



Power & Motion:
A New Mission
For A New Era p8

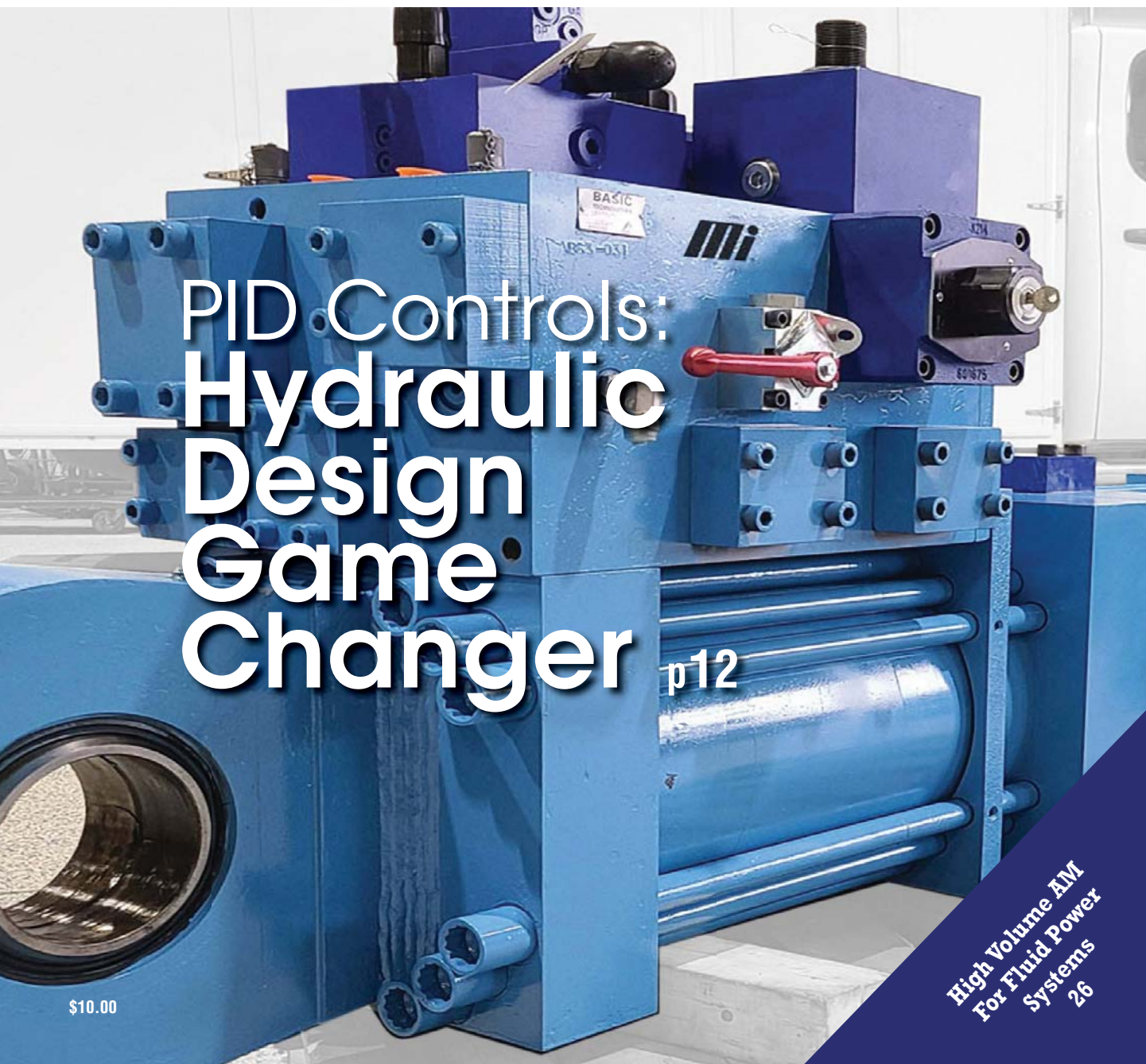


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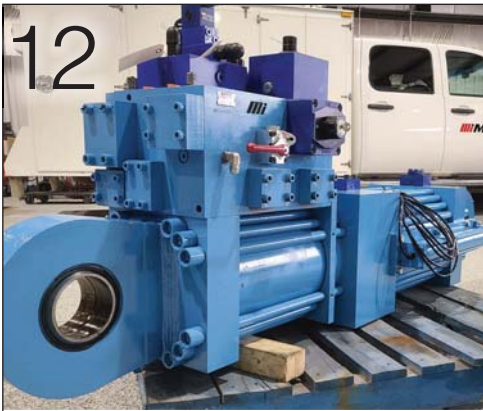
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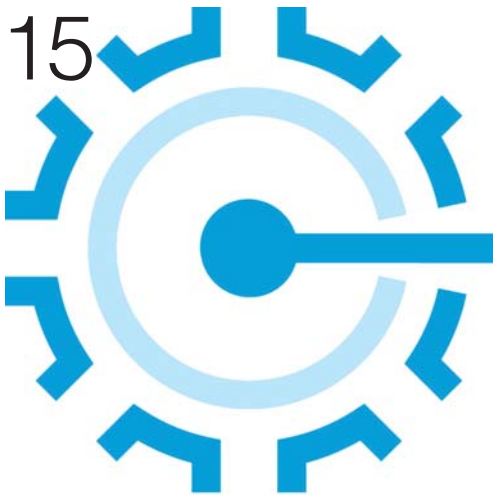
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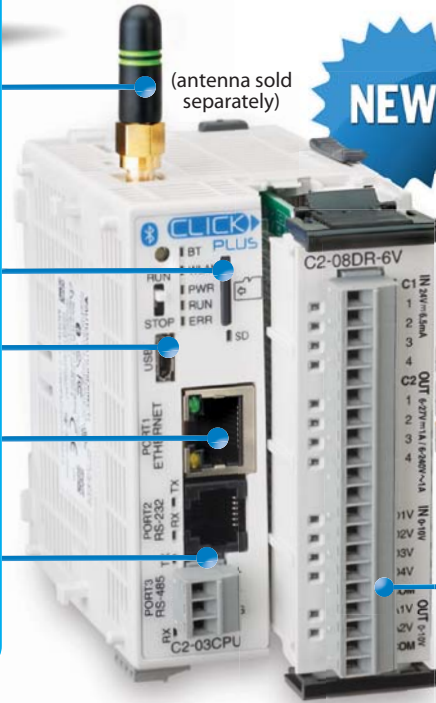
ISSN 0018-814X
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Subscriptions — U.S. and possessions outside U.S.: \$60/yr; \$90/two yrs. Single copies: \$10.00 each. In Canada: \$70.00/yr, \$110.00/two yrs. Canadian GST #R126431964. International: \$90.00/yr, \$140.00/two yrs. To order, phone 847-763-9670. Fax orders to 847-763-9673. Send subscription payment to: *Hydraulics & Pneumatics*, PO Box 3257, Northbrook, IL 60065-3257. Out-of-print copies available in complete volumes as positive microfilm from NAPCO 800-420-6272 x 6578. Photocopies of articles \$5.00 each. Payment must accompany request. Volume 74, No. 9, November 2021.



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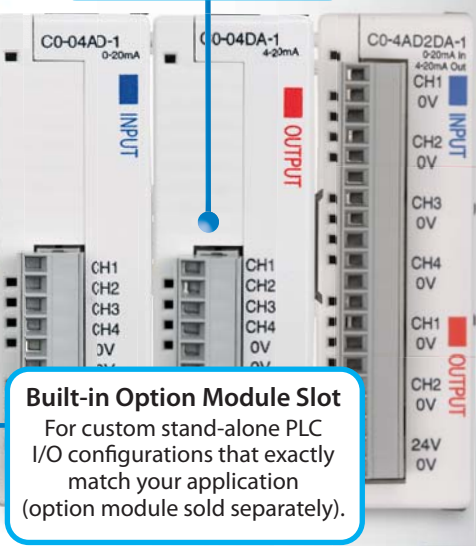
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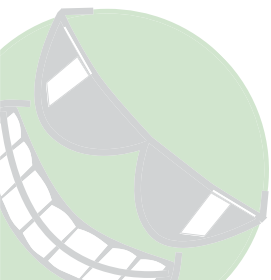


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SENIOR CONTENT EDITOR: **BOB VAVRA** bvavra@endeavorb2b.com
 MANAGING EDITOR: **JEREMY COHEN** jcohen@endeavorb2b.com
 SENIOR EDITOR: **STEPHEN J. MRAZ** smraz@endeavorb2b.com
 SENIOR EDITOR: **REHANA BEGG** rbegg@endeavorb2b.com
 SENIOR EDITOR: **MARIE MCBURNETT** mmcburnett@endeavorb2b.com
 CONTRIBUTING TECHNICAL EXPERT: **PETER NACHTWEY** peter@deltamotion.com
 CONTRIBUTING TECHNICAL EXPERT: **ROBERT J. SHEAF, JR.** rjsheaf@cfc-solar.com
 CONTRIBUTING EDITOR: **RAY SCROGGINS** ray@scroggins.biz

