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WINTER 2026

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Automating Manufacturing Processes for Efficiency, Precision and Compliance

VOLUME 38 | NUMBER 1 | VALVEMAGAZINE.COM

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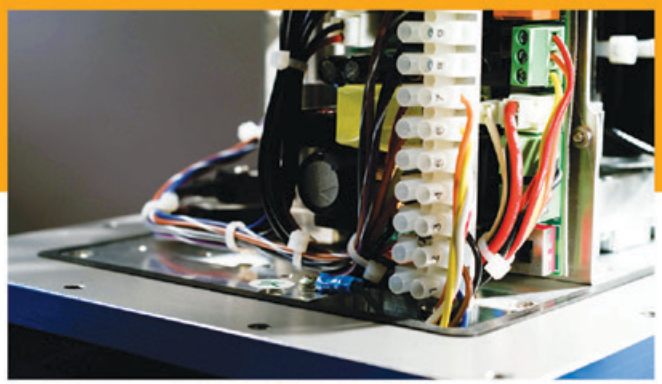

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WINTER 2026

VALVE MAGAZINE

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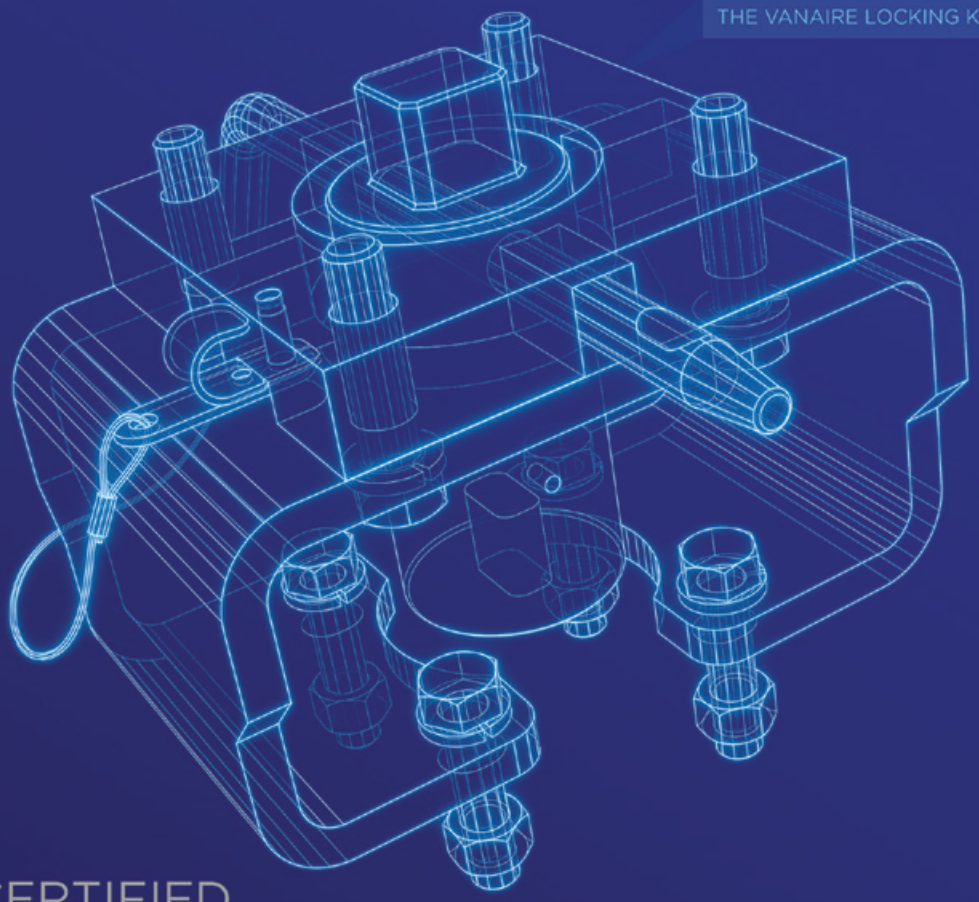
Delivering valve industry news, technology insights and education since 1938.

VOLUME 38 | NUMBER 1

Automating Manufacturing Processes Helps Manufacturers with Efficiency, Precision and Compliance

Departments + Columns

COVER PHOTO AND PHOTO ABOVE: iSTOCK



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To some, the mounting kit is considered trivial. An afterthought. A commodity. This approach has led to poorly designed kits, which often lead to premature valve failure. To us, an engineered mounting kit is the unsung hero of the entire assembly.

We strive to set the industry benchmark and, due to our engineering, manufacturing and quality capabilities, have been recognized across North America and beyond as the go-to source for many leading valve and actuator companies and their distributors.

Embracing Change

FOR ANYONE WHO STRUGGLES WITH CHANGE, YOUR NERVOUS SYSTEM HAS HAD QUITE A WORKOUT THESE PAST COUPLE OF YEARS — especially if you're running a business. The economy continues to shift in ways that may never fully return to pre-pandemic norms, and the steady drumbeat of legislative updates, tariffs and the rapid rise of AI tools has been a lot to absorb. You're not alone if it's had you on edge.

But change isn't all bad — it's often where opportunity hides. This year, VMA is bringing the Valve Forum: Conference & Exhibits back to Texas and the greater Houston area. As a hub for energy and oil and gas markets, it will be an exceptional event. Programming spans technical deep dives to standards updates and market outlooks across key sectors. The opening session features industry leaders sharing perspectives on workforce, geopolitics and the road ahead. Turn to pages 15–18 for a full preview, including a first look at sponsors and exhibitors. Sessions were drawn from abstracts carefully vetted by volunteers from VMA's Technical, Manufacturing and Education committees — VMA offers a sincere thanks to all of these volunteers!

Our cover story explores automation fundamentals in valve, actuator and industrial manufacturing. Adoption runs the gamut from shops running CNC machines to facilities with fully automated assembly cells. But some of the most compelling opportunities lie in smaller scale automation that frees your workforce for higher-level problem solving while machines handle repetitive work. Read more on page 20.

Also in this issue: articles on water hammer and mounting brackets for valves and actuators. These topics are foundational and unlikely to change dramatically, but both are critical to safe system operation. Several standards on mounting brackets have been recently updated, and water hammer remains a persistent challenge for operators. Find these articles on pages 24 and 32.

If you haven't registered for the Valve Forum, do so soon. To save $100 on registration, use code **VMVF26** for either Valve Forum or Valve Basics, a preconference seminar that covers six foundational topics — ideal for those new to the industry or looking for a refresher. Attendees can also join an optional facility tour, dedicated networking time, hands-on product interaction and exhibit hall access. I hope to see you there!

Cheers!

Heather Gaynor, *Editor-in-Chief*
hgaynor@vma.org

VALVE MAGAZINE

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INDUSTRY NEWS

Several key companies in the valve industry have announced mergers and acquisitions in the previous three months. Here is just some of the key news.

Flowserve to Acquire Trillium Flow Technologies Valves Division

Flowserve Corporation will acquire Trillium Flow Technologies' Valves Division (TVD) for $490 million in cash, with closing expected mid-2026. TVD supplies engineered, mission-critical valves for nuclear, traditional power, industrial and infrastructure markets and generates about $200 million in annual revenue with high-teen EBITDA margins.

The deal strengthens Flowserve's nuclear presence, adding a portfolio that includes more than 200,000 installed units, including assets in 115 nuclear reactors. Flowserve currently supports more than 300 reactors worldwide. The acquisition is expected to be accretive to adjusted operating income in 2026.

Flowserve plans to fund the purchase with cash and debt. The transaction is subject to regulatory approvals and customary closing conditions.

Courtesy of Flowserve/ Trillium Flow Technologies

Velan Holding to Sell Controlling Stake to Birch Hill Equity

Velan Holding, the controlling shareholder of Velan Inc., will sell approximately 72% of outstanding shares (representing about 92% of voting rights) to Birch Hill Equity Partners for CAD$13.10 (Canadian dollars) per share, totaling about CAD$204 million. Closing is expected in the first half of 2026, subject to regulatory approvals.

Birch Hill intends to maintain Velan's Montreal headquarters and Quebec presence while supporting growth across Canada and internationally. Dividends will be suspended until closing or termination of the cooperation agreement.

Following closing, Birch Hill may appoint up to four of seven directors while holding more than 40% of voting rights. The transaction applies only to Velan Holding's shares; other shareholders are not participating.

Courtesy of Velan

Valmet to Acquire Severn Group

Valmet will acquire UK-based Severn Group from Bluewater for $480 million (approximately €410 million Euro) in cash. The deal includes Severn Glocon, ValvTechnologies and LB Bentley, expanding Valmet's Flow Control business and strengthening its Process Performance Solutions segment.

Severn, which generates an estimated €215 million in annual sales with a 16% EBITDA margin, supplies severe service valve solutions for critical applications in refining, chemicals, mining, power and oil and gas. The company employs about 950 people and manufactures in the UK, U.S. and India. Completion is expected in Q2 2026, subject to customary conditions.

Courtesy of Valmet

FloWorks Acquires Cranford Equipment

FloWorks International, a specialty distributor of flow control products and a Wynnchurch Capital portfolio company, acquired Cranford Equipment Co. (CEC), a Louisiana-based distributor of filtration products for industrial applications.

Courtesy of FloWorks/CEC

CEO Scott Jackson said the acquisition expands FloWorks' presence in industrial filtration and enhances its ability to provide more complete solutions to flow control customers. CEC CEO Bart Cranford said the partnership will support growth initiatives.

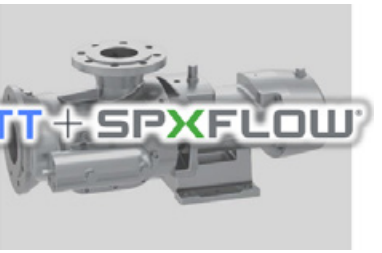
CEC marks FloWorks' seventh acquisition under Wynnchurch ownership.

ITT to Acquire SPX FLOW

ITT Inc. will acquire SPX FLOW from Lone Star Funds for $4.775 billion in cash and equity, valuing the company at 14.2x forecast 2026 adjusted EBITDA (11.5x including synergies). The deal is expected to close by the end of Q1 2026.

SPX FLOW, which generated $1.3 billion in revenue over the past year, supplies engineered equipment and process technologies for industrial, health and nutrition markets. The company will join ITT's Industrial Process segment.

ITT expects $80 million in cost synergies within three years and anticipates the acquisition will be accretive to margins and EPS beginning in 2026. The transaction will be financed through cash, stock and committed debt facilities.



