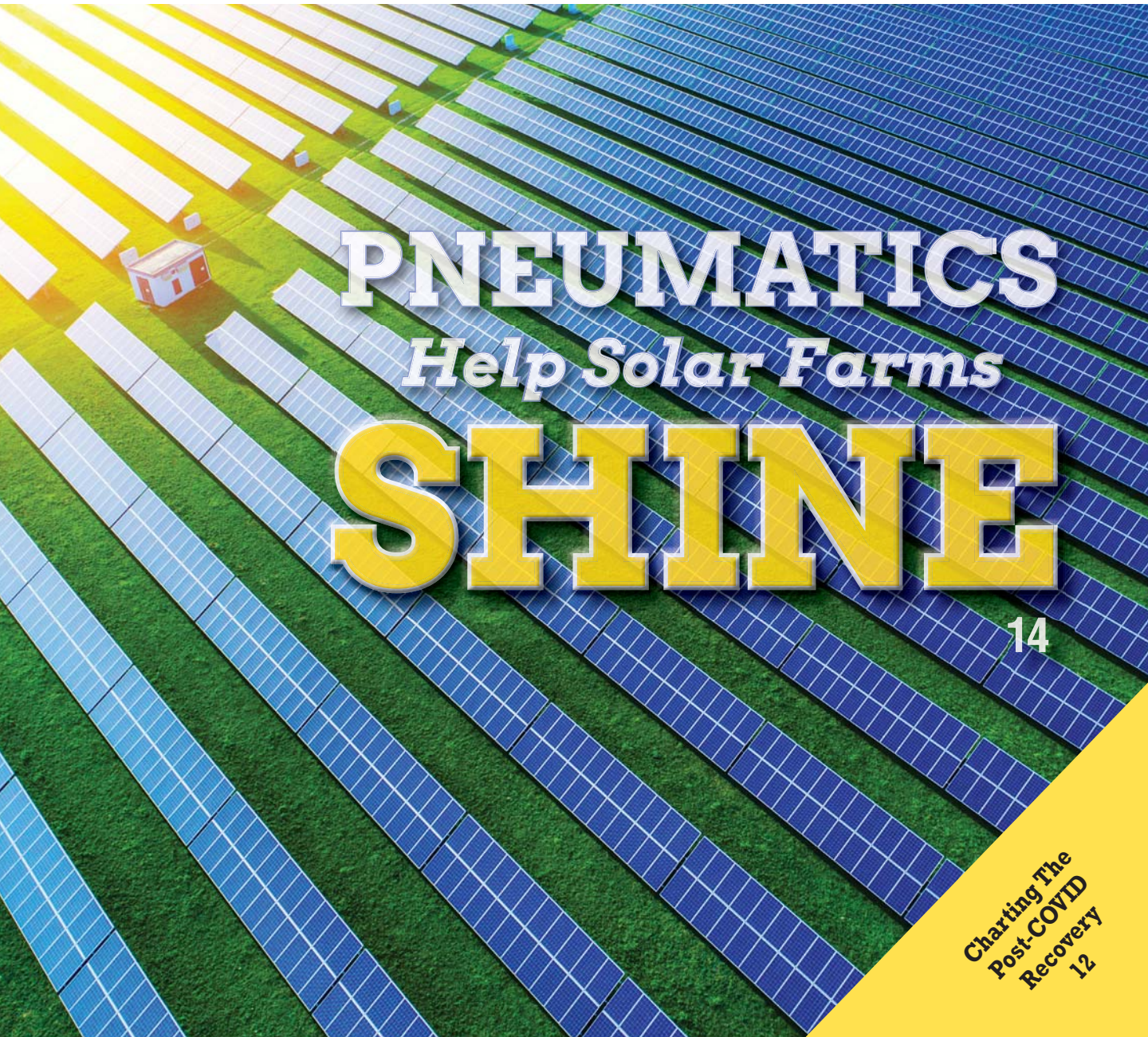
Free Ventilator Design Debuts 8 | Building a Better Bottle 18 | IIoT Solutions for Packaging 24

Hydraulics & Pneumatics®

THE AUTHORITY ON FLUID POWER TECHNOLOGY

SEPTEMBER 2020 hydraulicspneumatics.com



PNEUMATICS Help Solar Farms SHINE

14

Charting The Post-COVID Recovery 12

YOU CAN NEVER BE TOO CAREFUL

Tompkins®
INDUSTRIES, INC.

WE'RE WORKING TODAY FOR A BETTER TOMORROW

800-255-1008 | tompkinsind.com

VELJAN

Hydraulics For Mobile Machinery

55 Years of Excellence

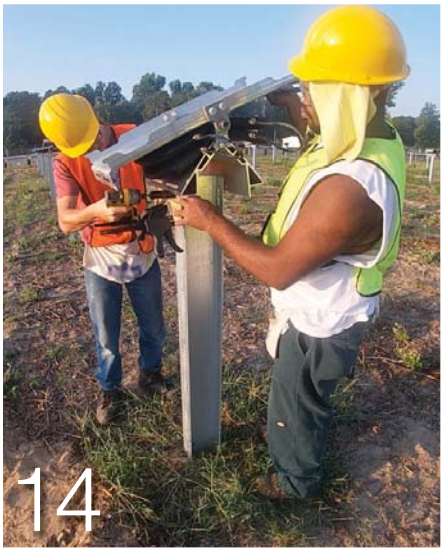
Please contact us:

Veljan Hydrair Inc.

Sales & Warehouse: 4034, Chamblee Road, Oakwood, GA 30566 (USA).

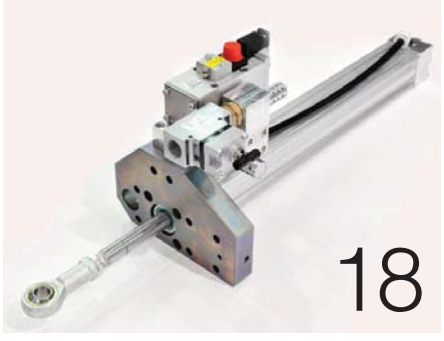
Phone: 877.793.6405 | Website : www.veljan.in | E-mail : sales@veljanusa.com

We Help You See Your Ideas Work



IN THIS ISSUE

FEATURES



DEPARTMENTS

JOIN US ONLINE

twitter.com/H_and_P_knows
facebook.com/HydraulicsPneumatics

ISSN 0018-814X

EVERYDAY BY YOUR SIDE TO MASTER THE TOUGHEST CHALLENGES

X FIGHT 4000 - 5000 - 6000 and 4SH are spiral hoses that offer measurably greater advantages in routing and installation. These latest-generation hoses provide excellent performance to meet the most demanding customer needs including ABS, MED and USCG certified marine applications.

DIESSE RUBBER HOSES
MADE IN ITALY

Via Provinciale 8, SP 155 - Filago (BG) - ITALY - Phone: +39 (035) 49.42.300 | **www.diesserubber.com sales@diesserubber.com**

Hydraulics & Pneumatics

SEPTEMBER 2020

Know Your Precise Position

Linear transducers provide high-precision position sensing at a great price

NEW! Linear Transducers

Linear Transducers are position sensors that convert linear displacement of an object to an analog signal (0-10VDC or 4-20mA), with the value being proportional to the change in displacement.

- Available in many sizes and offered in push-in style, rodded, and rodless extension styles
- Stroke lengths available from 0.25 inches all the way up to 18 inches
- Environmental protection rating of IP67 for all units
- Contactless operation to prevent internal wearout
- Field adjustable scaling

Also Available

Wenglor OPT Photoelectric Sensors

Linear Potentiometers

Ultrasonic Proximity Sensors

Research, price, buy at:

www.automationdirect.com/linear-transducers

Order Today, Ships Fast!

VOTED Best in SERVICE 15 YEARS

AUTOMATIONDIRECT.com

1-800-633-0405

the #1 value in automation

Editor's Page
BOB VAVRA | Senior Content Director
bvavra@endeavorb2b.com

Release Your Spirit of Innovation

AS THE PANDEMIC drags along into another month, it's easy to turn from disappointment to discouragement. Every time we toss out phrases such as "the new normal" we subtly concede that this predicament creates a more permanent change in our lives. As a result, we seem more bound by its limitations.

And yet exploration goes on. *Hydraulics & Pneumatics* reported online this month about the tools and technologies needed to send astronauts to Mars and return them safely. As daunting and dangerous as putting a man on the moon seemed 50 years ago, this extraplanetary voyage is an even greater challenge—and if successful, an even greater human achievement.

In the midst of all of this turmoil in earth, we continue to ask the fundamental questions of "how" and "why" as we stretch our understanding of the natural forces that constrain us. In that inquiry, we learn how we can use those forces rather than allowing them to use us.

It is a lesson we earthbound humans might ask as well in these times. I will leave the larger philosophies to others, but I will ask a business question: How are you preparing your company for what comes next?

If the specifics of that answer seem unclear at the moment, then we look to history to tell us that such global events are cyclical, and that from the depths of these chasms comes a soaring recovery. Things may change, but they do get better.

An economist at the National Fluid Power Association's Industrial and Economic Conference noted last month there is reason to expect economic recovery in the near term and a full recovery over the next 18 months. Those who seize on that knowledge will be prepared to reap the benefits. "You're going to be able to get your business further faster while other sit back and wait," he said. "Sitting and waiting is not an option."

This means investing, today, in your people and processes. It means trying new concepts and designing new solutions to old concepts. It means envisioning your operation as it could be rather than simply accepting it as it is.