ART DEPARTMENT

GROUP DESIGN DIRECTOR: **ANTHONY VITOLO** tvitolo@endeavorb2b.com
 ART DIRECTOR: **BILL SZILAGYI** bszilagy@endeavorb2b.com

PRODUCTION

GROUP PRODUCTION DIRECTOR: **GREG ARAUJO** garaujo@endeavorb2b.com

CIRCULATION LIST RENTALS & CUSTOMER SERVICE

USER MARKETING MANAGER: **DEBBIE BRADY** dmbrady@endeavorb2b.com
 REPRINTS: reprints@endeavorb2b.com
 LIST RENTAL / SMARTREACH CLIENT SERVICES MANAGER: **MARY RALICKI**
 mralicki@endeavorb2b.com
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SALES REPRESENTATIVES

NORTH AMERICA ACCOUNTS MANAGER: **PATRICK CARMODY**
 pcarmody@endeavorb2b.com
 INTERNATIONAL SALES
 ITALY: **DIEGO CASIRAGHI** diego@casiraghi-adv.com
 GERMANY, AUSTRIA, SWITZERLAND: **CHRISTIAN HOELSCHER**
 christian.hoelscher@highcliffmedia.com
 BELGIUM, NETHERLANDS, LUXEMBURG, UNITED KINGDOM, SCANDINAVIA, FRANCE, SPAIN, PORTUGAL:
LARA PHELPS lara.phelps@highcliffmedia.com
 PAN ASIA: **HELEN LAI** helen@twoway-com.com

DIGITAL

SENIOR DIGITAL INNOVATION & STRATEGY DIRECTOR: **RYAN MALEC**
 rmalec@endeavorb2b.com

DESIGN & ENGINEERING GROUP

EVP, DESIGN & ENGINEERING GROUP: **TRACY SMITH** tsmith@endeavorb2b.com
 GROUP CONTENT DIRECTOR: **MICHELLE KOPIER** mkopier@endeavorb2b.com
 VP OF MARKETING SOLUTIONS: **JACQUIE NIEMIEC** jniemiec@endeavorb2b.com

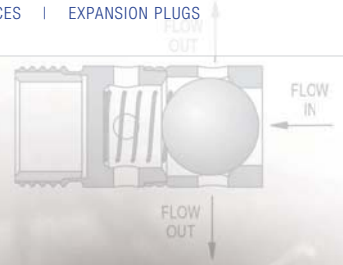
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Editor's Page

BOB VAVRA | Senior Content Director | bvavra@endeavorb2b.com

Imagining a “GPS for Change”

THE ROAD TO CHANGE can be crowded, messy and occasionally clogged by collisions. That's also almost unavoidable. Sometimes the road is paved with good intentions, but there are those willing to stick up roadblocks—internal and external—to keep change from moving forward. And since there's no speed limit on the road to change, it's impossible to know how fast you ought to be moving. Too slow often is as dangerous as too fast.

If this were a real road, you'd want to rely on a GPS system. GPS can show you not just where you're at and where you're headed, but also lays out the most efficient route and can alert you to roadblocks.

So is there a GPS for change? Absolutely.

We work in an age of sensors and analytics. They provide the fundamental knowledge of where your road is today.

You can assess the current health of your system—everything from heat to vibration to efficiency of energy use. That allows you to know where you're starting from. Now you have to figure out where you want to go.

This month's issue highlights two companies that are picking their direction. We have an interview with Valeria Tirelli, CEO of Aidro, a hydraulics and fluid power manufacturer based in Taino, Italy that focuses on volume production hydraulic and fluid power systems for oil and gas, agricultural equipment, aerospace, mobile and industrial machinery. Aidro's move to incorporate additive manufacturing into fluid power parts design was validated by its recent acquisition by Desktop Metal. This shows the potential for additive manufacturing in the fluid power industry.

Then there's the use of PID controls (proportional-integral-derivative) to help correct errors in real time. As author Ian Miller of Motion notes, if you haven't considered PID Controls in hydraulics, you should.


“Implementing PID control into hydraulic systems has resulted in unique technologies and equipment designs,” Miller writes this month. “When envisioning the possibilities, it is important to keep an open mind. The degree of system controllability is particularly interesting.”

The three keys words in that quote that jump out at me are “envisioning the possibilities.” The reality on the road to change is that standing still means you're going to watch as other fly past you. That's progress. And when you do get on the road again, catching up takes a lot of time and effort.

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Power & Motion Created to Propel Industry

In his final column, retired *Hydraulics & Pneumatics* editor and International Fluid Power Society Hall of Famer Alan Hitchcox looked to the future when he wrote, “Even though fluid power is a ‘mature’ technology, it certainly isn’t stagnant. The biggest news is the growing trend to power mobile hydraulic systems with variable-speed electric drives instead of internal combustion engines. Pneumatics is encompassing more diverse applications than ever, thanks, in part, to wireless and remote monitoring and control.”

I agree with Alan. Stagnation in the face of change is a path to obsolescence. Faced with the prospect of such change, the decision is a simple one. We have chosen to embrace change, and we will do it not by abandoning the legacy of the past, but by using that legacy as the foundation for the future.

In January, we will broaden our traditional coverages of pneumatics and hydraulics systems and strategies with expanded information on how those technologies are being integrated into modern electrical actuation and motion control solutions. The growth of these hybrid technologies, as well as a greater reliance on electric actuation, will be especially important as we contemplate a world of electric vehicles of all kinds. The growth in pharmaceuticals and food manufacturing also will require new solutions for motion control and the appropriate power sources to drive them.

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& MOTION™**



I’d like to introduce *Power & Motion*. As a brand extension of our traditional coverages, *Power & Motion* is different in two important ways. First, we have reinvented *Power & Motion* as a multi-platform content resource that will include:

- An in-depth look at trends, strategies and best practices in motion control
- Industry-focused research
- Videos highlighting the top industry leaders and trends
- E-books focused on best practices across several disciplines
- Integrated social media channels
- Industry event and show coverage
- Product galleries focused on the latest innovations.
- *Power & Motion* magazine and its digital counterpart, to be published eight times a year

Regular readers of our digital products, particularly our global newsletter audience, should make sure to whitelist

www.powermotiontech.com to ensure they will receive all of our content in the future. You will be receiving emails from *Power & Motion* in the next few weeks further discussing this change.

Our other big difference is our approach to this industry and its practitioners. In the dynamic future we envision, *Power & Motion* will provide a strategic review of the future of modern motion systems and their power sources—pneumatic, hydraulics, electrical and hybrid, as well as the hardware, software, training and maintenance needed to build a more productive and efficient system.

We were led in this direction by another visionary—Dr. Steffen Haack, now the CTO of Bosch Rexroth AG. Writing in *Hydraulic & Pneumatics* in 2019 as head of the company’s Industrial Hydraulics Business Unit, Dr. Haack saw the need to preserve hydraulics as an important component of a motion

control system. He wrote, “How can hydraulics technology transition its image to the new world? The answer is simple; the dinosaur must adapt by integrating new technologies, especially electronic control and electromechanical power transmission. By doing so, hydraulics will metamorphose into a novel, high-tech experience for users.”

Dr. Haack added, “In specific terms, this means retaining hydraulics’ strengths and combining them with the opportunities and benefits found in the technical ‘IT consumer world.’ Users will then perceive ‘hidden’ hydraulics as a compact, finished functional module—simple, intuitive, connected and


quickly installed. Regardless of this vision of the future, hydraulics must maintain its position against electro-mechanical drives.”

We see the future in the same way. As our new mission statement puts it:

Power & Motion provides a strategic review of modern motion system design and its power sources. *P&M* will cover pneumatics, hydraulics, electrical and hybrid technologies, as well as the hardware, software, training and maintenance needed to build and maintain a productive and efficient system. Content will focus on the emerging technologies to monitor and operate a modern motion system,

including sensors and integrated smart systems, electrohydraulics, fluid power management, condition monitoring, operational costs and the importance of training and development.

The choice never will be one solution to the exclusion of the other, but each solution, with its own strengths and virtues, all helping engineers and plant managers achieve the highest levels of safety, efficiency, productivity and power management in a still-evolving global landscape.

And as that landscape evolves, we look forward to your contributions, suggestions, critiques and ideas as we work toward the future. 

Fluid Power Conference Takes Aim at Environmental Challenges

by Stephen Mraz

The National Fluid Power Association will hold its quarterly conference on Dec. 2, and it will be presented as a live, interactive webinar to prevent the spread of COVID-19. The show’s organizers will broadcast the conference to attendees online using the Remo Online Conference Platform.

The theme of the conference is “Advanced Technologies for Eco-Friendly Fluid Power Systems,” which is supported by the three presentations scheduled for the event, which runs from 8 a.m. to 11:40 a.m. (EST).

