merits—the first design that makes it to market wins the most market share.

Obviously, reliable quick shipment of fluid automation products alone cannot ensure an OEM of initial market entry and dominance. However, it can ensure that no project misses the mark because of delays caused by late arrival of desperately needed valves or by cylinders that fail to materialize at critical times.

CONCLUSION

Perceptive managers across multiple industries are realizing that their fluid automation supplier's quick shipment program can be more than an occasional convenience. They're making regular use of such programs from reliable vendors as integral parts of strategic operational planning.

Planners say this approach saves time and resources, improves operational performance, achieves competitive advantages, optimizes supply chain and shortens purchasing cycles. OEMs confirm they've been able to cut development cycles, accommodate late changes and shorten time to market. End users report they're avoiding shutdowns, reducing maintenance and repair parts inventories, and increasing asset availability. VM

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Fail-Safe Actuators: Many Choices to Make

BY LARRY ROBINSON AND MATT ROBINSON

The simple short phrase "fail-safe actuator" conjures a vision of a wide range of different actuators. In fact, when you Google "fail-safe actuator," you get 1,910,000 results. It's clear that those who need a fail-safe actuator for an application have their work cut out for them selecting the right actuator. Perhaps the best place to start would be to address: what *is* a fail-safe actuator?

By its most basic definition, a fail-safe actuator is a machine that stores energy to position a driven device to a predetermined safe position should power be lost. TermWiki describes a spring return actuator (another term for fail-safe actuator) as: "A valve actuator that compresses an internal spring when the actuator moves the flow control element away from its starting position (open or closed) and then uses the energy stored in the spring to move the flow control element back toward its starting position."

Figure 1. Rack & pinion pneumatic fail-safe

With this definition in mind, we can look next at how many different types of fail-safe actuators are available. There are three basic categories of pneumatic, electric and electro-hydraulic. However, within each category, a wide range of different designs are available. For example, within the pneumatic family, there is rack and pinion, cylinder, scotch yoke, vane, diaphragm and more—each is designed for a specific group of applications. A few examples of different electric fail-safe actuator designs are the battery backup system, rack and pinion and rotary electric.

The next step after understanding what a fail-safe (spring return) actuator is and understanding how many categories there are would be to provide an overview of all the different types available. Since that's not practical in one article, here are a few of the more commonly used:

RACK AND PINION SPRING RETURN

The rack and pinion spring return actuator is a relatively simple design; compressed air drives a piston inside a cylinder, the piston drives a toothed rack. The teeth of the rack interlock with those of a pinion, which is turned as the piston drives the rack. As the pinion rotates, it provides the system with rotating force. As the piston/rack drives the pinion, it also compresses a series of springs; upon loss of compressed air, the springs return the piston to its starting position (Figure 1).

The pneumatic spring return actuator is one of the most widely used fail-safe actuators in the world. This is primarily because of the simplicity of operation of the pneumatic actuator and the low initial investment required, particularly when air lines are already available. In addition to low initial cost, there are other reasons to consider pneumatic actuators for fail-safe applications. Such actuators are light weight, fast acting, not affected by duty cycle, readily available and easy to install. In addition there are a wide range of torques to select from and vendors to assist with selection.

Meanwhile, there are also some operational issues to consider. These

include requirements for air line installation, maintenance and low ambient temperature; the reality that moisture in air lines can pose a problem; the types of control needed; cost of electricity for the compressor; and the fact pneumatic actuators are not as easily adapted to some of the more sophisticated control systems in use today. According to the Department of Energy, 24% of the annual cost of compressed air is from maintenance, equipment and installation while 76% is from direct costs of electricity for the compressor.

ROTARY ELECTRIC SPRING RETURN

The electric spring return actuator (Figure 2) uses an electric motor to drive a series of gears to rotate a drive shaft counter clockwise or clockwise depending on the desired fail-safe position. As the drive shaft rotates, a series of springs are compressed, or in some styles a spiral spring is tensioned, storing energy in the springs. As the output shaft rotates, it provides the system with rotating force. The start and ending positions are generally controlled by limit switches. At the end of the power stroke, the drive shaft is held in position by an electromechanical brake or in some spring return designs, a clutch system. Upon loss of electrical power, the springs return the drive shaft to its starting position.

The electric spring return actuator has been gaining in popularity over the past decade. This is because of moderate initial unit cost, low installation, operation and maintenance costs, and accurate control. Also, increasing torque range and advances in product design have opened up a wider range of applications. When pressurized air is not available or the cost of installing air lines is too expensive, the electric spring return actuator is a viable alternative to pneumatic spring return actuators.

ELECTRO-HYDRAULIC

Hydraulic systems are generally self contained closed-circuit systems. The hydraulic fluid used for control is filtered and stored in a reservoir. The liquid in the hydraulic system must be recirculated, thus requiring more maintenance and also storage because liquids do not compress. This is beneficial to control—because the liquid cannot be compressed, rigidity is provided when the liquid is not flowing and precision is provided when flow occurs.