Courtesy of ITT

Distribution Solutions Group Acquires Eastern Valve & Control Specialties

Distribution Solutions Group, Inc. (NASDAQ: DSGR), a specialty distribution company, announced the acquisition of Eastern Valve & Control Specialties Ltd., a company that provides industrial valve products and related services supporting customers across Atlantic Canada, as part of its Canadian Branch and Source Atlantic. Eastern Valve, located in Paradise, Newfoundland, Canada, supplies and services the highest-quality valves, instrumentation, actuation and ancillary product solutions throughout Atlantic Canada.

Founded in 2002, Eastern Valve has a strong reputation as a supplier of industrial valves, instrumentation and flow-control solutions across a range of industrial and infrastructure applications. The business is known for its technical knowledge, responsive service, and commitment to supporting customers' critical process and flow-control needs.

Eastern Valve, with annual revenues of approximately CAD$17 million, is expected to be immediately accretive to DSG and its Canadian Branch Business segment margins and was funded through the company's existing cash and availability under its credit agreement.

DSG DISTRIBUTION SOLUTIONS GROUP

Eastern Valve & Control Specialties

Courtesy of Distribution Solutions Group/Eastern Valve & Control Specialties

Vytl Controls Sold to CD&R's SunSource

In February, MiddleGroup Capital finalized the sale of its portfolio company, Vytl Controls Group to SunSource, a portfolio company of Clayton, Dubilier & Rice. Vytle designs, manufactures, distributes and repairs valves, actuators and instrumentation products for liquid and gas applications.

Vytl operates through several branded business units including Setpoint Integrated Solutions, W&O Supply, AT Controls and Valsource. Vytl designs, manufactures, distributes and repairs valves, actuators and instrumentation used to control the flow of liquids and gases in industrial systems.

MiddleGround acquired Vytl, then PVI Holdings, in July 2022 from family-owned Pon Holdings, a Netherlands-based supplier of measurement, regulation and control instruments for the maritime and offshore industry. During its ownership term, MiddleGround pursued several operating initiatives that improved Vytl's technology capabilities, strengthened its leadership and corporate functions, and standardized processes across its several business units.

SUNSOURCE

Courtesy of SunSource

SunSource is an industrial distributor that supplies a portfolio of fluid power, fluid process, fluid conveyance and industrial automation components and systems, including pumps, motors, valves, cylinders and related hydraulic and pneumatic components. The company also provides engineering, design support, service and repair services. SunSource customers include large-scale OEMs and end-user industrial manufacturers operating in the oil and gas, infrastructure, construction, agriculture, mining and food and beverage sectors. SunSource, led by CEO David Sacher, is headquartered near Chicago in Addison, Illinois.

IMI to Supply Specialty Filtration Equipment for Sizewell C

IMI has secured a second order from the Sizewell C nuclear power plant in the UK to supply specialty strainers for both EPR reactor units. The equipment, including RIS and EVU strainers, will support reactor cooling and safety systems.

Sizewell C Units 1 and 2 will become the seventh and eighth EPR reactors globally equipped with IMI components, following installations in China, Finland and France. IMI is also supplying equipment for Hinkley Point C.

The project is underway as part of the plant's long-term delivery program.

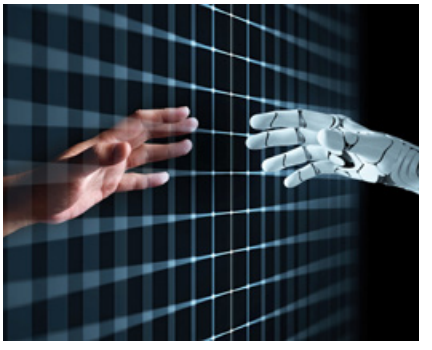
Courtesy of Rob Atherton/iStock Photo

Siemens and NVIDIA Expand Partnership to Build Industrial AI OS

Siemens and NVIDIA expanded their partnership to develop an "Industrial AI operating system" aimed at integrating AI into industrial design, simulation and manufacturing. NVIDIA will provide AI infrastructure, simulation libraries and platforms, while Siemens contributes industrial AI expertise, hardware and software.

The companies plan to create AI-driven adaptive manufacturing sites, beginning in 2026 with Siemens' electronics factory in Erlangen, Germany. Using digital twins and AI-powered simulation, factories will test and implement improvements in real time.

Several global companies are evaluating the technology. Siemens will accelerate GPU integration across its simulation portfolio, while both companies aim to deploy solutions internally before scaling globally.



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1950 – 2025

Next Gen Valves for Safe and Easy Repairs

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NRC Announces Reorganization to Support Efficiency and Innovation

The Nuclear Regulatory Commission is reorganizing to streamline licensing and inspection functions across three core business lines: new reactors, operating reactors and nuclear materials and waste.

The restructuring aligns with executive orders aimed at improving efficiency and accelerating safe nuclear deployment. Corporate support functions will also be consolidated.

The NRC plans to appoint key leaders and implement the new structure by the end of September.

EPA Announces Largest Single Deregulatory Action in History

The EPA has eliminated the 2009 "Endangerment Finding," which determined greenhouse gases could endanger public health and served as the legal basis for federal greenhouse gas regulations under the Clean Air Act.

The agency estimates the move could save taxpayers over $1.3 trillion by removing emissions requirements for vehicles and industrial sources and eliminating off-cycle vehicle credits. States may now have greater flexibility in setting their own greenhouse gas policies, with some states expected to relax current standards further. The action followed public input and analysis after recent Supreme Court decisions addressing agency authority.

Source: LD/iStock Photo

DOE Realigns Critical Minerals and Energy Innovation Programs

The U.S. Department of Energy's Office of Critical Minerals and Energy Innovation (CMEI) has reorganized into three pillars: Critical Minerals, Materials and Manufacturing; Energy Technology; and Innovation, Affordability and Consumer Choice.

The realignment aims to strengthen domestic critical mineral supply chains, accelerate energy technology development and emphasize affordability and consumer choice. Each pillar will be led by a Deputy Assistant Secretary.

The move follows CMEI's renaming and restructuring in late 2025 and aligns with national priorities for energy security and innovation.

Source: Neal - stock.adobe.com

Policy Shifts, Innovation and the Power of Connection

AS WE MOVE THROUGH THE FIRST QUARTER OF 2026, OUR INDUSTRY IS ONCE AGAIN ADAPTING TO CHANGES in tariff policy and the ripple effects across supply chains. While it may feel like déjà vu, this moment carries important differences from last year. Recent developments — particularly regarding the legality of IEEPA-related tariffs and questions about potential refunds — have created uncertainty. Across our industry, companies are asking how the refund process may work, what documentation will be required and how long determinations may take.

As we await additional federal guidance, preparation and credible information are essential. VMA is actively monitoring developments and engaging policy experts to better understand implementation expectations. Members can look forward to webinars focused on tariff updates, refund considerations and practical next steps. As always, VMA's goal is to serve as your "policy and regulator translator," providing clarity and access to trusted expertise.

At the same time, our industry is looking ahead. Artificial intelligence is no longer a distant concept — it is becoming a practical business tool with applications across hiring, engineering, manufacturing and supply chain management. From streamlining candidate screening to enabling predictive maintenance and improving the RFQ process or demand forecasting, AI presents meaningful opportunities to enhance efficiency and competitiveness.

Many companies recognize AI's potential, but questions remain: What is delivering measurable value today? Where should resources be focused? What may not yet be ready for adoption? Benchmarking and peer dialogue are essential to answering these questions, and VMA is committed to elevating these conversations and helping members evaluate where AI can provide real returns.

These discussions will be front and center at **Valve Forum: Conference & Exhibits, April 13–15, 2026, in The Woodlands, Texas** (see page 15–18 for more information). Open to anyone in the industry, Valve Forum is not a traditional trade show focused on foot traffic; it is a curated environment designed for quality conversations, shared learning and meaningful connection across the valve industry value chain. I hope to see you there!

VMA's engagement on key issues now formally extends beyond U.S. and Canadian borders. Last fall, VMA signed a Memorandum of Understanding with leading global valve associations. Collaboration on PFAS policy, energy expansion, sustainability and regulatory impacts reinforces an important truth: our industry is stronger when we speak with a coordinated voice.

In a year sure to be defined by policy shifts, geopolitical impacts and technological advancement, connection, collaboration and credible information remain some of VMA's greatest strengths. If you are not yet a member, I encourage you to learn how VMA can support your company.

Heather Rhoderick, CAE
President

VMA NEWS

VMA is dedicated to driving growth and innovation of the U.S. and Canadian valve industry globally. Through collaboration, education and advocacy, we work to create an environment where manufacturers, distributors and service providers of valves, actuators and controls can thrive. The VMA News section of *Valve Magazine* highlights key initiatives, industry developments and opportunities we're championing. To learn more or explore membership with VMA or VRC, contact VMA President Heather Rhoderick at hrhoderick@vma.org.

VMA Continues PFAS Advocacy at Federal and State Levels; Reporting States Begins

A major effort of VMA's government affairs has been the continued monitoring and input to proposed PFAS legislation and regulatory rule making at the federal, state and local levels.

At the end of 2025, VMA submitted comments to EPA supporting many of key provisions in a new proposed rule relating to federal PFAS reporting requirements under TSCA. For background, in November of 2025, the U.S. Environmental Protection Agency ("EPA") proposed revisions to the PFAS reporting and record-keeping requirements under TSCA §8(a)(7). These proposed revisions included a variety of changes to the final rule promulgated on October 11, 2023. Most notable to our industry were changes that eliminate the need for importers of articles containing PFAS to provide. Specifically, VMA's comments supported the exemption for PFAS in imported articles and adoption of a de minimis threshold for PFAS in mixtures or products, which if adopted in the rule would not have to report to EPA.

Other comments made by VMA include asking that the submission period should be set to start six months after the effective date of the last revisions to the rule or at least maintained at the current deadline of October 13, 2026 (as opposed to the three-month date in the proposed rule). VMA also asked the fluoropolymers to be excluded from the scope of PFAS subject to reporting.

At the state level, VMA continues to advocate for industry. At the time of this article being written, New Mexico is planning hearings regarding potential labeling requirements for articles that contain PFAS — even items including fluoropolymers that were already exempt from reporting due to CUU designation from other PFAS legislation in the state. VMA submitted a letter to the state's governor opposing the board labeling requirements and plans to submit comments directly on the legislation.

Maryland's state legislature is also planning hearings on a broad PFAS ban and reporting requirements that would affect our industry. VMA is part of a coalition opposing this legislation.