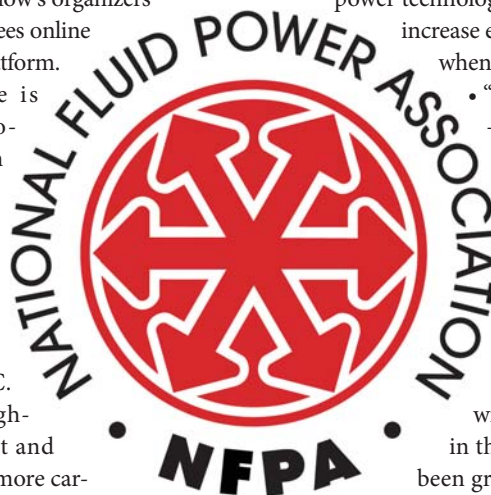
The presentations include:

- “Sustainability & Manufacturing,” given by Chris Bortnik, VP of engineering at Schroeder Industries, LLC. He will discuss ways of making high-horsepower, off-highway equipment and high-volume industrial fluid systems more carbon neutral while letting users maintain profits. Some of the solutions include reducing the volume of fluid used in systems, and reducing or eliminating how frequently companies dispose of used fluids.
- “4 techniques to achieve Eco-Friendly Fluid Power System


Designs for Industrial Machinery,” given by Neal Gigliotti, an application engineering manager at Bosch Rexroth Corp. His talk will give attendees insights into using conventional fluid power technologies and new engineering techniques to increase efficiencies, reduce noise and use less oil when cooling requirements allow it.

- “Electronification of Mobile Equipment – Impact and Opportunities on the Fluid Power Industry” will be delivered by Marty Christianson, market manager for E-Mobility/AE Cooling Systems at Hydac Corp. He will outline the challenges and opportunities possible when companies replace the internal combustion engines in construction and off-highway equipment with battery/fuel cell power. This is timely in that the trend toward electrification has been growing in the auto industry for over 10 years and is now gaining momentum in the mobile/off-highway equipment segment, which uses a significant number of fluid power components.

The presentation will address the effect on hydraulic circuits when the internal combustion engine and its limitation



are removed. It will also look at the challenges most companies will encounter as the hydraulics become lighter and more efficient, and how newer technologies such as battery cooling, hydrogen filtration and pressure sensing can be used to overcome these challenges.

There will be 20-min. breaks between presentations, which will give attendees time to meet and network with other attendees at “virtual tables.” The Remo platform lets attendees move from virtual table to table to see and talk to others “at” the conference. 

TO LEARN MORE about the conference and to register for it, visit nfpahub.com/events/conferences/regional.



Pack Expo is a Wrap, With Bundles of Optimism

by Bob Vavra

It was a typical third day at Pack Expo as the annual packaging and material handling event ended its run in Las Vegas on Sept. 29. Being able to use the word “typical” indicates how well the show went for attendees and vendors.

While traffic slowed down and exhibitors prepared to pack up their displays, there was a sense that the event was a success even beyond the realm of being able to stage it safely. Health and safety protocols were everywhere, assuring the normal business of this event could proceed.

With a lot of pent-up excitement because the show was forced to skip 2020, vendors reported positive traffic and enthusiastic attendees. One vendor reported that an attendee offered to buy the exhibited conveyor solution right off the show floor. Another vendor had a machine on the show floor priced to sell on the spot.

The enthusiasm extended to staff and hotel workers around Las Vegas. In the media center, one of the food service workers even stopped to thank a member of the press just for showing up.

If the 20-month hiatus from live trade events has caused some to rely more on digital meetings and video chats to conduct business, the success at Pack Expo also emphasized that a handshake—sanitized for your protection, of course—still has enormous power.


And while the focus of this event is packaging and conveyance, there are a number of solutions that have wider appeal, as companies continue to integrate robotics technology to help reduce worker injury and improve efficiency to new sensors and data management tools. Among the vendor announcements:

Emerson. One of the company’s key initiatives is sustainability, including



IIoT-enabled pneumatic sensors to detect leaks and optimize compressed air consumption. Other areas displayed at the show include augmented reality to help pinpoint machine performance issues in real time, increased development of plant SCADA and analytics, and improved leak detection using laser technology.

Festo displayed its Simplified Motion Series (SMS) that now includes an IO-Link control to manage multi-position applications. SMS combines pneumatics with the benefits of electric automation. “SMS takes proven ball screw axes, toothed belt axes, mini slides, electric cylinders, piston rod, and rotary actuators and integrates them with an onboard servo drive,” company officials said in a press release. “Users commission two-position functionality via onboard push buttons with no additional software needed.”

Regal Beloit introduced its Regal Perceptiv intelligence system to interact with Regal products and services. Regal Perceptiv intelligence includes customized solutions including enhanced web-based and mobile-friendly tools to find Regal product information such as online catalogs, 3D CAD drawings, selection tools, mobile apps and QR codes on products. Augmented reality tools and cloud-based solutions allow monitoring from a smartphone, tablet, laptop or computer. 



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AT A GLANCE:

- PID stands for proportional-integral-derivative, the types of control methodology used by the system setpoint to correct errors in real time.
- Implementing PID control into hydraulic systems has resulted in unique technologies and equipment designs. Consider, for example, the controllability of a fighter jet and its ability to turn on a dime mid-flight.
- A PID controller's goal is to correct the error between a system's setpoint and its output.
- Loosely described, PID functions as the present (proportional), past (integral) and future (derivative) means of controlling and correcting error for a given system.

PID Controls for Hydraulic System Design

Shown is a hydraulic cylinder used in a closed-loop control application after refurbishing by Motion's service center in Calgary.

When fluid power system designers can control how a system functions, they have better insights into the level of design complexity needed.

The advent of affordable PID controllers has been a game-changer throughout most industries. This is just as true in many of our everyday devices—anyone who has ever set their vehicle's cruise control while driving to work can thank this control methodology for not getting a speeding ticket. As computer processors become ever faster and more economical, new and exciting uses for this technology are starting to be seen everywhere—from the Segways that first captured consumers' imaginations to the hoverboards that children now zip around on.

To start, it is important to understand

the acronym *PID*. It stands for *proportional-integral-derivative*, the types of control methodology used by the system setpoint to correct errors in real-time. You might see P, PI, PD or PID referenced with the controller for a given system—these indicate what controls are or are not being applied.

At this point, you will most likely be drawing parallels between the terms above and your old math classes. You would be right to do so, in the same way you calculated slope, rate of change or the area under the curve. A PID controller's goal is to correct the error between a system's setpoint and its output.

Before discussing the individual com-

ponents of a PID controller, let's first define a *system*. It is anything where a command, setpoint or target is issued and a device, circuit board, program or piece of equipment is expected to react to that signal by matching it with the system's output.

The analogy that my controls professor always liked to use was balancing a stick on your finger. This helped explain the concepts of systems and controllability in an easy and intuitive real-world example. For this system, you have several components: your arm and hand that act as an actuator (the part doing mechanical work), your eyes as the feedback sensor and your brain as the controller. The system output is the stick's position in three-dimensional space. The goal or setpoint of this system is to balance the stick.

You may have, at some point in your life, participated in this activity. However, few of you have probably reflected on how easily your brain can intuitively apply a PID control to maintain the stick's position in real time. As your eyes monitor that position, your brain will perform a calculation and issue com-

mands to your arm/hand to keep the desired setpoint while correcting for the error. You could easily draw parallels to a servo system for cylinder positioning, hydraulic motor speed or even a pressure-control application.

When we discuss a system's controllability, it refers to the ease of controlling the function and thus the level of design complexity required for the equipment being constructed. If we extend our stick analogy, you could easily understand that a longer stick is inherently easier to control. Most people can balance a yardstick on their finger, but only a few could do the same with a pen. Further, possibly just one of those few could maintain tight control of pen movement. In this system, the controllability is directly linked to the length of the stick/pen.

This level of system controllability is important to understand for a given application if you intend to design an effective and cost-efficient PID control. This controllability will determine the equipment's complexity required. Some systems will not be controllable at all. When designing PID control for a system, determining if it is controllable should be your first step. The behavior of any system will be defined by the differential equations that govern that system (a topic unto itself). However, speed/positioning and pressure regulation for fluid power systems are typically controllable.

When discussing the individual components of a PID controller, proportional control is usually a good starting point. Whether implementing a P, PI, PD or PID control, proportional control will always be a major component—but this is not true for integral or derivative. In reference to these controls, you will also hear of the gains: K_p , K_i and K_d . These gains allow you to scale/ change the degree of influence that each control type will have.

For example, if you institute a PI controller, you set K_d to zero. Adjusting these gains is how systems are tuned during commissioning. This process



The hydraulic cylinder from the opposite page is shown before undergoing refurbishing by the Motion service center.

can be time-consuming because you often have to make small incremental changes. Changing one gain has an impact on the others, which can make tuning a challenge.

