

SPECIAL COVERAGE: VALVE REPAIR CONFERENCE

VALVE

MAGAZINE
SUMMER 2014
VOL. 26, NO. 3

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POWER PLANTS

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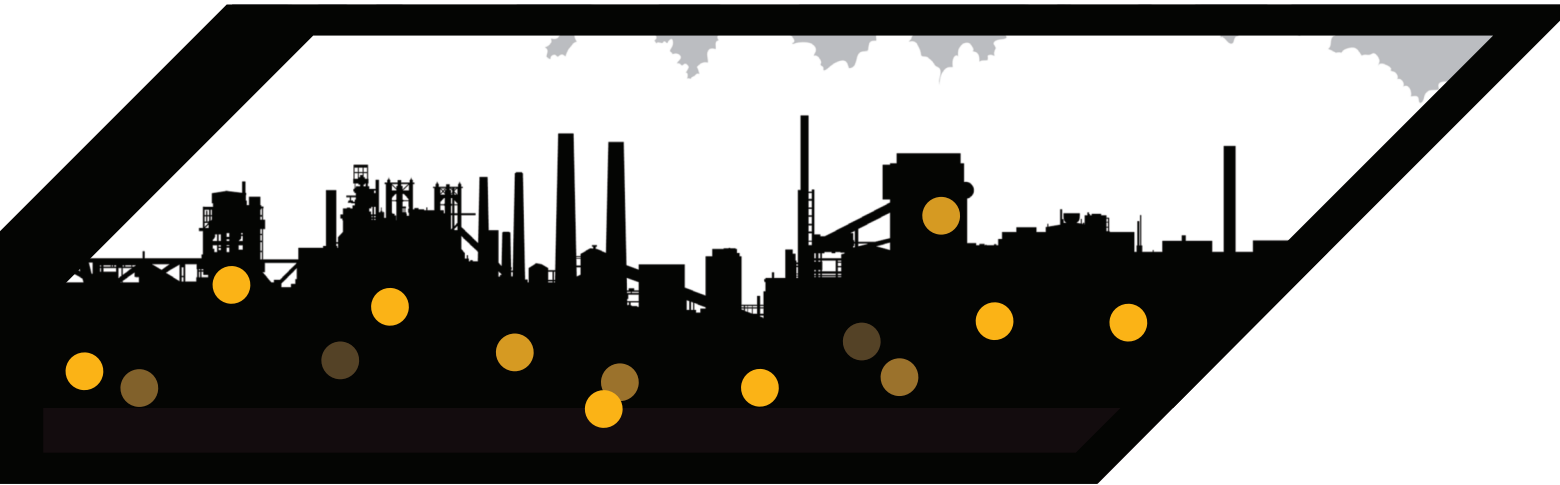


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It is not without reason that the SIPART PS2 from Siemens is the most widely used positioner for linear and part-turn actuators. For almost twenty years, this globally proven all-round design has ensured safe and precise sequences in the process industry. A wide variety of mounting options for countless valve applications make it an extremely flexible all-rounder that offers outstanding performance in almost every industry: from chemicals, oil and gas to pharmaceuticals, food and beverages, or marine engineering.

Whether it is a matter of extremely precise control of valves or the reliable regulation of actuators, SIPART PS2 can be relied on to have everything under control. Even in terms of simple installation and fast commissioning, it scores highly in at every stage. By providing reliable diagnostic data about the valve and actuator, the SIPART PS2 also reduces maintenance requirements in the plant and ensures maximum functional integrity in emergency situations.

Answers for industry.



Meet Paolo Ranieri, Managing Director and Chief Executive of Velan ABV. A mechanical engineer and ball valve expert, Paolo has an extensive technical and management background. When it comes to leadership, Paolo is a big believer in handing responsibilities over to his staff, giving them the freedom to get to pre-determined goals.

What you might not know about Paolo is that he rides a motor bike to work most days. The drive puts a smile on his face even before he walks in the door.

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25 Help Wanted!

There are plenty of great careers to be had in the valve industry and the industries that use valves, but not nearly enough qualified people. We review trends in recruiting, make suggestions on how to attract new professionals and reveal the results of a VMA survey on careers in the valve industry.

BY GREG JOHNSON

14 ADVANCED MACHINE TOOLS KEEP PRODUCTION COSTS IN CHECK

As valves and related equipment become more sophisticated, so do the tools that machine the equipment.

BY MIKE FINN

18 MITIGATING THE EFFECTS OF CYCLING A POWER PLANT

Most power-generating plants in North America were not designed to be operated in a cycling manner, which means the severe service control valves in the feed-water systems of those plants face special maintenance issues. How can operators minimize downtime?

BY JOHN MANGAN

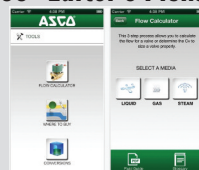
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Because safety instrumented systems are critical in keeping personnel and equipment safe, we need ways to measure their level of effectiveness. A number of tests and standards exist to accomplish this important goal.

BY LOREN STEWART

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PRODUCTS



- Mobile App
- Piston-type Actuator
- Wedge Gate Valves
- Trunnion Ball Valve
- Valve Booster
- Grooved-end Valve
- Chromatograph
- Diagnostic Software

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Green Technology: Much More than Biofuels

Hope for America's energy future rests partly with advances in unconventional oil and gas production. Meanwhile, green technology is paving the way to energy independence. Advances in green building, water re-use and recycling, solar and geothermal power generation, conversion of waste heat to power and generation of power with microbes are parts of the solution.

BY KATE KUNKEL

- » Ball Valve Repair 101
- » Update on Pressure Seal Standards
- » Impact of Leaking Valves
- » Knowledge: An Asset Worth Managing
- » Improving Ethylene Conversion: Critical Control Valves for Fractionation

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VALVE Magazine (ISSN No. 1057-2813) is the official magazine of the Valve Manufacturers Association of America (VMA) and is published quarterly by VMA, located at 1050 17th Street NW, Suite 280, Washington, DC 20036-5521; 202.331.8105; Fax: 202.296.0378. Advertising queries: 540.374.9100. Periodicals postage paid at Washington, DC, and at additional mailing offices.

POSTMASTER: Send address changes to **VALVE Magazine**, P.O. Box 1673 Williamsport, PA 17703-1673. Subscriptions are free to qualified readers in the United States and Canada; \$40 per year to unqualified readers in the United States and Canada; \$60 per year for all subscribers outside the United States and Canada. Statements of fact and opinion made are the responsibility of the authors alone and do not necessarily imply endorsement or agreement on the part of the officers or membership of VMA. Materials may not be reproduced in any form without written permission of VMA.

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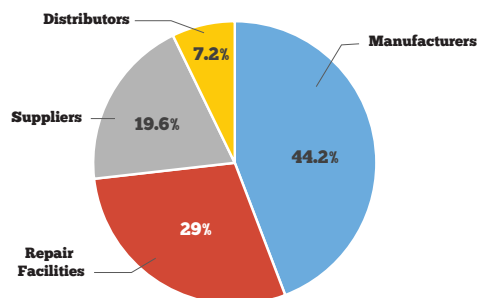
New Member Category Running Strong



I am pleased that these new additions have not only joined our ranks, but are attending our meetings as well as exhibiting at our tabletop exhibitions.

VMA's proud heritage continues with its newest category of membership: distributors/channel partners.

VMA was created in 1938 as a home for manufacturers of industrial valves. In 1975, VMA expanded to add actuator manufacturers to its membership ranks. Then in 1989, we added valve repair facilities to our fold, and in 1998, suppliers became a new membership category. The circle was completed in 2013 with the addition of distributor/channel partners as associate members of VMA.



This newest category has taken off like a rocket in the first half of this year with 10 members already official and many others in the wings. Our inaugural members are:

- AIV, LP
- Classic Controls
- DistributionNOW
- Edgen Murray
- FCX Performance, Inc.
- MRC Global
- RES Energy Solutions
- Setpoint Integrated Systems
- Sunbelt Supply
- Wolseley Industrial Group

I am pleased that these new additions have not only joined our ranks, but are attending our meetings as well as participating at our tabletop exhibitions. The last two issues of this magazine included columns on distribution, and we will be dedicating more space to the topics of interest in this area of the business in future issues.

I encourage companies in this category, as well as all VMA member companies, to contact editor-in-chief Judy Tibbs (jtibbs@vma.org) with ideas for editorial content. We also will be including more presentations at our meetings involving our channel partners.

For those who are not yet members, I encourage any distributor or channel partner that meets the criteria to become a member as soon as possible so you can network directly with the manufacturers of the products you represent.

Information on distributor/channel partner membership as well as criteria for membership and an application for joining can be found on www.vma.org under "About VMA." VM

Bill Sandler

President, Valve Manufacturers Association of America

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MERGERS & ACQUISITIONS

Rotork Acquires South Korean Valve Company

Rotork PLC has agreed to purchase the entire share capital of Young Tech Co., Ltd. (YTC). YTC, based in Seoul, Korea, is a manufacturer and supplier of valve positioners and accessories.

The acquisition of YTC follows Rotork's strategy of extending its offering of flow control and pressure control products. The acquisition further enhances and expands Rotork's position in the Asia-Pacific market.

QTRCO Goes Global

QTRCO, Inc. based in Tomball, TX has established QTRCO SG in cooperation with Severn Glocon Group PLC of Gloucester, England.

Ed Holtgraver, chairman of QTRCO, stated that "the size and strength of the rapidly growing and well respected Severn Glocon Group and its established global network of service centers and manufacturing facilities will enable rapid expansion of QTRCO SG to satisfy user requirements for large and small project opportunities."

Emerson Process Management Adds Reliability Firm

Emerson has acquired Management Resources Group, Inc. (MRG), a reliability consulting services firm. The acquisition adds MRG to Emerson Process Management's existing asset management capabilities to help customers face growing needs to improve safety, increase plant uptime and reduce maintenance costs.

Founded in 1987, MRG

helps process plant owners and operators improve plant availability through implementation of site and corporate-wide reliability programs.

REXA Electraulic Actuation to Separate from Koso America

Effective June 1, 2014, REXA Electraulic Actuation officially separated from the Koso America corporate entity. For years, Koso America, Inc. operated and manufactured REXA Electraulic actuators and drives alongside Koso Hammel Dahl control valves. Though both serve the industrial controls market, the two primarily operate as separate organizations. The REXA actuator business will operate as a new legal entity—REXA Inc. Koso America will continue as the legal entity and manufacturer of Koso Hammel Dahl control valves and Koso severe service control valves.

Sale of VanAire Announced

VanAire President Beverly VanDeVusse announced the successful completion of a transaction selling the company to William VanDeVusse. Beverly has led the company as president since the death of her husband, company founder Richard VanDeVusse, in 2008. William was named VanAire CEO in 2010, and now he will add president to his title and duties as CEO. Beverly will continue as executive vice president.

NEW FACILITIES

Pentair Opening Configuration Center at Alabama Morin Plant

Pentair's Actuation & Controls, a valves and controls



□ Emerson Process Management's new facility in Romania

product platform, is opening a new Configuration Center at its existing Morin plant in Pelham, AL. The new center will bring the Biffi ICON 2000 electric actuator series to the U.S.

The center provides commissioning and MRO services to its customers, with assembly, configuration and testing capabilities on site. It features the same facilities as Biffi's European base, staffed with local personnel. The center in Pelham follows a series of similar openings across the globe, including Australia, China, Mexico and Brazil.

Emerson Expands European Manufacturing and Engineering Services

Emerson Process Management is expanding the company's existing manufacturing and engineering services campus in Cluj-Napoca, Romania. The expansion includes a new, 18,800-square-meter flow measurement manufacturing building. This \$60 million investment will help meet growing demand for the company's flow measurement products and services in Europe and other regions.

Additionally, in the summer of 2014, Emerson Process Management moves into a separate, newly constructed \$16 million facility

on the Cluj campus that will be home to the Regional Project Engineering Center and the European System Integration Center. Emerson's Cluj-Napoca campus is now one of the parent company's largest sites in Europe.

Metso Opens Valve Technology Center in South Korea

Metso is investing in a new greenfield Neles globe valve technology center in South Korea. The groundbreaking ceremony for the new plant was April 22 in Chung-Ju, South Korea. The new factory will be ready for global deliveries during the last quarter of 2014.

It will serve oil and gas and power customers both locally and globally and will strengthen service capabilities in the growing Asian markets. The new technology center consists of manufacturing, control valve testing facilities, research and development, laboratory, engineering and service support units for South Korean EPC companies.

DISTRIBUTORS

Crane ChemPharma & Energy Names New North American Distributor

Crane ChemPharma & Energy has appointed industrial

valve distributor Petro-Valve as the North American distributor of Pacific pressure seal valves. Pacific brand products now offered through Petro-Valve include pressure seal gate, globe and check valves in a wide range of sizes, pressure classes and materials.

With this addition, Crane ChemPharma & Energy strengthens coverage and services within the U.S. and Canadian MRO power markets and can fill the needs of customers in the power, refining, chemical and general industrial industry segments.

ValvTechnologies Announces MRC is Global Certified Service Center in CA

ValvTechnologies, Inc. announces that MRC Global, Inc. is a new, certified service center for its oil and gas customers in California. MRC Global is headquartered in Houston, with a facility in Bakersfield, CA. The company has more than 90 years of experience in distribution and service for the oil and gas industry.

AWARDS & MILESTONES

AUMA Celebrates 50th Anniversary

AUMA is celebrating its 50th anniversary in 2014. Founded by Werner Riester and Rudolf Dinse in 1964 in Ostfildern, near Stuttgart, Germany, the company has grown from two to 2,300 employees with global representation and worldwide manufacturing facilities. AUMA launched its first range of electric actuators in 1965. The family-owned, private company has

become today's AUMA Riester GmbH & Co. KG with headquarters in Muellheim, Germany. AUMA USA was formed in 1976.

Members Recognized in Readers Choice Awards

Once again VMA members had a dominant showing in Control Magazine's 22nd Annual Readers Choice Awards. Emerson Process Management, Siemens Industry, Cameron, GE, Flowserve, Samson Controls, Metso, Rotork and AUMA Actuators were all recognized this year in a variety of categories. VMA members swept the control valve, electric valve actuator and pneumatic valve actuator categories.

GE Oil & Gas Wins Two Technology Awards at OTC

GE Oil & Gas was honored with two 2014 Spotlight on New Technology Awards for its SeaLytics BOP (blowout preventer) Advisor and GFI Ground Fault Immune Electric Submersible Pump Monitoring System products. The awards are given

at the Offshore Technology Conference to showcase hardware and software solutions that are advancing the offshore exploration and production industry to new levels of safety, productivity and efficiency.

Plant Engineering Awards Recognize VMA Members

Two VMA members were among those offered Product of the Year awards by Plant Engineering, which presents the awards to new products that improve productivity and safety in manufacturing operations.

Siemens Industry was honored in the automation & controls and the electric motors & drives categories. Spirax Sarco was recognized in the fluid handling category. Plant Engineering announced the winners in the April 2013 edition of the magazine.

Metso's PlantTriage Software Gets Several Awards

Metso has been honored with industry awards recognizing the company in the process control field. In

addition to the Control Magazine Readers' Choice Award, it received the Automation World's First Team Award and Control Engineering Engineers' Choice Honorable Mention.

In addition to first place in the loop-tuning software category for the Control Magazine award, Metso Automation received honorable mentions in the categories of control valve, on/off valve, electric valve actuator and pneumatic valve actuator.

CONTRACTS & COLLABORATIONS

MRC Global Renews MRO Contracts with ConocoPhillips

MRC Global Inc. and its McJunkin Red Man Corporation subsidiary signed a five-year contract as supplier of maintenance, repair and operations (MRO) pipe, valve and fitting (PVF) products and services to ConocoPhillips Company's operations in the lower 48 U.S. states.

PEOPLE IN THE NEWS

THE WM. POWELL COMPANY... has promoted **Todd Kaiser** to vice president/global supply chain. Kaiser has been with Powell Valves for eight years and held various positions within the supply chain group.

ITT... accepted the resignation of its Industrial Process (IP) Business president **Robert J. Pagano**, effective May 26. Pagano left ITT to become president and CEO of Watts Water Technologies.

Replacing Pagano as president of the IP Business is **Aris Chicles**, who previously served as executive vice president. Chicles joined ITT in 2006 from American Standard Inc., where he was vice president of Corporate Business Development.

COLFAX... has named **Christopher Metz** senior vice president, president and CEO of Colfax Fluid Handling. In this role, Metz will be responsible for leading the strategic direction and operational execution of the Colfax Fluid Handling business.

VALVTECHNOLOGIES... has named **Todd Blackburn** as director of global quality management and **George Stover** as industry director for the power group.

Based in Houston, Blackburn will be responsible for global quality standards, systems and processes. Stover will be responsible for developing and directing the long-term strategies and growth of the severe service power market. He has 37 years in the power business.

VALVE MAGAZINE

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gparente@vma.org.

In addition, MRC Canada ULC has entered into a multi-year agreement naming it as supplier of MRO PVF products and services to ConocoPhillips Canada Resources Corp. for its operations in Canada. MRC Global currently services ConocoPhillips at more than 50 U.S. locations and more than 20 Canadian locations.

**Metso Automating World's
Largest Cruise Vessel**

Metso has received an order from STX France to supply a vessel-wide automation system, including energy management, to the world's largest cruise vessel, Oasis 3. Royal Caribbean International's third vessel in the Oasis class series is currently under construction at STX France's shipyard in Saint Nazaire, France. The first automation system delivery based on Metso technology for a ship took place in 1983.

Metso has previously supplied automation technologies to Royal Caribbean cruise vessels. Oasis 3 is scheduled to be handed over to the owner mid-2016. The vessel will have 16 passenger decks, include 2,700 staterooms and accommodate 5,400 passengers in double occupancy.



□ The Caspian pipeline will use AUMA products.

**GE Oil & Gas Launches Mexican
Technology Agreement**

GE Oil & Gas, as well as Mexico's state-owned oil and gas company Petróleos Mexicanos (PEMEX) and the Mexico Institute of Petroleum (IMP) have signed a technology collaboration agreement focused on the oil and gas sector.

The agreement will initially research technologies needed to help PEMEX improve productivity and efficiency in mature onshore fields and to develop deep and ultra-deep water projects. Under the pact, GE will collaborate with IMP on specific technology areas at the outset, which include improving the efficiency of a mechanical flow device that could offer PEMEX significant recovery rate benefits in hundreds of wells.