Those who propose to take us to Mars are not expecting the planet will get any closer to Earth. They understand the challenges and the many dangers. They invent and persevere because it is what we do. That spirit of innovation was not defined by the plagues and wars that have derailed mankind in past centuries, and it cannot be deterred by the infirmaries of this one.

In early October, Mars will be visible in the morning sky. It will be a bright spot to begin our day, a distant, challenging milepost in our imagination. It also is a reminder to keep our heads up. There is something amazing on the horizon. hp

FluiDyne
FLUID POWER

FluiDyne Motors,
truly versatile.

Get Instant Answers.

Providing *solutions* that work.

Powered by
Customer Service

FluiDyne
FLUID POWER

586-296-7200
sales@fluidynefp.com
www.fluidynefp.com

THE FPDA MOTION & CONTROL NETWORK MEMBER

NATIONAL FLUID POWER ASSOCIATION NFPA MEMBER

OVER 40 YEARS OF QUALITY

News

Design for Low-Cost Emergency Ventilator AVAILABLE FOR FREE

Scientists at SLAC have developed a simple ventilator for COVID patients.

Researchers at the Department of Energy's SLAC National Accelerator Laboratory and Stanford University have invented an emergency ventilator that could help save the lives of patients suffering from COVID-19. It uses standard parts that cost less than $400, making the SLAC ventilator an affordable option when more sophisticated technology is unavailable, in short supply or too expensive.

Neither SLAC or Stanford will make or distribute the ventilator, but they are offering the technology at no cost to those who want to build and use it after getting regulatory approvals.

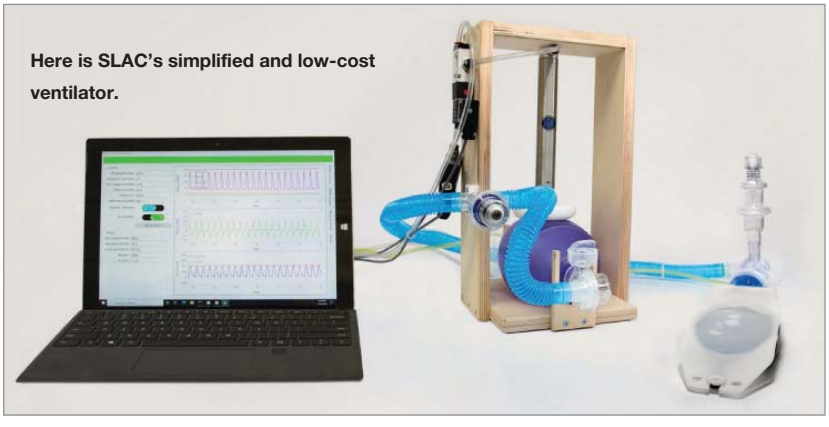
A ventilator's operating principle is simple: It compresses oxygen-rich air and pushes it through tubes into a patient's lungs, expanding them and helping the patient take up oxygen. The lungs contract on their own, pushing the air back out. Then the cycle starts over.

In the simplest version, doctors squeeze a self-inflating bag by hand to pump air into the lungs. High-end automated versions compress the air in other ways and use complex electronics to control pressure, volume, air flow and other parameters.

SLAC's emergency ventilator is based on a simple model, but it adds a mechanism that automatically squeezes the self-inflating bag. The system also incorporates modern, inexpensive electronic pressure sensors and microcomputers with sophisticated software that precisely controls the squeeze. The microcomputers also drive a small control panel, and operators can control the system with that or with a laptop computer. The rest is standard hospital parts.

Other groups have developed emergency ventilators in recent months, often by simplifying fancier machines. "Our invention stands out for the opposite approach: We made a fancier version of the simplest ventilator design," said SLAC project scientist Christina Ignarra, who helped build the device.

The simple design allowed the team to develop, build and test the device in about four months. It also made the ventilator very inexpensive —less than $400 per unit, compared to $20,000 or more



Here is SLAC's simplified and low-cost ventilator.

SLAC's acute shortage ventilator is tested at the VA Palo Alto Health Care System. *(Sander Breur/SLAC)*

HYDAC SUSPENSION SYSTEMS

HYDAC manufactures all three types of accumulators right here in the US – that means shorter lead times, less supplier risk and better responsiveness – **your gain!**

Our manifolds and cartridge valves are made here too – we have a team of experts ready to design custom solutions for you – whether you need hundreds, or a handful – **your gain!**

HYDAC superior suspension offers:

- Better vehicle handling – can reduce pitching and rolling movements
- Increased safety and performance – helps keep wheels in contact with the ground
- Improved operator comfort

LESS SHOCK. MORE ROCK.

LEARN MORE

HYDAC INTERNATIONAL

www.HYDAC-NA.com | www.HYDAC.com

HYD2008-2199

for a professional-grade system with field support. This should make the ventilator especially helpful for countries with scarce medical resources.

SLAC's acute shortage ventilator project started in the home workshop of Martin Breidenbach, a professor at SLAC and Stanford. He was sheltering at home during the COVID crisis and began building several prototypes in his home workshop. He used materials around the shop, ventilator parts from high-tech distributors and other components dropped off by SLAC colleagues. He tested his prototypes on Michigan Instruments Lung Simulator that replicates the behavior of sick and healthy human lungs. With additional support from the DOE and Stanford, the project expanded and the team set up four more prototypes at SLAC once scientists were allowed back into the labs.

They also took the ventilator to the VA Palo Alto Health Care System for more advanced tests to ensure the device met requirements from the Assoc. for the Advancement of Medical Instrumentation for simplified ventilator designs.

"We're now soliciting proposals from companies willing to take the technology from the lab and put it in the field," says Evan Elder from Stanford's Office of Technology Licensing. "When we find corporate partners that are a good fit, we'll be offering royalty-free licenses for at least a year." Based on the state of the pandemic, this approach will then be reevaluated. ■

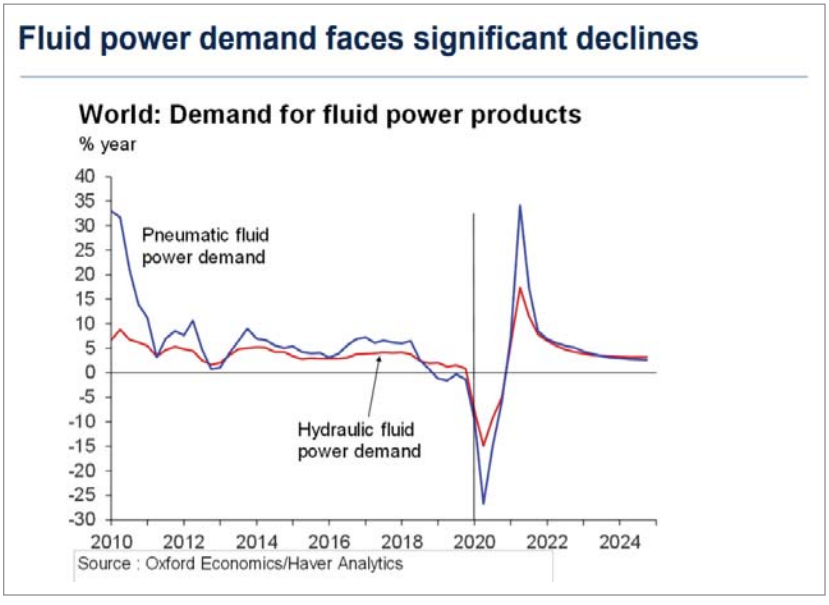
TO FIND OUT MORE about the project or contact the ventilator team, visit *https://www.slac-asv.net/.* For a video that looks at the project, go to *https://www.youtube.com/watch?time_continue=54&v=KpfTOUhRE3A.*

SITTING AND WAITING is Not an Option

NFPA Industrial and Economic Outlook shows fluid power market recovery faces headwinds, but there is room for optimism.

THREE DAYS OF intensive economic data presented as part of the National Fluid Power Association's annual Industrial & Economic Outlook Conference on Aug. 11-13 came to two fundamental conclusions:

1. The economy is on the road to recovery after a severe downturn following the COVID-19 pandemic;
2. That projection is valid as long as nothing derails the recovery.



The Oxford Economics review of the fluid power industry shows the depth of the decline as a result of the COVID-19 pandemic, but also projects a sharp recovery is projected into 2022. *(Image courtesy Oxford Economics/Haver Analytics)*

Economist Alan Beaulieu, who delivered the keynote at the virtual event on Aug. 11, sees a lot to like in the near-term economic trends, but also acknowledges there are a lot of concerns in a post-COVID world. His primary point is that barring a further shutdown of economies, the fundamentals of the U.S. economy remain sound.

"This was a shutdown instead of a breakdown," Beaulieu, president of ITR Economics, told the NFPA attendees. Beaulieu's presentation, and all of the three days of manufacturing and vertical market forecasts, are available through mid-October at *nfpahub.com*.

Because the economy was shocked into recession rather than reacting to specific economic policy failure, Beaulieu believes the recovery likely would be different than the 2008-09 Great Recession. The recovery could still take into early next year to get back to pre-pandemic levels, but he expects the recovery will gather steam throughout 2021.

The opportunity Beaulieu highlighted was for fluid power companies to catch the rebound on the upswing. "You're going to be able to get your business further faster while other sit back and wait," he said. "Sitting and waiting is not an option."

Michael Reid, senior economist for Ox-

ford Economics, underscored the severity of the decline on the fluid power industry in his presentation. “The overall demand for fluid power took quite a hit in 2020,” Reid said. “This pandemic is affecting all regions. No country is escaping this current crisis.”

Reid said it was important for suppliers and manufacturers to stay on top of changes in the market and be prepared to adapt as conditions change. “This is a significant and historic recession. You’re going to want to get forecasts on the most recent data, from economic data to health data,” Reid said. “A second wave of infections across a large number of countries could mean drastically lower growth next year.”