New International Alliance includes VMA

The International Valves and Taps Alliance, a new global partnership of the leading valve and tap manufacturers' associations from the U.S., Europe and Japan was launched in December. The creation of the alliance began in October during a meeting of the Italian Valve Association (AVR 2025 Assembly) in Milan, Italy.

The goal of the alliance is to build a transparent framework and ensure a unified and consistent voice on the sector's common priorities and to offer shared tools to address the main technology, regulatory and environmental challenges the valve industry faces globally including issues such as PFAS bans. VMA President Heather Rhoderick and Past Chairman of the Board Matt Thiel, President of AUMA Actuators Inc., participated in this kickoff meeting.

Rhoderick said, "Global coordination and alignment like this helps our respective members and the broader industry share knowledge and develop. In a global, connected industry it has never been more important that we can amplify our voices, heighten awareness and advance innovation in a way that quickly responds to changes. VMA is proud to be working alongside the other industry associations globally on behalf of its members."

Other members of the Alliance include associations from the UK, France, Spain, Japan, Germany and other European nations, as well as IAPMO (the International Association of Plumbing and Mechanical Officials) in the U.S.

Bill Sandler, Past VMA President and Longest Serving Employee, Has Died

William "Bill" Sandler passed away peacefully on January 11, 2026. His obituary is available online at https://bit.ly/4sjmBrO.

During his tenure with VMA, Bill helped lead the industry through multiple downturns and issues including fugitive emissions and asbestos challenges. He helped expand membership by introducing a category for distributors and channel partners in 2013 and was instrumental in growing VMA's educational programming including the launch of Valve Basics curriculum in 2009. Prior to assuming the VMA President role in 1998, he worked for the association in various capacities, most notably leading the statistics work.

Bill retired at the end of 2019 after more than 40 years of service with VMA. Heather Rhoderick, his successor, has been in the role since. "The legacy Bill leaves behind is vast," Rhoderick shared. "He made countless contributions during his decades with VMA, to both the association and to the industry at large. He expanded the association's offerings, especially with regard to education and training. The VMA Scholarship program is named in his honor to recognize his contributions to the industry," said Rhoderick.

VMA Scholarship Applications Being Accepted

The VMA William Sandler SCHOLARSHIP PROGRAM

VMA is excited to once again support careers in the valve manufacturing industry by offering financial assistance to students.

Open to children and dependents of VMA and VRC member companies, VMA's "William Sandler" Scholarship program is awarded to students who plan to attend, or are attending, technical schools and four-year universities and colleges that are studying in areas related to manufacturing or engineering that may relate to the valve industry. Scholarships are awarded in amounts ranging from $1,000–$2,500,

Encourage your students to apply by the deadline, Monday, March 31, 2026, at vma.org/page/sandlerscholar.

Reinforce the Fundamentals at Valve Basics Seminar

VMA is glad to offer its in person Valve Basics program this Spring, in conjunction with the Valve Forum: Conference & Exhibits. Not offered in the past two years and open to anyone, this program is ideal for those new to the industry, or those looking to strengthen their understanding of industrial valves, actuators and controls. The Valve Basics Seminar, April 13 at The Woodlands, TX, features a hands-on "petting zoo" with valves and six sessions taught by industry subject matter experts: linear, multiturn valves; check valves; quarter-turn butterfly valves; solenoids; electric actuators; and control valves and systems.

Attendees can also attend the opening session of Valve Forum: Conference & Exhibits and take part in the exhibit area. More information on Valve Forum can be found in the event preview that starts on page 15–18. For more information on the Valve Basics program or to register, go to vmaevents.org/valve-basics. Register by March 27 for the best rate.

88th VMA Annual Meeting Visits Canada

The VMA is excited to hold its 88th Annual Meeting, September 9–11, 2026, in Québec City, Québec, Canada. The premier event is open only to members of VMA and VRC and is targeted toward industry leaders, to provide trends and foresight on top issues impacting their business.

Discussions and analysis on market trends, innovations, AI, governmental policy and economic impacts, manufacturing and more will be covered — all in an environment conducive to networking with fellow industry leaders.

"With Rob Velan, Executive Vice President, International Operations and Vice Chairman of the Board at Velan Valve Corporation serving as VMA's Chairman of the Board this year, coupled with the strong valve market in Canada, the time was right for VMA to hold its premier event in Canada this year. I'm excited for the opportunity for our U.S. and Canadian members to take part in the event and hope to see some new faces in Québec City in a few months," said Heather Rhoderick, president of VMA. More information will be announced soon at vmaevents.org/annual.

Valve Repair Council Advances 2026 Priorities, Invites Industry Participation

The Valve Repair Council (VRC) Board of Directors met in early 2026 to review progress on strategic initiatives and set priorities for the year ahead, with a continued focus on financial strength, member programs outlined in the new three-year strategic plan and long-term industry growth. A key highlight is the *2026 Valve Repair Seminar*, taking place June 9–10, 2026, in Pasadena, Texas. The day-and-a-half program delivers timely technical education, an industry facility tour and valuable networking with repair professionals and leading suppliers — while offering up to nine professional development hours. Topics will span field repair, valve positioner selection and application, welding and machining best practices, workforce recruitment and retention, industry standards and more.

The VRC welcomes participation from across the valve repair community. By sharing expertise, contributing to programming or engaging in Council initiatives, industry professionals can help advance best practices, strengthen standards and build meaningful connections. To learn more or get involved, contact Caitlin Hughes, Executive Director, at chughes@vma.org.

VMA Committee Work Off to a Strong Start

VMA committees and the members who participate are a cornerstone of VMA. These committees help ensure VMA delivers the content, knowledge, analysis and programs that are valuable to our members. Here's a snapshot of a few Committees and what they are currently working on.

Government Affairs: A webinar for members on the new tariff changes and impacts, and what to expect regarding refunds, will take place this March. Additionally, a fly-in to Washington D.C. April 21–22, 2026, is being planned to discuss PFAS topics, tariffs and other topics with elected officials.

Technical Committee: This committee has finished developing the technical program for the Valve Forum. The focus now shifts to finalizing a matrix tool that can be used to help members better understand standards and applications applicable to their products.

Annual Meeting Program Planning Committee: Responsible for planning the program, selecting speakers and ensuring the Annual Meeting is the premier place for members to convene and hear from expert speakers, this Committee works with speakers and each other to ensure the Annual Meeting delivers value. The Committee is currently collecting program and speaker ideas for the September meeting in Québec City.

The full list of all the Committees is available at vma.org/committees. Members interested in serving on a committee can contact Caitlin Hughes at chughes@vma.org.

VMA Welcomes Industrial Components-AR, LLC

Industrial Components-AR, LLC has joined VMA as a supplier member. The company is a stocking distributor of plastic caps, plugs and flange protectors for the valve and pipe industries that are used for protecting products during the shipping process. The company is in Little Rock, AR. More information about them can be found on their website: https://industrial-components-ar.com.

Calendar of Events

Learn more at vmaevents.org or contact Caitlin Hughes, VMA's Director of Education and Operations at **chughes@vma.org**.

Valve Basics Seminar | April 13, 2026 | The Woodlands, TX

Valve Forum: Conference & Exhibits | April 13–15, 2026 The Woodlands, TX

Valve Repair Seminar | June 9–10, 2026 | Pasadena, TX

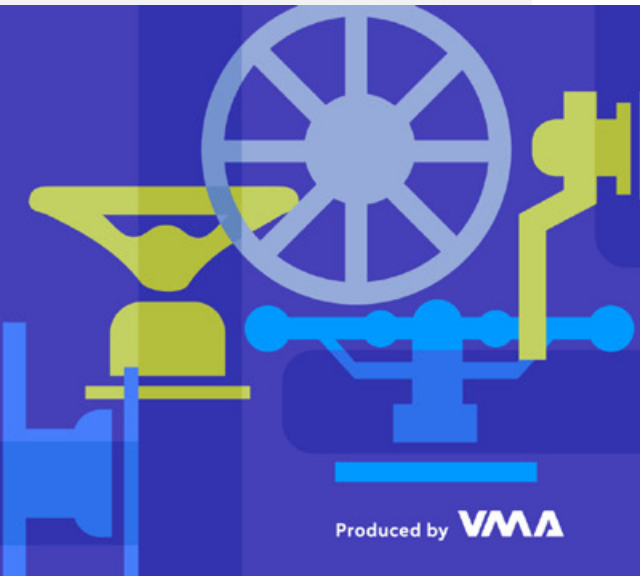
VMA and VRC Annual Meeting | September 9–11, 2026 Québec City, Montreal, Canada

VALVE FORUM 2026

CONFERENCE & EXHIBITS

April 13–15 | The Woodlands, TX

TECHNICAL · MANUFACTURING · MANAGEMENT AND MARKETING · VALVE FUNDAMENTALS



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Tuesday, April 14

7:30–8:30am: Continental Breakfast with Exhibitors
8:30–11:20am: Morning Programming
11:30am–2pm: Networking Luncheon with Exhibitors
2–5:10pm: Afternoon Programming with Networking Break
6:30–8pm: Networking Night Out (Ticketed Event)

Wednesday, April 15

7–8am: Continental Breakfast
8–11:50am: Morning Programming

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- **Keynote**
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  - Smart Valves, Smarter Decisions: AI-Driven Diagnostics and Automation with A-PRIME
  - Measuring Reliability in Industrial Valve and Automation Products: Tools, Techniques and Trends
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- **Business & Market Trends**
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FEATURED ARTICLE

Automating Manufacturing Processes Helps Manufacturers with Efficiency, Precision and Compliance

Simple automations can create big gains on the shop floor.

HEATHER GAYNOR, *EDITOR, VALVE MAGAZINE*

WHEN IT COMES TO AUTOMATION, THERE ARE MYRIAD APPROACHES AND TECHNOLOGIES that manufacturers incorporate into their businesses. Some of these could be as simple as materials handling equipment to load raw materials into and out of machines, or scanning systems for automating inventory picking for order fulfillment. It can be as complicated as fully automated machining cells with the entire manufacturing process completed within the confines of that cell. These systems often include material loading robots or cobots, CNC machining centers, optical scanners and metrology equipment to ensure precise measurement and quality, as well as inspection. And those are just a few of the key automation technologies found on shop floors today.

Valve and actuator manufacturers operate in one of the most demanding segments of metal manufacturing. These products inherently require tight tolerances, variable product configurations, pressure boundary integrity and documentation-heavy compliance requirements, creating a production environment where consistency is hard-won and errors are costly. Automation is increasingly viewed as a solution to these challenges, but in this sector, success depends less on full, lights-out production and more on targeted, technically informed automation that strengthens both process capability and workforce skills.