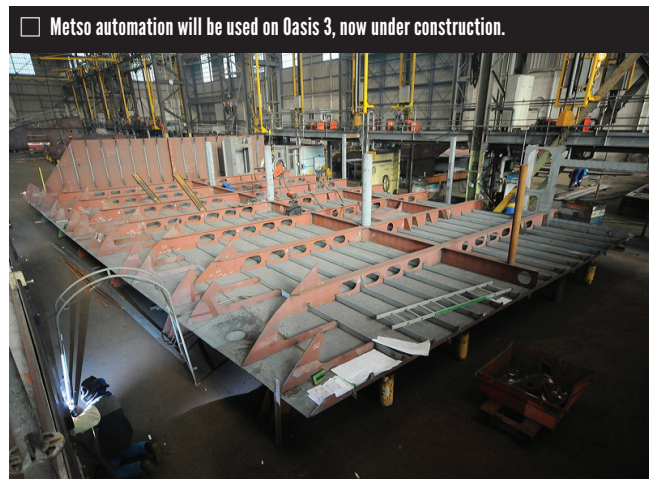
**Caspian Pipeline Consortium
Adopts AUMA Actuators**

Over 700 explosion-proof actuators, including controls, and 200 gearboxes have been supplied by AUMA to support the Caspian Pipeline Consortium (CPC). The project is a major international crude oil transportation initiative that involves Russia and Kazakhstan plus oil and gas companies including Chevron, Shell and Exxon-Mobil. The scheme will facilitate transportation of oil from the Caspian field to the Black Sea.

**Powell Valves, Chesterton
Develop Exclusive Partnership**

Two longtime industrial suppliers, The Wm. Powell Company and A.W. Chesterton Company, announced an agreement in which Chesterton will become the exclusive supplier of its low-emissions packing technology in Powell Valves.

The agreement allows Powell to produce valves that are compliant with the new API 624 standard for industrial fugitive emissions and to meet the latest EPA regulations. API 624 requires valves be manufactured to reduce fugitive emissions to 100 ppm or less for five years, which will result in reduced air pollutants.



□ Metso automation will be used on Oasis 3, now under construction.

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CALENDAR
2014

AUGUST

14-15

VMA Market Outlook
Workshop*Boston
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SEPTEMBER

18-20

VMA/VRC 76th Annual
Meeting*Marana, AZ
www.vma.org

27-Oct. 1

WEFTEC 2014

New Orleans
www.weftec.org

OCTOBER

30-31

VMA Valve Basics Seminar
& ExhibitsLas Vegas
www.vma.org

DECEMBER

2-4

Valve World Expo &
Conference 2014Düsseldorf, Germany
www.valve-world.org

9-11

Power-Gen International

Orlando, FL
www.power-gen.com

*Open only to VMA/VRC members.

If you are interested in learning whether your company qualifies for membership in the Valve Manufacturers Association or Valve Repair Council, please visit www.vma.org > About VMA.

Cameron Awarded Order for
Large Blowout Preventer

Cameron has received an order from Freeport-McMoRan Oil & Gas to supply a 25,000 psi blowout preventer stack and 25,000 psi manifold. Cameron delivered the industry's first and only 13-5/8-inch 25,000 psi blowout preventer to Freeport-McMoRan in 2011.

After successful and extensive use in the Gulf of Mexico, Freeport-McMoRan has decided to place this second order with Cameron for high-pressure activity planned to begin in 2015.

Weir and MTU to Develop
Purpose-Built Power Systems
for Fracking

Weir Oil & Gas and the Rolls-Royce Power Systems com-

pany MTU have signed an agreement to develop power systems specifically engineered for hydraulic fracturing. The system will be used for fracking operations during the well completion stage of shale oil and gas projects.

The fully integrated power system is expected to be available to customers in mid-2015.

EVENTS

WEFTEC 2014 Bigger than Ever

The world's largest water quality event, the Water Environment Federation's Annual Technical Exhibition and Conference (WEFTEC) brings together 22,000 people from 85 countries who are focused on learning the best way to ensure the world has adequate safe and clean water. The show has shown continual growth over the years and WEFTEC 2014 is expected to beat records for exhibits and session attendance that were set in 2013.

This year's event is Sept. 27 to Oct. 1 in the New Orleans Morial Convention Center, New Orleans.

WEFTEC 2014 offers more than 1,000 presentations including 140 technical sessions in 13 different subject tracks, 27 workshops and 7 tours of water facilities. The show's exhibit is also the world's largest show of its kind bringing together almost 1,000 companies who are featured on the floor along with specific areas such as a stormwater pavilion and an innovation pavilion. This year's show also offers



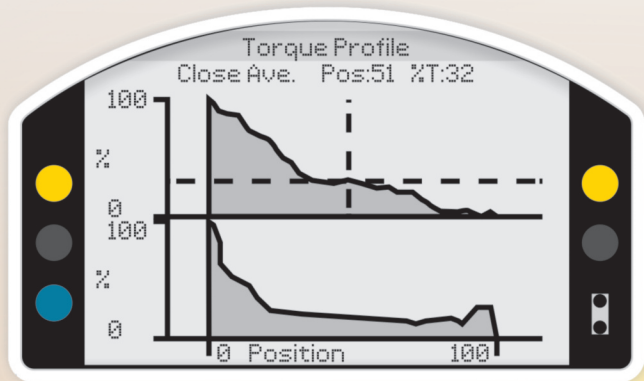
special tours of exhibits for public officials as well as mobile sessions designed to allow attendees to move together on the exhibit floor to compare different technologies.

Mobile sessions will focus on topics such as UV, disinfection, phosphorus removal and decentralized treatment.

On the floor are companies from every facet of the water industry from chemicals and chemical handling to pipe and collection systems and pumps, valves and motors. This year, VMA will have a booth at the event and VALVE Magazine readers are encouraged to stop by.

For information, go to www.weftec.org.

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Next Valve Basics in Las Vegas Oct. 30-31

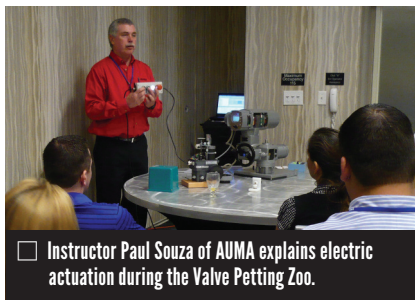
VMA's Valve Basics Seminar & Exhibits, featuring Valves, Actuators & Controls 101, is set for Oct. 30-31 at Planet Hollywood Resort & Casino in Las Vegas.

Since this event began in late 2009, nearly 1,000 people have learned the basics of what the different types of valves do and how actuators and control mechanisms help with those tasks.

The program runs for two full days and includes coverage of all the basic valve and actuator types along with lessons on controls, solenoids and actuator accessories. Those who complete the Valves, Actuators & Controls 101 course are awarded the equivalent of 12 hours of continuing education.

The Valve Petting Zoo, a hands-on experience with the products covered in the course, will take place the last afternoon of the two-day event.

Valve Basics is designed for a wide audience from newcomers to the valve industry who are employed—or those seeking employment—at plants and facilities that manufacture or use valves, actuators and controls, to experienced



□ Instructor Paul Souza of AUMA explains electric actuation during the Valve Petting Zoo.

professionals who feel they need to expand their knowledge or take a refresher course. The event is also well-received by upper-level mechanical engineering students who are ready to take the plunge into the world of industry.

In addition to the sessions, a table-top exhibit is part of the program, with companies that sell or provide services to valve manufacturers or end users on hand to answer questions and display their wares.

For more information and to register online, go to www.VMA.org > Meetings > Basics Seminar & Exhibits. Note that early-bird registration is available through Aug. 25. VM

VMA MEMBER COUNT CONTINUES TO CLIMB

VMA continues to add members to its newest category of distributor/channel partners. Recent new members are:

AIV, LP, which was established in 1991, is a master distributor of hard-to-find, exotic alloy valves for the chemical, oilfield, petrochemical, pulp and paper, refining, power and water treatment industries. It represents over 20 major valve manufacturers and is based in Houston.

Edgen Murray is a global supplier of specialized products for the energy and infrastructure markets delivering pipe, plate, valves and related components through more than 35 global locations and 20 stocking facilities. It is headquartered in Baton Rouge, LA.

FCX Performance, Inc. is based in Columbus, OH and has 25 locations covering 30 states. The company provides process flow control solutions and products from its over \$20 million inventory to a variety of process industries.

Wolseley Industrial Group, Newport News, VA, is the industrial division of Ferguson Enterprises, Inc. It is the largest North American supplier of pipes, valves and fittings, integrated services and fasteners/OEM, and provides supply chain management solutions for a full range of maintenance, repair and operations supplies. The company has over 1,300 local branches in the U.S. and Canada.

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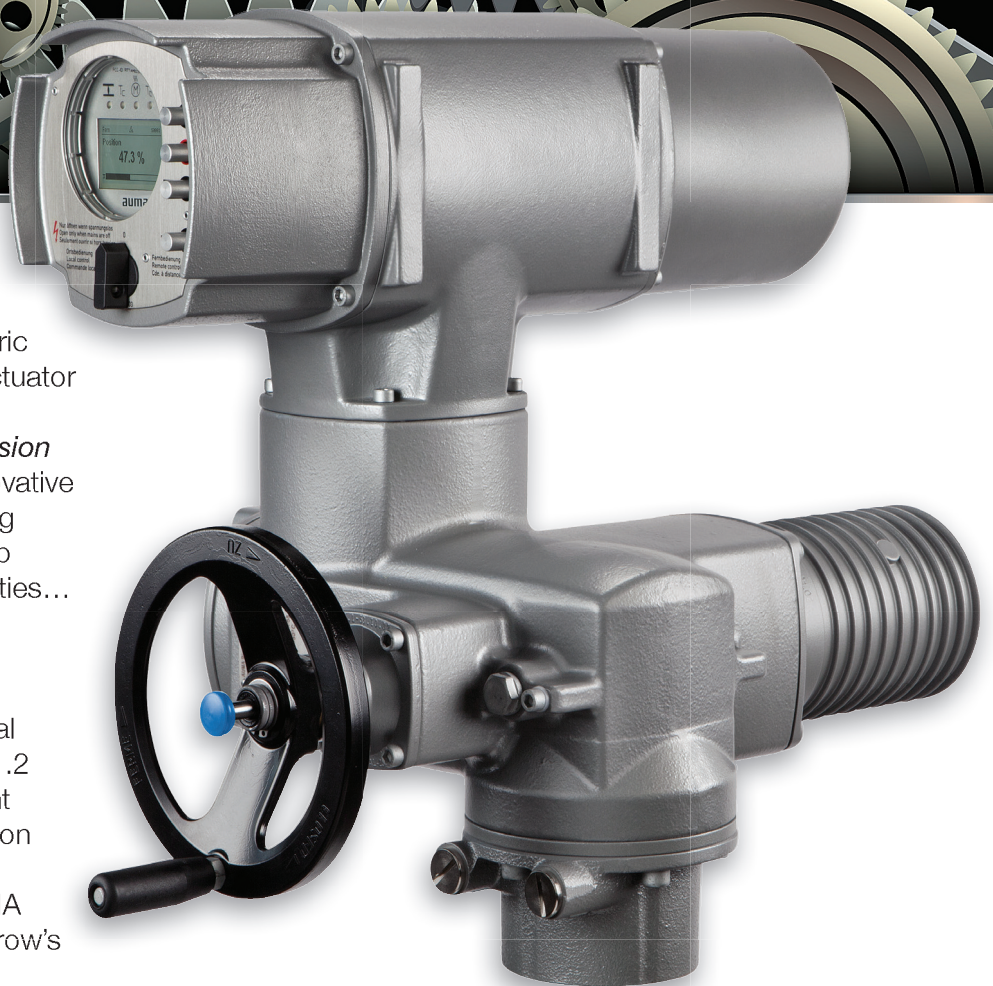
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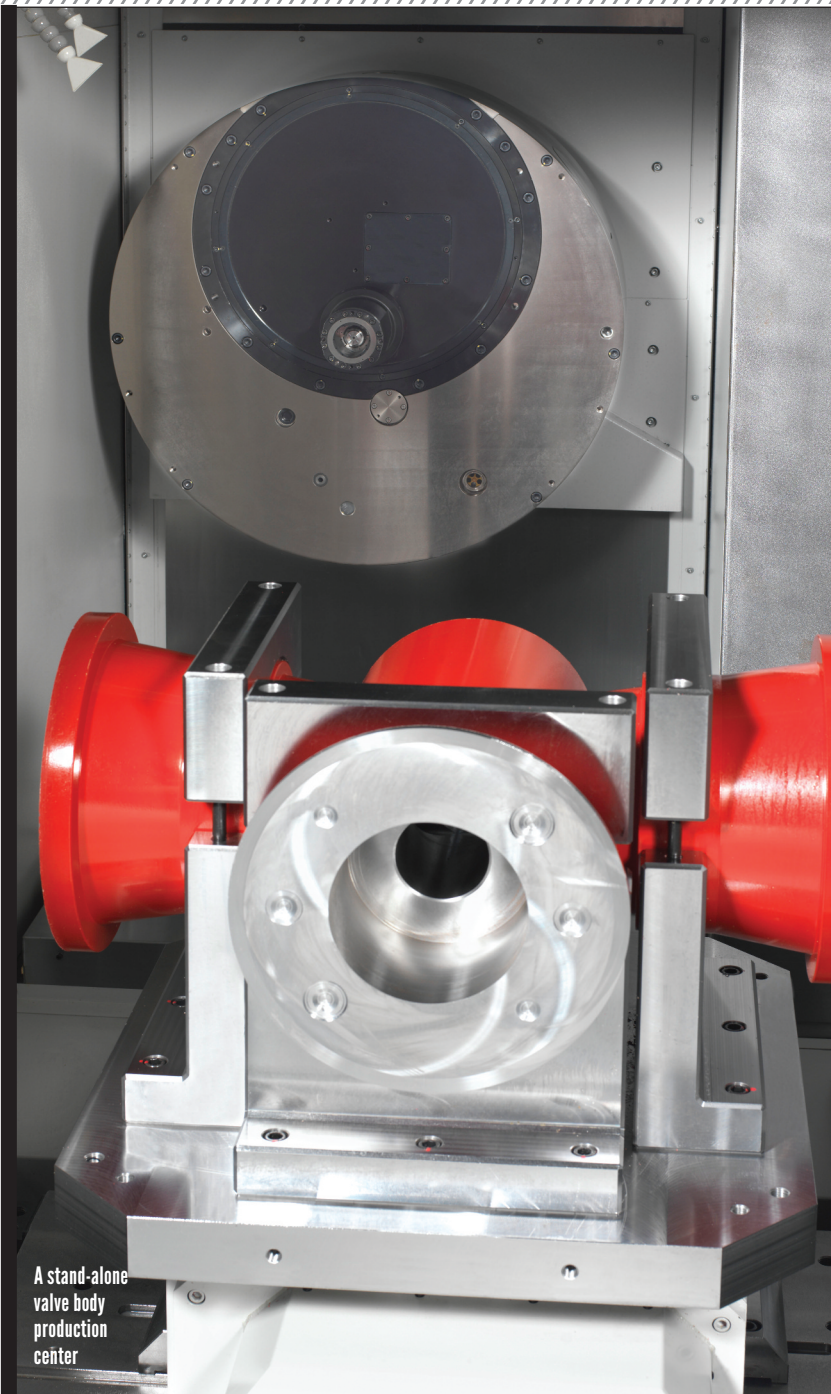
Advanced Machine Tools Keep Production Costs in Check

BY MIKE FINN

The valve landscape has changed over the past few decades—instead of über-high volumes of simple valves, many buyers and makers of valves are increasingly aiming for low-to-medium volumes of complex, high-precision valves made from exotic materials. That's because the number of applications presenting new, more difficult challenges has increased in fields ranging from oil and gas to food processing and chemicals to fossil and nuclear power. As valve requirements have broadened, the need for better machine tool capabilities has increased.

Inflexible, single-process equipment is pretty much out altogether these days. In its place are advanced machine tools with multi-tasking, 5-axis and done-in-one set-up processing capabilities (see "The Evolution of Machining"). These machines provide the agility to quickly change over from one part family to the next; the strength, repeatability and precision to meet current valve machining requirements; and the automation to increase productivity. But most importantly, with today's advanced machine tool technology, manufacturers can now produce the highest quality valves possible in the shortest amount of time. Plus, with the technology, they can significantly lower cost per part and thus pass savings on to customers.

Of the advanced machine tool technologies now available, some of the most predominant for small-to-medium-sized valve production include multi-tasking machines configured with twin turning spindles and twin tool turrets (plus a fourth or "Y"-axis capability), and machines that combine a turning spindle with a tilting fifth or "B"-axis milling spindle. For processing of larger valves, shops look for multi-tasking capabilities that can cut big part features requiring both inner diameter (ID) and outer diameter (OD) work in single workpiece clampings.



A stand-alone valve body production center

Executive Summary

SUBJECT: As control processes evolve and present new challenges for valves, tools for machining those valves and related equipment have been created.

KEY CONCEPTS:

- The newer types of machining tools
- What they can do
- How they can save costs and time

TAKE-AWAY: Today's new machining equipment can accomplish a number of tasks quickly and efficiently without the need for stopping between each process.

TWIN SPINDLE/TWIN TURRET

Twin turning spindle/twin tool turret multi-tasking machines (Figures 1 and 2) are well suited for medium to large valve components that require 5-axis machining. These machines permit shops to change jobs over in a matter of minutes as opposed to days. Additionally, they provide the flexibility to quickly adjust for varying part volumes, switch from one job to the next and squeeze in those frequently occurring hot emergency jobs.

Machines with Y-axis capabilities can perform off-centerline machining and complete valve parts in single setups that employ milling, turning, drilling, boring and tapping.