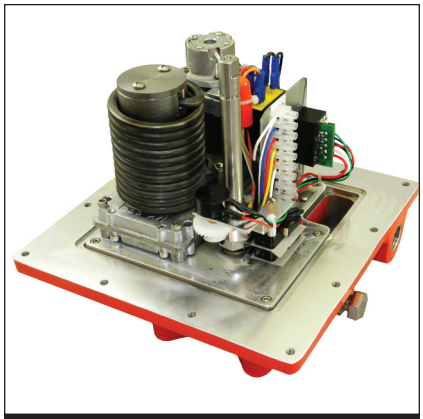

Figure 2. Output rotary electric spring return actuator displaying a coil spring design

Electro-hydraulic fail-safe actuators are available with high torque, they are fast acting, and they provide control with precision. On the other hand, these fail-safe actuators are costly and prone to oil leaks requiring some maintenance and can be affected by low-ambient temperatures if precautions are not taken.

From what we've been able to cover in this short column, it's easy to see that when selecting a fail-safe actuator, the most important thing is to know your application requirements and the available budget. Some considerations for selection are: the power source available; whether new lines have to be installed in the case of air; and whether the air compressor is large enough for the installation needs. Other considerations are the type of valve being controlled, the torque required (we recommend a sufficient safety factor of at least 25%), the type of control, whether you have on/off or modulating, the ambient temperature and the long-term operating cost. VM

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Q: SEVERAL YEARS AGO THIS COLUMN DISCUSSED LIMITATIONS OF PMI TESTING. HAS THE SITUATION CHANGED WITH ADVANCES IN PMI TECHNOLOGY?

A: The short answer is that the situation has changed in some ways, but that PMI still has limitations.

The long answer is a bit more complicated. First, let's clarify what is meant by the term PMI (which stands for positive material identification).

API RP 578, Material Verification Program for New and Existing Alloy Piping Systems; ASTM E1476, Metals Identification, Grade Verification, and Sorting; and the ASME B&PV Code Section I, Rules for Construction of Power Boilers, Nonmandatory Appendix B, Positive Material Identification Practice all cover what is commonly known as PMI testing. The definitions differ slightly in these documents, but in general they correspond with the standard concept that most people have in mind regarding PMI—it is a process used to provide the nominal composition of the alloy being evaluated to provide some assurance that it is indeed the specified material.

A number of devices are sold for the purpose of alloy or grade identification. The two most common use either x-ray fluorescence (XRF) spectrometers or optical emission spectrometers (OES).

The XRF devices are by far the most commonly used of the two. Newer XRF devices are generally gun-shaped, operate on rechargeable batteries (much like a portable drill), and use either a radioactive source or x-ray tube to excite the unknown material to generate x-rays, which are then read by the spectrometer. The onboard computer then uses this information to determine the chemistry of the unknown material and can compare that result with compositions stored in an alloy library to identify the alloy.

The previous article (which appeared in *VALVE Magazine*, fall 2004) discussed the accuracy limitations of the XRF devices that were in use at that time. The newer devices are much more accurate. In fact, there was one fairly recent instance where a newer XRF device caught a composition problem in some castings. The identified discrepancy was somewhat small and several years ago would have been attributed to inaccuracy of the XRF unit. In this case, the results from the XRF unit were verified to be accurate by third-party laboratory chemical analysis. The problem was ultimately determined to have been caused by improper calibration of an OES lab unit at the foundry. This is testimony to the much-increased accuracy of XRF devices in recent years.

On the other hand, the XRF units are still not capable of analyzing all elements of consequence in the alloys used in the process industries. For example, they do not provide information on carbon, nitrogen, phosphorus, sulfur or silicon. This means they still cannot verify the carbon content in carbon steels, alloy steels, stainless steels or other alloys. They cannot distinguish between standard and low-carbon grades of stainless steel. They cannot verify the nitrogen content in many of the newer stainless steels, which are nitrogen-alloyed for increased strength and resistance to chloride pitting. They cannot verify that silicon, sulfur and phosphorus content has been met in any alloys.

More recently, developed portable OES devices, which analyze optical light wavelengths and intensities generated by a spark discharge, can provide quantitative measurement of the elements that cannot be measured by the XRF units. These devices are generally more expensive than the XRF devices, and the spark discharge approach removes a small amount of material, leaving a small burn mark on the surface. Although these devices are "portable" (i.e., not confined to a laboratory), they are much less portable than the XRF devices. In addition, according to ASTM E1476, they are unproven when separation is based on carbon, sulfur or phosphorus. In other words, their ability to discern a low-carbon grade of stainless steel (0.03% maximum carbon) from a standard carbon grade (carbon greater than 0.03%, but no greater than 0.08%) is questionable. Because of their higher cost and reduced portability, these devices are not nearly as popular as the XRF devices. However, where there is a need for analysis of elements that cannot be measured using the XRF devices, the portable OES devices are useful.