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The most easily implemented automation strategies in valve and actuator manufacturing today focus on reducing ergonomic stress on employees and enabling skilled workers to spend more time on judgment-driven tasks such as setup, troubleshooting and continuous improvement. When deployed with intent, automation helps companies multiply the potential of employees not to replace them. And in a globally competitive market, it can offer time and cost savings that owners and investors demand.

Why valve and actuator manufacturing presents unique automation challenges

My career has taken me into a multitude of manufacturing environments — from two-machine shops to major consumer products manufacturing operations where thousands of final products are produced each day. I've seen shops with fully automated cells with multiple machines networked together, and other shops where barcodes and scanners for inventory and order fulfillment are the most sophisticated automation products employed in production.

Valves and actuators are unlike most other high-volume, highly standardized discrete parts as they are inherently variable. Manufacturers often have a high product mix, with wide ranges of sizes, pressure classes, materials, trims and end connections running through the same facility for the same essential part. Even within a single valve family, machining routings for flow paths, inspection points and test requirements can change significantly based on customer specification.

Performance failures in valves and flow control products can have safety, environmental or operational consequences, which is why standards such as ASME B16.34, API 598 and ISO 5208 place heavy emphasis on pressure integrity, closure tightness, testing and marking. ISO 5208:2015, for example, formalizes pressure testing and leakage verification of metallic valves as essential manufacturer responsibilities, not optional quality checks. Automation integrated into workflows that require these standards must be selected not just for surface-level quality measurements but structural integrity, flowpaths and even traceability of parts.

These constraints mean that automation works best when it is applied selectively to the highest-friction points in production rather than attempting to fully automate every operation at once.

Core automation technologies

Automated material handling moves components through production. Often beginning when materials are delivered to the dock door, automatic forklifts and automated guided vehicles (AGV) are often used to move materials from one part of the shop to another, using GPS guidance and track systems to navigate warehouses and machine shop floors. Conveyor systems with AGVs transport heavy valve castings or machined bodies between machining stations for various operations. Overhead gantry systems are also used for moving materials and deliver subassemblies for valves and actuators to workstations based on production schedules and order of operations.

Robotic systems are ideal for handling repetitive, precise tasks. In valve manufacturing, articulated robots can perform welding operations on valve bodies, particularly for creating seals in high-pressure applications. Multi-axis robots excel at the complex positioning needed for welding ball valve assemblies. For actuators, collaborative robots (cobots) assist with assembly of gear trains and motor housings, working alongside human operators to ensure proper operation and functioning of the systems before high quantities of products are made.

CNC machining centers are fundamental for precision manufacturing, although many shops today still have manual Bridgeport machines that are a key part of the product mix in their production — proving that the newest isn't always the best tool for the job. Multi-axis CNC machines can create valve bodies from raw castings or forgings, boring precise chambers and cutting intricate port geometries. They often have lasers and other metrology built into the machine to measure and validate specifications at each point in the manufacturing process. In actuator production, CNC lathes turn drive shafts and machine mounting flanges to tight tolerances within microns. Multi-axis machining centers can complete complex actuator housings in a single setup, reducing handling time and improving quality of manufacturing.

Vision and inspection systems are implemented in manufacturing and quality workflows. Machine vision inspects valve seat surfaces for defects, measuring flatness and finish to ensure proper sealing. Coordinate measuring machines (CMMs) are often outfitted with physical probes used to measure the physical geometry of products including dimensions, angles and surface area with results automatically recorded in quality databases that can be used for traceability.

Dimensional variation upstream often shows up as test failures downstream. By using automated inspection to stabilize machining processes, manufacturers can significantly reduce hydrostatic and seat test failures, which are among the most time-consuming and disruptive quality events in valve production. Vision systems are growing in use, for orientation verification checks, to inspect critical part marking for identification and traceability and much more.

continues ▶

Assembly automation ranges from semi-automated workstations to fully automated lines. For example, automated torque stations apply precise bolt tension during product assembly, again recording values for traceability. Automated presses can install bearings with controlled force, then parts can move to automated leak testing stations for final product integrity checks.

Process control and SCADA (supervisory control and data acquisition) systems monitor and optimize production. These systems combine hardware and software to monitor and control processes during production and enable manufacturers to analyze production data in real time. These systems alarm if products are out of specification and can have automatic control responses programmed that are triggered by certain events occurring or if system parameters deviate from the control settings. Some other examples of automated control systems include temperature-controlled curing ovens for epoxy-coated valve interiors that operate on closed-loop control, or pressure testing stations for actuators that automatically cycle through test sequences and document results.

Modern valve and actuator manufacturers increasingly adopt Industry 4.0 approaches and controls. The use of digital twins in manufacturing allows for operators to optimize production settings on machining centers to create the best order of operations and production flow for parts, and to implement real-time quality analytics to reduce defects.

CNC automation as the foundation

For many valve and actuator manufacturers, the most immediate and reliable return on automation comes from CNC machine tending combined with disciplined fixturing engineering. Valve bodies, bonnets, stems and actuator components are often well suited to automated loading and unloading, particularly in roughing and early finishing operations where cycle times are consistent and volumes justify investment.

However, successful CNC automation depends far more on workholding equipment and data strategy than on the robot itself. Poorly defined data or unstable fixturing simply produces bad parts faster. This is especially critical for sealing surfaces, bores and connection points that directly affect valve performance. Chip evacuation, coolant management and part cleanliness are very important in unattended or semi-attended machining, as downstream inspection and assembly are sensitive to contamination.

Tool life management is another technical consideration that becomes more consequential in automated cells. In valve manufacturing, tool wear is not just a productivity issue but a quality risk. Integrating tool monitoring with in-process probing or downstream measurement allows manufacturers to catch dimensional drift before it progresses into pressure-test failures with parts becoming scrap.

Automating pressure testing without losing expertise

Pressure testing is frequently one of the most labor-intensive and capacity-constrained operations in valve manufacturing. It is also one of the most amenable to automation that enhances, rather than replaces, skilled labor. Automated leak measurement improves repeatability while reducing operator fatigue and procedural variation.

When test systems are integrated with barcode or RFID-based identification, the correct test parameters can be automatically loaded for each valve, and results can be captured directly into digital test records. This approach aligns closely with ISO 5208's verification intent while shifting the role of technicians from manual execution to oversight, diagnosis and exception handling. The result is higher test throughput, more consistent data and better use of experienced personnel.

Assembly automation in actuator manufacturing

Automation in actuator production is often assistive automation rather than full robotic replacement. Torque-angle monitored fastening, basic assembly and cobots can improve consistency and ergonomics while preserving the flexibility required for mixed product lines.

In many cases, the primary return on investment comes not from faster assembly times but from prevention of errors and quality concerns during assembly. Incorrect torque, missing components or assembly sequence errors are far more expensive than gaining incremental cycle time savings. Automation that guides and verifies assembly steps helps ensure that actuators, or any components, perform as designed while reducing rework and warranty exposure.

Designing automation around specifications and traceability

Automation in valve and actuator manufacturing must be engineered with specifications and compliance requirements in mind from the outset. Standards such as ASME B16.34 define expectations around materials, pressure ratings, testing and marking that directly influence manufacturing processes. Automation that improves throughput but weakens traceability or documentation ultimately undermines compliance.

For this reason, traceability should be treated as a core design requirement. Applying unique identifiers early in production and linking them to automated data capture across machining, inspection, assembly and testing creates a practical digital thread. Standards such as MTConnect, (ANSI/MTC1.4-2018) provide a structured way to collect equipment data across mixed-vendor environments, and NIST's Smart Manufacturing Systems work demonstrates how interoperable data can support quality, maintenance and production planning without requiring excessive IT complexity or programming knowledge.

Safety as an integral part of automation design

Metal manufacturing automation introduces new hazards related to motion, stored energy and human–robot interaction. Addressing these risks requires systematic safety engineering rather than ad hoc guarding. OSHA provides guidance on robotics hazards and safeguarding concepts, and ANSI/RIA R15.06 defines the primary U.S. framework for industrial robot safety (OSHA Robotics; ANSI/RIA R15.06). Incorporating risk assessment, interlocks and functional safety into cell design from the beginning reduces both safety incidents and costly retrofits.

Automation as a workforce development tool

Concerns about automation eliminating jobs are particularly acute in an industry already facing labor shortages. Yet research from Deloitte and The Manufacturing Institute shows that the manufacturing sector's challenge is not excess labor but a shortage of skilled workers, especially as digital technologies become more prevalent (Deloitte Manufacturing Workforce).

In valve and actuator manufacturing, automation can be deliberately targeted at tasks that are repetitive, ergonomically risky or low in decision-making content. This allows experienced machinists, assemblers and inspectors to transition into higher value roles such as automation technicians, process optimization leads, metrology specialists or controls and maintenance experts. Involving your key manufacturing staff when first planning and designing automation on the factory floor builds trust in your staff, helps capture tribal knowledge and builds trust among employees who see the whole picture and don't think management is trying to eliminate their jobs. Automating shops also helps create clear career development pathways and helps businesses attract and retain younger talent who are drawn to shops with technology already integrated into workflow.

A pragmatic path forward

Instead of pursuing sweeping transformations and going fully automated, most valve and actuator manufacturers will benefit from a phased approach. Initial efforts often focus on stabilizing machining and inspection through CNC tending and in-process measurement. After that, expanding automation into testing and assembly, followed by broader data integration to connect equipment, quality and production systems, is a logical progression. But, safety and workforce development must remain foundational considerations rather than afterthoughts.

Precision, compliance and people

In the valve and actuator sector, automation delivers its greatest value when it reinforces the fundamentals customers care about most: consistent performance, reliable documentation and on-time delivery. Industry standards such as ASME B16.34 and ISO 5208 underscore that quality and verification discipline are inseparable from manufacturing success. When automation is aligned with these requirements and paired with intentional workforce development, it becomes a competitive advantage built on both technical excellence and human capability.

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FEATURED ARTICLE

Water Hammer in Piping Systems

Prevention can help operators avoid system damage and shutdowns.

PAUL ANDERSON, *DFT*

YOU MOST COMMONLY EXPERIENCE WATER HAMMER AT HOME. You open your faucet wide to fill a pot or bathtub, then shut the faucet valve quickly. You hear a banging in the pipes that echoes through the whole house or apartment.

What happens is that a flow of liquid in your home's water pipes was suddenly stopped — it "hit a wall" when you closed that valve. The impact of the water against the closed valve was transmitted as shock waves back through the pipes, smacking into the inside of the pipes at each turn, until the shock waves lost their energy and dissipated completely.