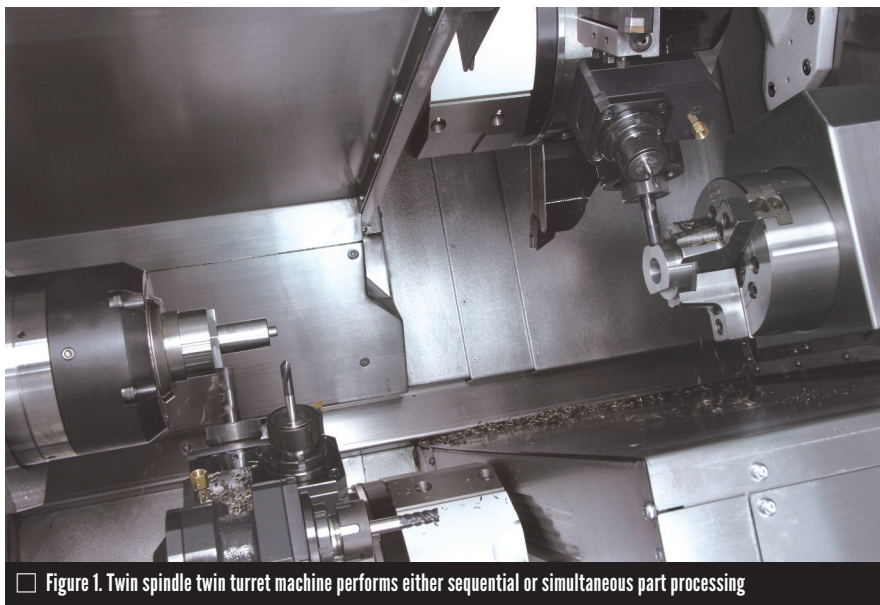
Twin turning spindles can be programmed to operate together or separately, allowing a single valve part to be machined on all its surfaces through a coordinated hand-off between the two spindles. Alternately, two different valve components can be machined simultaneously on one machine.

The tool turrets on these machines typically hold a variety of different cutting tools including fixed (lathe) and rotating (milling/drilling) tools. Multiple tool turrets can operate independently or together on the same part, providing the capability to machine two different features simultaneously or to use balanced machining strategies (Figure 3).

In balanced cutting operations, tools from the upper and lower turrets work together on the same valve part feature for rough and finish turning, rough and finish milling, or opposed feature drilling, tapping or boring. In cases where the part configuration permits, balanced machining significantly increases metal removal rates and shortens cycle times.

For valve manufacturing company Richards Industries in Cincinnati, OH, the versatility of multi-tasking machines allows quick changeovers from one part family to the next.

A larger tool magazine capacity compared to single-process (single spindle, single turret) equipment enables use of redundant tooling that significantly reduces machine changeover times for the company. The machine's single-setup, part-processing capability makes it possible



□ Figure 1. Twin spindle twin turret machine performs either sequential or simultaneous part processing

for Richards—and other manufacturers using this type of machinery—to hold very tight tolerances and provide high-quality parts in the shortest turnaround times possible.

TURNING SPINDLE/B-AXIS MILLING SPINDLE

In contrast to a twin spindle, twin turret multi-tasking machine, a machine with both a turning spindle and B-axis swiveling milling spindle combines the capabilities of a high-powered turning center with those of a full-function machining center.

Such machines may have a milling spindle with Y-axis travel and B-axis rotation that deliver full 5-axis machining capability. With them, a shop can easily process round parts, non-round workpieces and highly contoured sculptured parts. These machines can hold as many as 72 or

more tools, speeding changeovers via short tool change times.

A machine that features two turning spindles and a milling spindle allows for done-in-one operations. It can handle all processes from raw material input through final machining, providing dramatic reductions in lead times and improving workpiece accuracy by eliminating multiple setups.

For Conval Inc., a valve manufacturing company in Somers, CT, twin turning spindle/B-axis milling spindle multi-tasking machine tool technology provides the versatility to process a wide variety of part types and materials on one machine. The shop's various types of valve components are no longer pigeonholed on one particular machine or manufacturing cell because the multi-tasking machine can process any of the shop's components.



□ Figure 2. A machine with a turning spindle and a B-axis swiveling milling spindle

The goal at Conval is to get parts through as fast as possible without jeopardizing quality, and multi-tasking machine technology makes that possible. The shop goes from one job to the next between five and eight times per day with job lot sizes varying anywhere from one to 10 pieces.

TRENDING TOWARD BARSTOCK

Advanced technology for loading of raw workpiece materials also enhances process flexibility. Some machines are equipped with bar feeders—devices that move a continuous bar of part material directly through the machine chuck where it is cut off and machined into individual components.

Feeders typically can accommodate bars up to about 3 inches in diameter. For larger-diameter components, bulk work material must be cut outside the machine into blanks that are loaded and clamped in the chuck one piece at a time. For additional flexibility, some machines are equipped to perform both

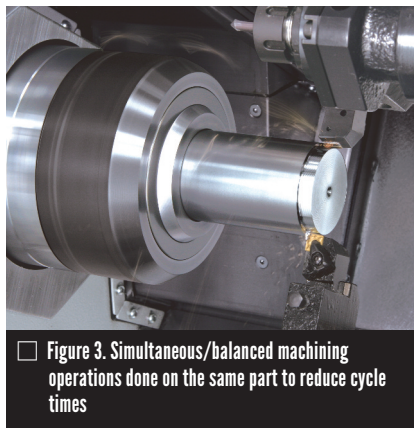


Figure 3. Simultaneous/balanced machining operations done on the same part to reduce cycle times

chuck and bar work. Such machines give shops the ability to machine smaller parts from bar-fed work material and also handle large components made from individually-loaded blanks that are in some cases over a foot in diameter.

As multi-tasking machines become more prevalent, many machine users have realized that pairing the machines with bar feeders can create stand-alone, self-contained automated

systems that further enhance output and machine utilization. At the same time, producing as many parts as possible from bar stock reduces material costs because less material is machined away. This is especially beneficial for valve shops working with expensive materials such as 316 stainless, F22 alloy steel, Inconel, Nitronic 50 and others. Plus, time and manpower needed to cut and deburr blanks for each job are eliminated.

Many valve manufacturers machine all their valve bonnets, bushings and other specialty internal components out of bar stock. This makes multi-tasking machines that handle larger-diameter bar stock desirable because a maximum number of components can be made at one time.

Today's bar loaders are engineered to automatically feed out material the required distance from the chuck to minimize bar remnants. Furthermore, chuck pressure management systems can change automatically according to part programs to accommodate a wide variety of workpieces. Such systems maintain not only the set chuck pressure per workpiece, but also produce the same pressure when changing material.

LARGE VALVE COMPONENTS

In addition to dealing with tough part materials, stringent testing requirements and extremely high-quality standards, valve manufacturers such as Emerson Process Management, Marshalltown, IA, also face the challenge of producing large-size valve components. Valve body diameters of 40 inches and bigger with extremely complex features, produced in small (one-off) lot sizes, are common at Emerson.

At the same time, no matter the size of the valve, the shop's varied workload requires versatility and flexibility to transition from one type of valve to another as quickly as possible. These demands make it essential to clamp and move a part only one time, if possible.

A good way to generate turned features on very big, cumbersome valve parts is to keep them clamped and stationary, letting the cutting tool move around them. A stand-alone valve body production center (See lead-in photo, page 14) that can finish most of the valve and other large part machining

THE EVOLUTION OF VALVE MACHINING

Valve manufacturing essentially began in the age of caves and loincloths. The first fluid control devices were made of piled-up rocks or perhaps carved-out tree trunks. These "valves" simply halted or redirected the flow of water. Among the first mechanical metal valves were those cast in bronze by the ancient Romans. The rise of steam power during the Industrial Revolution and subsequent need to transport fluids more volatile than water prompted the development and manufacture of increasingly more sophisticated valves made of tough wear- and corrosion-resistant materials and engineered for precision and unfailing reliability.

The processes and machines used to manufacture valves have progressed in parallel with valves' increasing sophistication. In the past, rough-cast valve bodies were finished with simple machine tools. Round features were turned on lathes, which are machines where a component is clamped and rotated while a cutting tool moves across it in two axes to cut external and internal diameters and thread. Holes, flats and complex contours traditionally were produced on milling or drilling machines, equipment in which the part is held stationary and a spinning cutting tool—a milling cutter or drill—moves in three axes to machine the features desired.

Today, machine tool makers offer computer-numerically-controlled (CNC) multi-tasking machines that can perform turning, milling and drilling all on one machine, in a single setup. Advanced machines have multiple spindles that hold parts and rotate tools. At the same time, wheel-shaped turrets store a variety of different tools that can be quickly switched to produce different features. Some machines offer 5-axis processing, which enables the cutting tool to be guided all around a part in three dimensions and basically eliminates the need to reclamp a part so tools can reach specific features. These multi-tasking, 5-axis machines represent a giant step forward in productivity and part quality because no time is lost moving the part from machine to machine and setting it up, and no quality is lost due to vagaries in the setup process. In other words, a valve can be "done in one" machining process, reducing cost and assuring quality.

operations in one clamping can contribute to maintenance of tight tolerances. In addition, the machine can be integrated with horizontal machining centers and other production equipment to form a fully automated system that provides 100% complete done-in-one valve manufacturing.

Advanced machine tools can produce part features and surface finishes that are specific to the fluid-handling industries. For valve bodies and other large workpieces requiring turned features, the machines can efficiently generate spiral-groove "phonographic" finishes on flange surfaces and cut tapered bores, internal and external grooves, concave surfaces, and other specialized valve details.

For processing large valves, today's advanced multi-tasking machine technology basically fuses together the capabilities of a horizontal machining center with those of a vertical turning center. The result is a machine that performs turning and milling for done-in-one processing of big, heavy, difficult-to-handle valve components.

C-axis rotary machine tables can make workpiece positioning and turning operations possible, while powerful and rigid milling spindles offer B-axis tilt from -30 to 120 degrees to accommodate both rotating (milling and drilling) tools as well as static ones for turning. Tool storage capacities can range from 40 to close to 350 tools. Two-pallet changers represent another way to enhance part-processing versatility.

Today's valve users demand the highest quality valves at the lowest possible prices. To meet those demands, valve manufacturers need to produce components as quickly as possible without jeopardizing overall valve quality. At the same time, the manufacturers must control prices while maintaining profitability. All of this is a tall order that today's advanced machine tools can help to fulfill. **VM**

MIKE FINN is an application engineer with Mazak (www.mazakusa.com). Reach him at mfinn@mazakcorp.com.

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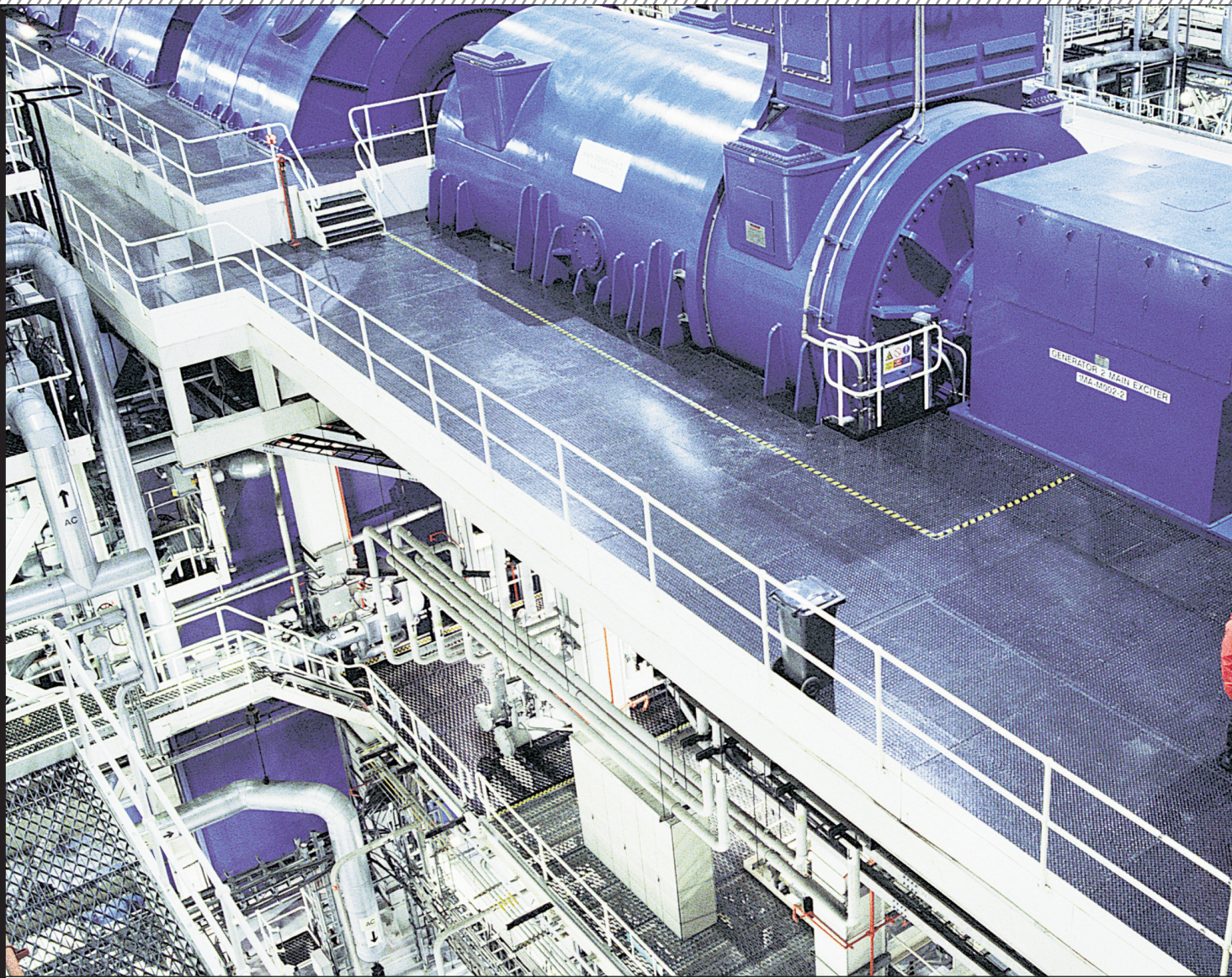
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Mitigating the Effects of Cycling a Power Plant

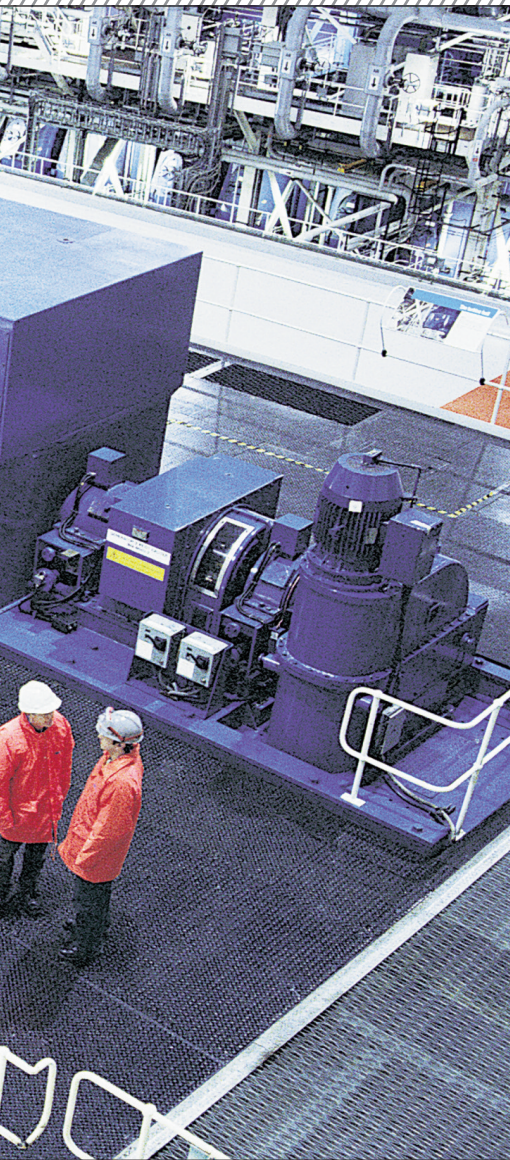
Executive Summary

SUBJECT: Severe service control valves in the feedwater systems of power plants can be greatly impacted by implementing proper procedures for maintenance, which can affect the bottom line.

KEY CONCEPTS:

- What can happen
- What can be done
- The proper steps to take

TAKE-AWAY: By using predictive and preventative practices, in addition to further diligence on typical reactive maintenance, unscheduled plant downtime can be minimized while maintaining optimum control valve and plant operation.



BY JOHN MANGAN

Significant changes in the power industry over the last 15 years have created new challenges for owners and operators of today's generation facilities. As market conditions fluctuate, those facilities must respond to the needs of the regional power markets they serve, the demands of local grid operators' requests for power dispatch, and their own operating and business objectives. As operators navigate these conditions and work to meet their objectives, a significant impact has occurred on generating facilities.

The major reason for this impact is the reality that most plants in North America were not designed to be operated in a cycling manner. But major equipment within plants—from high pressure steam drums to control valves—receive the brunt of what happens during this mode of operation.

This article focuses on the negative effects changes have had on the control valves associated with the feedwater system of a typical power plant and gives several examples of common errors or improper usage of these valves. It also addresses what asset management practices can be implemented to mitigate or negate these effects entirely.

PLANT CYCLING

Before deciding to cycle a fossil plant based on economics, plant and fleet management have to consider many short-term and long-term effects. For example, along with damage high cycling can do to major components, control valves can exhibit signs of misuse from incorrect operation.

Every power plant has several critical or severe service control valves, and it is essential these valves be operated and maintained properly for the facility to run at optimum levels. This is true whether starting up, maintaining minimum load, throttling down from maximum capacity to bring renewables online or for other modes that require good control performance.