But should the gradual improvement continue, economists who spoke to the NFPA conference agree that a recovery would be gradual and continue throughout 2021. “Despite seeing rising cases and rising deaths, we don’t see a widescale shutdown coming,” said Alex Chausovsky, director of speaking services for ITR Economics. “As long as that doesn’t happen, the trajectory is going to happen as we expect and there will be a rise in business over 2021. We still have some downside pressure, but we’re starting to see some green shoots in the economy.”

One lesson from the Great Recession was that those businesses and industries that correctly anticipated the recovery were better prepared to take advantage of the accelerating economy. It’s a lesson worth repeating today, Chausovsky said.

“You have to be planning for the recovery, and for the future,” he said. “Ask yourself, ‘What do I wish I’d done more of in 2008-09?’ You should determine what kinds of moves to make now to take full advantages of that recovery when it comes. In the near term, manufacturing is posed for more pain, but in the longer term, we’re quite optimistic.”

Optimism for the fluid power sector is more tempered, however. “Year-over-year growth in fluid power continues to deteriorate. Shipments are down 25% over 2020,” Chausovsky said. “We do expect a bounce back of 10% next year, which won’t get you back to where you were, but is well on the road to recovery.”

One key area is a re-examination of supply chains and more local sourcing of materials and parts. “We believe companies are actively looking to develop alternative sourcing. We challenge you to look for those opportunities,” Chausovsky said. “The decades of the 2020s looks very positive for manufacturing in the U.S. Companies are looking for shorter lead times and a higher focus on quality control.

“Obviously it’s more expensive to source in North America,” he added, “but it is a price they are willing to pay for significant improvement in the resiliency of the supply chain.” ■

IN A SEA OF CHANGE, Engineers Retain Cautious Optimism

THE GLOBAL COVID-19 PANDEMIC has changed the way engineers have worked and the way their companies operate. And while there are strong expectations their own business will return to something close to normal in the next 12 months, their optimism for the rest of the economy is more tempered.

These are the key findings in a new study of the Design Engineering group of Endeavor Business Media. This group includes *Electronic Design, Electronic Sourcebook, Evaluation Engineering, Hydraulics & Pneumatics, Machine Design, Microwaves & RF* and *Source Today*. The results were part of a larger study conducted across 78 Endeavor Business Media titles.

Engineering leaders expect recovery to start to take hold in 2021, with 32.2% seeing a rebound in the first half of the year and another 20% seeing recovery in the second half. Respondents are more optimistic that their own business will return to normal than for the economy as a whole. While 38.8% expect normal working conditions to resume on or shortly after the COVID-19 guidelines are lifted, 27.8% expect that normal business conditions could take a year to resume and 20% don't ever see a return to normal.

By comparison, while 34% of engineers think there could be an overall return to normal for all businesses, 38.3% said that could take more than a year and 22.8% said it would never return to normal.

When they do return to that new normal, engineers expect there to be changes in the way their business operates. These changes mainly concern sanitation, with 61.7% expecting an increased emphasis in that area, and social distancing, with 51.9% expecting continuing rules about maintaining worker spacing. And in one of the more surprising pieces of data, while 36% expect a re-evaluation of their supply chain and 19.1% planning a virtual customer service model, just 15.3% expect a company investment in automation or Internet of Things technologies.

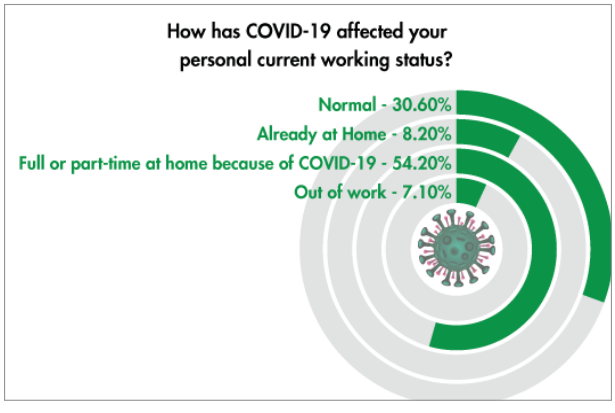
While about 35% of engineers said business activity has declined since "stay-at-home" guidelines were widely implemented, 27% have seen no change in business and 15.4% have seen an increase. Slightly more than half of respondents (50.8%) say they are optimistic about the next six months as business reopen, a higher level of optimism than expressed in the overall Endeavor survey (43.7%).

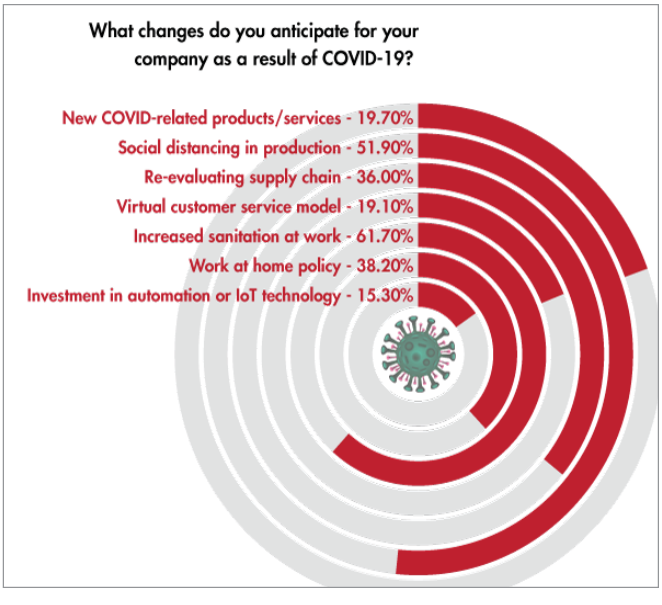
In many businesses, work-at-home guidelines have become a new normal, and 54.2% of engineering respondents said they now are working at home full-time or part-time as a direct result of COVID-19, while 30.6% are working normally, either in the office or in customer-facing roles in the field. Just 8.2% report they already were working from home full-time. The engineers said their company would be expanding the work-from-home policy for the future, with 38.2% expecting changes in that procedure even after restrictions are lifted.

Company officials said there either were prepared for some sort of business disruption or were quickly able to adapt. A disaster plan was in place for 44.2% of businesses, although 37.1% needed to update the plan to deal with the specific impact of COVID-19. Another 19.1% quickly developed a response plan, and 10.9% are now implementing a plan.

To meet the pandemic challenges, a number of businesses altered their purchasing, contract, employment and marketing plans. The two biggest areas of reductions were in overall budget cuts (43.7%) and eliminating new equipment purchases (41.5%). Companies also cut back on personnel, as 31.1% experienced either staff reductions or furloughs as a result of the pandemic.

One big area of changes for the near future is the way engineers seek out and obtain information. While 62.8% said they have no travel planning in the next six months and just 8.9% are back to their pre-COVID-19s travel schedule, 88.3% of respondents said they would attend a digital webcast, conference or meeting instead of traveling. ■





Alan McCay, Motion Industries

Fluid Condition Monitoring and Industry 4.0

FLUID CONDITION is one of the most important attributes to measure and maintain in a hydraulic system. Metrics such as solid particulate contamination, water content, additive depletion, and oil loss can cause premature failure of pumps, valves, and actuators. The costs associated with these issues include premature component failure, and more importantly, lost production time.

In times past, maintenance personnel would draw fluid samples and perform on-site contamination analysis by looking at patch samples under a microscope and comparing them to a visual comparator to determine ISO cleanliness codes. The more sophisticated equipment would include a portable contamination monitor that would provide a visual readout of the cleanliness code. These methods were effective, but provided only a snapshot reading of the contamination levels at the time of the sample. There was no information provided on water content or oil additive depletion, which would need the services of an off-site laboratory. In addition, if there was a change in condition of the fluid between sample dates, real-time fluid condition would go undetected, so the system components were vulnerable to catastrophic failure.

Fortunately there have been technological advancements in fluid condition monitoring, including real-time measuring of oil life, water saturation level, temperature, contamination and level.

REAL-TIME MEASURE OF DIELECTRIC CONSTANT

One sensing technology employs a device that determines the change in dielectric constant and/or conductivity of hydraulic or lubricating oil. The dielectric constant of oil is the measure of its ability to transmit electric potential energy. Changes in the value of used oil compared to new oil can indicate the presence of contamination, water, or changes in oil chemistry, such as additive depletion or oxidation. Oil chemistry changes can lead to hydraulic or lubrication system damage, leading to premature component failure. These sensors transmit a 4-20mA electrical signal, which can be translated to measure the change in dielectric constant which allows for real-time monitoring of these properties.

REAL-TIME MEASURE OF WATER SATURATION LEVEL

Another sensor technology is a water saturation level device commonly referred to as an “Aqua-Sensor.” The saturation level is the amount of water that can dissolve in the oil’s molecular chemistry and is typically 200-300ppm at 68°F for mineral oil. Water in hydraulic systems can corrode components, reduce lubricating properties, cause air entrapment, cavitation, and premature filter clogging. These issues can cause system component wear and premature failure. The saturation level is measured by the Aqua-Sensor and scaled from 0 to 100%. This level is transmitted electrically by the sensor as a 4-20mA signal, allowing for real-time monitoring.