In industrial systems, the pipe sizes are larger, the flow rates are higher, and the shock waves created are more powerful, all leading to the possibility of significant damage both to piping and to valuable connected components.

Consequences of water hammer

The consequences of water hammer can range from mild to severe. The sometimes-deafening noise associated with water hammer can be a source of distress and concern, especially if people are working nearby when it occurs.

Repeated occurrences of water hammer aren't just an annoyance, however. Water hammer can blow out gaskets which can cause leaks, and seriously damage pipelines, expansion joints, piping support systems and all the other components of a system (pumps, flowmeters, pressure sensors etc.). The pressure spikes associated with water hammer can easily exceed 5–10 times the working pressure of the system, placing a great deal of stress on system components. This can lead to immediate or fatigue failures, such as pipe wall cracks and

Source: iStock.com

sudden ruptures. Repairing or replacing damaged pipeline components and equipment can involve steep costs. If a spill results in an environmental issue, cleanup costs can add up.

Most significantly, water hammer is considered a safety hazard. The extreme pressure of water hammer can blow out gaskets and cause pipes to rupture suddenly. People in the vicinity of such an event could be seriously injured.

Causes of water hammer

The most common cause of water hammer is either a valve closing too quickly or a pump shutting down suddenly. Water hammer, also known as hydraulic shock, is, in fact, the momentary rise in fluid pressure in a piping system when the fluid is suddenly stopped. As Sir Isaac Newton observed, an object in motion tends to stay in motion unless acted upon by another force. The momentum of the fluid traveling in its forward direction will work to keep the fluid moving in that direction.

Sudden valve closure is most often associated with solenoid valves and automated quarter-turn types of valves. A simple solution is to avoid solenoid valves and close automated quarter-turn valves more slowly. This works in many cases but not all. For example, emergency shutdown valves need to close quickly, so other solutions may be necessary for these types of applications.

The other most common cause of water hammer is sudden pump shutdown. Multiple pumps feeding into a vertical pipe run or a common header, as in cooling tower applications or mine dewatering, either need to be shut down slowly, or need to have in-line silent check valves installed immediately after each pump. Silent check valves can be extremely effective in reducing and often eliminating water hammer.

Water hammer can also result from improper valve selection, improper valve location and sometimes poor maintenance practices. Certain valves, such as swing check valves, tilting disc check valves and double door check valves can also contribute to water hammer problems. These check valves are prone to slamming because they rely on reversing flow and backpressure to push the disc back onto the seat to close the valve. If the reverse flow is forceful, as in the case of a vertical line with normal flow upwards, the disc is likely to slam with a great deal of force. The resulting shock can damage the alignment of the disc such that it no longer makes full contact with the seat. This leads to leaks that, in the best case, undermine the efficiency of the system. In the worst case, this could do serious damage to other piping system components.

A spring-assisted, silent check valve, because its spring helps to close the valve, shuts before reverse flow is fully developed, and both limits impact of the closing disc and restricts any downstream shock wave from continuing back upstream of the check valve.

Predicting water hammer pressure spikes

It is possible to estimate the magnitude of water hammer pressure spikes based on detailed knowledge of the piping system and the fluid. The actual force of water hammer depends on the flow rate of the fluid when it is stopped and the length of time over which the flow is stopped. For example, consider 100 gallons per minute of water flowing in a two-inch pipe at a velocity of 10 feet per second. When the flow is quickly brought to a halt by a fast-closing valve, the effect is hundreds of pounds of force slamming into a barrier (the valve disc). If the flow is stopped in less than a half second (which might be the closing speed of the valve), then a pressure spike over 100 psi above the system operating pressure can be generated.

The equation for calculating the potential magnitude of the spike is:

$p = (a \times \Delta V) / (g \times 2.31)$

where,

p is the pressure generated

ΔV is the change in fluid flow velocity
a = acoustic velocity in the media

g = gravitational constant = 32.2 ft/s²

An example is:

a = 4864 feet per second at ~68°F

ΔV = 5 feet per second
p would be 327 psi

This value is assuming instantaneous valve closure.

continues

Source: iStock.com

Valve closure time

Ensuring that a valve closes gradually can mitigate the effects of water hammer. The basic formula for an absolute minimum safe valve closure time is related to the length of straight pipe through which a pressure wave can travel:

$T = 2L/a$

where,

T = minimum closure time in seconds

L = length of straight pipe between the closing valve and the next elbow, tee, or other pipeline structure

a = 4864 feet per second at ~68°F

For water and 100 feet of straight pipe to the next fitting,

T= 41 milliseconds minimum closure time

Solutions to water hammer

There are many ways to mitigate the effects of water hammer, depending on its cause. One of the simplest methods of minimizing damage from water hammer caused by hydraulic shock is to train and educate operators. Operators who learn the importance of opening and closing manual or actuated valves properly can take precautions to minimize the effects. This is particularly true for quarter-turn valves such as ball valves, butterfly valves and plug valves.

Normally the pressure wave of water hammer is dampened or dissipated in a very short amount of time, but the pressure spikes can do enormous damage during that brief period.

Piping design considerations

Water hammer arrestors provide a point of relief for pressure spikes caused by water hammer. These piping system components reduce the characteristic noise and damaging stress on the pipeline system by acting like a shock absorber, dissipating pressure waves in a small branch connection with an air cushion. When sized and installed properly, water hammer arrestors can be an effective solution to water hammer.

On the other hand, pumps that output into a long run of vertical pipe should be avoided. The vertical leg should either be minimized, or silent check valves installed close to the pump.

Hydraulic shock resulting from the sudden closure of swing check, tilting disc and double-door check valves can be remedied by exchanging these valves with silent or non-slam check valves. Silent check valves close upon the decrease of the differential pressure across the closure member of the valve as flowrate decreases, rather than closing from reverse flow. Thus, they are far less likely to slam shut.

System designers must be familiar with best practices and industry standards for minimizing water hammer, such as using slow-closing valves when appropriate, knowing optimal valve locations within a piping system and giving special piping design considerations for high-operating pressure systems.

When piping systems are properly engineered, the likelihood of water hammer occurring is greatly reduced or even eliminated. In systems that are already in place, the damaging effects of water hammer can be limited in a number of significant ways, such as installing water hammer arrestors, relocating check valves out of vertical lines, installing silent check valves as a primary line of defense and ensuring operating procedures for quarter-turn valves have a slow closing rate. Note that the closure time in automated systems should be at least 10 times what is calculated in the T=2L/a formula.

Conclusion

Water hammer has been studied for many years. Some of the founding research dates back to the late 19th century, and research continues today. Many major universities in the United States, the UK, and the Netherlands, as well as well-respected valve companies, have authored articles on the comparison of various styles of check valves and their installed dynamic characteristics.

This article only scratches the surface of the subject of fluid transients by exploring some of the causes and solutions of what we commonly call water hammer. Solutions to deal with water hammer problems can be quite costly, and, as always, an ounce of prevention is worth a pound of cure. Pumps feeding into vertical lines or common headers and rapid valve closures can all be avoided during initial system design. Once piping is in place and plant operation is underway, it is more challenging to find ways to eliminate or mitigate water hammer and its effects.

Most manufacturers of in-line silent check valves understand water hammer very well and have engineers on staff who can help. They can be the best source of knowledge when it comes to finding the right solution.

Next time you fill a pot or bathtub, close the faucet gradually. You'll have a quieter experience — and may prevent damage to your home's water pipes.

ABOUT THE AUTHOR

Paul Anderson is Director of Engineering at DFT Valves. Reach him at panderson@dftvalves.com.

FEATURED ARTICLE

Rebuilding Industrial Manufacturing in the U.S.

How tariffs, AI and geopolitical risk are fueling a resurgence in areas of manufacturing.

LISA ANDERSON, *LMA CONSULTING GROUP, INC.*

AFTER DECADES OF OFFSHORING, FRAGILE GLOBAL SUPPLY CHAINS AND MARGIN PRESSURE, U.S. MANUFACTURING, MINING AND CONSTRUCTION ARE ENTERING A DECISIVE NEW GROWTH CYCLE. Tariffs, sweeping policy changes under the One Big Beautiful Bill, heightened geopolitical risk and the accelerating impact of artificial intelligence, is leading companies to rethink where and how they build their products and serve their customers. Domestic investments, along with new agreements with allies and tariff negotiations, put a renewed focus on supply chain control and technologies that enable production at unprecedented scale are reshaping the industrial landscape. For manufacturers and industrial leaders, this moment represents not just a rebound, but the potential for a structural reset with long-term implications for competitiveness, resilience and growth.

Manufacturing, mining and construction on upswing

As tariffs, the One Big Beautiful Bill (OBBB) and new economic policies go into effect, manufacturing, mining and

continues ▶

Tariffs have been levied since March 2025 under IEEPA, which has now been deemed unlawful. Source: iStock.com

As U.S. manufacturers work to reshore, reconfigured supply chains are a necessity.

construction industries are projected to be on an upswing. Since China entered the World Trade Organization, the United States' share of global manufacturing declined rapidly, depleting its capabilities and capacities, and so dramatic change was required to impact that trendline and its impacts on supporting industries. Add artificial intelligence (AI) into the mix, and it further spurred the potential upswing in manufacturing, mining and construction. These industries are poised for aggressive growth.

Geopolitical risks heightened awareness

For decades, manufacturing declined, imports increased and business soared with the focus on reducing labor costs. Amazon-like service became the focus. The pandemic changed the world as geopolitical risk entered the spotlight. Relying on China for the medical and pharmaceutical supply chain and products in general was highlighted as shortages and extended lead times persisted, container ships lined up on the West Coast, and executives realized they were dependent on their end-to-end supply chain.

Russia invaded Ukraine, Iran-backed Hamas attacked Israel and China threatened Taiwan, creating unrest throughout the world and illustrating the risks associated with global supply chains. Major supply chain chokepoints were impacted such as the Suez Canal as Iran-backed Houthi rebels attacked ships, cutting off a major waterway connecting Asia to Europe and America. In addition, the drought in Panama caused another supply chain chokepoint, the Panama Canal, to create disruption in the supply chain, severely limiting this access from Asia to the East Coast of the United States.

Tariffs enter the scene

The Trump administration responded to this world situation with widespread tariffs. The markets dropped with worries over inflation and negative impacts on business profits. Companies have been relying on inexpensive foreign goods, often subsidized within the end-to-end supply chain, so it sent shockwaves throughout the system. Following this market downturn, U.S. trade representatives and leaders worked to negotiate more favorable trade agreements with countries such as the UK, Europe, Japan, South Korea and other Asian countries, completely reshaping the global supply chain.