Successful application of any severe service control valve depends on these key attributes:

- Accurate design conditions
- Proper trim selection
- Proper installation
- Appropriate control strategies
- Proper maintenance

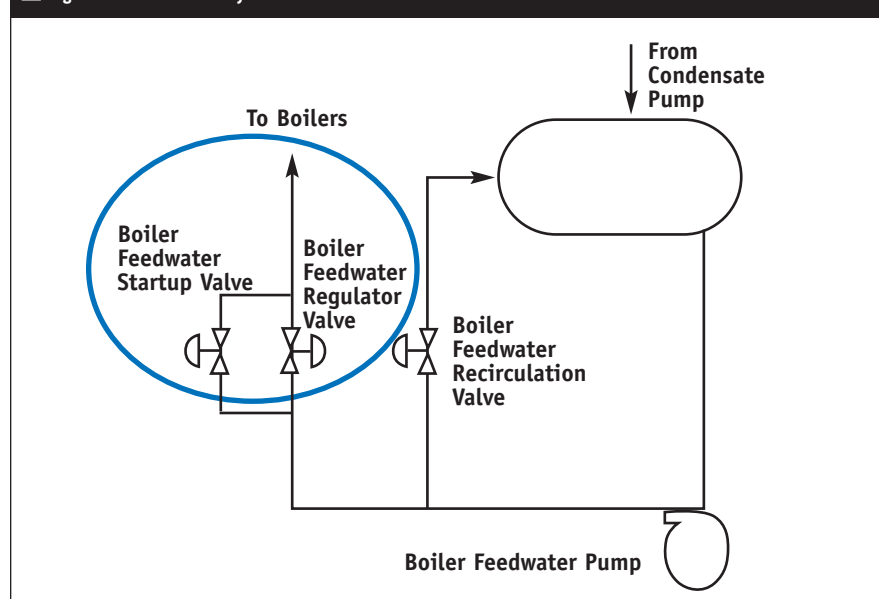
Understanding these attributes is critical to valve longevity and plant reliability whenever maintenance activities are planned for a severe service valve. This is because not understanding can cause significant problems for plant availability and uptime, which translates directly to plant profitability.

To illustrate the first key attribute of successful severe service valve application, let's focus on the feedwater startup and regulating valves in a typical power plant (Figure 1).

The valves that are part of the boiler feedwater system endure some of the most severe operating conditions in a power plant. Before addressing key attributes for successful severe service valve application, a basic review of these valves and their purposes is helpful:

Although some power plants are configured with only one feedwater valve to handle both startup and normal operation, many plants use a valve pair that splits startup and full load operation duties. In a plant configuration that uses two feedwater valves, the feedwater startup valve is used during plant startup to send feedwater to the boiler (or heat recovery steam generator—HRSG—in the case of a combined cycle plant). During startup situations, there may be a significant pressure drop across the valve due to high boiler feed pump discharge pressure and very low boiler pressure, which requires installation of anti-

Figure 1. Boiler feedwater system and associated control valves



cavitation trim. Once adequate pressure is reached in the steam drum, the regulating valve should be opened to allow a sufficient amount of flow so that this valve is not operating at or below its minimum throttling point. From this point, the regulating valve should be controlling all the feed-pump output that goes through the boiler.

ISSUES INVOLVED

When the key attributes for successful application of severe service valves are not followed, the valve asset generally suffers from reduced longevity. Common issues seen in feedwater control valves are:

- Insufficient information to determine valve selection
- Poor control strategy
- Oversized valves
- Failure to specify tight shutoff
- Improper operation
- Entrained particulate
- Improper installation

A closer look at these issues as they relate to feedwater valves follows.



□ Figure 2. Valve plug damage resulting from operating below minimum throttling point, as well as damage due to the presence of particulate.

Issue #1. Insufficient information to determine valve selection:

To ensure that final control elements continue to provide acceptable service and longevity, the conditions the valves face as a plant goes from start-up to full load, through hot or warm restarts and any outlier conditions must be carefully considered. Many times the control valve initially sized and selected may meet original design

and operating conditions defined on the data sheet but not necessarily be the most appropriate solution for every plant operation. Because of this, whenever a critical or severe service valve requires maintenance that potentially involves trim replacement or repair, these steps should be taken to replace in-kind maintenance:

Review the actual process conditions by:

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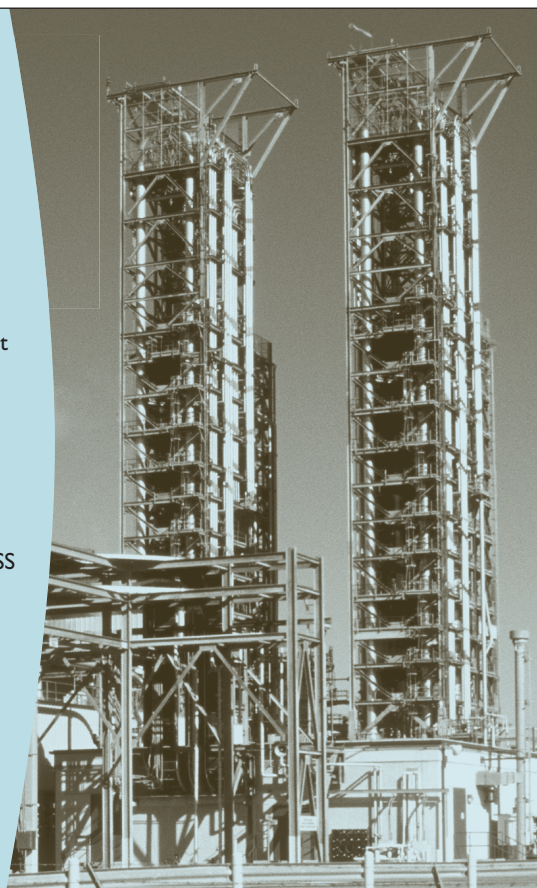
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- Retrieving historian data from cold start to full load.
- Finding boiler feed-pump header pressure, temperature, flow (valve inlet)
- Finding downstream pressure (valve outlet) for:
 - D/A, condenser or LP drum for BFP recirc
 - Economizer inlet pressure for FW regulator

The goal of these steps is to define a comprehensive set of service conditions that represent the actual process the valve will experience rather than replacing the same valve trim originally designed, sized and selected based on the engineering datasheet. That data may no longer be appropriate to support the same trim selection.

Issue #2. Poor control strategy:

Although a valve may have been sized and selected properly based on accurate and complete operating conditions, it may still experience reduced longevity if it isn't controlled properly by the operator and/or the distributed control system.

A primary example of improper control strategy is an incorrect transition between the startup and regulating valve. To maintain stable drum level control, this transition should be done at the point where the startup valve is at about 80% of its capacity and the regulating valve is at about 20% of its capacity. Implementation of this transition in the control logic has proven to be a successful practice for avoiding control issues between the two valves that are many times simultaneously throttling the output of the boiler feed pump. This practice is often referred to as the "80/20 rule." Significant deviation from this rule results in unstable drum level control and operation of the feedwater control valves in a range that reduces the service life of the valve assets.

One critical feature of this rule is that it avoids operation of the regulating valve below the minimum throttling point, which is defined as the minimum point of operation for effective throttling (and thus control) for the control valve. Also, depending on the specific design, the valve trim may



□ Figure 3. Valve seat ring damage due to operation of the valve below minimum throttling point, as well as damage due to the presence of particulate.

not be able to effectively stage the pressure drop to prevent cavitation if throttled below this point.

Operation below the minimum throttling point typically leads to erosion of the seating surfaces and to increased frequency of valve trim replacement. Since many combined cycle plants had been in a cycling mode with upwards of 250 startups and shutdowns per year, the damage inflicted to these valves appears daunting. If

the "80/20 rule" can't be met exactly, it should be met as closely as possible. Figures 2 and 3 show the damage that can result from operation at or below this minimum throttling level for appreciable amounts of time. This damage prevents proper plug and seat contact, resulting in decreased shutoff capabilities for the valve assembly. The decreased shutoff of the valve assembly can then lead to further and accelerated trim erosion damage.



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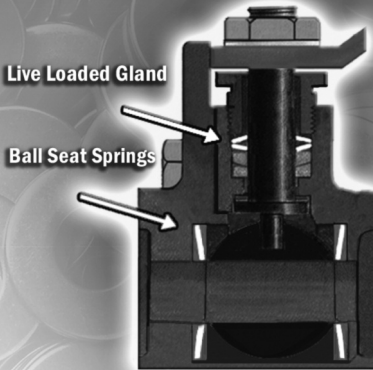
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Excess leakage also can cause excursions in drum level, which can cause excessive blowdown to maintain level and excessive pump start/stops if level cannot be maintained with blowdown.

Both symptoms lead to further leakage across the seating surface. To mitigate the damage from a poor control strategy, implementation of the "80/20 rule" should be considered. This type of control strategy can greatly increase the longevity of both these valves and lead to reduced maintenance and replacement part costs. Although 10% has been mentioned as a minimum throttling point, which is a conservative travel value to consider as the lower limit, specific minimum throttling values are available from valve manufacturers for each trim set so that control logic, including low travel cutoffs, can be customized for the given valve construction.

Issue #3. Oversized valve trim: Feedwater valves tend to be oversized for an application. Most times this is because a design accommodates an operating condition occurring during a plant "trip" when the safety valves lift and sufficient flow through the boiler or HRSG is critical to maintain. The valve pressure drop is designed to be minimal for this, many times only 20-30 psig.

While accounting for "maximum" condition ensures the valve will have sufficient capacity should this rare condition occur, it also causes the valves to operate at 30-40% open during normal operation. This means that during minimum conditions, the valve is most likely operating at or below its minimum throttling point. As mentioned above; lower lifts expose the seating surfaces to premature erosion during startup. As mentioned in Issue #1, the proper steps to ensure this doesn't continue involve developing a comprehen-

sive set of operating conditions that fully define the actual operating range the valve ought to be controlling.

Issue #4. Failure to specify tight shutoff: One of the more surprising discoveries about currently installed and operating valves in feedwater service is that they were initially specified with poor shutoff. Many times a Class II, III or IV shutoff is specified, which allow appreciable flow across the valve seating surface when the valve is in the fully closed position. As a best practice, all valves in feedwater service should be Class V to prevent erosion from leakage flow. Leakage classes of Class IV or lower provide enough flow to rapidly erode valve seats. The chart in Figure 4 illustrates the significant difference in the various shutoff classes for control valves.

Excess leakage also can cause excursions in drum level, which can cause excessive blowdown to maintain level and excessive pump start/stops if level cannot be maintained with blowdown. This can lead to pump motor damage.

Class V shutoff using 800 pounds per lineal inch of seat circumference of actuator seat force should be specified. Class V is a water test at service pressure where all other tests are at 50 psi air. Existing actuator sizing should be validated, and an actuator change may be required. Valve diagnostics will insure actual shutoff force meets required force, and valve travel cutoffs (which should be set within the digital valve positioner) will insure the positioner saturates to full output and that full seat load is available, while also ensur-

Figure 4. Comparing leakage rates for various classes of valves.

ANSI/FCI 70-2 leakage class	Leakage rate, 3-in. valve, gpm	Leakage rate, 4-in. valve, gpm
Class II (0.5% of valve capacity)	4.653	40.00
Class IV (0.01% of valve capacity)	0.08	1.086
Class V (0.0005 ml/psi/mm)	0.0015	0.0370

ing the valve does not try to control below the minimum throttling level.

Issue #5. Improper operation: An example of improper operation is when an operator decides to avoid using the boiler feedwater startup valve (Valve #1 in Figure 1) altogether because of personal preference or operation methodology. Choosing to start the plant and fill the downstream steam drum using only the boiler feedwater regulating valve (Valve #2 in Figure 1, also commonly referred to as the drum level valve) leads to cavitation damage, which further leads to leakage and subsequent high pressure feedwater cutting the seating surfaces of the valve trim.

In general this leads to reduced life of the final control element. If not repaired correctly, the result may be an inability to properly control plant startup or maintain steady state operating conditions, including critical drum level set points, when future plant operation demands it. Although undesired plant operation from the human element is never completely reduced, it is critical that plant operators understand the proper operation of the feedwater startup and regulating control valve pair. Since the startup valve's purpose is to handle the high-pressure drop conditions, placing the burden of handling those conditions onto the larger regulating valve (which isn't designed to prevent cavitation or to throttle at low Cv values) serves to reduce the longevity and reliability of that asset.

Issue #6. Entrained particulate: The issue of entrained particulate becomes more urgent when small orifice style trims are used (mainly in designs intended to prevent cavitation). Problems from flow-accelerated corrosion and the presence of magnetite manifest themselves in these types of trims by plugging the flow holes that are required to properly stage the pressure drop to prevent cavitation and its damaging effects to the valve trim.

Although small orifice trim styles are very effective when the feedwater is clean, the presence of particulate quickly degrades the performance and service life of this type of trim. If this is experienced, an upgrade that uses a dirty

service style of trim designed to properly stage the pressure drop and also allow for particulate passage should be considered. These trim types incorporate an inherent protected seating surface so that as the valve plug moves from the closed position to a certain set point, high-pressure feedwater flow has sufficient area to pass through so that localized high velocities across critical seating surfaces can be avoided.

Issue #7. Proper installation: Startup and commission of the entire power plant is a critical step in the construction process of a power plant. It is important to ensure all piping and related components are suitable for operating pressures, that all welds were performed correctly and the joints don't leak, and that all debris in the piping system has been properly flushed so that sensitive equipment is not damaged.

Many times, proper flushing of the feedwater lines is not performed, and valves with small orifices as part of the design (for example, with small holes in the cage) are plugged and damaged from debris caught between the plug and cage, causing scoring and galling

of critical valve trim surfaces. A highly recommended best practice is to use proper flushing trims available from the valve manufacturer to ensure that these assets are not compromised even before they are put into service.

SUMMARY

By focusing on analyzing existing maintenance practices and making a step toward predictive and preventative practices, unscheduled plant downtime (equivalent forced outage rate) can be minimized while ensuring assets operate at optimum levels. Aside from the significant benefits of implementing these practices, improvements in reactive maintenance methodology can also contribute greatly to asset optimization and ensure that during outages (planned or unplanned), the correct maintenance is done. Through analysis and enhancement of existing reactive maintenance practices, greater levels of plant performance, availability and reliability can be realized. ■

JOHN MANGAN is power industry manager for Emerson Process Management, Fisher (www.fisher.com). Reach him at john.mangan@emerson.com.



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VALVE BASICS




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11 18/01

TOPIC B: PLUG VALVES

Lift type non-lubricated valves

- Plug movement
 - Lifts off seating surface
 - Rotates opening
- Merits
- Extends life of the plug seal
- Allows for double block and bleed



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11 26/08

TOPIC B: STANDARDS, RATINGS & TESTING

Typical valve test requirement

- 12" Class 300 WCB gate valve (to API-600)
- Test requirement – API-598
- ASME B16.34 300 Class CWP (working pressure @ ambient) = 740 psig

	Pressure (psig)	Duration (secs)
Shell Test	1125	120
Seat Test	90 (air)	120
Backseat test	825	60
HP seat test option	825	120

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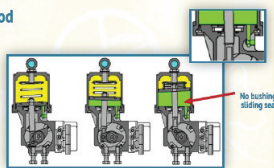
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- For future reference, a downloadable PDF of all slides.

11 24/07

TOPIC B: ACTUATOR TYPES

Pneumatic piston - tilting rod

- Piston as source of force
- Variant - tilting rod
- Typically uses higher pressures
- Torque curve same as diaphragm



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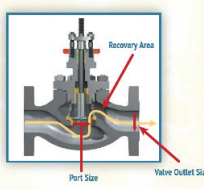
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11 48/09

TOPIC E: SIZING AND SELECTION

Valve capacity factors

- Flow pattern
- Port size
- Valve outlet size
- Recovery area
- Plug restriction



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LESSON 7: CONTROL VALVES & SYSTEMS





BY GREG JOHNSON

Most business experts agree that a company is only as good as its most valuable asset: its own people. But what do you do when you face the situation the valve industry now faces? Top-level management and many of the most skilled people that make up production crews are retiring at the same time schools are failing to attract students to technical studies or telling them how they can use their knowledge once they graduate.

It's unlikely that most of the people who work in the valve world woke up one day to the realization that this is what they wanted to do with their career. Yet opportunity abounds in this industry with jobs that range from CEO to valve technician to sales. Our job is to tell them what is available.

Help Wanted!

CAREERS IN THE INDUSTRY

- Accountant
- Accounting clerk
- Actuator technician
- CNC operator
- CNC programmer
- Computer programmer
- Corporate communications professional
- Database manager
- Electrical engineer
- Electrician
- Field service repair technician
- Graphic designer (print and Web)
- Human resources manager
- Industrial electrician
- Industrial hygienist
- Instrumentation technician
- Inventory specialist
- IT manager
- Machinist
- Maintenance mechanic
- Marketing manager
- Mechanical engineer
- Mechanical engineering technologist
- Metallurgist
- Non-destructive testing technician
- Pipefitter
- PLC programmer
- Product manager
- Project manager
- Quality assurance manager
- Quality assurance technician
- Safety manager
- Sales (inside & outside)
- Sales manager
- Trainer
- Website content managers
- Welder

WHAT'S THERE

The big question for human resource personnel in the industry today is where to start and, more importantly, where to finish in the search to fill all the open positions.

Valve and actuator companies—both manufacturers and the many industries that depend on valves and actuators to run their operations—are looking for people with dozens of different crafts, skills and trades as well as sales and administrative personnel. As always, there is also a very strong need for engineers and research and development staff.

A sampling of some of the more popular jobs in valve and actuator manufacturing companies, and service and repair companies, as well as some of the plants that use flow control products, is shown in the box at left.

The list should be promising to people looking for jobs. But it is scary for those who must fill those positions.

So how do we do it? In the old days, we



So how are we finding the right people today?
The most successful companies are using a multi-pronged approach.

put the largest ad we could afford in the local newspaper or, if we weren't in a large metropolitan area, we appealed to the college newspapers.

Today, however, it's more like a "Where's Waldo?" exercise: much more complicated given the wide range of ways people look for jobs or skilled workers.

There are three problems that have to be dealt with: 1) the lack of qualified applicants, 2) the difficulty in reaching the applicants, and 3) generating interest in manufacturing and industry.

The good news is that, based on the number of engineering graduates coming out of schools today, there are more qualified applicants looking for jobs than there were 24 months ago. The bad news is the demand for jobs is much greater than 24 months ago so the competition among industries to attract the best talent is keen.

An important part of the sales pitch we need to use in attracting talent among that greater pool of applicants is convincing

potential employees that the valve industry is challenging, interesting and offers a great opportunity for growth in their chosen fields.

How, then, are we finding the right people? The most successful companies are using a multi-pronged approach, as evidenced in findings from VMA's recent survey (see "VMA Survey Reveals Extent of Talent Drought").

RECRUITING METHODS

VMA's June 2014 poll of its membership revealed much information about what members are doing. One reality is that they are not relying very heavily on social media to find people: More than 50% of respondents stated they do not use social media in their hiring process.

Of those companies that do use social media, LinkedIn was used by 44% of companies followed by Facebook at 24%.