Proportional control is scaled directly proportional to an existing error between the setpoint and a system's output. This means that when an error is large, the reaction to that error is large; when the error is small, the reaction is small. A good visualization would be an ideal spring anchored on one end, with the other connected to a movable load in space (or anywhere without gravity). In its resting state, assume that position to be the setpoint. If the load is disturbed, the spring will be either compressed or stretched relative to the disturbance. The spring will immediately work to correct for the disturbance. If compressed, the spring will push against

the compression; if stretched, it will likewise resist and apply an opposite force.

After the disturbance is removed, the spring will return to its steady-state position. In this analogy, the "proportional gain" is the spring's strength. The stronger it is, the quicker and more forcefully it returns to its steady-state position, but the more susceptible it is to oscillating over time. With a higher gain, it will move towards the target more aggressively—but it is also more likely to overshoot.

Integral control, much like integration from your old calculus class, can be best thought of as fancy addition. The integral component accumulates the error over time between a setpoint and output of a system: As the target approaches the setpoint, the value will increase, and if the target overshoots the setpoint, the value will decrease. Over time, this value will reach an equilib-

rium and the system will stabilize. An overly aggressive integral gain will make the system susceptible to “integral wind-up” (overshooting the target). In a cylinder positioning system, this integral windup would appear as the cylinder slightly overshooting the target and then come to rest in position.

Derivative control is used to counteract the change rate of an error. This is most effective against sudden disturbances as it works to resist change and quickly correct for the disturbance. This does, however, mean the derivative control can be susceptible to noise or error from things like the sensor limitations or the signal discretization in processors. Also, if there is no disturbance in the error (i.e., it is steady but off by a defined value), the derivative control will not help correct for that error. When tuning derivative gain, be very careful: Make small changes and start at a low value. Adding too much derivative gain

or having noise in the system can lead to violent reactions for some systems.

Pulling it all together, you can loosely describe PID functions as present (proportional), past (integral) and future (derivative) means of controlling and correcting error for a given system. The proportional control focuses on correcting for something as it happens, integral control corrects for past error over time, and derivative control corrects for disturbances and their predictive impact. Now, this isn't to say that it predicts the future, but by reacting to the rate of change, it can take “predictive-like” corrective action.

Implementing PID control into hydraulic systems has resulted in unique technologies and equipment designs. When envisioning the possibilities, it is important to keep an open mind. The degree of system controllability is particularly interesting. At face value, a more controllable system often seems positive, but for the quickest way to be

dynamic and nimble, a less controllable system with a robust PID control might be an advantage for the task. A good example would be a fighter jet and its ability to turn on a dime mid-flight.

Be receptive and get creative as emerging technologies from adjacent industries quickly spill into the fluid power industry. This enables newer and better ways to design equipment while blurring the lines between historically well-defined disciplines in the system design space. As time goes on and new technologies appear, the separation between mechanical, automation and fluid power system design will be less distinct. **hp**

BASED OUT of Calgary, Ian Miller, P. Eng. is a national services business development manager for Motion. He has over a decade of hydraulic and electrical experience in the field, including system design, troubleshooting, on-site installations and technical training/support.



FRL EVO

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2021 IDEA! AWARDS WINNERS


BOB VAVRA | Senior Content Director

AT A TIME when manufacturers are looking for innovative ways to improve productivity and better manage costs, the 2021 IDEA! Awards provided a variety of great new solutions to review.

The IDEA! Awards, presented by *Machine Design* and *Hydraulics & Pneumatics*, offered engineers from all over the world a chance to review the latest product advancement. They also got to vote on those products they felt best fulfilled the promise of greater operational effectiveness.

Gold, Silver and Bronze winners have been selected in six categories:

- Automation & Software
- Fluid Power
- Machines & Components
- Motion Control
- Motors & Drives
- Sensors

The Branson GMX-20DP ultrasonic metal welder from Emerson received the Big IDEA! Award, presented to the product that received the highest number of votes from all product categories. The formal announcement of the awards was made Nov. 10 at the 2021 IDEA! Conference, part of the Manufacturing & Technology Conference in Cleveland. The announcement also was made simultaneously at machinedesign.com and hydraulicspneumatics.com. 

BIG IDEA | MACHINES & COMPONENTS

GMX-20DP Ultrasonic Metal Welder

The Branson GMX-20DP ultrasonic metal welder joins thin, fragile nonferrous foils and films (approx. 5-10 μm) in assemblies of 100-plus layers using higher downforce and lower weld energy (weld amplitude). Its unique "direct press" actuator delivers direct vertical downforce on parts (unlike typical cantilever-type actuators) for more consistent, yet gentle joining of more "energy dense" many-layered battery structures, while virtually eliminating the film/foil tearing and cracking that compromises battery assembly quality. The Branson GMX-20DP welder directly enables the development of lighter, more "energy-dense" battery cells and packs, capable of delivering more watt-hours of energy per unit of battery weight.

Emerson
www.emerson.com



Branson GMX-20DP Ultrasonic Metal Welder

Emerson

AUTOMATION & SOFTWARE

GOLD: Studio 5000 Design Software
Rockwell Automation

SILVER: Sitara AM2x MCU
Texas Instruments

BRONZE: OPTIME
Schaeffler Group USA Inc.

FLUID POWER

GOLD: SLV20 load-sensing proportional directional valve
Eaton

SILVER: MXT-XTP Hydraulic hose
The Gates Corporation

BRONZE: Cartridge Flow Transmitter (CFT)
DGD Fluid Power

MACHINES & COMPONENTS

GOLD: har-modular
HARTING

SILVER: Antimicrobial Food Grade Type LAFG
Electri-Flex Company

BRONZE: Four Outlet Gen4 Power Supply
EXAIR Corporation

MOTION CONTROL

GOLD: PGVA Pressure Vacuum Box
Festo

SILVER: SmartStage XY
Dover Motion

BRONZE: Electrak LL Electric Actuator
Thomson Industries, Inc.

MOTORS & DRIVES

GOLD: Häggglunds Atom
Bosch Rexroth

SILVER: Twin Multi-Drive
One Motion

BRONZE: DS2020 Digital Servo Drive
Moog Inc.

SENSORS

GOLD: AWR Antenna on Package Sensor
Texas Instruments

SILVER: Cordis Electronic Flow Controllers
Clippard

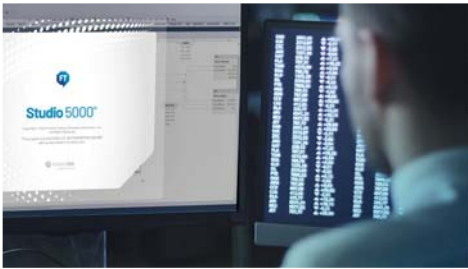
BRONZE: SBV-01
INXPECT

BRONZE: Tag-It Program
Regal Beloit

GOLD | AUTOMATION & SOFTWARE

Studio 5000 Design Software

Two new additions to the Studio 5000 design software allow for industrial engineers to design machines and processes more efficiently. The Simulation Interface tool transforms how users design, test, validate and commission systems using



digital engineering. The tool connects a system's controller to advanced simulation and modeling tools. Users can then simulate how products or processes with dynamic properties will behave in production. The Application Code Manager (ACM) tool allows users to automatically generate documentation for projects after creating a template and placeholders for data. The ACM also allows users to import information from architect tools, which reduces rework.

Rockwell Automation
www.rockwellautomation.com



SILVER | AUTOMATION & SOFTWARE

Sitara AM2x MCU

The Sitara AM2x microcontroller portfolio combines processor-level performance with MCU design simplicity to enable real-time control, networking and analytics applications at the edge. The portfolio enables 10 times the computing capability of traditional, flash-based MCUs. The Sitara AM243x device features up to four Arm Cortex-R5F cores running up to 800 MHz each, with integrated real-time control and industrial communications to simplify factory automation. Integrated stacks support common industrial protocols and gigabit Ethernet with TSN. The on-chip security features help engineers meet encryption requirements, while functional safety mechanisms and collateral can help achieve up to SIL 3 for industrial systems.

Texas Instruments
www.ti.com



BRONZE | AUTOMATION & SOFTWARE

OPTIME

OPTIME is an affordable and easily scalable condition monitoring system that consists of wireless, battery-powered vibration sensors, a cellular gateway and an app to visualize the resulting data. OPTIME provides 15,000 unique measurements per sensor per year to deliver advance warning of potential damage to machines such as electric motors, fans and pumps. OPTIME's sensors, which install in just minutes, can be put into operation without any prior condition monitoring expertise. OPTIME captures six different vibration measurements plus temperature at preset intervals, thereby adding value to the customer by providing timely information on machine condition status to avoid unplanned outages.