Tariffs have highlighted the good and bad of end-to-end supply chains. China responded with additional tariffs levied on the U.S., which caused escalating tariffs on both sides, and effectively shutting down trade while creating concern within global logistics circles. Although a temporary de-escalation and partial deal was negotiated, it highlighted the impact of reliance on global supply chains for critical products. Additionally, during this turbulent time as tariffs were rolled out, China cut off access to rare earth minerals for the world, highlighting the critical importance of controlling the end-to-end supply chain. Rare earth minerals are required for thousands of products in defense manufacturing, automotive, electronics, medical devices and shipbuilding supply chains. And, as the name implies, they are in limited supply so having

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access to them is imperative for the continued production of thousands of parts and products the world relies upon in industry and in life in general. Again, this situation spurred executives to rethink their supply chain partners for these critical materials.

In addition to illustrating global dependencies, tariffs created business uncertainty as executives were unsure about changes that would impact their situation. Customers held back on orders and investments until stability returned. Since U.S. industrial manufacturing in many sectors has been in a decline since late 2022, this shrinking of backlogs caused further tightening among manufacturers and their customers. Demand shrunk and manufacturers put all non-essential spending on hold, keeping the sector on the edge of recession.

On the other hand, as the U.S. negotiated tariffs with countries, stability slowly returned. In addition, new deals opened markets for key industries such as aerospace, energy and farming. For example, Qatar purchased 210 widebody jets and the European Union agreed to purchase significant liquified natural gas (LNG), oil and nuclear fuel. In addition, new opportunities emerged for manufacturing, mining and construction as companies and countries started announcing significant investments into the U.S. economy. For example, Japan agreed to invest $550 billion in U.S. industries, including energy, critical minerals, AI and electronics, as part of a major trade deal. Similarly, South Korea is investing in shipbuilding as they have superior capabilities in that sector. In addition, significant pharmaceutical expansions were announced by companies including Eli Lilly, Johnson & Johnson and Roche, driving new domestic production and R&D.

Further expansion with OBBB and artificial intelligence

Closely following the tariffs, Congress passed the OBBB with significant incentives for manufacturers. Not only did it make the favorable tax rate permanent, it allowed for depreciation of equipment and buildings, as well as other tax benefits for manufacturers including in R&D spending. These benefits, in conjunction with tariffs, are creating a wave of investments and expansions into manufacturing, mining and construction.

Going a step further, as the race for AI heats up, investments in data centers, energy infrastructure and critical minerals are escalating. Depending on which estimates to cite, there is somewhere between $8–20 trillion of investments in these areas planned over the next decade. Even if you cut the low end by 50%, these are substantial investments which will spur a rapid expansion and need for additional capacities, capabilities and supporting infrastructure.

AI also is integral to the expansion of manufacturing as it supports building at scale. Labor costs are far less relevant to the total cost of products as advancements in AI, automation and robotics can reduce the need for low-skilled labor in some areas. More importantly, AI supports production and building at scale by enabling a significant increase in output rapidly. When transitioning from minimal output to radically more output, continuous improvement will not suffice. AI and advanced technologies have become a must.

Proactive approach for success in scaling production

As manufacturing, mining and construction scales up, the companies that will succeed the most and the fastest are taking the proactive approach with predictive processes, upgraded tools and advanced technologies. For example, SIOP (Sales Inventory Operations Planning) enables executives to stay ahead of changing business conditions, potential geopolitical threats and roadblocks to maximizing margins in a way that creates predictable revenue, superior customer performance, EBITDA growth and working capital strength. Simultaneously, more efficient use of ERP with upgrades of programs such as materials requirement planning (MRP), inventory optimization and the rollout of advanced technologies that enhance supply chain visibility with tools such as geofencing and crowdsourcing. Advanced planning systems such as CRM (customer relationship management), sales forecasting, APS (advanced planning and scheduling), TMS (transportation management) and related technologies such as digital twins, autonomous vehicles and robotics can also dramatically increase capabilities.

The bottom line

As global supply chains evolve, the companies that thrive are staying ahead of changing conditions with an innovative and forward-thinking perspective. There will be more opportunities in the next few years than at any time in history for those willing to take prudent risks and prepare for growth while keeping costs intact. Success will go beyond common sense, continuous improvement, historical perspective; instead, it will go to those willing to leap forward with AI-enabled processes and related technologies, hoarding top talent while building the future workforce, and those willing to fail and learn forward.

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Lisa Anderson is founder and president of LMA Consulting Group, Inc., a consulting firm that specializes in manufacturing strategy and end-to-end supply chain transformation that maximizes the customer experience and enables profitable, scalable, dramatic business growth. She recently released SIOP (Sales Inventory Operations Planning): Creating Predictable Revenue & EBITDA Growth that can be found at https://www.lma-consultinggroup.com/siop-book/.

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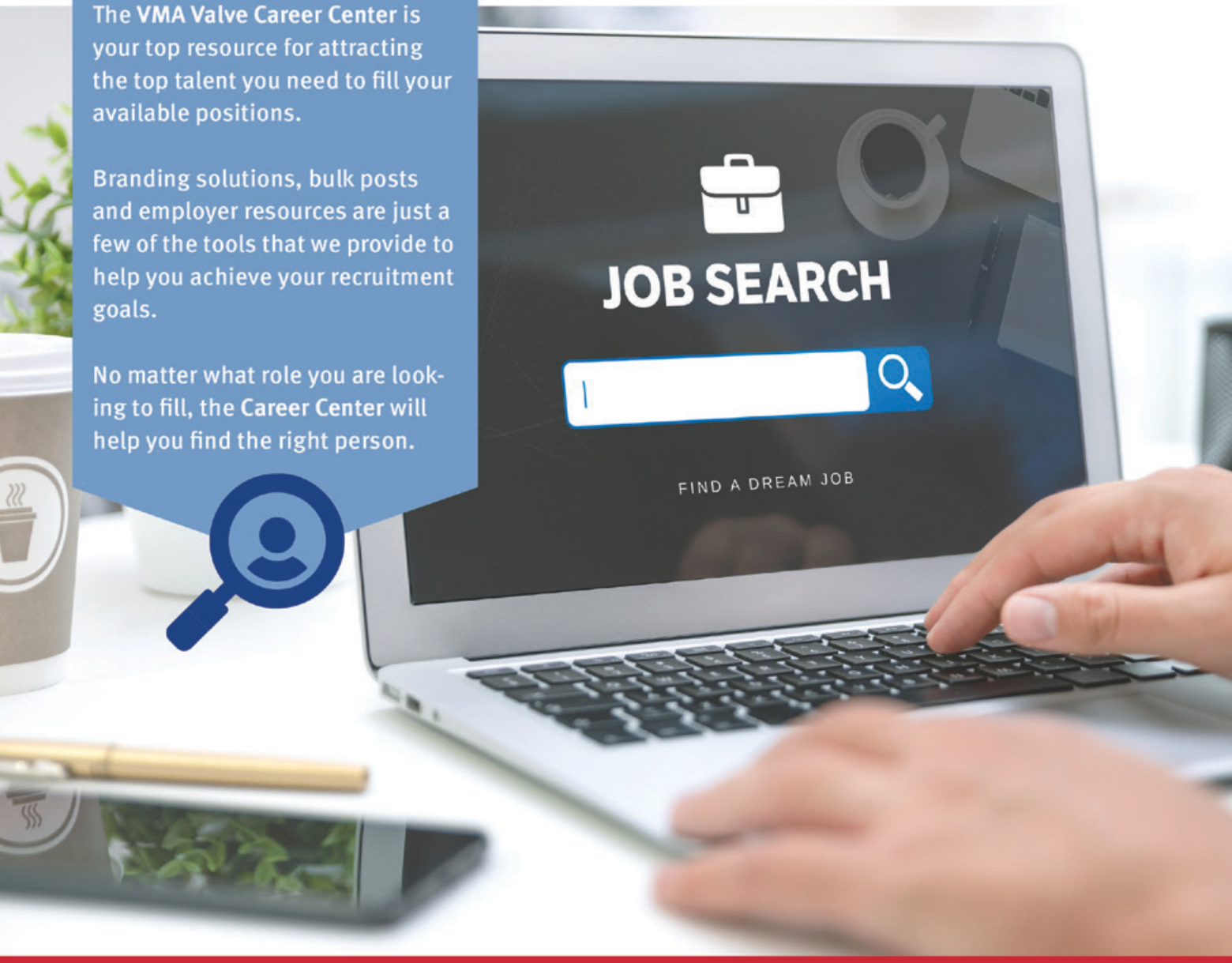

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VALVE Basics

The Underappreciated Mounting Kit — Revisited

Why engineered mounting kits are critical to valve automation integrity.