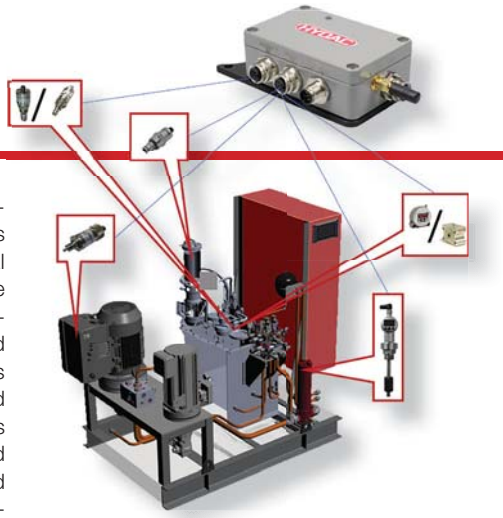
REAL-TIME MEASURE OF PARTICULATE CONTAMINATION

Employing particulate sensors to measure the particulate contamination of oil is also critical. Particulate contamination in a hydraulic system causes wear on pumps, valves, motors, and cylinders, which lowers system efficiency creating heat, wasting horsepower, and causing premature component failure. In lubrication systems, the lubricated component life is shortened and can lead to catastrophic failure. Contamination sensors use a 4 to 20mA electrical signal which translates to ISO/SAE or ISO/NAS classifications – measuring the particulate levels at specific micron sizes. This can ensure that the contamination levels are kept at a minimum required for specific hydraulic or lubricated components for extended life.

1. When installed onto a hydraulic system, such as a power unit, a contamination sensor like this one from Hydac provides real-time measure of particulate contamination. The sensor works in conjunction with a datalogger to help ensure levels are kept low to help increase system uptime.

REAL-TIME MEASURE OF RESERVOIR LEVEL

Lastly, incorporating level sensing in a hydraulic system reservoir can be a valuable indicator of potential problems in a system. By once again applying an analogue output signal, base-line level can be monitored for changes beyond the normal range to prevent tank overflow or oil loss due to problems such as leaks, which can cause pump aeration and failure.



2. Various sensors installed on a hydraulic system feed into a datalogger (upper right), to enable database and cloud-based storage of data. Visualization and analysis are then provided through the use of Hydac’s FluMoS software. *(Images courtesy of Hydac)*

SYSTEM MONITORING FOR INDUSTRY 4.0

Monitoring oil condition within hydraulic and lubrication systems adds significant value to an effective reliability management program. Additionally, data captured by the sensors described above may be combined with vibration and filter bypass data for an even more comprehensive view of asset health. Fluid condition monitoring solutions consist of hardware (sensors that collect key data in real time) and software (that interprets electrical signals and detects health trends). The output created by these systems generally includes a digital representation (a time series graph or digital gauge) of each parameter and/or the asset’s health as a whole, which maintenance and reliability professionals can view multiple ways depending on system configuration. If the solution is “local,” the health indication could be viewed with an onboard HMI. If the solution is cloud-based, it may include a dashboard view accessed as a web browser on any computer or personal smart phone/tablet.

Access to condition monitoring data is a powerful tool and a vehicle for advanced PdM practices. Early detection of defects and damage allows maintenance and reliability professionals to prevent unplanned machine downtime, reduce life cycle costs, and reduce total operating costs.

Alan McCay, CFPS, has worked for Motion Industries (Birmingham, AL) for 25 years and is currently Product Sales Manager for Fluid Power. For more information, visit MotionIndustries.com, or skill up even more on hydraulics by visiting Mi’s Fluid Power Specialist Knowledge Link (https://tinyurl.com/y478gzha).

MOCAP®

Manufacturer of Quality Plastic and Rubber Products

Caps • Plugs • Grips • Product Protection • Finishing • Masking

- All Sizes & Styles in Stock
- Most Extensive Tooling
- Global Stocking
- Smallest Minimum Order Quantities
- Lowest Prices
- Easy Ordering

Order Online For Fast Turnaround

Solutions that Fit®
the Fluid Power Industry

Plastic & Vinyl Caps for gas, metric, UNF, JIC fittings (PVC, LDPE, HDPE, PP & NYLON).

Plastic and Vinyl Plugs for gas, metric, UNF, JIC fittings (PVC, LDPE, HDPE, PP & NYLON).

Flat and Round Grips

Masking Tapes, Discs, Caps and Plugs

Pipe and Flange Protection

...and *Much More!*

MOCAP FREE SAMPLES

1-800-633-6775 www.mocap.com sales@mocap.com

Cover Story

STEPHEN MRAZ | Senior Editor

Pneumatics Let Solar Arrays Generate MORE POWER

Elegant and simple pneumatically powered solar tracker helps squeeze more electricity from solar panels.

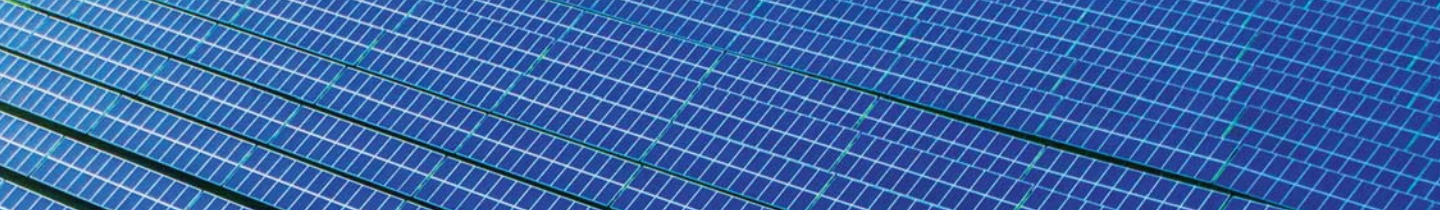
Engineers and designers are using all the engineering tools and techniques in their arsenals to improve the efficiency of solar power facilities. Most end up building solar farms covering acres of mostly flat land with row upon row of identical panels of solar cells.

The managers and engineers at Sunfolding *(www.sunfolding.com)*, a San Francisco-based company, decided to put their heads together and devise an even more efficient method of building the next-generation of solar farms.

The goal was a flexible, easy-to-assemble array that could deliver the most electricity for the lowest cost. The result was the Sunfolding T29 Tracking array. Like other solar arrays, it is designed to be laid out in East-West rows with the photoelectric cells facing south to catch the sun from morning until dusk (in the Northern Hemisphere). To increase the amount of sunlight shining on the cells over the course of day, Sunfolding added a simple pneumatically powered tracking device that keeps the arrays pointed toward the moving sun.

The T29 uses AirDrive X actuators. Each contains two flexible air bladders—one to the West, the other to the East—sandwiched between two metal plates. The solar module mounts on

Field of arrays P&L.



the top metal plate. When the western bladder inflates, it lifts the west side of the panel and angles it towards the east, which lets it gather more sun in the morning. It then does the opposite toward sundown.

Single-axis trackers such as these generate 20 to 25% more electricity than static arrays, depending on geography and other installation factors. The question in the industry is no longer whether to use trackers or not, but which tracker is most profitable.

On the T29, a Tracker Controller controls the air pressure into and out of the 50-lb AirDrive X so that it points the modules toward the sun. The controller is programmed with celestial tables containing the sun's position in the sky during the day and aims the modules accordingly. A controller on end of each row of modules handles the entire row.

Compressed air comes from Sunfolding's Supply Air System (SAS). It has a single air compressor and can handle modules or panels that generate from 4 to 6 megawatts of electricity. So, for example, a 50 MW solar farm might need 10 SAS. The compressor consumes a negligible amount of electricity in terms of cost, according to Sunfolding. They also use air as the working fluid, a readily available material that's free of charge and can be vented to the atmosphere. The SAS's are delivered from the factory as pre-assembled plug-and-play units that get dropped in place near the inverter.

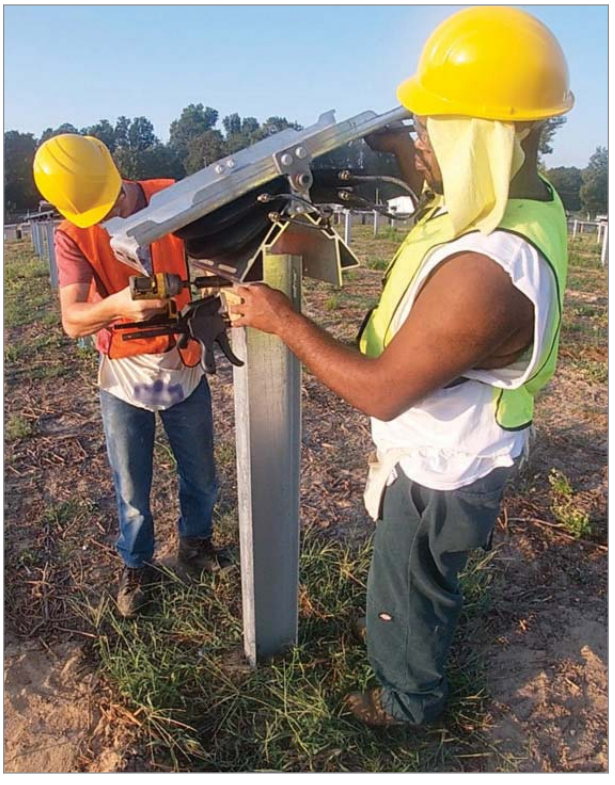
The Sunfolding T29 drive uses bladders to lift and aim solar panels.

Relying on this pneumatic approach gives the T29 significant benefits. The units only have to move the modules once per day. That's a pretty low cycle rate, translating into less than 13,000 cycles over a 35-year lifespan. The air actuator in the T29 could likely withstand 6 million cycles before needing to be replaced. This means Sunfolding T29s are durable with little need for maintenance.