More recently, developed portable OES devices, which analyze optical light wavelengths and intensities generated by a spark discharge, can provide quantitative measurement of the elements that cannot be measured by the XRF units.

As stated in the previous article, if a customer wants components in a valve fully certified to a specified grade chemistry, this can only come from the certified material test reports analysis, which in turn requires implementation of controls to ensure heat number traceability. The proper use of the portable analyzers is to verify nominal alloy identification to provide confidence that the material being examined is actually the proper alloy. These devices should not be used to verify full compliance with the compositional requirements of the material specification. VM

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What's the Word on the Water and Wastewater Markets?

BY KATE KUNKEL

ONTARIO POWER GENERATION

Workers at the tunnel opened the valve allowing water to flow from the Niagara River up to the tunnel gates in an area known as the intake channel. Once in service, water will flow from the Niagara River through the tunnel leading to the Sir Adam Beck generating stations.

In November 2012, a valve was opened at the Chippawa end of the Niagara Tunnel Project, the third hydro tunnel under the city of Niagara Falls. That one valve, which allowed water to flow into an intake area to bring more water to Ontario's Sir Adam Beck hydroelectricity facility, will generate enough additional electricity to power about 160,000 homes.

When we think about water valves, we tend to visualize mainly municipal drinking water supply and wastewater treatment. But that valve in Niagara Falls joins millions of others like it that drive dozens of other applications such as stormwater diversion, energy production, mining, food production, manufacturing and hydraulic fracturing.

According to a 2010 report by the Equilibrium Capital Group, the U.S. Water and Wastewater Market in 2015 is expected to reach $150 billion, which includes municipal utilities and the industrial sector's operating and capital expenses. During the VMA Market Outlook meeting in August 2012, experts in the field stressed that, while the markets for water and wastewater valves have slowed down somewhat in North America, the growing urbanization of developing nations is creating a boom in infrastructure building. Desalination, water re-use and the need for improved wastewater management are especially important in those developing countries.

As valve, actuator and control manufacturers are among the key players in this industry, and a good portion of our readers are end users who work in these markets, we've decided it's time for a column dedicated to the water and wastewater industry in its entirety.

Issues such as scarcity of water resources, environmental regulations and the lack of financial resources for upgrading and maintaining municipal infrastructure provide challenges to the valve industry, but they also provide opportunities. This column will explore both angles. It will also look at new technology that makes it possible to safely re-use urban water and generate power from wastewater and discuss how valve manufacturers can contribute to the efficiency and viability of new projects. Our goal is to share information in this column that will facilitate even more technological advances.

VALVE Magazine approached some VMA members who make products for water applications to ask them what they see as vital issues for the valve industry in the water and wastewater market and what they would like to see covered in this column. Here's what they said:

U.S. Water & Wastewater Spending – 2008

Water Spending	Billions $
Transmission & Distribution	$201
Treatment	$75
Storage	$37
Source	$20
Other	$2
Wastewater Spending	**Billions $**
CSO	$64
Secondary Treatment	$60
Advanced Treatment	$46
Sewer R&R	$33
Stormwater	$25
New Collector Sewers	$21
New Interceptor Sewers	$20
Green Infrastructure	$17
Others	$12

SOURCE: U.S. EPA Needs Survey

MEMBERS TALK

Robert Abbott, director of corporate marketing communications at Mueller Co., said that VALVE Magazine is important for his company as a manufacturer of flow control products for the potable water distribution industry because it focuses specifically on

valves in all their variations. Because editorial is not tied to the myriad of water distribution issues and products that other water-related industry publications have to cover, it can give valves and actuators more comprehensive coverage. In this way, "we can reach the readers in the water works industry whose responsibilities involve the application and use of valves."

What Abbott said is reflected in the sentiments of Jeff Bricker, general manager at Bernard Controls, who said, "I believe our customers in water are looking at the magazine to find out what new technologies are out there and how they can best be utilized to make their operations more efficient." He said the column provides an opportunity to bring new products and innovations to the attention of the industry.

In a presentation at VMA's 2012 Market Outlook Workshop, Thomas Decker, vice president and mid-Atlantic area manager of Brown and Caldwell, provided an overview of the water/wastewater market. There are approximately 155,000 public water systems in the United States, according to Decker. In the United States alone, water and wastewater treatment is a $100 billion market. Globally, it is a $500 billion market.

Jeff Bowman, president of Lined Valves, provided an example of recent innovations that affect performance and enhance efficiency and that might be reported in this column. Those include new fabrication techniques and improved materials, which he said are vital because they are changing the water treatment industry.

Anne Sophie Kedad, marketing manager of Emerson Industrial Automation, ASCO Valve, Inc., sees this new column as an opportunity to present information about market development as well as the environment and products used by industry professionals.

For instance, she suggested coverage of key trends and major concerns in the water treatment/wastewater market and the most effective ways to manage utilities' water resources. Kedad also suggested the column "detail new and future MRO and capital investment growth or plant expansion and upgrade plans."