TONY LAMBERT, VANAIRE

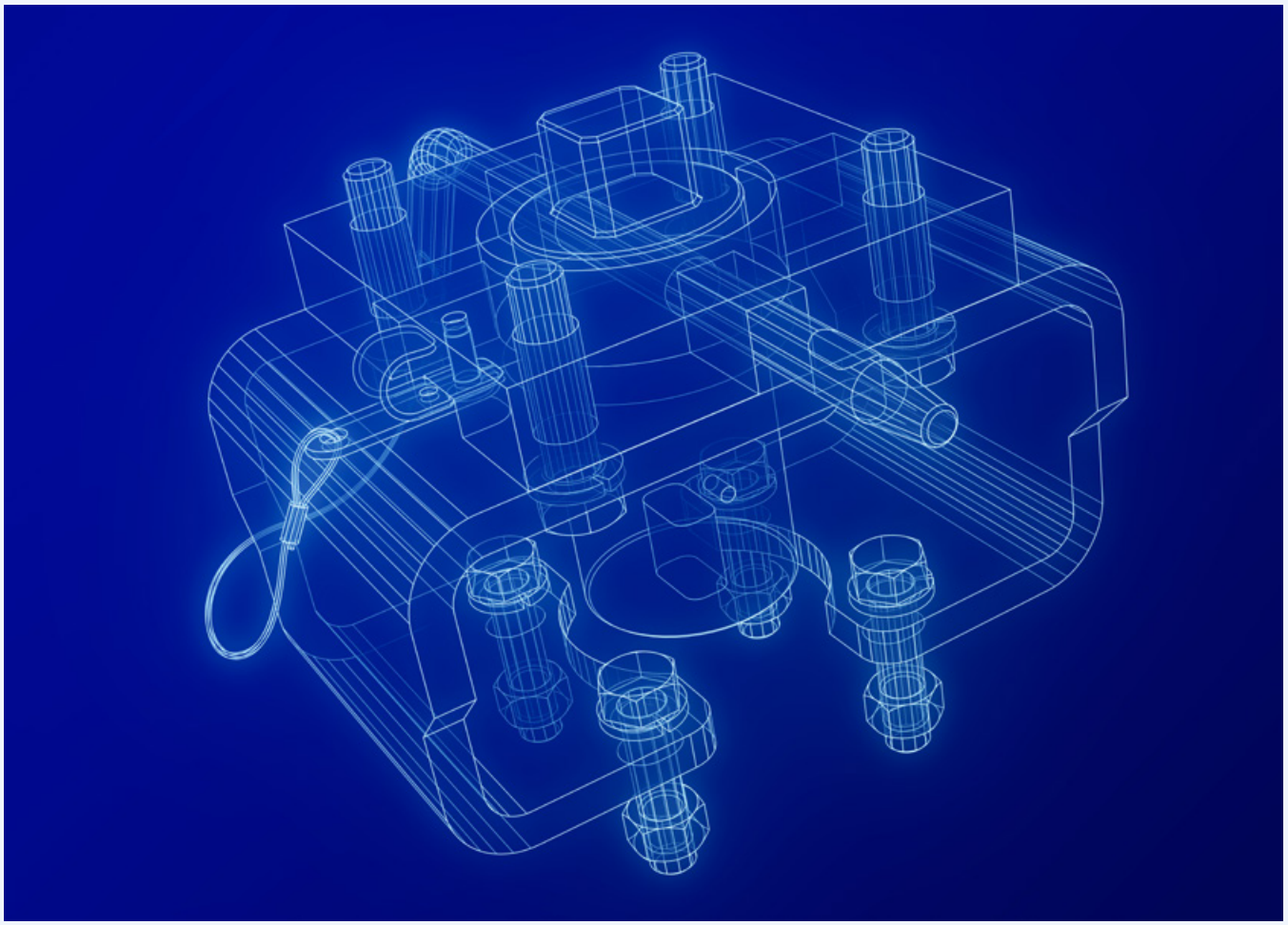
FOR DECADES, MOUNTING KITS HAVE BEEN TREATED AS COMMODITY HARDWARE, AN AFTERTHOUGHT — compared to valves, actuators and instrumentation. Yet in practice, the mounting kit is the structural backbone of many automated valve assemblies: the mechanical interface that transfers torque, thrust and external loads between actuator and valve. When improperly engineered, it may become a primary contributor to premature valve failure, misalignment, fugitive emissions and unplanned downtime.

Industry has increasingly recognized this risk.

In response, formal standards were introduced to address the complete valve automation assembly, including its mounting kit. In 2011, the International Organization for Standardization released ISO 12490: Mechanical Integrity and Sizing of Actuators and Mounting Kits for Pipeline Valves. This was followed by the American Petroleum Institute's API 6DX in 2012.

While originally written for pipeline valves, these requirements are now widely adopted across refining, chemical processing, power generation and general industrial automation.

Since 2023, the Manufacturers Standardization Society (MSS), the International Society of Automation (ISA) and the International Organization for Standardization (ISO) have



A 3D rendering of an engineered mounting kit.

released mounting kit standards focused specifically on actuator-to-valve mounting components. They expand beyond pipeline applications and establish comprehensive design constraints, dimensional requirements, material expectations and performance criteria for precision, consistency and reliability across automated valve assemblies.

The intent is clear: Mounting kits are not accessories — they are structural components.

Mechanical integrity begins at the interface

The two original standards (ANSI/API 6DX and ISO 12490) required mounting kits to transfer all loads from actuator to valve, including forces equal to or exceeding 1.1 times maximum torque or thrust, taking into account the following:

- Pneumatic or hydraulic actuators at maximum operating pressure
- Spring-return actuators at maximum spring compression
- Electric actuators at stall torque or 100% torque switch setting

The standards specified allowable tensile, shear, torsional and bearing stresses, which were derived from ASME BPVC Section VIII (2004). Welding was also considered, and fillet welds needed to use a strength efficiency factor of 0.75. The bolting in mounting kits was not permitted to be subjected to shear forces.

The recently released standards built upon this foundation by introducing clearer performance expectations for actuator-to-valve mounting components, including stiffness, alignment integrity and dimensional repeatability. Excessive deflection or misalignment can introduce side loading on valve stems, which can accelerate packing wear, increase operating torques and contribute directly to fugitive emissions. This is where engineered mounting kits differentiate themselves from generic brackets.

It is critical that mounting kits are designed using engineering analysis, controlled tolerancing and application-specific geometry to maintain concentricity and parallelism between the actuator drive, coupling and valve stem — protecting both sealing integrity and mechanical longevity.

The expanding standards framework for mounting kits

Modern engineered mounting kits now draw from a growing ecosystem of international standards, including:

- ANSI/API 6DX: Standard for Actuators and Mounting Kits for Valves
- ISO 12490: Mechanical Integrity and Sizing of Actuators and Mounting Kits
- ISO 5211: Industrial Valves — Part-Turn Actuator Attachments
- ISO 5115: Industrial Valves — Part-Turn Valve Actuation
- ISO 5640: Industrial Valves — Mounting Kits for Part-Turn Actuator Attachment
- MSS SP-101: Part-Turn Valve Actuator Attachment — FA Flange and Driving Component Characteristics
- MSS SP-162: Design Requirements for Actuator-to-Valve Mounting Components

continues ▶

- ISA 96.09.01: Guidelines for the Specification of Mounting Hardware for Quarter-Turn Valve Actuators

Together, these documents specify the importance for: mechanical integrity, interface geometry, bolted joint design, bracket stiffness and alignment control. Collectively, they reinforce a system-level engineering approach to actuator mounting.

Bracket stiffness: the most overlooked performance requirement

Among all mounting kit components, the intermediate support, or bracket, is often the most underestimated.

API 6DX explicitly states: "Deflections of the mounting kit shall not prevent the valve closure member from reaching the fully closed or fully open position or restrict actuator functionality."

ISO 5115 further adds: "The intermediate support design shall be sufficiently strong by design and material selection to ensure no visibly discernible movement of the actuator from twisting or warping of the intermediate support during operation."

These statements elevate stiffness from a **convenience** to a **performance requirement**.

If mounting brackets are not designed and manufactured to these guidelines, they can experience:

- Side loading on valve stems
- Uneven coupling engagement
- Increased packing wear
- Reduced actuator efficiency, or
- Accelerated mechanical fatigue

MSS SP-162 reinforces the proper design of a mounting bracket by formalizing stiffness and dimensional control expectations for mounting components. Brackets are to be engineered for rigidity using material selection, section geometry and proper analysis, ensuring torque is delivered to the valve stem, not absorbed through bracket deformation.

Alignment, parallelism and concentricity

The mounting kit standards require mounting kits to maintain: parallel mounting faces, concentric bolt patterns and alignment between actuator drive, coupling and valve stem.

These are not cosmetic tolerances — they directly impact operational life.

Misalignment can result in side loading on the valve stem, degrading seals and can increase the required torque to open and close the valve. Engineered mounting kits control these parameters through proper design, machining and inspection.

Fasteners and slip-critical joint design

Multiple standards now converge on a single philosophy: Bolted joint connections must rely on friction, not bolt shear.

- ISO 5115 requires fasteners to be manufactured to a specification with defined minimum mechanical properties. Without knowing the minimum mechanical properties, proper tightening techniques could not be defined.
- API 6DX mandates bolt preload calculations sufficient to prevent slippage in assemblies lacking anti-rotation features.
- ISA 96.09.01 formalizes this further:
  - » All bolted connections within an assembly shall be slip-critical joints.
  - » Slip-critical joints depend on calculated bolt tension to generate clamping forces that exceed applied shear loads — preventing joint movement under maximum actuator torque.
  - » Without this engineering discipline, bolts become structural members, leading to fatigue, loosening and eventual failure.

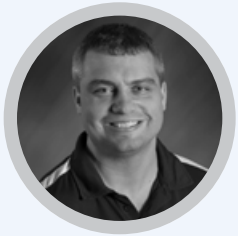
Conclusion

Every automated valve assembly is only as reliable as its mounting system.

ANSI/API 6DX and ISO 12490 established the foundation for mechanical integrity. MSS SP-162, ISA 96.09.01, ISO 5115, ISO 5640, ISO 5211, and MSS SP-101 extend that framework — bringing stiffness, alignment, fastener performance and system integration into sharper focus.

Together, these standards reinforce a simple truth: Engineered mounting kits — designed, analyzed, fabricated and inspected as mechanical systems — protect valves, actuators and ultimately plant operations.

ABOUT THE AUTHOR



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Charlotte, NC
remason.com

Riggio Valve
Bayonne, NJ
riggiovalve.com

Scallon Controls
Beaumont, TX
scalloncontrols.com

Score (Canada) Limited
Edmonton, AB, Canada
score-group.com

Setpoint Integrated Solutions
Baton Rouge, LA
setpointIS.com

Southern Valve Service Inc.
Baton Rouge, LA
southernvalve.com

TEAM Industrial Services
Houston, TX
teaminc.com

United Valve
South Houston, TX
unitedvalve.com

Universe Machine Corp.
Edmonton, AB, Canada
umcorp.com

Valmet
Shrewsbury, MA
valmet.com

Valve Reconditioning Service Co.
Melvindale, MI
vrsinc.net

ValvTechnologies
Houston, TX
valv.com

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qualityvalves.com

LATEST LAUNCHES

Emerson Releases ValveLink Pro Software

Emerson released Fisher ValveLink Pro software, designed to streamline the configuration and diagnosis of Fisher Fieldvue DVC7K Digital Valve Controllers. The software is available as a free download. The software enhances instrument tehnicians' ability to ensure optimal performance and reliably identify changes in valve performance over time, without the need for specialist expertise.

ValveLink Pro's intuitive, modern user interface simplifies the process of configuring, calibrating and diagnosing valve issues for assemblies equipped with DVC7K digital valve controllers. The software offers diagnostic alerts and actionable recommendations, allowing users to address issues efficiently, optimizing performance and reliability.

Notably, the ValveLink Pro software includes the new DVC7K Firmware 2 update, which introduces robust offline diagnostics such as Step Response Tests and Total Scans for DVC7Ks purchased with the Advanced Diagnostic (AD) Tier. These tools provide deeper insights into valve behavior, ensuring precise, continuous, proactive maintenance. **emerson.com**

Next-Generation Positioner from A-T Controls

The ASD-5 series positioner now available from A-T Controls was designed to replace the legacy SS2 and SS5 positioners. Designed for enhanced reliability, simpler installation and with in-depth diagnostics, the new ASD brings updated performance to the market. The ASD-5 will serve as the primary replacement for most SS2 applications requiring weatherproof or intrinsically safe ratings, while the fail-free option provides fail-in-place functionality to replace the SS5.