This finding is significant for one reason: Our industry may not yet be using this medium, but we are bound to use this

channel more in the future. According to a 2013 survey by Jobvite, 94% of recruiters use or plan to use social media to find people going forward, a number that has increased steadily in the last six years. Perhaps even more significant, however, is that 73% of 18- to 34-year-old people looking for a job used a social network to find their last job, according to the Aberdeen Group. It's clear that if our industry does not more fully embrace this trend, other industries may draw away some of the potential talent.

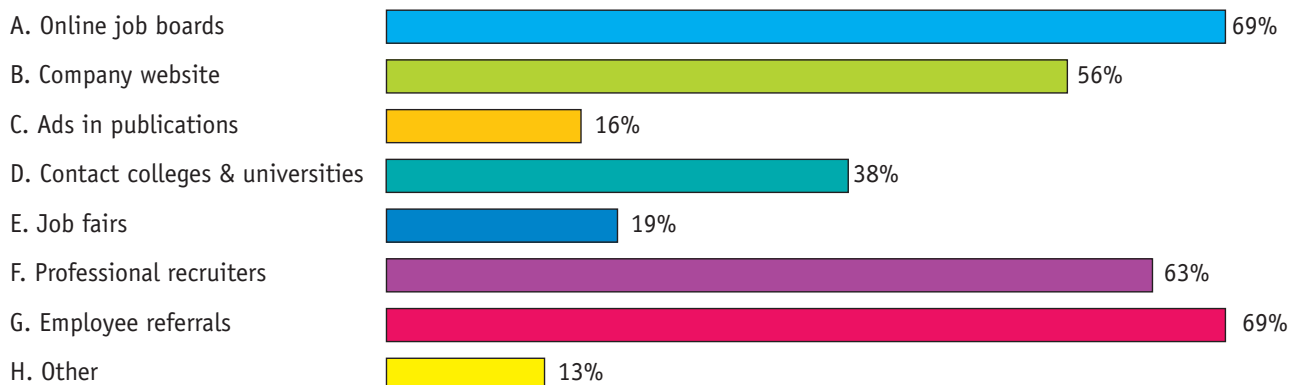
Here's what members are currently doing:

Internet job boards such as Monster.com are used by nearly 70% of the VMA companies polled, though how heavily those boards are used depends on job type. Traditional methods, such as employee recommendations and job recruiters, are still a big part of the hiring process for upper-level positions.

CONTINUED ON PAGE 28

VMA SURVEY REVEALS EXTENT OF TALENT DROUGHT

RECRUITING METHODS FOR POSITIONS REQUIRING BACHELOR'S OR MASTER'S DEGREES*



*Based on VMA member companies responding to a June 2014 survey. SOURCE: Valve Manufacturers Association

BY GENILEE PARENTE

Responses to the first question asked on VMA's "Careers in the Valve Industry Survey" show exactly why the association and the industry need to be searching for ways to attract skilled workers: When asked if finding qualified personnel is difficult, over 90% of respondents answered "yes."

The percentage reveals how deep the problem goes, while the rest of the survey results provide details on where the skills are needed and what companies are already doing.

SKILLS NEEDED

It's clear from responses that one of the greatest needs lies in sales: 45.2% indicate they have difficulty hiring inside sales people while another 45.2% say hiring for outside sales is a problem. The other great need is for people with appropriate technical skills: 41.9% of respondents have trouble finding the right floor or production personnel while 35.5% can't find the right engineering/R&D people. In addition, 29% say they have difficulty attracting people who know repair, service and maintenance.

"It doesn't matter if the unemployment is up or down, it's always hard to find qualified people for doing valve repair work," comments Kim Beise of DOWCO.

Non-technical positions don't fare nearly as poorly: 3.2% of respondents can't fill executive level positions; 3.2% can't fill administrative and customer service positions; and 9.7% can't fill marketing jobs. The only place where management positions are a problem are on the production lines: 22.6% have trouble filling manufacturing management jobs.

HOW POSITIONS ARE FILLED

Even though social media is touted in many industries as the best way to find personnel today, it's not the primary channel the valve industry uses: 54.8% of respondents indicate they use no form of social media for recruiting.

The other means of searching for talent depends on the job

and the level of education required.

For example, for jobs that require no college, 67.7% use online job boards such as monster.com and 61.3% post positions on their own website while the next greatest source is referrals from other employees (58.1%).

For positions that require at least a 2-year technical degree or specialized training post-high school, the results are about the same: 71% use job boards, 64.5% post on their own website and 61.3% rely on employee referrals.

However, for jobs that require 4-year or master's degrees another source comes into play: 63% of respondents say they use professional recruiters (compared to 48.4% for jobs requiring some technical education). Still, job boards play a heavy role at this level at 69% as do employee referrals at 69% and the company website at 56%.

Open-ended comments revealed a few additional ideas for places to look. Bruce Broxterman, Richards Industries, says his company relies on interns and part-time jobs for students who are in machining classes at the local technical high school. Cliff Smith of Metso Automation USA says his company has full-time recruiters on staff and that Metso also has college-level co-ops, "which are a great source for new employees."

WHAT VMA CAN DO

Other comments also reveal that industry professionals have a variety of ideas for ways their association can help. Bob Kemple of ASCO suggests developing relationships with universities and inviting them to industry meetings.

Ray Jacques of Bradken Engineered Products suggests inviting students to learning workshops or encouraging companies or colleges to sponsor such attendance. David Hughes, Pentair, said that VMA members could visit college campuses to promote careers in the industry. **VM**

GENILEE PARENTE is managing editor of VALVE Magazine. Reach her at gparente@vma.org.

When asked if finding qualified personnel is difficult, over 90% of respondents answered "yes."



VMA is embarking on a campaign to help increase industry awareness.

When asked why an employer today would opt for the services of a professional recruiter instead of a job board placement, Don Rivers of Don Rivers & Associates (DR&A), a professional recruiter who focuses on the valve industry, explained: "Our customers tell us they can't afford to make a mistake by hiring the wrong person off of a job board." Using a professional recruiter is like "shooting with a rifle as opposed to a shotgun. Our focus is often on jobs that are never listed on job boards," he noted.

Another interesting fact revealed by the VMA survey is that the most in-demand positions in the valve world are in sales—both inside and outside. Rivers echoes those findings. When asked which positions were most sought by his clients, he said "sales engineers, sales managers and inside sales," and thinks the current job market is the best he has seen in 26 years. Close behind the need for people to sell the valve products is the need for technicians and manufacturing operations-type personnel.

GOOD PAYING JOBS

On the Gulf Coast, the number one degree valve companies seek when filling technical sales positions is a logistics or industrial distribution degree. Graduates from these programs receive a fair amount of technical education in addition to courses in sales, distribution and supply chain management. Two of the more popular schools in the Gulf Coast offering this type of degree are Texas A&M University and the University of Houston.

While sales positions are most in demand, the hardest positions to fill are those that require technical expertise, according to Rivers as well as VMA's survey. At the top of DR&A's difficult-to-fill list, for example, are valve automation sales engineers and valve technicians.

This has changed slightly in that several years ago, it was widely accepted the most urgent need in industry

was for more young engineers. That situation has improved, and the number of young faces at valve standards meetings and participating in other industry activities is very encouraging. At the same time, however, there still are many engineering openings because the Medicare clock is gaining on the last of the baby boomers.

Starting pay for mechanical engineers on the Gulf Coast is about \$65,000, while experienced engineers can receive \$100,000 to \$150,000 per year.

Jobs that require technical or associate degrees in the valve industry also pay well. For example, craftsmen, such as machinists and welders, can make an excellent salary with pay for machinists in the Houston area running from \$18 to \$30 an hour and almost all such jobs providing guaranteed overtime because of sheer need. It is not unusual for an experienced machinist to make more than \$100,000 a year. This shows these are not just "jobs," but excellent, well-paying careers to pursue.

All of this also reveals the jobs are there, and they need to be filled, but what is the best way to connect the valve employer with the prospective valve employee? That question is closely associated with a second question: How do we inform prospective employees about the industry, as well as the benefits of making it a career choice?

Recognizing its role as the leader for the U.S. and Canadian valve manufacturing industry, VMA is embarking on a campaign to help increase industry awareness. While plans are still under development on how to get to that goal, proposals include a special career section on VMA.org to supply necessary information to those considering a career in the industry—from an industry overview to types of jobs available.

The association also plans to develop a flyer that can be distributed at trade shows, college career fairs, technical schools and similar places.

THE MODERN MANUFACTURING FACILITY

One of the more daunting tasks facing us today is repackaging the manufacturing side of the industry to make it more attractive to skilled people. Unfortunately, the past 20 years have not been kind to the manufacturing image. Much of the public still pictures a smoky, belching furnace and rundown, dimly lit brick factory.

While U.S. and Canadian manufacturing facilities are not Willy Wonka's Chocolate Factory, today they are very clean and safe places to work. They also are likely to be filled with computers, programmable logic controllers, robots and modern computer-controlled machine tools, as well as the latest innovations in modern manufacturing productivity.

One example comes to mind: A VMA member's 500-person plant in the Southeast is an impressive facility with a combination of excellent working conditions and modern productive equipment. This company facility is not unique among VMA member companies. There are many like it, from Connecticut to California, from Texas to Quebec. These facilities are the priceless intellectual property of the valve industry, and we need to capitalize on them in every way possible. If more high school and college students could visit these facilities—either in person, by viewing videos or via webinars—the image of the industry would receive a boost that could very well equate to more jobs filled.

The time is right, and the opportunity is there. VMA members—and others in the industries that both produce and use valves—need to work together as a team to help educate the public and potential employees about our industry. We also need to create productive venues and processes for attracting the best available candidates. VM

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

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Evaluating and Proving SIS Safety Levels

BY LOREN STEWART

Because the equipment used in a safety instrumented system (SIS) application has a critical job, such equipment must be carefully evaluated and justified. This justification must be based on information sufficient for giving those responsible adequate confidence that the equipment will perform as needed for the intended application.

Evaluation and justification includes two areas of analysis:

APPLICATION MATCH

Any piece of equipment chosen for safety applications must match functional and environmental needs. Actuator/valve assemblies, for example, must be looked at for seat tightness and closing times. In addition, the materials used in all equipment for a SIS must be compatible with process materials, a reality that is especially important in wetted services typically found in the oil and gas and chemical industries. Process environmental conditions must not exceed ratings, and application evaluation is common sense, and therefore, common practice. A newer area of evaluation and justification is safety integrity justification.

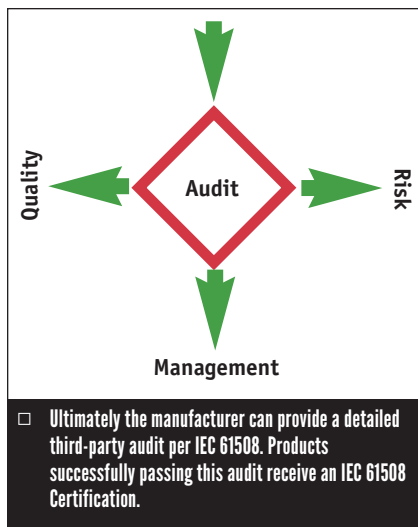
Executive Summary

SUBJECT: When it comes to safety instrumented systems (SIS), the very nature of what they do requires they be studied to ensure they will perform as expected. Today, those who use these systems have a number of ways to retrieve and assess data that can help prove effectiveness.

KEY CONCEPTS:

- What needs to be tested
- What tests are available
- What manufacturers can provide to users

TAKE-AWAY: In the end, SIS users and manufacturers must work together to ensure equipment will provide needed safety levels.



SAFETY INTEGRITY JUSTIFICATION

The functional safety of equipment also must be assessed as to whether the equipment is safe enough for specified safety integrity levels. Justification decisions in this area must be documented as part of project records.

Rigorous safety integrity justification has been a common practice for sensors and programmable logic controllers, but only recently has such attention been given to solenoid valves, actuators and valves used in the SIS final element.

So how can an engineer assess the functional safety of an actuator or a valve? IEC 61511, Functional Safety for the Process Industries, requires that equipment used in safety instrumented systems be assessed based on either IEC 61508 certification or an evaluation the standard calls "prior use." Unfortunately, the standard does not give specific details as to what constitutes the criteria for prior use. Most agree, however, that if a user company has many years of documented successful experience (i.e., no dangerous failures) with a particular version of a device, this provides a good foundation for prior use justification. Most also agree that prior use justification requires vendor quality audits and that a comprehensive system should be in place to record field failures and failure modes at each end-user site.

Records of the different versions of equipment must be kept because design changes may void prior-use experience. Operational conditions must be recorded and must be similar

to the proposed safety application.

However, a problem with prior-use approaches is that many process sites simply do not have those levels of recordkeeping in place.

Because of this, many users have asked their manufacturers to help with this particular justification.

HELP FROM MANUFACTURERS

A manufacturer can provide two aspects of justification: 1) Failure rate and failure mode data for each piece of equipment; and 2) The manufacturer's design process and manufacturing process quality audit.

Failure Rate and Failure Mode Data

Failure rate data is important so that system designers can create safety function designs adequate for process risk reduction requirements. Several techniques are used to predict field failure performance, including cycle test data; manufacturer's warranty return data; and failure modes effects and diagnostics analysis (FMEDA).

■ **Cycle test data:** Cycle testing is a method used primarily on mechanical equipment to determine wear-out mechanisms. The method also is used to predict the random failure rate during the useful life of a device.

The testing method assumes premature wear-out from a manufacturing defect would be the dominant failure mechanism and that no other failure mechanisms would be significant. This assumption is valid in common mechanical applications with frequent motion.

A specified quantity of devices are cycled until they fail 10% of the time (10% fail). A calculation is done based on a cycle rate for a given application to determine the failure rate.

Because cycle testing assumes

constant dynamic operation, it is used for high-demand applications only, not for static or low demand. This means the method is rarely valid or used for safety instrumented system applications that might remain dormant for long periods of time. Cycle test failure rates should only be used for safety functions with frequent demand rates (demands of at least once a week).

■ **Manufacturer's warranty return data:** This data can be used to approximate predictive field failure rates on new products. It depends on a number of assumptions. However, often the assumptions used result in publication of highly optimistic failure rates. The most optimistic assumption may be that all field failures are reported. A survey of end users found that often it is less expensive to throw away a product than to send it back to the manufacturer. Also, sometimes repairs are made by the end users, and the failure is not reported back to the manufacturer. This is especially true of mechanical devices such as valves and actuators for which rebuild kits are offered. Overall end-user survey results indicated that roughly 10% of failed items were actually sent back to the manufacturer. This number is higher during the warranty period; but some users reported that 0% were sent back after the warranty period.

Another issue with this type of data analysis is return categorization. As products are returned, they are tested. Many times these tests show "no problem found." It is assumed those returns must not be real failures so they are not counted.

A second optimistic assumption is that such tests can detect all possible failures. But what if the failure occurs only under specific field conditions not duplicated in the manufacturing test? What if the test simply is not complete and does not detect all failures? Many returns are classified as "not a problem" or "customer abuse." All of this depends on the manufacturer's warranty policies, but frequently, real failures are not counted.

CYCLE TESTING

THE PROS:

Helps establish end-of-life value

THE CONS:

Assumes application has constant dynamic operation

MANUFACTURER FIELD RETURN DATA STUDIES

THE PROS: Real Data

THE CONS:

Calculation methods vary widely; cannot know what percentage of actual failures are returned; different definitions of "FAILURE"

■ **FMEDA:** The hardware analysis called FMEDA can be done to determine the failure rates and failure modes for a piece of equipment. An FMEDA is a systematic detailed procedure first developed for electronic devices and then extended to mechanical and electro-mechanical devices. Each part in a design is given a failure rate based on field failure data. The failure modes of that part are examined to determine the failure mode of the device.

Failure rates are added for each mode. Some assessors also do a useful life analysis to provide safety instrumentation engineers with any wear-out mechanisms and the time periods until they wear out. Some FMEDA analysis is also extended to evaluate the effectiveness of given proof test coverage factors including partial valve stroke testing. The information can be used for more realistic probability of failure on demand average calculations.

One of the major advantages of the FMEDA approach is that component failure rates can be established for different operating environments. The failure rates of certain mechanical components used in valves (e.g., solenoid valves) and actuators vary substantially depend-

FMEDA

THE PROS:

Can provide detailed and complete information; predictive – does not require a multi-year lag time to gather statistics

THE CONS:

Dependent on the analyst having a good component failure mode/failure rate data



□ Third-party reports often come in the form of ISO-style audits.

ing on operation. Seals such as O-rings, for example, have fundamentally different failure modes when used in applications with frequent movement (dynamic) versus applications with infrequent movement (static). When both sets of failure rates are established, FMEDAs can provide data sets for both static and dynamic applications, or in high and low demand.

MANUFACTURER DESIGN AND PRODUCTION AUDIT

In addition to good failure rate and failure mode data, a manufacturer can provide third-party audit results for its design manufacturing processes.

The manufacturing process audit has been going on for some time and is often covered thoroughly by an ISO 9000 style audit. The design process audit report is not as common, but some manufacturers can supply a report that can be used by an end user as evidence in a prior-use justification.

IEC 61508 CERTIFICATION

A trend among manufacturers is for them to provide a certificate and a full assessment report according to the requirements of IEC 61508. The full assessment should include an FMEDA, as well as a detailed assessment of the design and manufacturing processes. An IEC 61508 assessment digs deeply into the methods used for new product development and also provides detailed study of the testing, modification and user documentation.

Many of the requirements of IEC 61508 focus on eliminating systematic faults through use of the world's best

product design methods. To demonstrate compliance with all requirements of IEC 61508, a product creation process must show extensive use of many fault control and fault avoidance procedures. These methods and procedures must be applied with different levels of rigor when they are a function of the safety integrity level (SIL) rating of a product. When a product has demonstrated full compliance with the requirements of IEC 61508, the end-user has a high level of confidence that the product will provide the level of safety specified in its SIL level rating.

CONCLUSION

All of these assessment techniques, including the full IEC 61508 certification, do not evaluate the suitability of a device for a particular function. End users must specify and evaluate any product for their particular installations.

As safety instrumented systems are designed and implemented, it is clear that manufacturers and end users must work together to achieve optimal functional safety. The manufacturer must specify the environmental and application limitations. The end user must design the product into an application that will not exceed the limitations of the instrument design.

In addition, field reliability and safety performance must be communicated to the manufacturer so that any unanticipated design issues are understood and communicated to all end users. **WM**

LOREN STEWART is a safety engineer at Exida (www.exida.com). Reach her at L.Stewart@exida.com.