Schaeffler Group USA Inc.
www.schaeffler.us



GOLD | FLUID POWER

SLV20 Load-Sensing Proportional Directional Valve

Eaton's SLV20 load-sensing proportional valve is a priority flow-sharing solution for mini and micro machinery. Utilizing screw-in cartridge valves in aluminum sections, the SLV20 offers greater versatility and serviceability than cast iron valves, plus significant weight and space savings. A patent-pending multi-function logic element enables flow sharing and flow prioritization in the same valve bank, a feature previously available only on heavy traditional valves. Individual sections can be produced with additional functions, such as counterbalance valves, replacing remotely mounted ancillary valves. By reducing machine weight and providing flexible flow-control options, the SLV20 can increase efficiency, load-carrying capability and battery life.

Eaton
www.eaton.com



SILVER | FLUID POWER

MXT-XTP Hydraulic Hose

MXT-XTP is a hydraulic hose that combines patented wire braid technology that makes it lighter weight and more flexible while maintaining 600,000 impulse cycle performance, which is three times the industry standard. The abrasion and ozone resistance XtraTuff cover provides additional protection for the hose to stand up to the toughest of applications. Ozone is everywhere and impacting hose performance, so having a robust cover material to prevent hose breakdown and keep machine uptime high is of great benefit. MXT-XTP joins the Gates lineup of other industry leading products that include MXG4K-XTP and Multi Master GMV.

The Gates Corporation
www.gates.com



BRONZE | FLUID POWER

Cartridge Flow Transmitter (CFT)

DGD Fluid Power enters the hydraulic market with the CFT (Cartridge Flow Transmitter) with multiple output options provides a convenient digital solution to measure flows in hydraulic systems. The flow transmitter can be easily installed anywhere in the hydraulic circuit for continuous monitoring of all critical hydraulic functions, e.g., component performance, diagnostics, closed loop control and data acquisition for predictive maintenance and remote troubleshooting. Future models to be released include pressure and temperature sensors, combined with the CFT in a cartridge valve format.

DGD Fluid Power
www.dgdfluidpower.com



GOLD | MACHINES & COMPONENTS



har-modular

HARTING's har-modular series offers a unique and flexible solution for the connection of PCBs. A modular concept, based on the time-tested and reliable DIN 41 612 connector family, this product allows engineers to develop custom connectors using off-the-shelf components. In this way, customization can be achieved without the normal barriers of long lead times and development costs. This

revolutionary PCB connector system offers over a billion combination possibilities for data, signal and power. It is configurable online and can be ordered in quantities of 1.

HARTING

www.harting.com



SILVER | MACHINES & COMPONENTS

Antimicrobial Food Grade Type LAFG

Type LAFG is a UL listed, CSA certified "Heavy-Duty," flexible liquid-tight steel conduit that is now antimicrobial. It is designed to safely route electrical wiring through modern food processing plants, while safeguarding foreign material contamination, and inhibiting bacteria growth. The flexible PVC jacketing contains an antimicrobial biocide additive, inhibiting bacteria growth and reducing commonly known food processing microbes in a 24-hour period. The blue jacketing color does not occur naturally in the food chain, making plastic contamination in the product stream easy to spot. The increased high/low working temperature are critical for installations near heat-producing equipment and hot washdowns.

Electri-Flex Company

www.electriflex.com



BRONZE | MACHINES & COMPONENTS

Four Outlet Gen4 Power Supply

EXAIR's Gen4 Four Outlet Selectable Voltage Power Supply allows the choice of input voltages of 115 VAC or 230 VAC. Four 5kV stainless steel output connectors can energize four static eliminators at once. They are UL component recognized, CE and RoHS compliant. They feature an electromagnetically-shielded modular power supply cable which eases routing and connections. An integrated fuse on the primary protects against voltage spikes. The lighted power switch indicates operation and is field replaceable. The Gen4 Power Supply is housed in a durable metal enclosure (6 in. L x 4.0 in. W x 4.4 in. H) that is ideal for rugged, industrial environments.

EXAIR Corporation

www.exair.com



GOLD | MOTION CONTROL

PGVA Pressure Vacuum Box

The Festo PGVA pressure vacuum box provides an all-in-one solution for generating regulated, filtered air for pressure and vacuum-controlled liquid dispensing systems. This innovative compact solution is installed on or inside an instrument to supply compressed air and vacuum for liquid handling. This is useful for laboratory automation solutions when compressed air is not available. For easy operation, PGVA can be controlled from any RS232, USB or Ethernet port. It features a compressor, proportional pressure/vacuum control, air filter, silencer, pressure/vacuum reservoirs, pressure sensor, switching valves, 24V power supply, digital outlet for valve actuation, and all within an 8 in. x 3 in. x 8 in. housing.

Festo
www.festo.com



SILVER | MOTION CONTROL

SmartStage XY

The SmartStage Linear is the first of its kind high performance stage where the motion controller, drive circuit and encoder are all built-in, reducing the overall motion footprint within the instrument. By embedding multiple cables and external electronics, the control is seamless and performance-optimized for low noise.

- Takes up 75% less space
- Built-in controller, 3 phase servo drive, 5 nm resolution
- Flexible communication supports RS-232, RS-485 and CAN
- Cables reduced from 4 to 1
- Reduces complexity, product development time and overall system cost
- Improves instrument's throughput with high-speed linear motor
- 50-200 mm travel available, stackable for XY

Dover Motion
www.dovermotion.com



BRONZE | MOTION CONTROL

Electrak LL Electric Actuator

Thomson Electrak LL actuators give linear motion designers new capabilities to deploy intelligent electric products for long-life operations in challenging environments. A brushless motor design enables up to 100% duty cycle and ten-fold increase over standard travel distance. High ingress protection and wide temperature ratings maximize reliability in harsh environments. Designers can now leverage smart actuators in applications that previously required more complex and expensive configurations, such as battery-powered mobile devices and machines. The Electrak LL is ideal for lifting and positioning in mobile equipment; pantographs; door, hatch and valve control; pick, place and sort; material handling; and conveyor control.

Thomson Industries, Inc.
www.thompsonlinear.com



GOLD | MOTORS & DRIVES



Hägglunds Atom

The Hägglunds Atom from Bosch Rexroth is one of the fastest, most power-dense hydraulic motors in its class. A revamped version of the Hägglunds CAb, Bosch Rexroth's smallest Hägglunds motor, this radial piston motor supplies maximum torque of up to 13.6 kNm and a specific torque of 40 Nm/bar. With full torque at speeds up to 400 rpm, its maximum power of 394 kW substantially outstrips motors of similar size. Hägglunds Atom is ideal for mobile, marine and recycling applications.

Bosch Rexroth
www.BoschRexroth.com

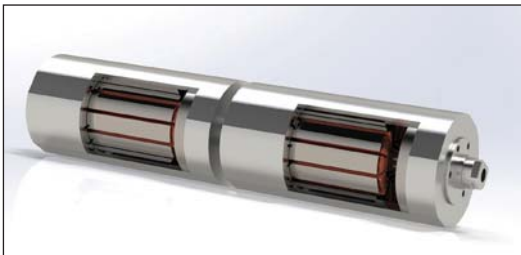


SILVER | MOTORS & DRIVES

Twin Multi-Drive

The Twin Multi-Drive by One Motion is a revolutionary design that allows for independent control of two rollers on a single shaft, with precise registration and speed ranging from up to 500 RPM. Motion is created by directly driving the outer rotating shell using magnetic force. The gearless, magnetic direct drive design is hygienic, reliable and highly efficient. The Twin offers a high-performance solution for numerous applications such as product merge, skew correction and more.

One Motion
www.onemotion.info



BRONZE | MOTORS & DRIVES

DS2020 Digital Servo Drive

Moog's DS2020 drive with Combitronic capability satisfies customers who need larger, high torque motors, while leveraging the advantages of SmartMotor technology. The DS2020 expands Moog's standard drive's capabilities by allowing it to act as a follower device on the Combitronic network, which means the drive can be controlled by any Moog SmartMotor on that network. The DS2020 works seamlessly in SmartMotor-based machines and applications, while supporting the SMI software and AniBasic programming language to configure and program the entire system.

Moog Inc.
www.moog.com

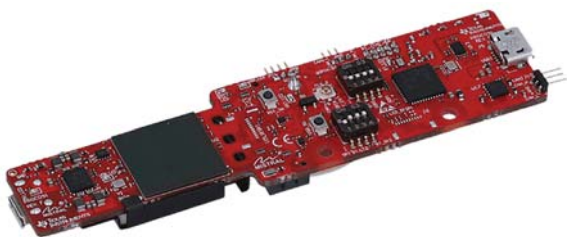


GOLD | SENSORS

AWR Antenna on Package Sensor

TI's family of pin-to-pin compatible 77GHz/60GHz single-chip radar sensors with integrated antenna-on-package (AOP) for near-field and in-cabin automotive applications are 25% smaller than non-AOP devices. Sensors can be added to space-constrained areas such as door handles and head-lights for smart door openers and parking sensors and the vehicle pillars and overhead console to enable child-presence detection, seat belt reminders and gesture recognition.

Texas Instruments
www.ti.com



BRONZE | SENSORS

SBV-01

The SBV-01 is the first world safety motion device for industrial applications based on radar technology certified SIL2 PLd. It consists of a controller and from one to six sensors that monitor operator body presence both in access and in restart prevention, and even when the operator is standing still. Volumetric 3D detection and increased robustness allows for outdoor and harsh environment use.