New environmental regulations will also be vital going forward, Kedad added. Of particular concern is how these markets are handling the new lead-free regulations, as enacted in the "Reduction of Lead in Drinking Water Act," signed into law by President Barack Obama on Jan. 4, 2011 and set to take effect on Jan. 4, 2014. The law reduces the permissible levels of lead in wetted surfaces of faucets, pipes and pipe fittings to 0.25% from the previous national standard of 8.0% maximum. While many manufacturers in the plumbing industry are already meeting these reduced standards, the uniform national standard to harmonize requirements will tie together the patchwork of requirements across the country. A consortium of plumbing manufacturers and industry trade associations has been formed to spread the word about this new legislation. A communications campaign by the "Get the Lead Out of Plumbing Consortium," directed toward contractors/apprentices, distributors, plumbing engineers and code officials is launching in January 2013.

SHARE YOUR THOUGHTS

VALVE Magazine wants to know what concerns or issues readers would like to see addressed in this column. For example, as an end user, do you have a particular product or application that could use improvement? As a valve, actuator or control manufacturer, do you have a new technique or technology that can increase efficiency or decrease costs for end users?

We will be seeking contributors for this column, as well as other educational articles to publish in VALVE Magazine or on VALVEmagazine.com. If you have a technical article or case study that you feel would be a good fit, please email kkunkel@vma.org. VM

Kate Kunkel is senior editor of VALVE Magazine. Reach her at kkunkel@vma.org.

The Great Teflon War

BY GREG JOHNSON

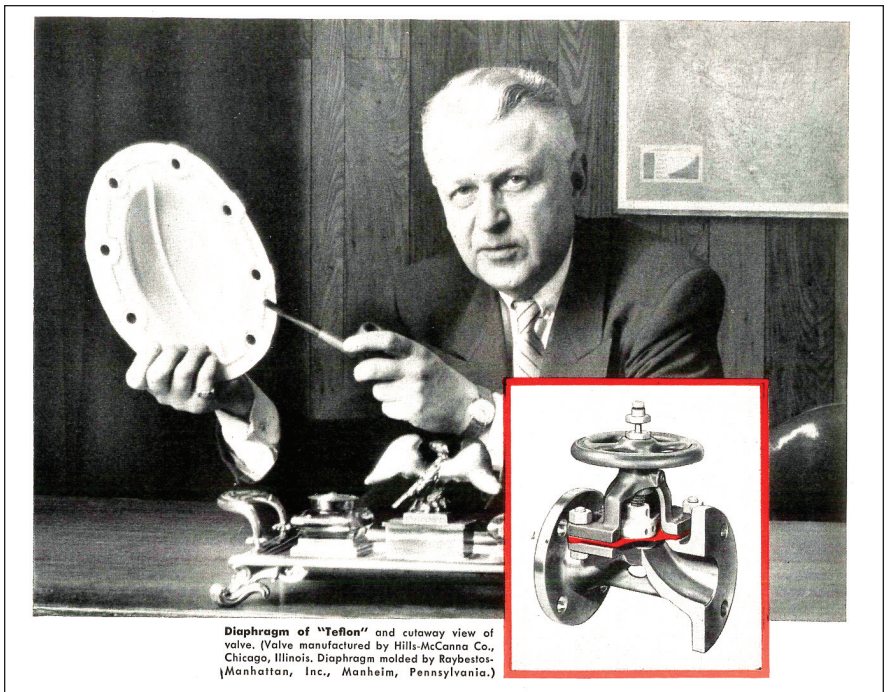
You might call it either the "Great Teflon War" or "The Battle of Massachusetts," but either way, the fight took place in the courtrooms of The Bay State, rather than in its cities or countryside. No matter how it's labeled, however, the victory prize was substantial: rights to the patent for the first functional bidirectional elastomer-seated ball valve.

A BATTLE HARD FOUGHT

The saga began in the laboratories of the DuPont Chemical Company in the years preceding World War II. Chemist Roy Plunkett was searching for a new form of refrigerant when he stumbled upon polytetrafluoroethylene (PTFE) resin quite by accident. After creating his "mistake," however, he began to analyze the sample and discovered that the properties of the new compound were unmatched by any other material. At this point DuPont knew it had a winner, and so it coined and registered the trade name "Teflon" to identify the new substance.

The new material was immediately put to work in a secret endeavor in which DuPont assisted the government—The Manhattan Project. Teflon was used for gaskets and seals to contain the corrosive uranium hexafluorides and other tough applications required for the atomic bomb project.

At about the same time (1942-1943), the Navy was having trouble fighting shipboard fires and needed a better spray nozzle, one that could create a blanketing fog to smother a fire. A young engineer for the Rockwood Sprinkler Company, Howard G. Freeman, solved the problem and created a fog nozzle. The Navy was impressed and called upon Rockwood and Freeman for other solutions. During this period, Rockwood also became involved with the Manhattan Project. As an insider, Freeman learned all about the new DuPont Teflon material and the miracles it could accomplish.