The T29 system consists of mainly off-the-shelf components that have already undergone rigorous testing in the lab and in the field. There is also a supply chain of manufacturers and distributors already providing pneumatic parts and components for a handful of large industries. For example, a complete solar farm of Sunfolding T2s can be hooked up using pneumatic-hose harnesses made by companies that supply similar harnesses for cars and trucks. The automotive-grade harnesses connect quickly and easily using standard connectors.

The T29 also uses fewer parts than arrays with tracking systems that have

Pneumatically Powered Solar Tracker



Installing Sunfolding T29s is simple and requires no special tools.

complex machinery and an army of motors or hydraulic actuators. The pneumatic system has far fewer critical points of failure and fewer maintenance needs than other tracking-array technologies, according to Sunfolding. This lowers costs, including installation, and reduces the risk of failure.

With tracking technologies that rely on heavy motors to move the panels, designers have an incentive to ensure the motors are used to their fullest capacity. This leads to long rows of panels powered by one motor to keep capital expenses in check. But that limits how designers can arrange the arrays on the parcel of land available for the solar farm. With Sunfolding's air-driven trackers, designers can efficiently use shorter rows of panels to put as many solar panels as possible on the land no matter how it is shaped. The shorter rows also let power wires or even roads cross the land without letting too much acreage go unused.

Sunfolding is competitive with other self-tracker solar arrays. The real advantages come in the form of flexible layouts that get more electricity from odd shaped parcels on rough terrain, as well as construction savings due to fewer components and fasteners that simplify the installation process. The finished farm has fewer maintenance requirements over the life of the project. hp

SEE A VIDEO of the Sunfolding T29 tracking array in action: *https://vimeo.com/371750875.*

WORK READY SERVO AND PROPORTIONAL VALVES

YOUR SOURCE FOR REPLACEMENT HYDRAULIC VALVES

We stock and support such brands as: Abex®, Atchley®, Atos®, Bosch Rexroth®, Dyval®, HR Textron®, Hydrolux®, Moog®, MTS®, Parker®, Schenck Pegasus® and Vickers®. We also offer repairs on most all brands of hydraulic servo and proportional valves. Make Hydraulex your first call when you need replacement hydraulic components for your equipment.

To learn more, talk to your Hydraulex sales rep today, give us a call, or visit us at HYDRAULEX.COM

DON'T FORGET
WE REPAIR
AMPLIFIER CARDS

1-800-422-4279
sales@hydraulex.com

ATTICA HYDRAULIC EXCHANGE, INC. | GENUINE METARIS | HYDRAULIC REPAIR AND DESIGN | FHi Flint Hydrostatics, Inc.

HYDRAULEX
The Right Replacement, Right Now®

GERSON HENNING | Manager of Business Development, Food and Beverage Packaging, Emerson

Pneumatics in Packaging: New Developments for Better Bottles

IIoT-enabled stretch blow molding machines can solve many challenges in PET bottle production.

AT A GLANCE:

- Many packaging companies are turning to systems that combine the stretch blow molding (SBM) process with the bottling process in a single production flow.
- Pneumatic technologies can solve PET challenges such as cost, reliability, recyclability and the need for flexible production and IIoT intelligence.
- Smart sensors for SBM machines issue alerts when the leakage rate exceeds a predetermined value, so leaks can be diagnosed early.

Emerson stretching units can perform up to 2,400 cycles per hour in the SBM process.

Pneumatic technologies and products play a vital role in a wide range of packaging systems serving the consumer products markets. They provide reliable, proven and efficient systems for a wide range of actuation and material movement tasks within many types of packaging systems. The newest generation of smart pneumatics lets them integrate seamlessly into digital packaging machine environments thanks to on-board intelligence and compliance with all relevant communication standards.

The most widely used bottling product in the world is the polyethylene terephthalate (PET) bottle. In 2016, more than 6.12 billion bottles were produced in plants in every major market across the globe. PET bottles are most extensively used for beverages—water, juice and other drinks—but versions of these containers are also used for cosmetics, pharmaceutical, personal care and household chemical products.

The demand for PET bottles remains strong and, as a result, it is estimated that approximately 3,500 stretch blow molding (SBM) systems are built and deployed each year. Several pneumatic technologies play a critical role in these systems, with innovative products such as proportional control valves that help SBM systems provide the flexibility, high throughput rates and product quality that global packaging companies need.

GROWTH OF COMBO SBM PRODUCTION SYSTEMS

In SBM machines, PET preforms are mounted on cores and carried through a heating oven to soften them. There is then a pitch change to orient them for insertion into molds that set the shape of the bottles. The preform is physically stretched while low pressure air is injected to instantly expand the bottle (pre-blowing), which conforms to the shape set by the mold and afterward high-pressure air—up to 40 bar (blowing)—to finalize the production process given the container the final stiffness

and start lowering the temperature. The bottles are then ejected for the next step of processing.

Pneumatics plays a key role in these processes: Pneumatic cylinders using low-pressure supply air to manipulate the cores as they move through heating into the stretching and blowing process, while the high-pressure pneumatic valve blocks and control valves deliver the critical expansion blow.

Until recently, manufacturing PET bottles and filling them with beverages were two separate processes, often occurring at two different locations. Many packaging companies—typically drink bottlers—are now purchasing "combo" systems that combine the SBM process with the bottling process in a single, uninterrupted production flow.

It offers great efficiencies for the bottlers and gives them the ability to control and change the size and shape of PET bottles to be more responsive to changing customer trends and market demands and improve product differentiation.

This combo process also helps bottling companies address a concern about sustainability: PET bottles are highly recyclable, but in many markets, recycling programs are not as effective as they could be, leading to efforts to ban or strictly limit PET bottle use. The implementation of combo production systems offers the potential to help significantly reduce the carbon footprint of this container type since they no longer need to be produced in one place and shipped to the bottling plant where they're then stored till filled.

KEY PET PRODUCTION CHALLENGES

Bottling companies that invest in combo production lines, as well as the original equipment manufacturers (OEMs) supplying their systems, face several challenges related to maximizing the value and performance of their production systems—especially their SBM machines. Among these challenges:

Improving costs and productivity. Typical blow molding production ranges from 2,400 to 3,000 bottles per mold per day. Manufacturers want to sustain that level of production with extremely low rates of rejected/poor-quality bottles.

Demand for wider range of bottle shapes and sizes. Efficient, flexible production of different bottle sizes and shapes is critical to easily produce different sizes and shapes. This is especially important as some companies seek to expand their production of customized bottle shapes and bottle-on-demand capabilities.

Maximum reliability. There is a continued need from bottlers and OEMs for system components with long operating lives and predictive maintenance capabilities.

Industry 4.0/IIoT intelligence. More real-time, usable data from production machines and components within machines that can be used to improve efficiency and reduce machine downtime is needed. Another challenge is to visualize the data and make it actionable—to get the full story on how things are operating.

Recyclability. PET bottlers and end-users are also interested in developing ways to increase the percentage of recycled PET in the production of new containers with the same quality and characteristics.

Multiple pneumatic technologies answer many of these challenges. Many have reliable, high-performance functionality that has been refined through decades of close collaboration with machine builders.

Pneumatics are used in several key areas of SBM machines. Pneumatic air preparation systems provide improved efficiency and better control of both the low-pressure and high-pressure air used by the preform actuators and stretch blow bottle expansion steps.

Low-pressure air activates pneumatic actuators and devices that move and manipulate bottles through the process, such as changing pitch, stretching units and ejection units, while modular filter/regulator units and sensors support the high flow rates needed for the high-pressure bottle expansion step.

The latest generation of smart sensors for this application will issue alerts when the leakage rate exceeds a predetermined value, so leaks can be diagnosed early and addressed before they become a major issue. This gives bottlers actionable insights on machine data (such as flow, pressure and temperature), helping optimize energy consumption, prevent machine downtime and reduce costs.

Another key set of pneumatic components critical to the SBM process are high-performance blowing blocks. These pneumatics provide bottle volume growth control through key parts of the bottle expansion process: preblow, blow, recovery and exhaust.

The latest generation of these components is engineered for thousands of hours of operation. Many suppliers have fine-tuned their designs to make them more compact for fitting into tight machine spaces, reducing dead volumes and improving response times to enable high-speed bottle production.

Pneumatic cylinders play an important role in several SBM machine steps, including repositioning the preforms as they move out of the heating oven and are inserted into the blow molds.

Pneumatic cylinders, directional control valves, valve systems and custom-designed ejection units are widely used in these applications.

Pneumatics continue to be used in these SBM functions because they are both reliable and efficient systems. Many of these products, such as valves, are hygienically designed for food zone environments. This makes them well-suited for combination plants where the bottles are filled directly down the line from the SBM system.

High-performance blowing blocks provide bottle volume growth control, making them a critical pneumatic component in the SBM process.

The EP07-PT block is equipped with a high-quality flow rate regulator, a blowing block integrated valve and IoT integrated functions.

INTELLIGENT PROPORTIONAL CONTROL VALVES

As with many other automation technologies, pneumatics has been adding capabilities to provide new levels and ranges of control to key manufacturing processes. One major pneumatics supplier has recently introduced a proportional control valve for the pre-blow expansion step in PET production.

This control could be a game-changer for this step, replacing what had previously been an on/off high-pressure flow—setting the flow rate and having it remain the same throughout the blow process—with modulation of the flow to fine-tune each bottle's expansion within the mold.

This new solution combines a specially designed proportional valve, control electronics and software that can either store the set points for the blowing sequence in the valve or respond to control directions from the SBM PLC managing the blowing process.

As with many other automation technologies, pneumatics has been adding capabilities to provide new levels and ranges of control to key manufacturing processes. One major pneumatics supplier has recently introduced a proportional control valve for the pre-blow expansion step in PET production.