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Why Quarter-turn Valves ‘Pop’ Open

BY ED HOLTGRAVER

We’ve all seen this situation: A quarter-turn valve is in the closed position. A pneumatic actuator applies an opening torque that exceeds what’s required to begin to open the valve. Suddenly, the valve “jumps” or “pops” open to as much as 45 degrees or more, resulting in a sudden surge of potentially disruptive flow. Why did this occur and how can we avoid this phenomenon?

THE PHENOMENON

Some time ago, the makers of a wave pool decided to use high-performance butterfly valves to control the flow of pressurized air to induce wave motion. The valves supplied initially, however, refused to open smoothly. Instead, they jumped from fully closed to half open before control could be established. Because of this, wave control was not possible using these valves.

Another time, a butterfly valve was under cycle testing as part of a development program. The high-seating torque exhibited by the valves caused them to stick in the closed position.

Once the valve disc moved out of the seat, the valve jumped so much that the actuator end caps failed from impact by the pistons.

In both instances, the valves exhibited high seating torque and minimal torque once they broke free of the seat. Blame for the opening jump can be placed on a valve’s torque characteristic; but in fact, the actuator is typically just as much to blame as the valve.

WHY THIS IS

For pneumatic actuators to operate, pressurized air or gas fills the entire void volume of the actuator. Essentially, this volume of compressed air can be thought of as stored energy contained by the piston’s resistance to movement (i.e., the valve torque). Once the valve moves away from the seat, resistance decreases, and the compressed air is free to expand until the pressure equals the valve’s resistance.

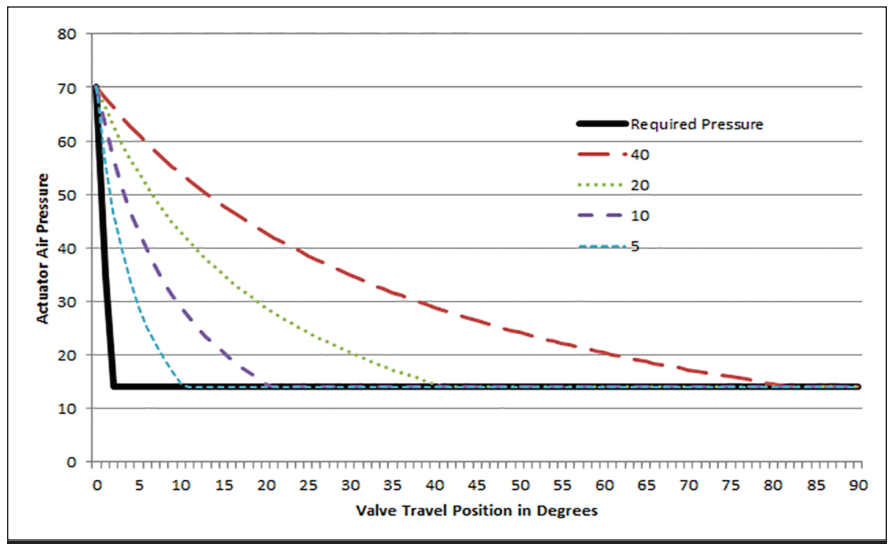


Figure 1. Model of pressure’s effect on travel

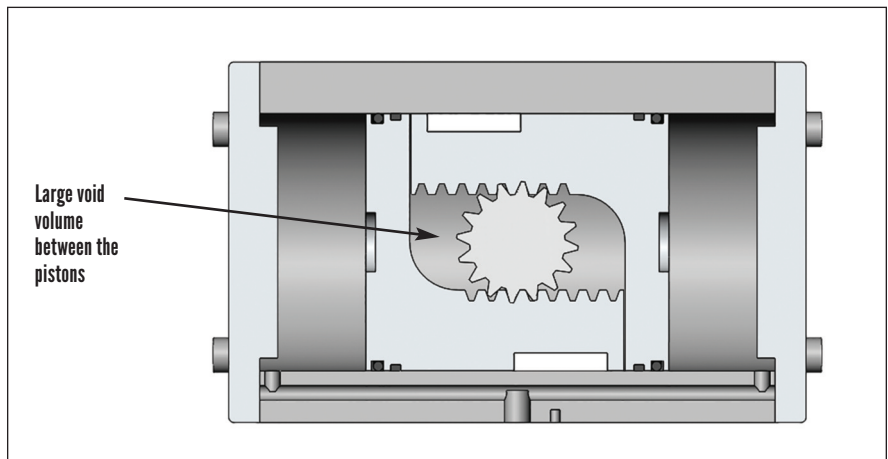


Figure 2. Rack & pinion actuator with pistons outward when the controlled valve is closed (normal arrangement)

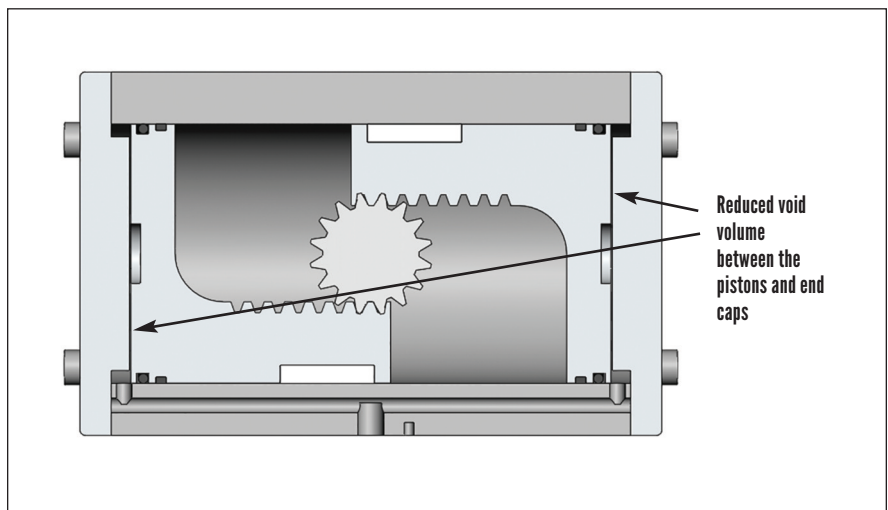
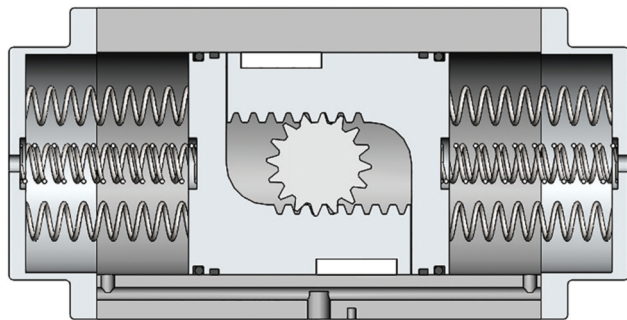


Figure 3. Rack & pinion actuator with pistons inward when the controlled valve is closed



□ Figure 4. Spring return actuator with pistons inward when the controlled valve is closed. Void volume is high, but springs assist in resisting motion.

Figure 1 demonstrates how this works. It shows a valve torque characteristic where there is a high initial unseating torque followed by minimal torque requirement once the valve leaves the seat (represented in this graph by the solid line). Note that this graph shows the actuator pressure required to operate the valve at each travel position.

Resulting actuator travel and valve position are shown for various actuator void volumes. To establish a mathematical model, we've used a 6-inch piston with a 3-inch piston travel for full 90-degree travel in this example.

With a 40-cubic-inch void volume, the example actuator will cause an opening jump of nearly 80 degrees. Decreasing the void volume to 20 cubic inches reduces the jump to 40 degrees, and a 5-cubic-inch void volume results in a jump of only 10 degrees.

While the example cannot be used to predict the opening jump for specific applications, it clearly demonstrates that the void volume of an actuator significantly contributes to opening valve jump and that minimizing the void volume will result in less jump.

Actuator void volumes vary by type, design and direction of travel. Consider the example actuator shown in Figures 2 and 3. Void volume is considerably greater if pressure is applied between the pistons to cause valve opening than if that pressure is applied to the

outer surfaces of the pistons. In this example, opening valve jump can be reduced by the choice of actuator orientation.

Clearly, to reduce the amount of opening valve jump, a pneumatic actuator with minimal void volume should be selected.

Alternative solutions for a jump situation are:

- Adding spring to the actuator (Figure 4) will help because the spring's resistance to motion increases with travel, reducing the jump. Preferably, select a spring return actuator with a minimum of void volume.
- To a lesser extent, the actuator mechanism can lessen the effect. For instance, while a rack and pinion actuator produces a linear torque curve throughout travel, scotch yoke types decrease their torque output at mid-travel; therefore, they may cause less valve travel from the stored air pressure.
- Another option is using a hydraulic or electric actuator, neither of which will typically produce any opening jump. ❏

Ed HOLTGRAVER is founder, chairman and chief technical officer of QTRCO, Inc. (www.qtrco.com). Reach him at ed@qtrco.com.

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Smarter Pump Operation

BY MIKE PEMBERTON

Have you ever experienced a sprained ankle that tweaked your hip joint and then resulted in a stiff back? This is an illustration of how chain reactions can occur in complex systems. The body, like a highly engineered industrial process, can experience immobilization and downtime, i.e., each joint, bone and associated connective tissue inside works as part of a highly integrated system. When one subsystem fails, other issues may be the root cause.

If a control valve is presenting problems, it may be a sign of a greater systemic issue, with other “bad actor” system components taking the blame.

Collectively and individually, one of the biggest sources of plantwide maintenance and electrical energy savings in industrial processes today¹, can be found at the heart of the facility—the centrifugal pumps.

FUZZY LOGIC ABOUNDS

Putting pure engineering analysis aside, logic states that a bigger pump can produce more available head and thus give reserve pressure capabilities that can be put to work, if and when needed. Plant managers dream of the day output will significantly increase because a new processing line comes online, leveraging as much existing infrastructure as possible.

Historically, however, the combined notion that larger pumps are insurance, as well as an investment in the future productivity of a facility, has led to the installation of many oversized pumps. In fact, according to recent research by the Finnish Tech Research Center², the average pump efficiency is less than 40%, with roughly 10% of all processing pumps operating at 10% efficiency or less. This is largely because of valve throttling and oversizing.

EXTENDING VALVE LIFE AND MORE

The plain truth about pumps operating at or near the best efficiency point (BEP) is: They run smoother, last longer and operate on much less energy. A throttled pump can consume 75% or



□ These pumps are used to unload bleach from tanks into a pulp and paper plant bleaching process. They use a seal-less design that eliminates failure that can result from crystallizing bleach.

more excess power³, transmuted in the form of vibration, heat and noise. And here's the kicker—pumps operating at or near BEP help the rest of the system components operate more efficiently and last longer.

Valves, seals, gaskets, pipes and other subsystem components can wear out faster when pumps are throttling flow. In fact, an estimated 60% of scheduled maintenance checks on valves and motor systems can be avoided when the pump system is operating at BEP and monitored by real-time asset systems⁴. This is especially pertinent given the reality that, across continuous process industries, about 40% of manufacturing revenues are devoted to maintenance. (Source: DOE Industrial Technology Program, ITP “Motor Challenge”)

Pumps are at risk from this reality as well. Valves that are less than 40% open expose pumps to massive resistance, resulting in component stress that accelerates bearing damage and seal wear⁵. Pump shafts often break under these constrained conditions.

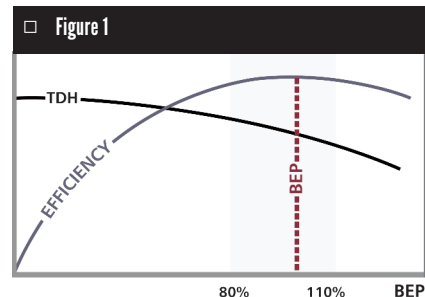
But perhaps even more important is the fact that pumps operating at BEP offer plants greater control over the process. Throttling pumps can result in increased process variability from a combination of control valve, pump and pipe mis-sizing. This leaves engi-

neers no choice but to operate control loops in manual mode. In some industries, up to 80% of process control loops contribute to increased process variability⁶, and valves are without question the biggest contributor to process variability primarily because of stiction and backlash.

UNDERSTANDING BEP

In pump systems, two separate curves represent the hydraulics, each plotted on the same cartesian plane correlating force and flow (Figure 1—TDH is total dynamic head). The total head, typically represented on the Y-axis and measured in feet (or meters), represents pressure (kg/cm^2). The pump flow capacity, typically represented on the X-axis and measured in gallons (or liters) per minute, represents volume transfer per time increment.

The two key curves are the pump curve, which is convex and decreasing;



and the system curve, which is concave and increasing. If these two curves cross near BEP, then the pump will operate efficiently and reliably.

When fluid flow is restricted enough to move a pump left of BEP, it is being throttled, thereby increasing pressure inside the pump casing. Potentially, this can result in undue wear and tear from increased radial loading and the resulting low-flow cavitation⁷ plus suction recirculation. When the flow is too great, the pump may experience a lower-pressure area inside the pump in a condition called “runout,” which can also cause vibration, recirculation and other losses in efficiency⁸. In some cases, seals may begin to leak because there isn't enough pressure inside the pump to keep them seated properly.

In most systems, it's unlikely that the pump will operate at its exact BEP all of the time. Shifting process variables and swings in end-user flow demand affect pump efficiency. However, a pump that is properly sized will maintain a flow near peak efficiency most of the time. As a general rule, maintaining a flow between 70% and 100% of BEP is acceptable performance⁹.

“TUNING” A SYSTEM TO BEP

When a pump is creating too much or too little force in the system, inefficiency and the problems described above emerge. There are a few ways to “tune” the system so that the pump is operating at BEP:

- **Variable Frequency Drives (VFDs)**—In processing scenarios where variability is important, VFDs are a great solution—they adapt to changing process conditions, enable soft starting and shutdown to help protect components from start/stop forces, and ensure that the right amount of energy flows into the pump to keep it at BEP under virtually all normal operating conditions.
- **Trimming Impellers**—In some cases it's possible to trim the pump impellers on a throttling pump, reducing the head it produces. This takes careful thought. It's not possible to “un-trim” an impeller without replacing it.
- **Turning off One or More Parallel Pumps**—An often misunderstood factor is that turning on two or

more parallel pumps doesn't result in doubling or tripling the flow rate. Due to backpressure in the piping, each pump turned on only adds to the flow incrementally; e.g., 1+1+1 ≠ 3, it equals more like 1.5 times the flow rate. Turning off pumps that don't need to run saves the maximum amount of energy.

- **Replacing the Pump**—In some scenarios, an overrated or underrated pump cannot be brought into BEP in a given system. This occurs when the pump is dramatically oversized. The only solution becomes replacing it.

VALVE WEAR AND OTHER COSTS ADD UP

When pumps operate outside of BEP, and especially when they are throttled, inefficiency and repairs occur at higher rates. These costs can be significant, even exceeding the original cost of the equipment (Figure 2).

In typical American Petroleum Institute (API)-rated pump systems, electrical energy costs over the lifetime of a pump can be more than 10 times the cost of the initial investment in the pump. Maintenance costs can be higher or lower than the electrical energy cost of the pump, depending on the sizing.

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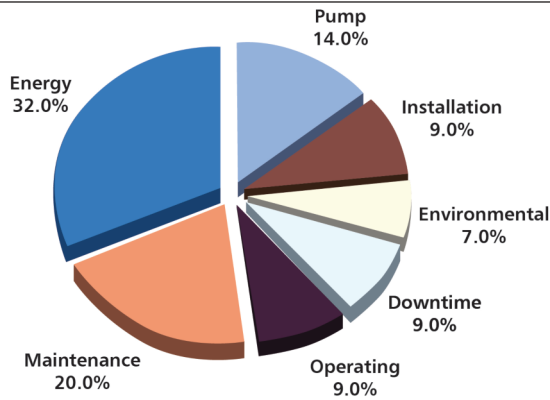
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□ Figure 2. Life-cycle costs for a typical API pump system

These facts and others have taught many process engineers to look beyond the cost of the initial investment and consider the cost of the investment from cradle to grave—the Total Cost of Ownership metrics.

Sometimes, the source of a faulty valve isn't the way it's installed, operated or constructed. Poor pump performance can be the product of how the valve is sized in proportion to the pump upstream. If a plant is suffering from a "bum hip" that's been lingering for some time, a solution may be to

optimize the rest of the system. With the right, holistic approach, a plant can be up and running better than ever, pain free and ready to tackle the expansion its managers have been hoping to implement all along. **VM**

MIKE PEMBERTON is the energy & reliability program manager for ITT PRO Services (<http://ittproservices.com>), Plant Performance Services. He served as co-chairman of the Pump Systems Matter education committee for the Hydraulic Institute (HI). He is also co-editor of the HI guidebook, "Optimizing Pumping Systems: A Guide to Improved Energy Efficiency, Reliability and Profitability."

Reach him at Mike.Pemberton@itt.com.

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END NOTES

- ¹ Pemberton, Mike. "A Big Picture Evaluation Can Produce Big Savings." Pumps & Systems. September, 2013.
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- ⁸ Ibid.
- ⁹ Ibid.

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Standards, Safety, Training Top Topics at Meeting

BY KATE KUNKEL

Twenty-five years ago, the member companies of the Valve Manufacturers Association of America (VMA) saw a need to promote both safety and quality in valve and actuator repair. As a result, the service operations of VMA members banded together to create the Valve Repair Council (VRC). As part of its mandate to educate manufacturers, rebuilders and customers on the importance of proper service and to provide a forum for an exchange of information, the VRC sponsors events such as this year's meeting and exhibition in Houston, which was June 5-6.

Attendees from across the valve repair industry came together to hear a diverse array of topics on safety, repair trends, the latest revisions in standards for valve repair and more.

SAFETY FIRST

Rod Helm, EHS manager, basic rigging at Granite Services International, emphasized the importance of considering every aspect of rigging and hoisting valves under service.

"While this may seem obvious, you wouldn't believe how often something critical is forgotten," he said. "You have to consider everything that has an effect on the movement of equipment."

Helm itemized variables that must be considered and explained how each could be handled. While weight, shape and size of the load seem like obvious factors to look at, the center of gravity is a bit more difficult to ascertain but just as critical, he pointed out.