Diaphragm of "Teflon" and cutaway view of valve. (Valve manufactured by Hills-McCanna Co., Chicago, Illinois. Diaphragm molded by Raybestos-Manhattan, Inc., Manheim, Pennsylvania.)

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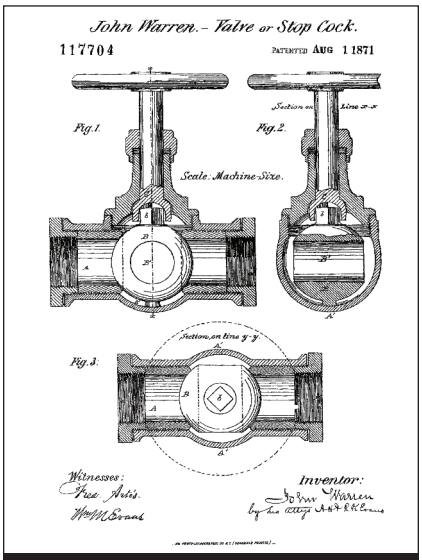
☐ The late 1950s saw the introduction of Teflon as a valve material for seals and closure members. This vintage Dupont ad touts the exemplary properties of Teflon as a membrane material for diaphragm valves.

TEFLON AND VALVES

The principle of the basic ball valve or spherical plug valve as it was also called, goes back to the 19th century, with the first patent issued for a metal-seated ball-type valve (patent #0117704) in 1871 to John Warren, who assigned it to John Chapman, the founder of Chapman Valves. The design was generic and does not appear to have been put into production. Additional ball valve designs ensued over the next 60-70 years but the effective soft-seated ones were only unidirectional in function. The problem of the day was how to create a bidirectional soft-seated ball valve.

Howard Freeman, although well compensated at Rockwood, yearned to start his own company and create the first bidirectional, zero-leakage ball valve. Freeman left Rockwood Jan. 25, 1955. His new company, called Jamesbury, began business the next month as Freeman put his ideas for bidirectional seats on paper and began mak-

As part of its 75th anniversary celebration, the Valve Manufacturers Association presents this series of articles on the history of valves, with the final installment appearing in the special Fall 2013 anniversary issue of VALVE Magazine.


John Warren. – Valve or Stop Cock.
117704
PATENTED AUG 1 1871
Fig. 1.
Fig. 2.
Scale: Machine Size.
Fig. 3.
Witnesses:
Inventor:
John Warren

The idea of a ball or spherical valve is not new, as this 1871 patent granted to John Warren clearly shows. Unfortunately the bronze to bronze, non-energized seat design did not work too well or last too long. It would take 80 years for the proper seat materials to become available, which would make the ball valve the workhorse that it is today.

ing the valves. The key to the valve's success and the heart of the patent was the design of the flexible Teflon seats, which created a positive seal in either direction. Freeman filed for a patent on the design in February of 1958 and patent #2945666 (a.k.a. the "666" patent) was granted in July of 1960.

The success of the valve was tremendous, and not surprisingly the lawsuits began to follow. The first court battle was waged between the new owners of Rockwood (E. W. Bliss Co.) and Jamesbury. The suit, which was filed in 1966, claimed that the idea for the "666" patent valve was conceived while Freeman was still with Rockwood. Bliss claimed that "an undisclosed idea is an invention" while Jamesbury countered "that an idea must be written down or documented before it becomes an invention." The federal Appeals Court ruled in favor of Jamesbury in 1971.

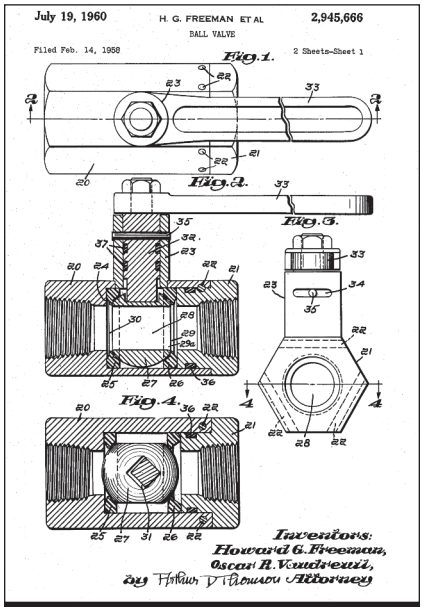
NEXT UP: BATTLING WITH GOVERNMENT

The U.S. Navy was an early proponent of the Jamesbury valve for use in its submarines. It was quiet, easy to open and close, and leak tight. Unfortunately, shortly after Jamesbury's initial sales to the government for the U.S. nuclear navy, the Navy allowed other suppliers, including prime contractor, Electric Boat, to infringe on its patent. Electric Boat began building Jamesbury-designed valves without permission thinking that "little" Jamesbury wouldn't fight the Navy's favorite son, Electric Boat. They were wrong.