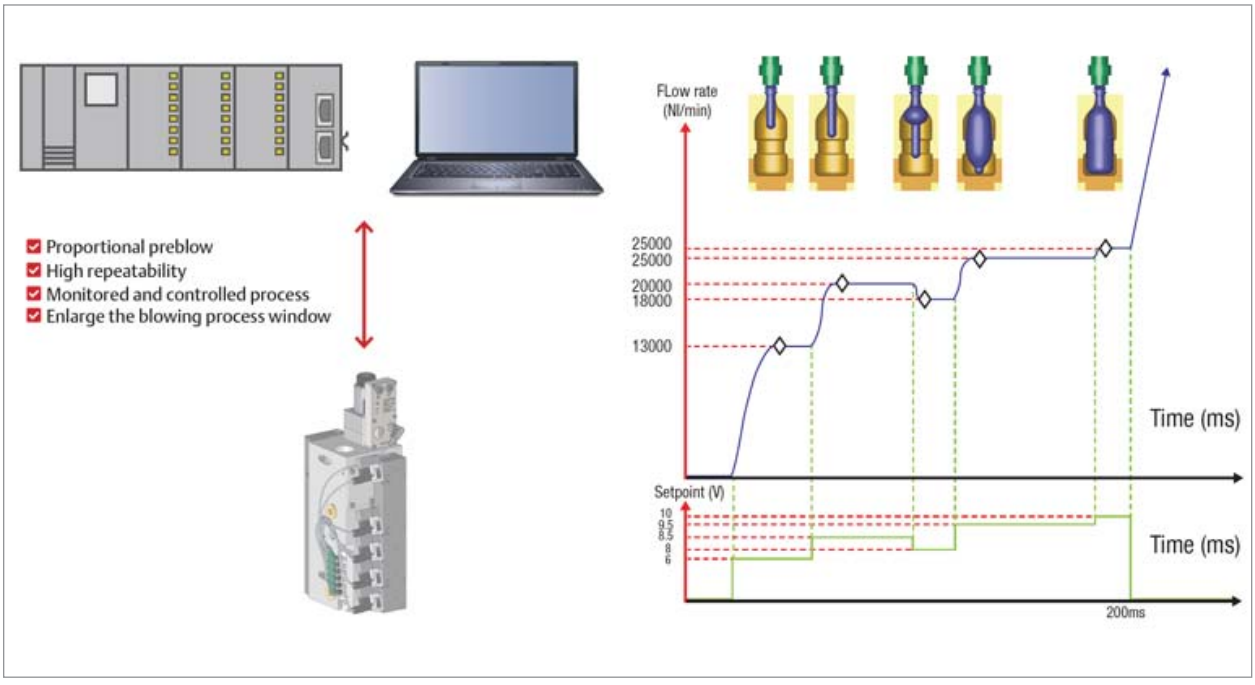
The bottle expansion typically takes between 70 to 200 ms, depending on the size of the bottle and the desired thickness. In the past, the flow rate would be uniform, but with this proportional valve technology, the bottle growth is intelligently modulated, giving a much greater level of control over how the heated bottle expands within the mold.

This provides real-time control of each machine station, and there can be up to 48 stations. The system also includes the ability to capture feedback results for the quality of each blow, providing critical data needed by bottle manufacturers to fine-tune the process and reduce the number of rejected bottles to a minimum.

Proportional technology for PET blowing moves pneumatics to a whole new level of value for this process, offering multiple advantages:

- The potential to reduce material consumption with the ability to fine-tune bottle wall and shape formation, as well as to create thinner, more lightweight containers
- Enabling the high throughput production of more complex bottle shapes, a critical goal for bottler's marketing purposes
- Helping to generate energy savings in two ways: by potentially reducing blow air pressure needed to accomplish quality bottle forming and by reducing the heating temperature in the pre-blow oven
- Improving manufacturing flexibility, since the process is easily changed via software/PLC formula specific to each blowing station on the machine

Since the proportional valve system also captures and communicates data about each blow, it provides a rich source of data for quality documentation to



The introduction of a proportional control valve in the pre-blow expansion step of PET production gives a higher level of control of each machine station than the previously used on/off high-pressure flow model.

safeguard and track process control. It also provides condition monitoring data to support routine and preventive maintenance programs.

CONCLUSION

In PET blow molding, pneumatics continues to evolve and improve, combining reliable performance for several key process steps with innovations that satisfy the needs of OEMs and manufacturers for greater control and flexibility.

As combo SBM machines continue to be the solution of choice for many bottlers, the need for smart pneumatics that provide IIoT sensors, real-time data capture and interfaces with leading bus architectures will continue to grow.

OEMs who collaborate with experienced pneumatic technology suppliers can take advantage of their expertise in pneumatic technologies as well as co-develop new solutions and refinements to existing products, which ultimately helps improve how pneumatics contributes to the performance and competitive value of their systems. hp

JUSTIN LESLEY | Industry 4.0 Innovation Manager, Motion Industries
CHRIS NOBLE | Business Development F&B/IIoT Consultant, Emerson Automation Solutions

Why Using IIoT for Pneumatics is Simple, Yet Critical

A closer look at the value of IIoT and pneumatics in the packaging industry.

AT A GLANCE:

- Know the right questions to ask when it comes to managing data.
- In the scope of pneumatics, installing IIoT applications and improvements of just a few percentage points mean major savings in energy dollars.
- Incorporating IIoT solutions within packaging machinery could become a standard expectation of OEMs.

The Industrial Internet of Things (IIoT) is disrupting manufacturing. The applications for collecting sensor data and using it to optimize machine performance are limitless. Solution providers are developing ever-enhancing tools to automate data ingestion, interpret the "ones and zeros" and enable stakeholders to access solution insights remotely. Remote access to plant performance and machine reliability data will be increasingly important for the "work-from-home" era that the global COVID-19 pandemic has created.

Not only are IIoT solutions getting better over time, but they are also getting less expensive, which is great news for manufacturing organizations searching efficiency upgrades. All of this brings holistic, operational benefits to the company and it all sounds great…but where do you even begin?

Like any new venture, there will inevitably be bumps in the road and growing pains when implementing IIoT technology. Still, with a little research and a helping hand from subject matter experts, you can leverage new technology to the benefit of your company.

Below are some questions that will need to be answered, regardless of whether project leaders are working with in-house IIoT specialists or engaging third-party professionals. Knowing the right questions to ask when it comes to managing data can be a big time and cost saver up front as well as in the long term. Consider the following:

- Will sensor data be transmitted wirelessly?
- Will data be visualized on a local HMI or with a mobile app?
- Will it feed into a locally hosted or cloud-based database?
- Will it be saved and formatted for future analysis in combination with supplementary data?
- Will there be a requirement for new data to be compatible with existing software platforms?
- Is there an existing data analytics strategy or will one need to be created?
- Will data from multiple machines be aggregated?
- Will data from multiple plants need to be viewed remotely by management or a corporate official?

IIoT AND PNEUMATICS

In the scope of pneumatics, IIoT applications are generally initiated by a desire to improve energy efficiency. Depending on the size and nature of the equipment in question, improvements of just a few percentage points can mean tens of thousands of energy dollars saved each month.

We all know that air leaks are a continual issue with pneumatically powered equipment, but how can you determine how that lost air translates into wasted dollars? The obvious answer is that you have to measure air usage and use your local energy rates to calculate costs. What isn't obvious is choosing which sensor and software tools you should use to quantify pneumatic inefficiency. Answers to the technical questions above will help to guide decisions about which solutions to deploy.

An air flow sensor such as the Aventics Series AF2 gives end-users actionable insights on machine data such as flow, pressure and temperature, and helps to optimize energy consumption and uptime. *(Credit: Emerson)*

Let's say you have a pneumatic packaging application and you'd like to leverage an IIoT solution to optimize energy efficiency. After consulting with solution providers, you may find that there are opportunities to enhance your results by also tracking performance of key components and overall machine health to maximize the useful life. This implies the need for continuous monitoring of air usage and performance/health parameters as opposed to a one-time, audit-style measurement/assessment.

Let's assume that your facility has an existing data collection and analysis software platform, and your operations team agrees that air and performance data should be integrated into it. We now have some critical design criteria to work with, and your IIoT-enabled efficiency solution is well on its way to being realized.