Awareness of overhead hazards, the travel path and the footing of cranes is also essential—factors most operators already know. "But, do you know if the equipment has been inspected? Do you know that the crane you're operating or the lift or hoist is in good shape? Did you inspect the slings and rigging hardware? If there is pilling or wear on a webbed strap, it could give way with weight," Helm said.

Deductions for maximum load must always be taken when ropes or rigging



One of the topics addressed at the Valve Repair Meeting was API RP 621, which addresses repairs for emissions.

have wear, he said, or if splices have occurred.

He also warned that softeners need to be used when rigging something over a sharp edge.

"You can't believe how many people will stick a piece of cardboard between a sharp edge and a strap. Cardboard has zero protection ability for rigging," Helm said. He recommended fire hoses as the best possible choice. Helm also pointed out the necessity of appointing a dedicated signal person for a crane operator. That should be the person's only task, "No tag lines, no rigging, nothing else," he said. He also warned that, while cranes often have computers in them, a computer in a mobile crane is to assist the operator—it is not a substitute for the heavy lifting. "Safety must be priority one," he warned.

BLENDED LEARNING

It's clear from the recent VMA "Careers in the Valve Industry" survey, that manufacturers are having difficulty finding personnel to fill open positions (see page 27), with the hardest slots to fill coming from the sales end and the production line. The survey also showed that 29% of companies report it's tough to get people who know repair, service and maintenance.

These statistics will only get worse as skilled workers retire. According to figures from the U.S. Department of Labor, the nation can expect to see a 10% increase in valve maintenance employment by 2022.

In her presentation at the VRC meeting, Judi Camerano of the Petroleum Extension Service at the University of Texas said this new demand for skills has translated into a skyrocketing demand for thorough and responsive training programs. At the same time, the way valve technicians and other personnel in the oil and gas industry are trained are evolving partly because of generational and individual differences in the way people learn.

Camerano explained one way companies are meeting those needs is through blended learning.

Blended learning is "a formal education program in which a student learns at least in part through online delivery of content and instruction," she said, thereby giving that student some control over the timing, location and pace of his or her learning. Most blended programs are a hybrid of computer-based training such as e-learning, self-paced videos, online book programs with audio training, classroom training, webinars, seminars and performance-based, on-the-job-training.

The advantage of this type of learning is that it appeals to people no matter whether they are audio, visual or kinesthetic learners, Camerano said.

By using a blended learning approach, students see, hear and do, so everything they ingest through eyes and ears is reinforced by actually doing something with their hands. This also aids in long-term memory of the information, she added.

By combining self-paced instruction with instructor-directed and guided learning, trainees tend to be more proactive in their learning experience.

The down side of this method is that it is more expensive and takes longer than traditional training methods. However, with generations of video gamers coming into the workforce, the general consensus is that training will have to change, and blended learning is one solution, she concluded.

STANDARDS

Whenever valve professionals get together, you can be sure some discussion will occur on the varied and numerous standards that affect every aspect of their work. The VRC meeting



□ A valve is readied for final inspection.

was no exception. Here is some of what was discussed:

MSS 141

According to Glenn Hamilton, engineering manager, and Kevin Gentry, business development manager of Gulf Coast Modification, in the distant past, valve shops were not considered a trusted part of the supply chain by manufacturers or end users. However, as user needs became more specific, manufacturers realized there was sup-

port for modification facilities. The first manufacturers to approve modification facilities were Kitz and Velan in the early 1980s.

Since then, many manufacturers have selected, audited and approved modification facilities throughout the country, and end users have accepted the modification shops as an extension of the manufacturers and a vital part of the supply chain.

To ensure the quality of these modifications, standards have been created.

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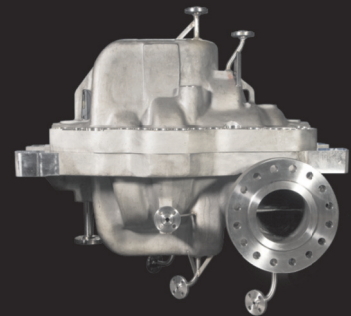
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One of the first was Manufacturers Standardization Society (MSS) SP 141. This standard covers multi-turn and check valve modifications and establishes the minimum requirements for modification of new gate, globe and check valves that have been manufactured to industry guidelines, but require modification to meet end-user specifications.

“Every step of the modification process is covered, which gives the OEM confidence that a modified product meets codes and standards that customers expect,” Gentry said. The standard establishes a quality system based on ISO 9001 or API Q1 and specifies the documentation and design requirements. It also mandates that OEMs must authorize any modifications and that non-conformances are addressed in a timely and systematic manner.

SP 141 covers welding and joining, heat treatment, marking and traceability, and even the manner in which valves are disassembled and assembled.

Also addressed is non-destructive examination, which Hamilton said, “follows the American Society for Non-Destructive Testing’s recommended practice.” Hydrostatic pressure testing, dye penetrant of valve body and bonnet, magnetic particle examination of body bonnet and radiography of critical areas per ASME B16.34 are also addressed.

In addition, MSS SP 141 covers trim changes, bolting, hardness testing, packing and gasket replacement. It specifies that the maximum operating temperature on a valve tag must be changed if it is lowered by the gasket change.

In short, every possible scenario has been considered to ensure that an end user and OEM are confident that a modification will meet rigorous requirements, speakers said.

EPA Action and API 624/641

Scott Boyson of AW Chesterton Company reported at the meeting that: “Leaking equipment is still the largest source of hazardous air pollutant emission from petroleum refineries and chemical manufacturing facilities,” and the largest amounts of that emission are coming from valves.



□ A valve technician performs a final hydro test before shipping.

Boyson pointed out that recent EPA monitoring during on-site audits showed three to five times more leaks than what was reported. Thanks largely to electronic monitoring, inspectors can sift through huge amounts of data and, if they find a problem, they issue consent decrees, which are essentially EPA lawsuits in which companies agree to take specific actions without admitting fault or guilt.

“Part of a consent decree is punitive,” Boyson said, as in, ‘You harm the environment, you pay a penalty.’ But the real purpose is to get them [violators] to prevent the leaks. It saves money for the plant, and it’s less harmful to the environment.”

As of June, 2014 Boyson reported that over 90% of refineries are operating under a consent decree, and the EPA has been focusing recently on chemical plants. DuPont, Dow, Formosa, Sabic, Solutia and Ineos are now operating under consent decrees, and gas processing facilities are the next target for increased monitoring and audits.

“They’re trying to send warning shots to the refineries, chemical plants and gas processing plants,” Boyson said. “They want to see work practices that proactively reduce the likelihood of developing a leak. This can and does have a big effect on valve repair.”

Boyson said that standards for valves and packing currently are changing and being tightened. The recently

published API 624 affects gate and globe valves while a standard being drafted, API 641, will affect quarter-turn valves such as ball, butterfly and plug valves. Meanwhile, the repair of valves for low emission performance is also addressed by API RP 621. (See Greg Johnson’s comments next page).

According to Rodney Roth, also of Chesterton, the changes being made impact design, tolerances, assembly, packing requirements and expertise. As a result, low-emission certified valves, packing and repair will become more important in the future.

“For valve people, this opens up opportunities,” Roth said. “Enforcement is going to continue, which will increase demand for technology and expertise offered by repair shops and suppliers.”

Meanwhile, “The old way is no longer the best way; plant personnel are relying on their suppliers to support them, and they say they want their suppliers to be proactive, not reactive,” he added.

Roth pointed out the situation will create a shift in market share, and repair shops will have different requirements as the standards continue to evolve.

“They will have to increase their knowledge and get more technical training and work with others like packing manufacturers and valve OEMs that can assist them,” Roth said.

RP 621

Greg Johnson, president of United Valve, covered RP 621, which specifically addresses repairs for emissions.

Johnson stressed to the audience, "Once you take custody of a repair, you have to adhere to the new standards and you have responsibility, but you also have opportunity."

As end users balance the concerns of their accountants and attorneys, the Occupational Safety and Health Administration and EPA, those concerns result in more detailed standards to reduce liability and improve safety. "Sometimes it's almost easier to meet these requirements when you are repairing as opposed to bringing in new valves," Johnson said.

According to Johnson, RP 621 is a compilation of Exxon, Mobil, Dow, Shell and other user repair specifications. About 10 of these specifications were homogenized to put the original edition together, which came out in the spring of 2001.

RP 621 provides guidelines for reconditioning heavy wall (API 600 and API 594) carbon steel, ferritic alloy (up to 9% Cr), stainless steel, and nickel alloy gate, globe and check valves for ASME pressure classes 150, 300, 600, 900, 1500 and 2500. Guidelines in this RP apply to flanged and butt-weld cast or forged valves, but the standard does not cover quarter-turn valves. It also does not cover control or pressure relief valves.

Under the standard, when the owner (user) ships valves to the repair facility, they must provide a complete range of product or service information and the material safety data sheet (MSDS) for the product. All products must be drained, and the valves are to be sufficiently decontaminated and shipped in the open position.

Another essential component under RP 621 is that every valve undergoing repair must be traceable. Each valve must have a unique ID number. There must be a digital or hard copy shop traveler; all dimensional changes and weld repair information must be recorded; and a new stainless-steel tag with repair data has to be affixed to the valve.

CONCLUSION

The current economic and environmental climate has more standards and more detail in standards. As Johnson put it, "Nobody wants accidents. The ramifications for a plant manager or CEO in a plant are huge."

They can be held criminally liable if they do anything to alter the chain on their process equipment or if they don't keep it up with maintenance issues.

"Plant managers have gone to prison because they haven't looked after things," Johnson said, which is a significant incentive to be sure valves are repaired according to standards. VM

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



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Private Operations Can Run Lean and Mean

BY KATE KUNKEL

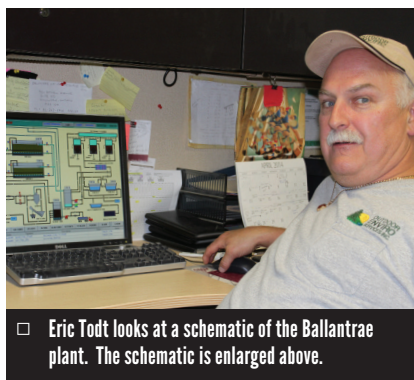
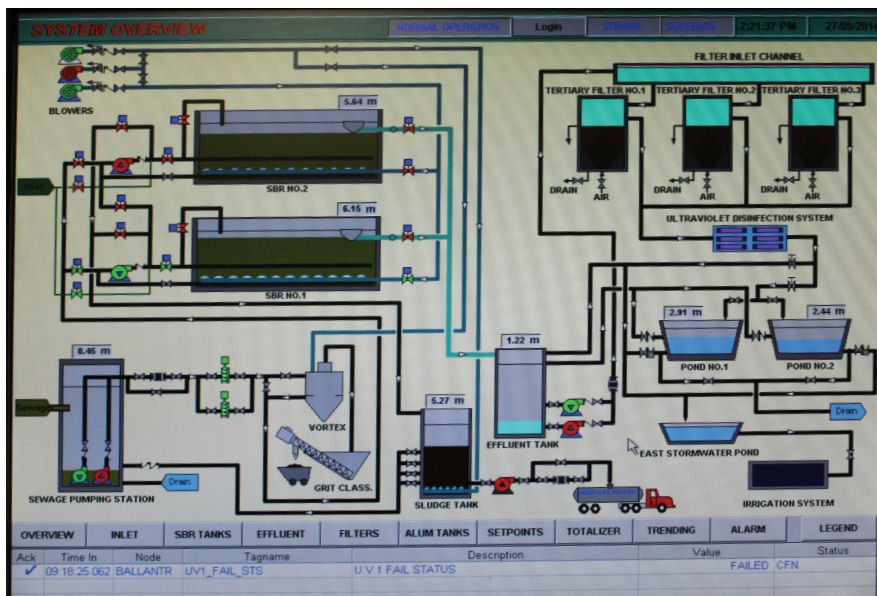
During the 1990s, it was popular for municipalities around the world to enter into agreements with private contractors for water and wastewater treatment plants and services. The trend has slowed and lost favor for new systems in urban residential areas, but wastewater treatment for industrial operations remains largely private, and private wastewater treatment agreements are still desired in many suburban areas. Suburbia likes private contracting because it allows developers the chance to build higher density housing in areas where municipalities cannot or will not provide wastewater treatment.

An example of how that works is the Ballantrae Wastewater Treatment Plant at the northernmost edge of greater Toronto, Canada. The plant serves 800 homes in a senior community constructed around a golf course. When the developers decided to build the subdivision, the hamlet of Ballantrae had a population of only about 300 people. The rural community around that hamlet did not have a municipal wastewater treatment plant; every home had its own private well and septic system.

"Because by-law restrictions on lot size existed for a tile bed and septic system, the builder [for the new senior community] performed its own environmental study and built its own wastewater treatment plant. That was the only way to construct high-density housing," said Eric Todt, owner of Outdoor Enviro Services, Inc., the company that now operates the plant.

The plant was built in 1999 and continues to be managed efficiently under a contractual arrangement. One of the challenges in a situation like this is that "we don't have a bottomless pit for operation expenses," Todt explains. Those expenses are covered by the budget for just 800 homeowners.

"The municipal fresh water system is separate from our operation, but just like municipalities everywhere, we're



□ Eric Todt looks at a schematic of the Ballantrae plant. The schematic is enlarged above.

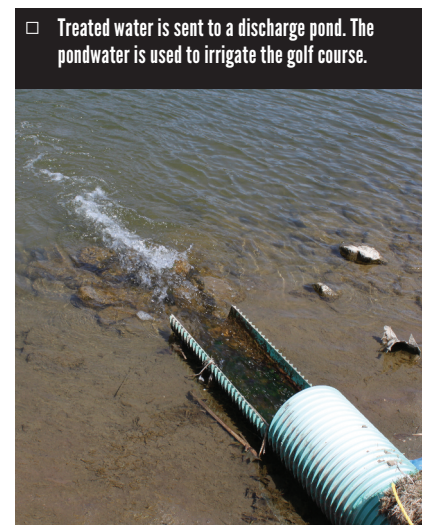
governed by environmental laws," Todt adds. However, because of more intense focus and less labor expense, costs are low, and "we can run lean and mean."

Don Stronge, an operator at the plant, who previously worked for the municipality of York for 38 years, adds, "It's very different working with financial restraints, but we operate very efficiently."

One tool that helps is technology. Like most municipal and private wastewater treatment systems, Ballantrae Natural Resource, Inc., the contractor that manages infrastructure for the subdivision, uses a supervisory control and data acquisition system (SCADA) to control the plant. It operates the programmable logic controller (PLC), which controls the sequence and stepping of plant operations. While the

plant can run without human beings on site, the SCADA system is continually monitoring what's going on, and staff is on call 24-hours-a-day, 7-days-a-week. "There's no rolling over in your bed and going back to sleep when that beeper goes off!" Stronge jokes.

Also, "our staff is very small, so we use essential support companies to help maintain the plant," Todt says. Using contractors reduces liability, increases speed and reduces costs. "We have computer, instrumentation and mechanical systems, and they all require skilled people to deploy. We have to hire qualified contractors who specialize in pumps, valves and computer systems to fix problems we can't fix."



□ Treated water is sent to a discharge pond. The pondwater is used to irrigate the golf course.



□ Some manually actuated valves are used in the system for purposes such as controlling raw sewage as it flows into areas where debris will be removed.



□ The plant works with local contractors to get special parts such as a repair kit for this obsolete plug valve.

DEPENDING ON THE EXPERTS

Another area where expertise is needed is supply.

"A significant expense is valves and pipes," Todt says. "But I work with a great distributor," which allows him to focus on operation and environmental health and safety compliance so that the plant maintains its perfect record. (The Ballantrae plant has never had a reportable environmental incident in its history.)

Both Todt and Stronge stressed how important a distributor is in finding what's needed quickly and on budget. The main distributor used for the project has extensive experience with local municipalities and uses that experience to find equipment that can be retrofitted with minimal impact, Todt says. Also, "There is two of everything in this plant so if one part goes down, I have a spare."

For hard-to-locate equipment, Todt finds new sources. For example, he explains a situation in which a valve became obsolete—nobody currently carries repair parts for the valve despite the fact the same kind of plug valve is used in municipal plants throughout North America.

"They don't even make a seal kit for this valve anymore. But I approached a local company that makes hydraulic seals, and they made up a kit up for us," said Todt.

Beyond meeting provincial regulations, Todt and Stronge are especially sensitive to the necessity of ensuring every aspect of the treatment plant is

operating with minimal environmental impact. Treated water from the plant discharges to a pond on the property, and the site itself is a registered site for the National Audubon Society.

"We get swans, ducks, geese and migratory birds of all kinds. The pond also has koi," Todt says. One of the ways he measures how the company is minimizing its effect is that these fish "are huge. We know we're doing a good job of wastewater treatment because all the fish are living."

The pond water also is used to irrigate the golf course in the summer; in the winter, the discharge is subterranean. "It's a complete hydrographic cycle," Stronge says.

The use of treated residuals from wastewater processes (biosolids) are regulated in Ontario by the Ministry of the Environment, and in the U.S. by the Environmental Protection Agency. Meanwhile, local governments on both sides of the 49th parallel determine whether those biosolids can be recycled as fertilizer, incinerated or buried in landfills.

VALVE USE

Ninety-nine percent of the valves at the Ballantrae wastewater treatment plant are plug valves; the remainder are ball or gate valves. Generally the valves are made of ductile iron.

Most of the valves in the plant are electrically actuated because they are controlled by the SCADA system to react to changes in sewage levels, temperature and flow rates. Automation is

also required to regulate the amount of air that gets to the bio-organisms that are carefully cultivated to treat the water. To be effective, this biota require oxygen and food to live. The bacteria and protozoa consume biodegradable soluble organic contaminants such as fats, sugars and other organic molecules. The precision required to make this happen is possible only with a fully automated system.

Stronge uses his experience with municipalities to show how automation has affected the wastewater treatment facilities. In the past for a city the size of Toronto, "There was a man operating every valve. But when computers came into operation and actuation was automated, the city was able to greatly reduce labor costs." Even the amount of alum—the coagulant used as a sludge dewatering agent in the plant—is controlled by the computer system, he said.

EXPANDING ROLE

Private wastewater treatment plants are fulfilling increasingly important functions in the nation's infrastructure. The purpose of these plants is to make possible subdivisions in rural areas, run commercial facilities in rural areas or protect the environment during oil and gas exploration. Essential ingredients in making these plants economical are automation as well as good suppliers and contractors. ■

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Q: WHAT POLYMERS CAN BE USED FOR SEALS AND SEATS IN API VALVES FOR LNG APPLICATIONS?