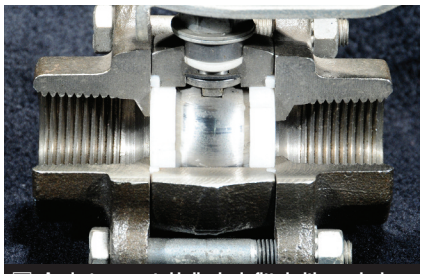
Jamesbury filed suit against the government as well as all the vendors that manufactured Jamesbury-patented designs. It wasn't until 1980 that the suit against the government was successfully won by Jamesbury, and other suits against vendors in this case were not settled until as late as 1988.

An interesting anecdote to the Teflon ball valve story surrounds the patent by Crane Valve Company for a soft-seated ball valve design (also called a spherical plug valve), patent number 2373628, which was granted in 1945. The Crane design used spring-loaded, graphite-impregnated rubber seats for bidirectional sealing. It is not known how well the valve actually worked because during those booming post-war years, Crane decided to concentrate on other valve types. According to a retired Crane engineering manager, at that time "the company could see no useful purpose in that type of valve design and that future sales success could not be guaranteed." Obviously, timing is everything, including in the valve business. Perhaps if Crane, while it was assisting with the Manhattan Project and nuclear navy projects, had learned of and applied the technology of Teflon to their ball valve seats, history would be different.

The key to the valve's success and the heart of the patent was the design of the flexible Teflon seats, which created a positive seal in either direction.


July 19, 1960
H. G. FREEMAN ET AL
2,945,666
BALL VALVE
Filed Feb. 14, 1958
2 Sheets-Sheet 1
Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Inventors:
Howard G. Freeman,
Oscar R. Vaudreuil,

This is the famous Freeman "666" patent that kick-started an industry and created a lot of income for the legal community along the way.



An elastomer-seated ball valve is fitted with energized Teflon seats that allow for bidirectional sealing.

BIDIRECTIONALS GROW IN USE

The last 25 years have seen an explosion of bidirectional soft-seated ball valve designs from all over the world. The technology and designs are now mature, and the valves are used everywhere. The original Teflon material has been updated and upgraded with additives such as glass fibers and carbon put into the mix to increase mechanical properties and temperature resistance. Meanwhile, the dust has settled on the courthouse floors of Massachusetts and the Great Teflon War has been won, at least for the valve industry. Teflon is now used in many types of valves as well as cavity linings and seating inserts.

And of course, the entire nation now knows about the wonders of Teflon, though most of us think about non-stick cookware. No doubt chemist Roy Plunkett would be both surprised and pleased at what his invention has wrought. VM

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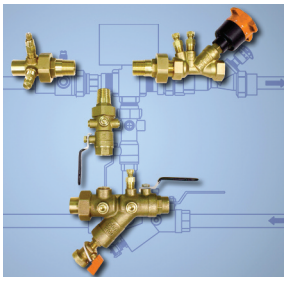


ANVIL INTERNATIONAL offers a new package system for HVAC—Gruvlok KNX series Hydronic Hook-Up Kits. The kits integrate the typical 54 components required to connect piping to hydronic heating or chiller system equipment into a pre-engineered, pre-assembled and pre-tested kit of only four components, saving up to 80% on labor compared to traditional connection methods.

These kits are available in connection sizes from ½" to 2" and are configured to the system designer's specifications, streamlining the ordering process for contractors.

ASCO NUMATICS has introduced the 212 Series of composite solenoid valves that incorporate the new FasN universal connection system. The 212 Series has been designed specifically for water purification and conditioning systems in commercial and industrial applications. They're molded from 30% glass-fiber-reinforced polyphenylene ether engineering plastic.

The long life of the 212 Series is attributed to highly reliable coils and the highly robust engineered diaphragm, which also contributes to minimal service requirements.

The series incorporates a universal connection system for water purification and conditioning systems in commercial and industrial applications. The series has what are said to be the highest pressure and temperature ratings on the market: up to 150 psi and 180°F (82°C).

CRANE CHEMPHARMA FLOW SOLUTIONS launched its new Saunders I-VUE Smart Valve Sensor. The sensor is designed for aseptic diaphragm valve applications in the Life Science industry. Compatible with Point-to-Point, AS-i and DeviceNet control systems, the product offers substantial benefits over standard switch controls including enhanced reliability and accuracy, simplified installation and lower maintenance costs by applying factory or user-defined device settings to monitor valve cycle count and end point tolerance limits, preventing false alarms and unnecessary diaphragm replacement.

CURTISS-WRIGHT FLOW CONTROL's Farris Engineering business unit is introducing the Farris SmartPRV, a 2600 Series pressure relief valve (PRV) equipped with a Fisher 4320 position monitor. With the new technology, PRVs can be monitored in real time, providing immediate feedback during an overpressure event. Areas of the plant previously difficult or impossible to track using traditional wired products are now effectively monitored. The product also extends the range of field applications with Emerson's SmartWireless solutions network, including critical assets.