INXPECT
www.inxpect.com



SILVER | SENSORS

Cordis Electronic Flow Controllers

Clippard's new compact Cordis Flow Controller utilizes an extremely fast-reacting mems technology sensor upstream of Clippard's proportional electronic valve. Adding an optional DR-2 precision regulator for accurate and precise pressure control makes for a very small, compact package by eliminating the need for an external regulated supply. <50 ms response time, ≤ 25 mV resolution and IP65 housed. It features:

- Compact size and weight
- <50 ms response time
- Multiple low flow ranges
- ≤ 14 in. H₂O pressure drop

Clippard
www.clippard.com



BRONZE | SENSORS

Tag-It Program

The Regal Tag-It program powered by Perceptiv intelligence is an asset management platform with functionality that enables users to view details on mechanical and electrical assets in operation and reduce redundant or obsolete inventory. Perceptiv wireless monitoring can also be added to watch critical assets at all times. A push of a button shows the equipment health, allowing users to be proactive with maintenance and replacements.

Regal Beloit
RegalBeloit.com



A Smooth
Way to

POP the

Jeep convertible designers utilize corrosion-resistant, self-lubricating components.



TOP

If the appeal of convertible vehicles has diminished in recent years, that feeling of the wind rushing through your hair while out on the open road will always hold charm for some drivers.

Many drivers like to do so in a Jeep, where the vehicle's 4-wheel drive capability and sturdy frame make it an excellent vehicle for rugged terrain.

The Jeep Wrangler, which was introduced in 1987 but whose roots date back to the 1940s, has its best sales year in 2018 when more than 230,000 Wranglers were purchased. As part of that transaction, many Jeep owners replace their hard tops with soft tops, a feature unique to the automaker.

Colorado-based Bestop was the first to

innovate the Jeep soft top nearly 70 years ago and remains the soft top of choice for consumers and industry leaders—especially when it comes to premium tops. Soft tops allow Jeep owners the simple option of “opening up” their vehicles to become convertibles with a swift swap. Bestop soft tops are easy to install and operate and offer several different con-



Components

figuration styles, often all in one top.

Georgia-based myTop has introduced an electrical component to its soft tops and moves them into the open or closed position at the touch of a button. “myTop was born out of the thought many a Jeep owner has had while changing their top,” said David Lozano of myTop. “That thought was “There has to be an easier way.”

GOING SOFT

The retractable soft top for Jeep is not new. Tom Bradley started Bestop in the Rocky Mountain foothills in 1954 with the vision to open up and let in “the pine-scented air and warm sun, making his drives even more enjoyable,” the company says on its website.

With canvas, a sewing machine and an idea, Bradley and seven employees in his Boulder upholstery shop stitched together the first soft tops for Jeeps. The company grew over time, and Bestop has been the exclusive provider of original equipment soft tops for Jeep Wranglers since the 1980s. Bestop also manufactures replacement soft tops for Jeep Wrangler and CJ models.

While Bradley’s early designs were rather simple, Bestop now offers a wide assortment of soft tops with abundant features for the Jeep Wrangler and Gladiator. Some products from Bestop can be installed in 30 minutes with a pair of wrenches.

“Our tops are easy to install, and we’re able to keep the price point down,” said Duane Junkin, a design engineer with Bestop. “The design interface with the Jeep is also a benefit, and clearance is favorable for drivers and passengers.”

TAKE IT EASY

myTop aims to simplify the process of lowering and raising the top. “We wanted to make it easy to make the Wrangler a convertible,” Lozano said.

The company’s journey also began in Colorado, five decades after Bestop. It started in 2013, and the first prototypes hit the road in 2014. It now has dealers and installers in 38 states and seven interna-

Branson GMX-20MA Ultrasonic Metal Welder Wins 2021 IDEA! Award



With its new “direct press” actuator, the GMX-20MA revolutionizes battery production. It’s the first metal welder to reliably join 100-plus thin-foil layers, enabling commercialization of lighter, more energy-dense battery cells for extended-range electric vehicles.

Learn more at: [Emerson.com/Branson](https://www.emerson.com/Branson)



BRANSON

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EMERSON

CONSIDER IT SOLVED™

tional markets, and hopes to have all 50 states covered by the end of the year.

Like Bestop, myTop makes a soft fabric cover. It also includes small electric motors that maneuver the top into the up and down position in just eight seconds. Tops are available in different colors, and can be used in square back and fast back models.

SELF-LUBRICATING COMPONENTS

Bushings, bearings, flanges and washers from Providence, R.I.-based igus are included in the Bestop products. They are made with iglide 300, the company's most popular material worldwide. The material offers high wear resistance, is cost-effective, and is resistant to dust and dirt—all important design considerations for an off-road vehicle. The all-purpose bearing is typically included in applications for medium to high loads, medium surface speeds and medium temperatures. The products are used in everything from agriculture equipment and construction machinery to fitness and physical therapy equipment.

"We were looking for a bearing solution because the product we had been using was too thin, and there was no crimp. We needed a bearing within pivot joints for smooth actuation," Junkin said. "There was some friction between link-to-link contacts and spacers that we needed to solve."

Lozano said myTop specified igus components due to the high stress tolerance and corrosion-free material. "Both the bearings and washers are located at the pivot points of our mechanism," he said. "They avoid corrosion when exposed to the environment. They make the mechanism silent in each opening and closing."


igus components are frequently found in automobile assemblies, including door hinges, linkage systems, sliding doors and tailgates on SUVs, seat adjustments and brake calipers. The same benefits that make them useful in those



Georgia-based myTop has introduced an electrical component to its soft tops and moves them into the open or closed position at the touch of a button.

applications make them valuable for the soft tops as well.

"We needed a bushing solution and igus helped us find that solution," Junkin said.

"They are frictionless and fit well with our units. We've been using them since 2014 and it has helped us solve an issue we had been working on for a while." 



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“Additive Manufacturing is a Good Technology for Hydraulics”

Aidro CEO Valeria Tirelli talks about how her company’s acquisition by Desktop Metal unlocks new fluid power system capabilities.

AT A GLANCE:

- Aidro successfully redesigned hydraulic manifolds with additive manufacturing methods for agricultural machines.
- The partnership between Aidro and Desktop Metal will amplify high-volume production of hydraulic products using additive manufacturing methods.
- Benefits of using additive manufacturing: R& customization; consolidating multiple components.



You’ve witnessed the macro trend: The focus on developing smart equipment using innovative materials and processes to create new products and service-based models with superior outcomes.

Aidro, a hydraulics and fluid power systems manufacturer based in Taino, Italy, is a textbook example. Back in 2017, Aidro’s CEO, Valeria Tirelli, and her team used additive manufacturing methods to introduce a new generation of hydraulic components and to overcome the limits of traditionally manufactured parts.

The strategic move to introduce additive manufacturing would set Aidro on a transformative journey that required the company to redesign and produce 3D products such as 3D-printed hydraulic spools, heat exchangers, valves and high-pressure hydraulic manifolds. Since then, the company has

seen a surge in digital transformation, explained Tirelli.

Moreover, it ultimately spawned the recent acquisition of the company by a 3D printing unicorn, Burlington, Mass.-based Desktop Metal. The new partnership will effectively amplify Aidro’s capabilities to deliver high-volume production of fluid power systems through additive manufacturing and to enter new markets.

In the following Q&A with *Hydraulics & Pneumatics*, Tirelli reflected on why introducing additive manufacturing approaches triggered a new way of thinking for a 40-year-old, mid-sized conventional hydraulics manufacturing company and what the acquisition means for its future.

(The interview has been edited for length and clarity.)

Hydraulics & Pneumatics: In the transaction with Desktop Metal, Aidro brings specialized knowledge and

expertise in hydraulic components and fluid power systems for oil and gas, aerospace and industrial sectors. What will it mean to you to be able to combine and to leverage Desktop Metal’s capabilities?

Valeria Tirelli: Desktop Metal is a big company now with a lot of technologies. And we decided to join forces because we see that there is a big potentiality for fluid power using additive manufacturing. There are a lot of benefits of this technology, such as lightweight parts, to design complex parts using less material compared to conventional manufacturing, and especially compared to casting.

The meaning of additive manufacturing is to add material only where it is needed. Thanks to our ability to design fluid parts with this new additive manufacturing approaches, we are able to reduce the weight of the part, use less material, produce it faster compared to conventional methods. And, we are mov-

ing now to high-volume production that will be possible with Desktop Metal's technology of binder jetting.

H&P: What's next for Aidro? Can you tell us more about your transition and how you will be working together?

VT: We are all excited and ready to go to the next step from being a medium-sized company into a big family. Desktop Metal is a big family for us, and we will have access to a lot of technical resources, but also to share new ideas and to develop new projects together. We are really thrilled about this new adventure because, from the Italian perspective, we are moving to the U.S., and we will add new design capabilities, new machines and new people...I think we are really ready to grow and to boost additive manufacturing. We need to prove to the industry that additive manufacturing is a good technology for fluid power.