BY MIKE HEDGER

A: The valve industry faces a host of challenges today ranging from extreme temperatures and aggressive media to fire safety and fugitive emissions. High-performance thermoplastic materials can provide effective solutions for many of these issues.

One good example where these materials can be vital is the liquid natural gas (LNG) transportation market where valves face extremely low temperatures down to -320°F (-196°C). Manufacturers that currently service the upstream oil and gas industry with soft-seated valves are scurrying to offer products that will perform in these low temperatures. Particularly challenging in their search is finding an effective sealing solution. Merely attempting to retrofit existing valve designs often meets with failure because such low temperatures need special polymer seals not typically used by American Petroleum Institute (API) valve manufacturers. A few of the materials and

why they are used today include:

MODIFIED PTFE

Polytetrafluoroethylene (PTFE) seals are an industry standard for API valves. As a sealing material, PTFE is very effective from 500°F (260°C) to about -150°F (-101°C) depending on the specific blend and application pressure. However, as temperatures decrease, material hardness increases, making sealing more difficult. To counteract this, higher-applied loads are required to facilitate sealing.

Since PTFE becomes more brittle at lower temperatures, fracturing of seats and seals can easily occur, resulting in seal failure. Failure can also occur from seal thermal contraction. The relatively

high coefficient of thermal expansion (CTE) for PTFE can cause excessive circumferential (hoop) stresses in seals as they contract onto mating valve hardware. These hoop stresses often exceed the strength of the material, which leads to fracture and subsequent seal failure.

To effectively seal at lower temperatures, perfluoropropylvinylether (PPVE) is added to PTFE to improve key material properties. The result is modified PTFE (MPTFE). Compared to PTFE, MPTFE has higher compressive strength, allowing it to better absorb the energy from high-load springs used in cryogenic sealing, resulting in better sealing at low temperatures. Additionally, better creep resistance and better resistance to cold flow allow this polymer to remain dimensionally stable at both high and low temperature extremes. Unfilled MPTFE can be used effectively for sealing at temperatures that range from 550°F (288°C) down to -200°F (-129°C), which makes it an excellent choice for LNG valve stem packing. Nevertheless, to seal close to the fluid media flow path where seats and seat seals exist, other polymers must be used.

PCTFE

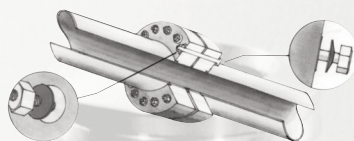
When it comes to effectively sealing at very low temperatures for LNG, another thermoplastic, polychlorotrifluoroethylene (PCTFE), outperforms MPTFE. As a fluoropolymer, this material is extremely chemically inert, similar to PTFE. While noticeably more rigid at ambient temperatures, PCTFE offers a

Polymer	Polymer Structure	Sealing Temperature Range	Material Cost
PTFE	$\left[\begin{array}{c} \text{F} \quad \text{F} \\ \quad \\ -\text{C}-\text{C}- \\ \quad \\ \text{F} \quad \text{F} \end{array} \right]_n$	-150°F to 500°F	\$
MPTFE	$\left(\begin{array}{c} \text{F} \quad \text{F} \\ \quad \\ -\text{C}-\text{C}- \\ \quad \\ \text{F} \quad \text{F} \end{array} \right)_n \left(\begin{array}{c} \text{F} \quad \text{F} \\ \quad \\ -\text{C}-\text{C}- \\ \quad \\ \text{F} \quad \text{O} \\ \quad \\ \text{F} \quad \text{C}-\text{F} \\ \\ \text{F} \end{array} \right)_m$	-200°F to 550°F	2X \$
PCTFE	$\left[\begin{array}{c} \text{F} \quad \text{F} \\ \quad \\ -\text{C}-\text{C}- \\ \quad \\ \text{F} \quad \text{Cl} \end{array} \right]_n$	-320°F to 350°F	15X \$

□ Comparison of materials

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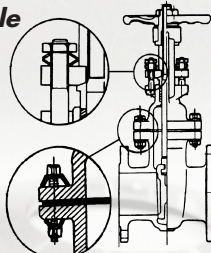
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unique characteristic that makes it the industry standard for extreme low-temperature sealing; that characteristic is high compressive strength. In fact, the compressive strength of PCTFE is almost four times that of PTFE, allowing it to absorb the energy from high spring loads without fracturing. Coupled with high resistance to cold flow and a relatively good maximum elongation, this polymer offers an ideal mix of properties for LNG service.

SEAL/SEAT DESIGN FROM PCTFE

When converting existing valve designs for LNG service, it is important to take a critical look at the design of seats and seals. Though manufacturing existing PTFE seat designs in PCTFE will generally result in effective seal-off and good overall performance, small design changes may be needed to cope with the increased stiffness of this polymer.

Seals, on the other hand, will not fare as well as their seat counterparts. Spring-energized seals used for some stem packings and on seat carriers are typically made from softer polymers such as PTFE. These seal designs do not lend themselves to effective LNG seals. They often are too bulky, resulting in an overly rigid design when machined from PCTFE. In addition, special design considerations must be made to ensure seals do not succumb to failure from thermal contraction. These design changes usually include custom springs with increased spring loads to overcome the thermal contraction of the polymer at extremely low temperatures. Blindly increasing the spring load by too much comes at the cost of additional stem torque, which will require stronger, more expensive actuators for the valve. Ultimately, finding the right balance is critical for the performance of the valve and the bottom line.

Simple stem V-packing can be easily changed from PTFE or MPTFE to PCTFE. However, higher loading is generally required to maintain sealing at low temperatures. Most LNG valve manufacturers have opted instead for longer, extended bonnets that place stem seals further away from the flow path, resulting in a much higher temperature at the seals. Stem seals benefit greatly

Seals will not fare as well as their seat counterparts.

from this increased temperature, which often allows use of less expensive MPTFE seals instead of PCTFE. To finish off stem seals, a flexible graphite element reinforced with stainless-steel mesh has proven to be an effective fire barrier, allowing PCTFE seals to meet industry fire safety requirements.

CONCLUSION

Numerous properties of materials must be considered for seats and seals when

engineering valves for LNG service, including compressive strength, creep resistance and high resistance to cold flow. Because PCTFE is expensive, polymer engineers are working to bridge the gap in cost and performance between MPTFE and PCTFE to create a low-temperature, low-cost polymer that will effectively seal in LNG service. In the meantime, the right design choices allow PCTFE to meet valve manufacturers' needs for effective LNG valves. **VM**

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www.dowcovalve.com

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www.service-solution.com

Emerson Process Management -
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Flotech, Inc.
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Flowserve Corporation
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Formosa Plastics USA
Point Comfort, TX
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Furmanite
Houston
www.furmanite.com

GE Oil & Gas
Houston
www.ge.com

- Consolidated and Masoneilan
Aftermarket and Field Service
Deer Park, TX

- Consolidated Safety and
Safety Relief Valves
Alexandria, LA

- Masoneilan Control Valves
Avon, MA

Gulf Coast Modification, LP
Houston
www.gulfcoastmod.com

Gulf Coast Valve, Inc.
Corpus Christi, TX
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J&S Machine and Valve, Inc.
Nowata, OK
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Kirksey Machine
Houston
www.kirkseymachine.com

Metso Automation
Shrewsbury, MA
www.metso.com

Midwest Valve Services, Inc.
Minooka, IL
www.mwvalve.com

NWS Technologies
Spartanburg, SC
www.nwstechnologies.com

Pentair Valves and Controls
Stafford, TX
us.valves.pentair.com/valves

Pioneer Industrial Corporation
St. Louis, MO
www.pioneerindustrial.com

The Wm. Powell Company
Cincinnati
www.powellvalves.com

Precision Fitting and Gauge
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Precision Pump &
Valve Service
Charleston, WV
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Southeast Valve Inc.
Charlotte, NC
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Southern Valve Service, Inc.
Baton Rouge, LA
www.southernvalve.com

Thorco, Inc.
Tulsa, OK
www.thorcoinc.com

United Valve
South Houston, TX
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Universe Machine Corporation
Edmonton, AB Canada
www.umcorp.com

Valve Reconditioning
Service Co.
Melvindale, MI
www.vrsinc.net

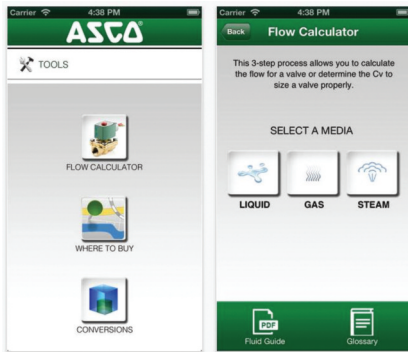
Wal-Tech Inc.
Mobile, AL
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Watson Valve Services
Houston
www.watsonvalve.com

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Quality Valve
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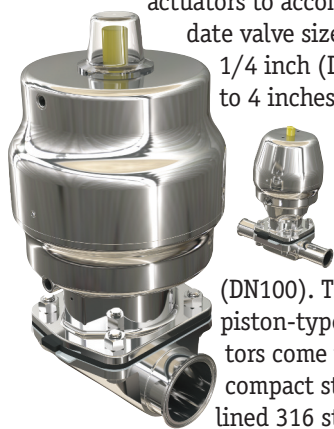
For more information on joining the Valve Repair Council, contact Marc Pasternak at 202.331.0104 (mpasternak@vma.org).



ASCO NUMATICS has introduced a new mobile application for iPhone and Android Devices. The application, available by searching "ASCO Flow Calculator" within the Apple App or Google Play stores, is free. It enables users to quickly calculate flow for a valve or determine the Cv needed to properly size a valve. In addition, the Fluid Guide provides reference information on the types of valves available for most common corrosive and non-corrosive gases and liquids.

The app also has a distributor locator that allows customers to search by zip or city/state or by GPS location, and it features an interactive conversion tool that quickly converts between metric and imperial values.

CRANE CHEMPHARMA & ENERGY has expanded the Saunders' range of S360 actuators to accommodate valve sizes from 1/4 inch (DN8) up to 4 inches



(DN100). These piston-type actuators come with compact streamlined 316 stainless-steel housing, maintenance-free piston technology and easy-to-change compressors to deliver superior performance for biopharm applications.

Modular range delivers compact dimensional envelope to enhance system design and reduce dead-leg between associated valves. Maintenance-free piston technology provides powerful closure performance.

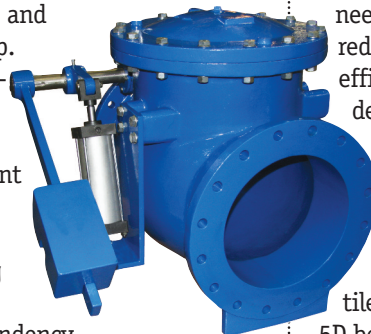
MUELLER CO. introduces the all-ductile iron resilient wedge gate valve. The new iron gate valve has a working pressure of 350 psi and will be commercially available in August 2014. The Mueller style A-2361 resilient wedge gate valve will be offered in sizes from 4–12 inches and features innovative dual-purpose lifting lugs, a user-friendly T-head bolt retention design and a unique pressure-assist wedge geometry. The valve meets AWWA's C515 standards and is both UL listed and FM approved. It's also certified to ANSI/NSF 61 and ANSI/NSF 372.



then lead-sealed, ensuring valuable time saved while minimizing potential start-up problems.

The booster is completely pressure balanced to provide a stable output, even under fluctuating pressure conditions. When used in combination with a positioner, the booster allows control valves with large pneumatic actuators to be controlled quickly and precisely, even in applications with high flow rates or significant pressure drops.

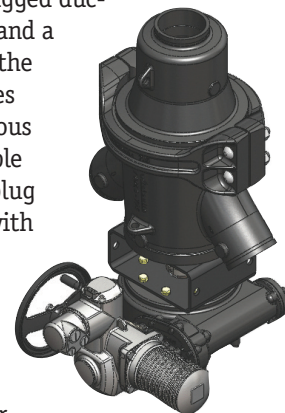
VAL-MATIC's QuadroSphere Trunnion Ball Valve has multiple flow paths through the valve and four recessed surfaces of the ball that provide self-flushing to prevent clogging by avoiding high scale and solids build up. The self-flushing feature makes this valve important in industries where the media flowing through the valve has a tendency to collect and solidify, causing other valves to fail. The special machining of the ball substantially reduces the ball-to-seat surface contact, creating less resistance during cycles, lowering the torque for operation.



VICTAULIC introduces the Series 725 Diverter Valve, the industry's first grooved-end valve designed specifically for paste backfill lines in mining operations. The valve improves the efficiency of backfill operations while providing durable, reliable service.

This diverter valve eliminates the need to reposition fill lines, which reduces handling and results in more efficient operations. Providing 180-degree service, the valve reduces the need for crews to manually redeploy backfill piping systems to other areas of a mine, saving time.

With a rugged ductile iron body and a 5D bend profile, the Series 725 ensures smooth, continuous flow. An adjustable stop means the plug aligns properly with the outlet to improve performance and reduce wear. The valve also features a tamper-resistant lockout and blowout proof stem design.



SAMSON CONTROLS has a new design for a valve booster that aims to eliminate time-consuming trial and error procedures associated with fine-tuning control valves. Because of its precisely manufactured bypass restriction, the booster can be accurately adjusted and



EMERSON PROCESS MANAGEMENT has released the Danalyzer 370XA Gas Chromatograph (GC). Providing reliable measurement accuracy, minimal maintenance and ease of use, it is designed for continuous online analysis of natural gas for applications such as custody transfer, power generation and burner fuel/air ratio control.

CONTINUED ON P. 52

ARE YOU A **DISTRIBUTOR** **OR CHANNEL PARTNER** OF THE U.S. OR CANADIAN INDUSTRIAL VALVE, ACTUATOR OR CONTROL INDUSTRY?

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CONTINUED FROM P. 50



The new chromatograph has a maintainable module that incorporates the analytical components in an easily removable module. It can be replaced in the field in about two hours (including warm-up and purge) and can be maintained at the component level for repair.

METSO ExperTune PlantTriage software now includes a new capability: Model Predictive Control (MPC) Monitoring. These assessments are used to diagnose issues with disturbance variables, controlled variables, manipulated variables and the MPC Controller itself. There are over 100 assessments of performance, which allows a high degree of specificity in the recommended corrective actions.

In response to client requests, the new interface is completely integrated with Metso ExperTune PlantTriage's traditional monitoring of underlying regulatory control loops, allowing users to drill down directly from MPC monitoring to find root causes that may lie outside the MPC structure itself. **VM**



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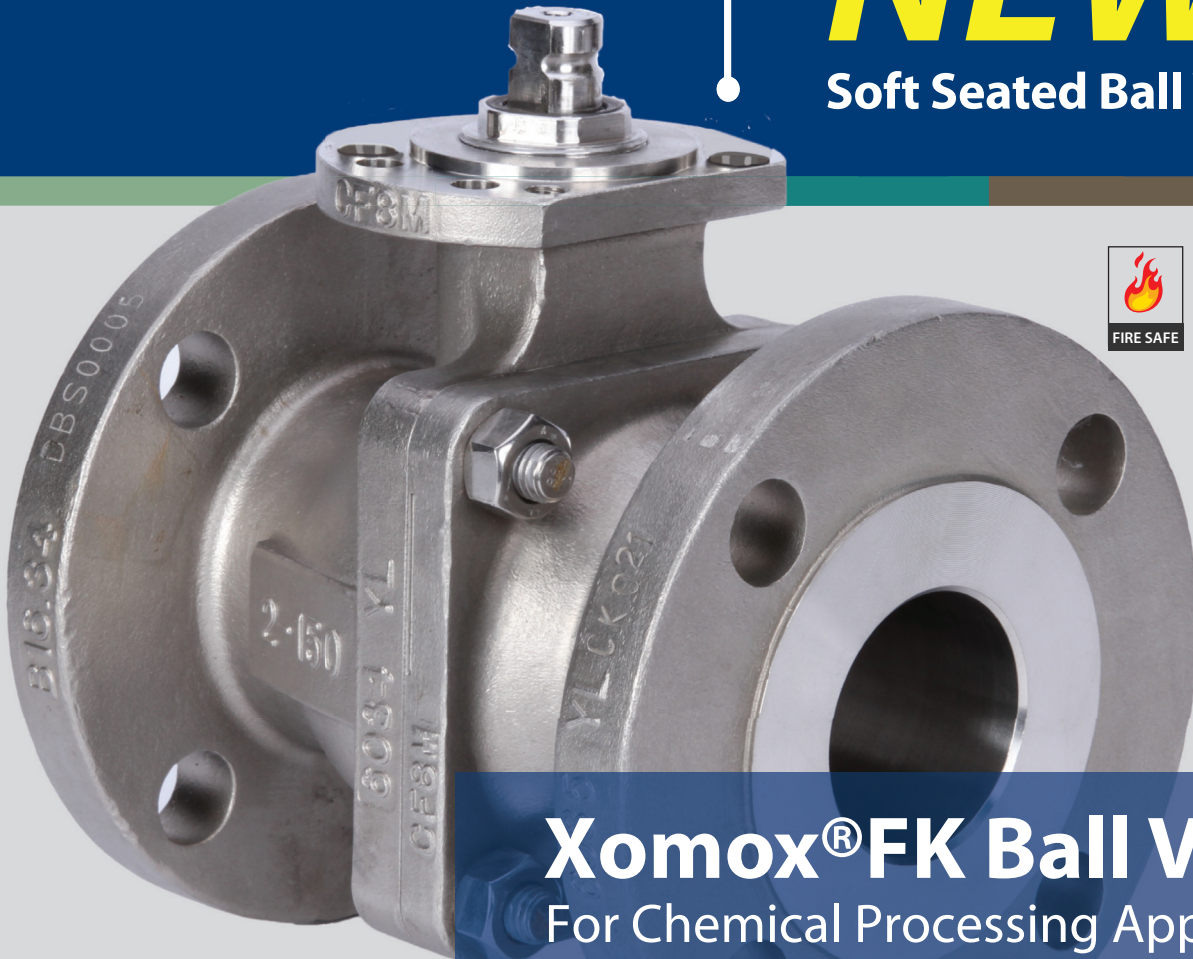
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