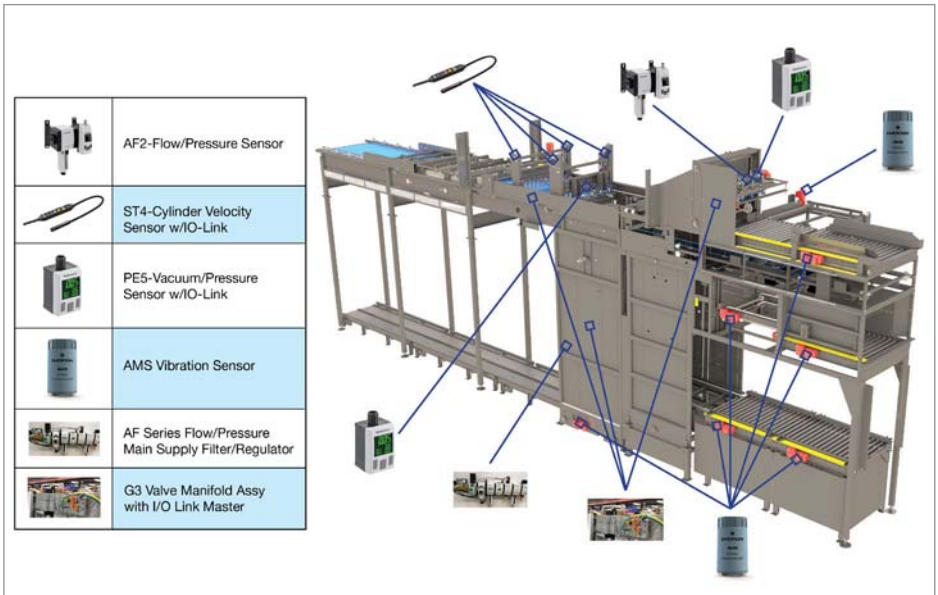
Scope creep is a constant reality with any technology initiative; it's already happened here in our hypothetical pneumatic monitoring application! We started with energy efficiency and now we've added performance and overall health monitoring to the equation. To implement a comprehensive pneumatic IIoT strategy like this, we will need more than just air usage data. The palletizer application illustration shows a high-speed, bulk palletizer equipped with a comprehensive machine health monitoring solution from a leading solution provider. Capturing the necessary data for this application requires cylinder velocity sensors and mechanical cushioning wear sensors for lifecycle management, pressure sensors, vibration sensors and leak detection devices (such

The Aventics Smart Pneumatics Analyzer monitors and visualizes pneumatic installations and systems. The integrated IIoT edge gateway Smart Pneumatics Monitor (SPM) continually records the respective operating states. The sensor data from the pneumatic maintenance unit is digitized and turned into information using mathematical algorithms. *(Credit: Emerson)*

as air supply and consumption sensors). In this scenario, data from the network of sensors is analyzed by software running on an edge computer and insights are stored in an existing platform or data historian for machine learning purposes.

GETTING THE PROJECT APPROVED

In addition to assessing data and software architecture on the technical side, an experienced IIoT pro will also help to ensure the project accomplishes your financial goals. You will need to know if your company has established criteria for calculating ROI and whether there is a minimum payback timeline requirement for plant upgrades. This information will be used in project budgeting and the approval process.



A palletizer application. Using the type of edge-based, machine health monitoring as seen here from Emerson can increase uptime using predictive maintenance while providing greater overall equipment effectiveness. *(Credit: Emerson and (palletizer) Arrowhead/SJI)*

Thankfully, IIoT solution providers generally design their technology to be modular and scalable. In addition, many offer "starter kits" that are specifically designed to prove the benefits of a full-scale solution without requiring users to make a big investment up front. These offerings are extremely helpful when you need to show concrete proof of project savings potential to decision makers in your organization before large capital or operational expenses are approved.

ENSURING THE BEST POSSIBLE OUTCOME

The IIoT solution market can be intimidating, but don't let fear keep you from experiencing the benefits promised by new technologies. Incorporating IIoT solutions within packaging machinery will effectively redefine the term "state-of-the-art machine" and could become a standard expectation of OEMs in the near future. The ability to track OEE (overall equipment effectiveness), predictive machine health KPIs, environment conditions and energy consumption will enable packaging operations to reach new levels of efficiency and reliability.

Modern IIoT solutions also create the potential to monitor multiple machines simultaneously, which could reduce variation between similar packaging machines. In addition, the connectivity aspect of these technologies allow technicians and managers to supervise machine performance and troubleshoot problems remotely.

The packaging industry will substantially benefit from predictive health and machine monitoring technology solutions. A great place to start your IIoT journey is with the help of professionals who will help steer you in the right direction by asking the right questions. Engaging your IIoT specialist or a qualified third party will be key to avoiding costly obstacles and reaching your continuous improvement goals. hp

FOR MORE INFORMATION, visit MotionIndustries.com/hydraulicsandpneumatics or learn about Mi On-Site Solutions (https://tinyurl.com/y9novcve).

JUSTIN LESLEY, Industry 4.0 innovation manager at Motion Industries, directs IIoT strategy and partnerships related to the MRO industry. He guides manufacturers along their digital transformation journey by helping them utilize connected predictive maintenance solutions. CHRIS NOBLE is business development F&B/IIoT consultant, Emerson Automation Solutions business development manager, working with industrial automation, F&B and packaging industries OEMs for Emerson. He specializes in digital Transformation/IIoT, consulting with CPGs and OEMs on how to engage and implement machine health monitoring and analytics on capital equipment.

Useful Products

For more products, visit the Equipment Product Directory link at *www.hydraulicspneumatics.com.*

Valve Series Offers Wider Control

COMPRISED OF FOUR DIFFERENT STYLES of APVS valves, the APVS Media Separated Valve Series provides many options for handling caustic media, all while allowing safe operation in volatile areas. The series includes inert gas/spring-operated valves to control high-purity, aggressive and corrosive liquid chemicals while allowing a flow rate superior to other similar valves on the market. Each APVS Valve can be configured to meet critical user requirements with ordering options that include various port sizes, diaphragm seal materials, pilot options and valve function. In addition, an optional magnetic piston is available for end-of-stroke position sensing and can be combined with a magnetic position sensor to maintain positive feedback. Every Spartan Scientific and Canfield Industries valve is manufactured in the U.S. to ISO 9001:2015 standards and passes through rigorous and extensive testing to ensure reliable performance and adherence to bubble-tight standard ANSI FCI 70-2 Class VI. Comprised of four different styles of APVS valves, the APVS Media Separated Valve Series provides many options for handling caustic media, all while allowing safe operation in volatile areas.

SPARTAN SCIENTIFIC, www.spartanscientific.com

Guided Motion Air Cylinders Assure Non-Rotating Positioning

PRECISION GUIDE SHAFTS are supported in your choice of linear slide or ball bearings. Magnetic pistons are standard on all models. Optional sensors feature surge suppression, polarity protection, LED indicators and extremely fast switching speeds. Approach design problems with confidence or tackle cost-cutting projects with industrial interchanges.

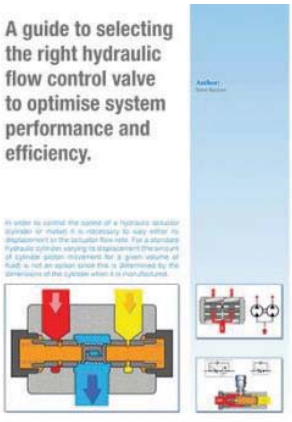
FABCO-AIR, INC., www.fabco-air.com

Efficiently Cool 3D Printing Systems

THE NEXTREME RECIRCULATING CHILLER PLATFORM offers reliable and precise temperature control of 3D printing systems used in additive manufacturing applications in a wide range of industries. The platform is able to efficiently control the temperature of all sensitive electronics within 3D printing systems, including the power source, the laser or electron beam optics, and the thermal print head. In addition, a chiller can be used to quickly cool smaller and/or highly detailed 3D printed objects to preserve fine design details. For maximum uptime, the Nextreme Chiller features the optional “hot-swappable” 5-micron water filter for filtering particulates from the coolant circuit, which means that the unit can continue operating even during maintenance. With no moving parts, an optical fluid level sensor offers higher reliability and increased uptime when compared to chillers that use mechanical float switches. The programmable alarm alerts the user when the fluid level drops below acceptable operating conditions. To prevent damage to equipment in high pressure operating conditions, the Chiller senses the supply fluid pressure and will alert users when low- or high-pressure limits have been exceeded.

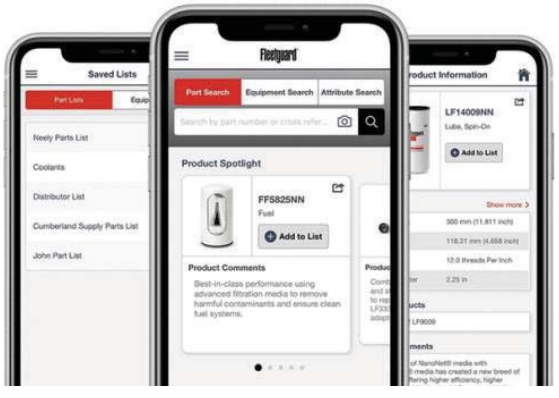
LAIRD THERMAL SYSTEMS, www.lairdthermal.com

Hydraulic Training Guide



IN ORDER TO CONTROL the speed of a hydraulic actuator (cylinder or motor), it is necessary to vary either its displacement or the actuator flow rate. For a standard hydraulic cylinder, varying its displacement (the amount of cylinder piston movement for a given volume of fluid) is not an option since this is determined by the dimensions of the cylinder when it is manufactured. Strengthen your hydraulic skillset with Webtec's guide on selecting the right flow control valve.

WEBTEC, www.webtec.com



Fleetguard App Finds Parts Quickly

THE FLEETGUARD APP for mobile devices provides users with multiple ways to search for parts, create custom lists, share literature, and quickly find part numbers and details on thousands of Fleetguard products. Developed with aftermarket parts dealers, distributors and maintenance managers in mind, the app lets users search the Fleetguard catalog by cross-reference, equipment type or attribute. Users can also search by using the camera on their mobile device to scan a Fleetguard barcode. More than an electronic catalog, the Fleetguard app has tools that make it easier to do business and share essential information. The app is free and available to download at Apple's App Store and Google Play.

CUMMINS FILTRATION, www.cumminsfiltration.com

Monitor Valve Position with Sensing Platform

THE INTEGRATED SENSING PLATFORM (ISP) is a valve sensing platform that reliably monitors valve position. With advanced capabilities in calibrating, operating and communicating with diaphragm valves, the ISP provides customers a reduced piping footprint, shortened set-up time and simplified operation. With the ISP, customers are provided with advanced sensing devices for their EnviZion, Pure-Flo and Dia-Flo valves from ITT Engineered Valves. The ISP sensing module is closely integrated with the patent-pending valve actuator to provide a compact assembly, up to 70% shorter than current assemblies on the market. The non-contact sensing technology provides highly accurate and repeatable valve position feedback with no moving parts to wear. Calibration of the device is fast and simple, whether using the external magnetic dongle or with the newly created ISP app.