H&P: Reflect on how you transitioned from being a conventional hydraulics manufacturer to adding additive manufacturing to the mix. Why did you add AM to your offering?

VT: We started some years ago to investigate additive manufacturing. At the beginning it was only with polymer materials. And we purchased the first two FDM printers—[relatively] easy technology. We used these printers to make tooling or prototypes for our conventional hydraulics valves. But the more we used this technology, we started to think differently and to see that additive manufacturing responds to our needs



Valeria Tirelli, CEO
and president, Aidro.

in a very fast way, and in a way that is not possible with the conventional manufacturing. So that's why we started to think why we can produce functional parts with additive manufacturing. Then we moved from using polymers to metal.

At the beginning, we conducted research with an Italian university to prove that additive manufacturing is a good technology for hydraulics. Four or five years ago there were no other companies using this technology, so we were a pioneer in fluid power. In 2017 we exhibited at the Hanover Messe—I'm sure that you know this is the big fair in Hanover, Germany. We had a small booth there in the Italian pavilion. We received a lot of visitors because they were interested to see the first 3D-printed manifold or 3D-printed valves. We were the first to show that it's possible to produce functional parts with additive manufacturing.

After a period of testing mechanical properties, fatigue, pressure and so on, to validate the technology, we were amazed by its potential. We started to promote and use the technology mainly for hydraulics, but also in other sectors, like oil and gas and aerospace. So, we started to speak with big companies that we didn't have the opportunity to be in contact with before. Technical people, especially, were very interested in knowing more about additive manufacturing.

H&P: What are the benefits of additive manufacturing and producing AM components? Why do you think that there is such interest in growing in that direction?

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VT: There are very many benefits in different fields. For example, in the research and the development of new products. Thanks to additive manufacturing, we're able to produce the first prototypes rapidly. Also, in one printing we can produce the same prototype with different features, for example, and test all the different versions to validate which prototype is the best one.

But it's not only at the research and prototyping level that additive manufacturing is interesting. We started to design—with the new mentality of additive manufacturing—functional parts for small series CETOP valves, which we made in stainless steel. We added this material especially for corrosion environments.

And we were able to have lighter components. To lighten components is very important for mobile applications, like agricultural machinery or off-highway vehicles, where more electrification is a new trend. And of course, it's possible to reduce the weight of the different hydraulic components using additive manufacturing. This means using less energy to move the machine and less oil consumption.

Also, the possibility to customize the shape and, in some cases, the shape of the hydraulic systems and hydraulics component that should be customized to take into account the space that is available inside the machine. So, more and more, we are able to exactly fit the spaces that are in the systems, and create the exact part with the exact shape that is needed.

Another benefit is the possibility to combine multiple components into one. Just a few weeks ago we presented an approach with CNH Industrial, where we combined two hydraulic manifolds into one. For example, we reduced the assembly time, we reduced the ceilings and the o-rings that connect into manifolds. We also have benefits in the logistics; because we have only one part there are benefits for the purchasing department. So, you see, there are very different benefits in different applications.

More and more, we see that in the future, different industries will be interested in additive. The oil and gas industry is one example. We started many collaborations with oil and gas companies. Also, working on the digital inventory is a new trend. The idea to move from physical inventory (or physical warehouse) to a digital file that can be 3D-printed on demand exactly when it is needed and where it is needed. This is something for the future, but we are working now to validate additive manufacturing for digital inventory.

H&P: Can you elaborate on how you're developing smart parts?

VT: We are working with an Italian company to produce valves for oil and gas. Their inventories need to be ready with many spare parts. We worked with them to evaluate and identify which components of the valves can be digitalized and 3D printed. Not everything can be 3D printed. But it's really important to start to evaluate. We identified two components, and transformed the valve with the 3D printing files. This means, the valve components can be printed with laser power bed fusion or with the other technology. After the printing, we tested the component and we also qualified the component.

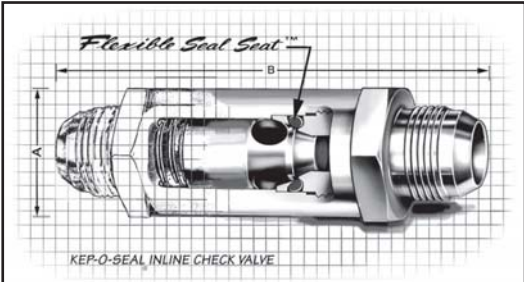
More and more we see that it's really important to follow process and procedures in accordance with qualification systems. And, more and more industries are using additive manufacturing and starting to have standards for different sectors. Aerospace is at the forefront of standard procedures for additive manufacturing, but oil and gas and other sectors are following.

H&P: Tell us a bit more about your role after you succeeded your father, Paolo Tirelli, as CEO in 2012. What leadership advice did he pass along to you?

VT: Thank you for this question. My father was an engineer. He started working for a big Italian fluid power company not far from where we are based. After about 25 years of experience working for this company, my father decided to open his own business. Aidro was created in 1982. He worked a lot. He was really a big entrepreneur but he also loved his activities. He created Aidro as his family house; the people working at Aidro are a kind of family. Some have worked at Aidro for 25 years.

This is really important to me, and this is the message that I received from my father: to create a very friendly environment because the people are the main point of the company. Taking care of employees is something that takes time, but it's really important. The best part of my job is to be the general manager of Aidro. **hp**

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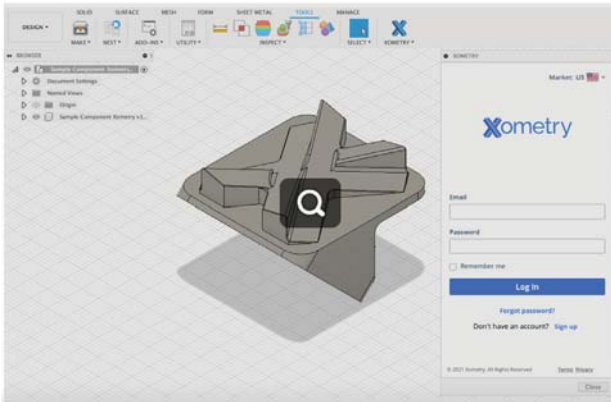




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New Autodesk Fusion App Improves Design Process

VERSION 2.0 OF Xometry's app for Autodesk Fusion 360 can be downloaded directly from the Autodesk Fusion 360 App Store at <https://apps.autodesk.com/>. Updated with new features in addition to the instant price and lead time capabilities launched earlier in 2021, Version 2.0 now offers manufacturability feedback and multiple part upload features, improving processes for engineers and designers working in Autodesk. With manufacturability feedback, engineers and designers receive information on part manufacturability while they are designing in the Fusion 360 interface, allowing them to improve their designs.

XOMETRY, www.xometry.com

RapidRinse Materials Dissolve Quickly in 3D Process

THE RAPIDRINSE AND ABS-R materials are suited to print a range of industrial applications to specification, from manufacturing tools to production parts. RapidRinse is a fast-dissolving support material designed to eliminate cumbersome and costly post-processing procedures. RapidRinse easily dissolves in warm tap water and does not require caustic chemicals, typical for some soluble support materials. RapidRinse can dissolve significantly quicker than other high-temperature soluble support materials under the same conditions. Without the need for solvents, engineers no longer need to purchase additional post-processing equipment. RapidRinse's water soluble properties are intended to make it an easier and safer support material to work with, leaving behind minimal residue.

MAKERBOT, www.makerbot.com



Applied Robotics Integrates Robotics With Other Functions

APPLIED COBOTICS AIMS to provide automation solutions by integrating collaborative robots (cobots), material lift systems, 3D printing and other automation technologies into manufacturing systems. Applied Robotics strives to implement collaborative cobots to perform tasks side-by-side with the human workforce, provide gripper options that offer greater flexibility in automation; create innovative systems such as the Automated Material Lift (AML) System for more efficient, lights-out manufacturing; and employ 3D printing to create jigs, prototypes, custom grippers and trays for parts set-up and queuing.

PBC LINEAR, www.pbclinear.com

Stretch Hooder Offers Flexible, Small Footprint



THE MULTI FLEX1 Electric stretch hooder features an electrically operated stretch frame; the machine frame movement is electrical, as well. Its overall smaller footprint, due to reduced safety-area fencing, means that the Multi Flex1 Electric can also maximize valuable production floor space and be placed closer to a facility's perimeter. The Multi Flex1 Electric shares the same powerful five-sided protection attributes as the traditional Multi Flex1. It has the ability to be fitted with several film rolls, allowing it to wrap multiple load sizes with greater variations quickly. The machine hosts a variety of film patterns, including fully closed hoods, film sleeves, short hoods and film reinforcement capabilities. The Multi Flex1 Electric is engineered for cubed loads, irregular loads with protrusions and varying product shapes, and is capable of wrapping more than 200 loads per hour.