The new SmartPRV identifies production and profitability losses, reduces emission fines and associated administrative costs and improves plant safety and environmental performance.

VICTAULIC introduces the AGS Vic-Ring System. The system eases the installation of and provides a strong connection for large-diameter pressure piping systems up to 72 inches, while extending the service life of abrasive services piping.

The AGS Vic-Ring System consists of Style W07 rigid AGS (Advanced Groove System) couplings, Style W77 flexible AGS couplings and specially designed rings containing a patented AGS groove profile. Rings are butt- welded to the pipe ends, and the coupling is assembled on two rings—one on each pipe end—to complete the joint. Style W07 couplings create a completely rigid joint, while Style W77 couplings allow limited linear and angular pipe movement at the pipe joint that can be used to accommodate thermal expansion and contraction, vibration, seismic movement and other applications requiring flexibility.

FLOWSERVE has released the Flowserve NAF Duball DL ball valve featuring spring-loaded packing technology, the newest addition to the full bore, metal-seated NAF Duball valve range. A patented Z-trim option improves control behavior, providing high rangeability, as well as anti-cavitation functionality and noise attenuation. A NAF Turnex pneumatic actuator can be mounted on the ball valve and offers a high-performing, vibration-resistant compact valve package providing economical total cost of ownership.

The design incorporates new spring-loaded stem packing technology on ANSI class 150 and 300 versions covering applications up to 482°F (250°C).

CONVAL offers custom-designed, low-cost Whisperjets for gas or liquid pressure reduction, for new or retrofit installations. These long-lasting devices reduce gas or liquid pressure through a series of multi-stage pressure reductions. As a result, there is virtually no part erosion. With gas applications, noise is significantly reduced because

CONTINUED ON PAGE 48

POWELL VALVES

BRONZE

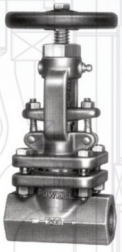
Products:	Gates, Globes, Checks
Size Range:	1/8" to 24"
Pressure Class:	125, 150, 300
Materials:	ASTM B-61 & ASTM B-62

IRON

Products:	Gates, Globes, Checks
Size Range:	2" to 60"
Pressure Class:	125 and 250
Materials:	ASTM A126 Class B and 3% Nickel Iron

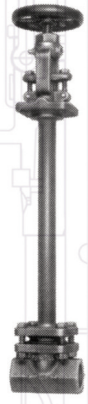
CAST STEEL (BOLTED BONNET)

Products:	Tilting Disc Checks (API 600, ASME B16.34)
Size Range:	1" to 60"
Pressur e Class:	150, 300, 600, 900, 1500, 2500
Materials:	WCB, WCC, WC6, WC9, C5, C12, C12A, LCC, LCB, 316, 316L, 304, 304L, A-20, Monel, Hastelloy C, Hastelloy B, and Nickel



CORROSION RESISTANT

Products:	Tilting Disc Checks (API 600 and API 603, ASME B16.34)
Size Range:	1/8" to 60"
Pressure Class:	150, 200, 300, 600, 900, 1500, and 2500
Materials:	316, 316l, 304, 304L, A-20, 317, 317L, 347, 321, Monel, Hastelloy C, Hastelloy B, Inconel, Titanium, and Duplex Stainless



CRYOGENIC

Products:	Gate, Globe, Check Valves (ASME B16.34)
Size Range:	1/2" to 30"
Pressure Class:	150, 200, 300, 600, 900, 1500
Materials:	Bronze, WCB, WCC, WC6, WC9, C5, C12, LCC, LCB, 316, 316L, 304, 304L, A-20, Monel, Hastelloy C, Hastelloy B, and Nickel

NEW PRODUCTS IN DEVELOPMENT

- High Performance Triple Offset Butterfly Valves
- API 6D Gate Valves

PRESSURE SEALS

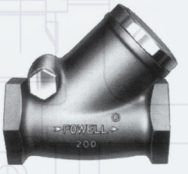
Products:	Flexible Wedge Gate, Tilting Disc Check, Parallel Slide Gate, Globes, Checks, & Non-Return Valves (ASME B16.34)
Size Range:	2" TO 42"
Pressure Class:	600, 900, 1500, 2000, 2500, and 4500
Materials:	WCB, WCC, WC6, WC9, C5, C12, C12A, LCC, LCB, 316, 316L, 304, 304L, A-20, Monel, Hastelloy C, Hastelloy B, and Nickel

HIGH PERFORMANCE BUTTERFLY VALVES

Body Style:	Lug & Wafer
Size Range:	2" TO 42"
Pressure Class:	150, 300, 600
Seat Designs:	Soft, Metal, Fire-Safe
Body Materials:	WCB, T316SS, Specials

DUAL PLATE CHECK VALVES

Body Style:	Lug & Wafer
Size Range:	2" TO 42"
Pressure Class:	150, 300, 600
Body Materials:	WCB, T316SS, Specials