ITT ENGINEERED VALVES, www.engvalves.com

Thick Wide Flange Tapered Plug Cap

MOCAP THICK WIDE FLANGE tapered polyethylene plastic plug cap is an inexpensive dual function closure which can be used as either a plug or a cap. The TWF plug cap features a thicker and wider flange which is easier to handle and prevents plug from pushing through the opening. These closures meet aircraft, aerospace and defense industry standards.

MOCAP, www.mocap.com

"DV" High Flow Bi-Directional Electronic Valves

CLIPPARD MINIMATIC ELECTRONIC VALVES are precision-built control valves utilizing a patented valving principle. The DV-Series was designed as the next generation of the well-known original EV line of Clippard "Mouse" valves. With a life cycle of over a billion, a solid, compact design and extremely high flow rates, these valves are suitable for many applications across numerous diverse industries. Standard and proportional series are available along with a variety of voltage, connector and mounting options.

CLIPPARD, www.clippard.com

Reducing Flanges

MAIN MANUFACTURING PRODUCTS' new catalog and website show the reducing flanges MAIN has stocked for years. MAIN has more than 7,000 items in inventory and can manufacture parts quickly from over 100 tons of carbon steel flat bar and plate ordered to special hydraulic flange specifications. Over 40 tons of stainless steel, PVQ, aluminum and copper nickel are stocked as well. Reducing flanges eliminate the extra leak paths created by the additional connectors. Installation and material costs are reduced as well.

MAIN MANUFACTURING PRODUCTS, INC., www.mainmanufacturing.com

Advertisers Index

ROBERT J. SHEAF, JR. | Contributing Technical Editor

Cable Pulling Winch Loses Power

A CUSTOMER WAS HAVING PROBLEMS with a winch and vacuum/air pump system on one of his pieces of cable pulling equipment. The winch valve did not have any power to pull the cable up on the reel, but the vacuum/air pump worked fine. The customer ordered a new winch valve and, after installation, found it did not cure the winch's loss of power.

The pump circuit needed 1,800 psi, but the winch circuit only showed 250 psi maximum when trying to pull a cable. The only difference between the existing plumbing to the shown circuit was the winch valves tank line was connected before the filter, and only one valve function at a time was used. This should not have caused any problems because it had always worked before.

Any idea what the problem could be?

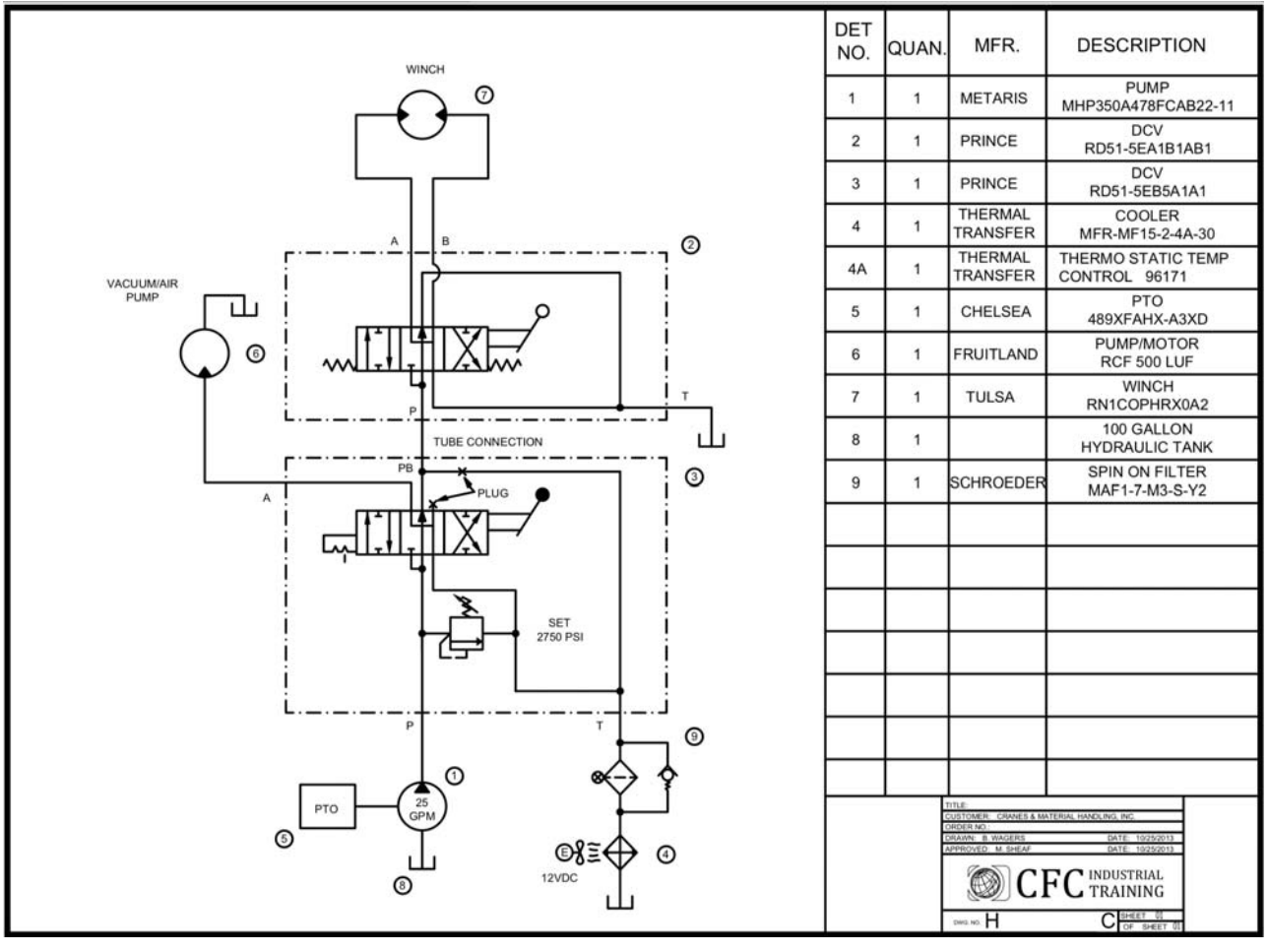
WHAT'S THE PROBLEM?

Think you know the answer to this month's troubleshooting problem? Then email your answer to rjsheaf@cfc-solar.com (put "Sept" in the subject line.) All correct answers received by Sept. 20, 2020 will be entered in a random drawing. The winner will be mentioned in a future column.

SOLUTION TO LAST MONTH'S PROBLEM: 60-Ton Press Overheats When Idling

THE OVERHEATING PROBLEM with the 60-ton press during idle was caused by the repair mechanic switching the location of the case drain checks. The ½ psi check was going directly to tank and not letting the case drain through the heat exchanger during idle periods. Switching their locations fixed the problem. hp

ROBERT J. SHEAF, JR., is the founder and president of CFC Industrial Training, formerly Certified Fluid Consultants, part of CFC-Solar Inc. CFC-Solar provides technical training, consulting and field services to any industry using fluid power technology.



DET NO.	QUAN.	MFR.	DESCRIPTION
1	1	METARIS	PUMP MHP350A478FCAB22-11
2	1	PRINCE	DCV RD51-5EA1B1AB1
3	1	PRINCE	DCV RD51-5EB5A1A1
4	1	THERMAL TRANSFER	COOLER MFR-MF15-2-4A-30
4A	1	THERMAL TRANSFER	THERMO STATIC TEMP CONTROL 96171
5	1	CHELSEA	PTO 489XFAHX-A3XD
6	1	FRUITLAND	PUMP/MOTOR RCF 500 LUF
7	1	TULSA	WINCH RN1COPHRX0A2
8	1		100 GALLON HYDRAULIC TANK
9	1	SCHROEDER	SPIN ON FILTER MAF1-7-M3-S-Y2

TITLE:
CUSTOMER: CRANES & MATERIAL HANDLING, INC.
ORDER NO.:
DRAWN: B. WAGERS DATE: 10/25/2013
APPROVED: M. SHEAF DATE: 10/25/2013
CFC INDUSTRIAL TRAINING
DWG. NO. H C SHEET 01 OF SHEET 01

FESTO

Always get a star performance every time★

Whether you're designing control systems or programming PLCs, you need to know the core products are going to perform like stars. Festo's Stars of Automation offers you a one-stop solution for products, with over 4,000 quality-engineered, high-performance components.

For great value, look to the stars. Choose Festo.

Discover all the Stars that will brighten your automation process at Festo.us/stars

Fast Shipping Guaranteed!

★ **24 hours** ☆ **5 days or less**

Hydraulics & Pneumatics

A Human Commitment

Our readers are committed to us, and we're committed to them. It's our responsibility to understand what they expect from us, and it's our privilege to write for each individual reader. No one else engages with key fluid power audiences like we do.

A Team of Individuals

Debbie Brady

Manager of User Marketing

Debbie has been working in audience development for most of her career. She has a soft spot for Hydraulics & Pneumatics and takes personal pride in ensuring that all subscribers have requested the magazine, and they all specify fluid power components.

Our Audience by the Numbers

- Average monthly reach: **264,284**
- Average unique monthly visitors: **146,013**
- Qualified print circulation: **28,885**
- Reader makeup
  - **75%**: Managers or above
  - **25%**: Other
- eNewsletter reach: **49,423**

Hydraulics & Pneumatics

ENDEAVOR BUSINESS MEDIA

To learn more about opportunities with Hydraulics & Pneumatics, visit us at *www.hydraulicspneumatics.com*