SIGNODE, www.signode.com

Medical Assembly Adhesive Bonds to Many Materials

1040-M IS THE latest in the MD line of adhesives for medical device assembly applications. Designed to be autoclave resistant for more than 100 cycles, MD 1040-M offers extremely low water absorption (0.5%), making it ideal for surgical tools and devices that are subjected to numerous instances of sterilization, including autoclave or STERRAD (plasma). This material also works well as an encapsulant, protecting critical sensors and electronic components where moisture ingress may be of concern. The material cures quickly upon exposure to broad-spectrum UV light and is optimized to be LED curable at 365 nm wavelength. 1040-M successfully bonds to a variety of substrates including stainless steel, aluminum, glass, PP/PE and PCB, and is especially suited for encapsulating RFID chips, sensors and other electronic components found on medical devices, tools and vials. Additional applications include a variety of medical scopes and dental equipment.



DYMAX, dymax.com

Robot Arm Module Designed with New Features

THE MRS ENCODER module series for robot arms has been expanded and is now available with redesigned embedded bearings to better withstand outside tilting forces. This new compact and all-inclusive design also significantly simplifies the installation process. The MRS 2280 and 2281 encoder modules have been specifically designed for use in tilting and rotary axes with high tilting rigidity bearings, making them ideal for measuring arms and measuring robots. Overall, the MRS 2200 series provides options with an easily mountable ultra-compact design, system accuracy of ± 10 in., and tilt resistance of up to 52 Nm/mrad tilt resistance. Because the bearing and encoder components are already ideally aligned and adjusted, builders can forego having to make those typical complex adjustments, reducing their installation efforts up to 70%.



HEIDENHAIN, www.heidenhain.us

CNC Retrofit Protects Older Windows Machines

FANUC AMERICA HAS an upgrade solution for legacy CNC machines running on operating systems older than Windows 10. The Panel i Replacement Program retrofits FANUC CNCs with an industrial PC available with touch or non-touch LCD display, solid-state drives and Windows 10 IoT Enterprise. CNCs running on obsolete operating systems, such as Windows 7, XP or older, are no longer supported by Microsoft and therefore not receiving their critical updates. If machines connect to an online network, this can leave sensitive manufacturing equipment open to major cybersecurity breaches. Retrofitting industrial PCs on these machines allows businesses to safely and securely connect their CNCs to their network and take advantage of Industrial Internet of Things data.



FANUC AMERICA, www.fanucamerica.com



Hydraulic Hose is Lighter, More Flexible

THE MASAIS MXG 5K hydraulic hose is lighter, more flexible and more durable than a typical 5,000 psi (350 bar) hose. It has been tested to 1 million impulse cycles at 250°F (121°C), twice the legacy industry standard for spiral hoses. The new hose platform is 20% lighter, 25% more flexible and 5% more compact than legacy spiral hoses, improving the safety and ergonomics of hose installation while also enhancing the performance of machinery by reducing weight. MXG 5K also offers greater abrasion resistance and more than 800 hours of ozone resistance to minimize downtime related to environmental conditions.

GATES, www.gates.com/mxg

Level Controllers Measure a Variety of Liquids

THE PROSENSE CLC series conductive liquid level controllers detect and control levels of conductive liquids (tap water, seawater, sewage, chemical solutions, coffee, milk, etc.) in dual-probe pump-up (fill) and/or pump-down (drain) applications. These controllers compare the measured resistance value between the high/low probes and a common (either the tank wall or a third probe) with the setpoint controlled by the onboard potentiometer. A wide adjustable sensitivity range is included to meet a large variety of liquid types. These level controllers pulse the probes with a DC voltage to prevent potential electroplating issues. The output relay can control pumps, solenoids or valves to automatically lower, raise or maintain the liquid level in the tank.



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Manufacturing's Revolution Responds to Challenges

A Cisco exec notes that growth has continued despite supply chain and COVID issues.

This is a good time to reflect on the journey many manufacturers have been on since the pandemic began and where the journey has yet to take them. For most, it's meant a smaller workforce, an increase in automated processes, more connected devices and a rise in cyberthreats.

As manufacturers take what they learned from the pandemic and look to the future, here are a few considerations to keep in mind.

EMBRACING INDUSTRY 4.0

Industry 4.0, or the fourth Industrial Revolution, is a term that's been talked about for nearly a decade, with some skepticism as to whether we really were in the middle of a revolution.

The COVID-19 pandemic confirmed it.

All manufacturers are in different places in their digital maturity, but those who are digitally native, successfully bridging the gap between the cyber and physical worlds, fared better during the pandemic.

Data from IMD World Competitiveness Center shows a K-shaped recovery, where digitally savvy companies have recovered significantly quicker than other organizations since the economic downturn in March of 2020.

This is because they already had the basic infrastructure in place to maintain production levels and better manage the reduction in workforce. In a word, technology made them more resilient.

AUTOMATING AND DIVERSIFYING THE SUPPLY CHAIN

To put it simply, the supply chain is a mess right now. Silicon impacting the manufacturing of cars is just one exam-

ple of many where the pandemic tested manufacturers' resiliency.

To combat these issues, manufacturers found they had to diversify their supply chain. Some only sourced from individual suppliers for cost reasons, but as that supply dried up, they had to look elsewhere. Others looked at how data analytics could help them predict supply chain shortages moving forward.

Manufacturers also found the need to look at the internal supply chain. Less workers on the factory floor means more machines doing that work. That also means an increased chance of maintenance needs. Adopting artificial intelligence to identify preventative maintenance needs allows manufacturers to make sure they have the right materials onsite for repairs.

AUTOMATING THE FACTORY FLOOR

One of the defining features of the pandemic was virtual work. But what happens in an industry that relies on its workers on the factory floor to produce finished goods and products? As factory floor workers were sent home, the manufacturers had to do more with less.

Nissan is just one example of a manufacturer running with this concept. The company recently implemented the "Nissan Intelligent Factory," a next-generation automobile manufacturing concept, at its Tochigi plant in Japan.

The plant utilizes a high-speed, secure IoT network that can streamline operations to support the e-powertrain



production line for electric vehicles. It also uses a next-generation identity and access control platform at the network edge, making it possible to manage and control network access for employees offsite, production lines and equipment.

CYBERSECURITY

A recent report from the FBI showed a 69% increase in cybercrime complaints in 2020 over 2019. That alone is concerning, but also of note was the fact that hackers had unauthorized access to networks for an average of 56 days.

This highlights the need for all industries, including manufacturers, to have full visibility over their network. If the network is a highway, then administrators need a road map, showing all of the on and off ramps. If a data enters or leaves the network in a way other than it was supposed to, they need to know.

NEXT STEPS

Embracing the factory of the future and Industry 4.0 is a leap that many manufacturers still need to take. It is not one that they can, or should, take alone. Manufacturers should identify where they are in their digital maturity, and what steps they still need to take before they successfully leverage and deploy the best practices of both OT and IT. **hp**

CARLOS A. ROJAS is worldwide industry lead for manufacturing solutions at Cisco.



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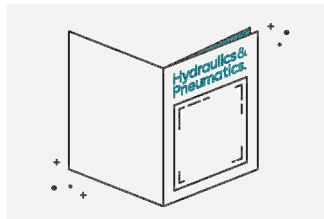
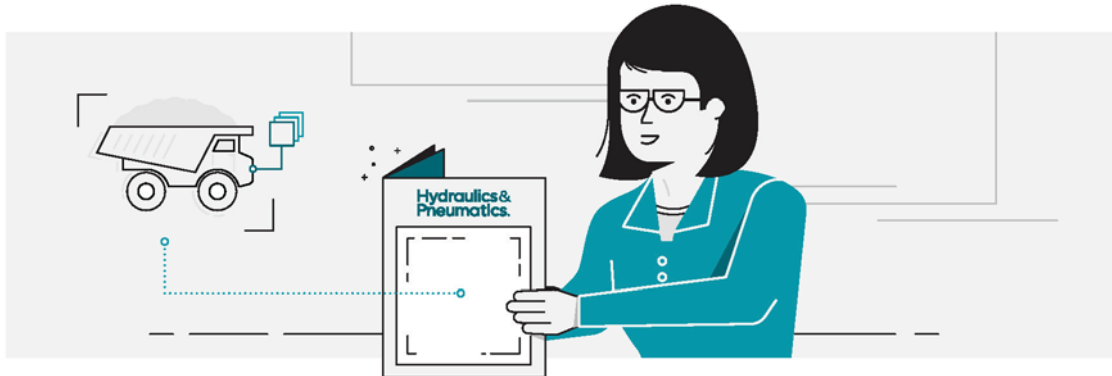
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After a long career in the newspaper industry, Bob has been an editorial team leader for more than 20 years. During that time, he covered the global transition of the plant floor and its systems and managed several international automation conferences. Bob is also a sought-after Webcast moderator and event emcee, and has presided over events in the U.S., Germany and China.