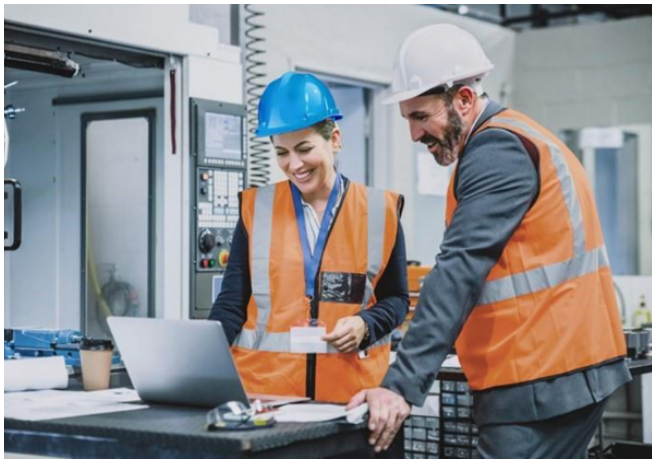
The positioner offers noncontact magnetic position sensor, HART protocol, advanced diagnostics and can be used with single- or double-acting actuators. **vytlcontrols.com**

Valmet Introduces New Electric Actuator

The Valvcon QB-series is an extremely versatile, quarter-turn electric actuator with integrated mechanical spring back-up power. Designed for a wide variety of valve and damper applications, the actuator includes a brushless DC motor for reliable, continuous-duty performance and is available in both NEMA 4/4X and NEMA 4/4X/7&9 configurations. Standard features include multiple power and control options, integrated mechanical spring back-up power, holding brake, heater/thermostat and CSA (C US) certification.

Installation and configuration are easy with multiple power and control options and a variety of standard features. The product is low maintenance, making it ideal for installations with limited or difficult access. The product is based on the ADC-series platform. **valmet.com**

Snowflake Energy Solution Integrates with Siemens



Siemens now offers its Siemens Industrial Edge integration with Snowflake, enabling energy and industrial companies to securely bring data from decentralized industrial assets into Snowflake for advanced analytics and AI. Building on this foundation, Siemens is introducing new analytical capabilities, which allow teams to interact with operational data using natural language to gain faster insight into performance, maintenance and operational issues. Together, these capabilities help energy companies improve reliability, reduce costs and make more informed decisions across complex, distributed operations.

Snowflake, an AI Data Cloud company, built this product to enable power, utilities and oil and gas companies to build a trusted data foundation for AI by securely connecting data across IT, OT and IoT systems to modernize infrastructure, improve efficiency and accelerate progress toward a more reliable and lower-carbon future.

Organizations such as ExxonMobil, Expand Energy, IGS Energy, Powerex, PG&E, Siemens and Sunrun are turning to Snowflake to secure critical infrastructure, improve operational resilience and navigate volatile markets with real-time insight. This launch also builds on Snowflake's new partnership with SAP, enabling energy companies to combine SAP finance and supply chain data with operational and field data on Snowflake, so insights derived from both business and operational systems directly inform grid operations, asset planning and commercial performance. **siemens.com**

IMI Launches SIS Positioner

The new SHP-SIS safety smart high-performance positioner works within pneumatic operating pressures of 150 psi, and ambient temperatures between –67°F and 186°F. The SHP-SIS's built-in partial stroke testing (PST) and diagnostic capabilities ensure compliance with functional safety requirements and assist in preventive maintenance.

The positioner was designed to create a digital twin within the control system to allow for faster set up and switching of products in the system, with a complete digital inventory of the valve configuration and performance history.

The SHP-SIS is available in low copper aluminum housing or 316 stainless steel, with a painted option available for harsher environments. It is TUV-certified for SIS applications and is certified according to IEC 61508:2010 up to SIL 3. **processautomation.imiplc.com**

Endress+Hauser Unveils Flowmeter for Data Centers

A new OEM-configured model of the Picomag electromagnetic flowmeter for the U.S. market was purpose-built for liquid cooling applications in data centers. The compact design is for accurate measurement of conductive fluids in small diameter pipes and combines flow, temperature and conductivity in one device. The flowmeter is available with Bluetooth deactivated at the factory for OEM and data center operations that have demanding security requirements that don't allow wireless connectivity. It integrates into standard cooling skids, secondary distribution loops and rack-level cooling modules. The Picomag is available in 1- and 2-inch sizes. **us.endress.com**

INDUSTRY
PROFILE

David Escobar

Valmet, Director of R&D

David received his bachelor's degree in mechanical engineering from NYU Polytechnic School of Engineering and has spent his career in industrial research and development and engineering roles.

What inspired you to pursue a career in the world of valves and actuators?

I started my career at General Dynamics, Electric Boat Division, eventually designing cooling systems for Nuclear Submarine propulsion plants. I saw the diversity of the valves and controls used and the critical nature of their function, and later when I decided to broaden my horizons beyond a single customer (the U.S. Navy), the valve industry felt like a natural next step. Thirty years later, I'm still grateful I made that choice. This industry has provided me with continuous learning, challenges and purpose.

Why did you decide to get involved with VMA?

I was introduced to VMA by David Bayreuther, a mentor, as he transitioned off the technical committee to focus more on standards development. It was a great opportunity to network and engage with the larger community of end users, suppliers and competitors. I was attracted to the mission of providing timely, actionable technical content through the technical seminars which are now one of the core offerings of the VMA Valve Forum.

Are there any exciting projects or initiatives you are working on that you'd like to highlight to our readers?

At Valmet, we're completing a strategic transformation that positions us to serve even more of our customers' flow control needs. It's energizing to be part of a global organization in a period of meaningful growth.

Within VMA, I'm contributing to the recently completed 2026 strategic plan, with a focus on modernization and expanded member value. As chair of the technical committee, I'm also helping develop new ways to extend our impact beyond the technical track of the Valve Forum.

Personally, with my children out of the house and thriving, I'm rediscovering travel and recreation, something I haven't had much time for in recent years.

How do you stay abreast with changes in the valve/actuator industry?

For critical issues such as PFAS regulation and emerging compliance requirements, VMA continues to be a leading and trusted source. I also remain active in standards organizations including MSS, API and ASME. Participating in these groups allows me to stay connected to the technical, regulatory and market forces shaping our industry.

What advice would you give someone who wants to explore a career in our industry or one of our end markets?

Speak up, get involved and be curious. This industry offers enormous opportunity, but you get out what you put in...

Read the full interview: VALVE-MEDIA.com/articles/industry-profile-David-Escobar

VALVE MAGAZINE

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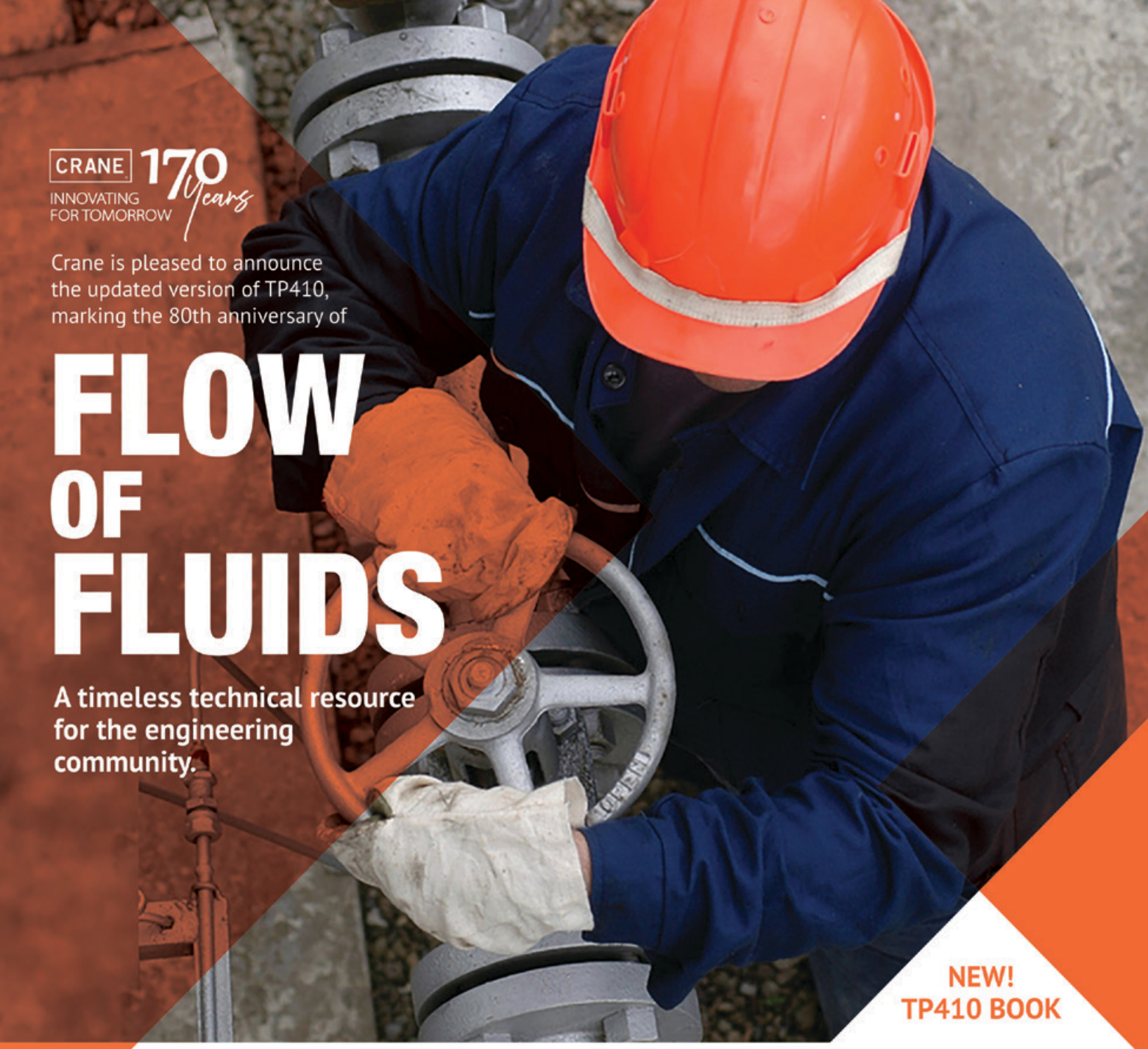

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