FORGED STEEL

Products:	Gate, Globe, Swing/Lift/Ball Check, Needle globe
Size Range:	1/4" to 2"
Body Styles:	Welded & Bolted Bonnet
End Type:	Threaded, SWE, BWE, and Flanged (Class 150, 300, 600)
Pressure Class:	150, 300, 600, 800, 1500,1690, 2500, 2680
Materials:	A105, F22, F11, F5, F9, 316, 316L, 304, 304L, F91, and Special Alloys

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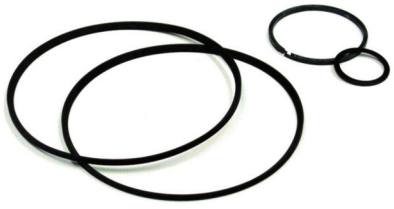
orifices on each stage are sized to keep the flow of the gas below critical velocity.

Whisperjets are available in ASME pressure classes through 4500#, in sizes from 1/2" up, with socket weld or butt weld end connections.

QUADRANT EPP announces the launch of Fluorosint 135, a polytetrafluoroethylene material designed to provide the lowest coefficient of friction and deformation for seals, bearings and washer applications. Quadrant Fluorosint 135's machinability and stability offer protection against wear and breakdown. At extreme temperatures and pressures, it protects and reduces the risk of malfunction due to corrosive chemical attacks. The Fluorosint 135 is available in a wide range of rod, tube and sheet sizes.



METSO has released Nelprof 6 expert valve sizing software to the North American marketplace. The new version extends earlier Nelprof versions with two new calculation modules that enable the selection of intelligent automated on/off valves and emergency valves. Special safety requirements, such as an actuator-sizing safety factor or a complete valve-assembly safety-integrity level, can be evaluated with the new state-of-the-art tools in the program.

Nelprof, first introduced in 1981, can be used to select all of Metso's automated on/off and emergency valves. VM

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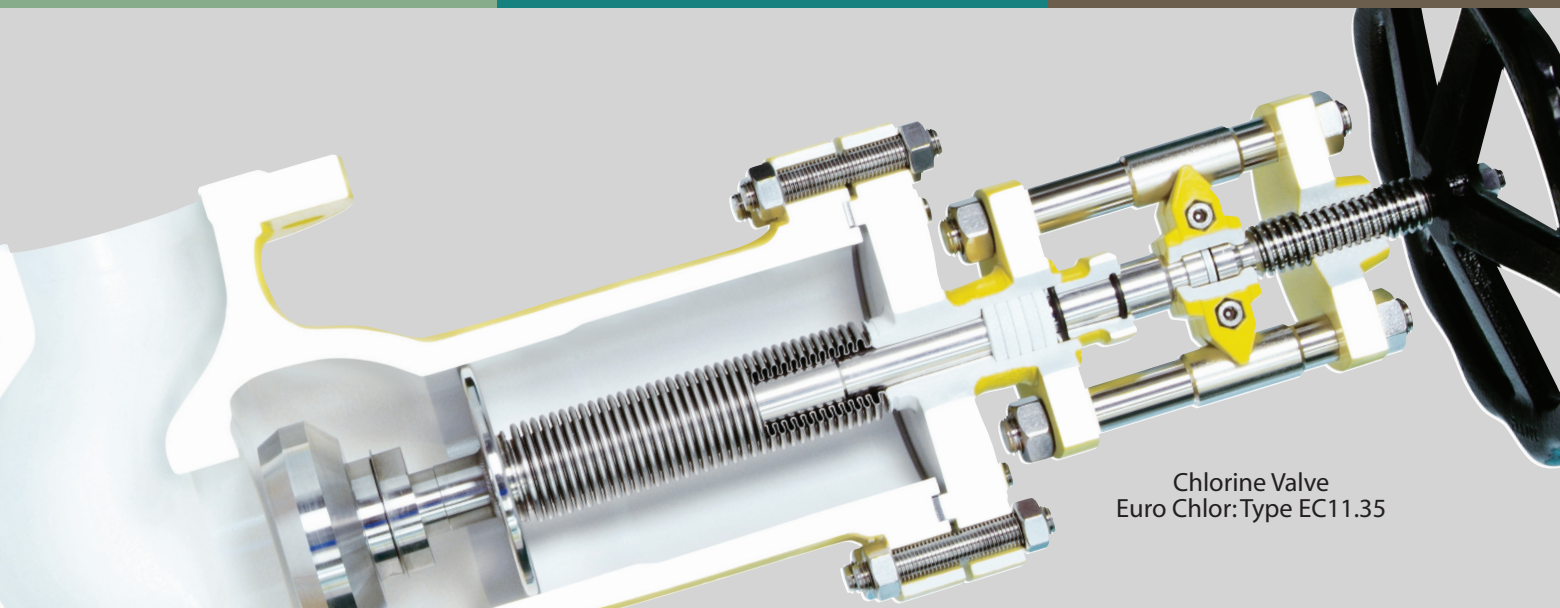

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