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BONUS SECTION

MH&L Material
Handling
& Logistics

Logistics Management Braces for the Future

7

TRADE SHOW COVERAGE

MODEX TRADE SHOW

Ground-breaking products and technologies unveiled at MODEX that are shaping the future of supply chain optimization and logistics efficiency.

17

FEATURED PRODUCTS



Right-Size Your
Packaging Operations

6



Problem-Solving
Workbench Tools

30



Mechanics Truck Sets
New Industry Standard

32



Transform Power
Distribution

39

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TABLE OF CONTENTS

VOLUME 89 • ISSUE 2 | NEWEQUIPMENT.COM

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COVER STORY



Editor's Choice	2
New Sources	3
Technology Toolbox	5
Product Guide	6, 30
MH&L	7
Trade Show: MODEX	17
Leaders in Manufacturing	19
Literature Digest	36
Product Express	37
Ad Index	38
From the Editor	39
Checklist	40

PRODUCT SPOTLIGHT

p 31

Autel Energy's AC Elite G2 EV charger offers fast charging for commercial vehicles with a charging power of up to 19.2 kW (80 A).



p 33



AMT's robotic induction system—ROBiN— improves the process of removing/organizing products on pallets for integration into AS/RS.

p 35

Elevate's EZ Quick Start Kits combine hardware and software to make advanced telematics accessible, straightforward, and immediately deployable.



p 38



Protecting against deflagrations and stable detonations of flammable gases, **WITT's F53Ndeto** extinguishes flashbacks before temperatures become hazardous.



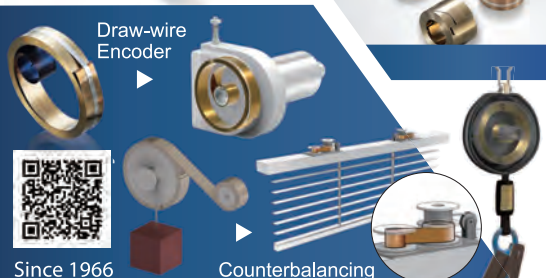
LONG-LIFE BELTS MOVE HEAVY LOADS

When a competitor's belts failed after only nine months service in a large postal distribution center, Dura-Belt's **Long-Life HT belts** replaced them. **Nine years** later, HT belts are still going strong -- moving your mail on conveyors that run 24 hours/day, 7 days/week.

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Knowles Corporation

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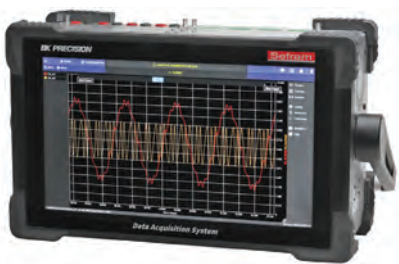
Unmanned Underwater Vehicle

An unmanned underwater vehicle, the **REMUS 130** enhances underwater operations with a compact, 2-person portable design, effortless payload integration, operational depths down to 328 ft (100 m), and a battery life of up to 10 hours. It features modern core electronics, navigation, and communications systems with modular, open architecture interfaces for wet or dry payloads. It's intended for data collection and oil & gas exploration.

HII



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High-Speed, Modular Data Acquisition Recorder

The **DAS1800 data acquisition recorder** has multiple input modules that can be configured for a variety of different applications. With a single module, users can measure voltage up to 600V DC, current (shunt), and temperature with thermocouples or RTDs. The built-in li-ion battery provides up to 3.5 hours of operation for field testing.

B&K Precision Corporation

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Smart Gripper Adapts to Tasks at Hand

Using sealing foam to adapt to any product, the **Cobot Smart Gripper CSG** offers 3 versions for different environments such as pick & place in packaging, assembly tasks, or mechanical processes. The electric version has an internal 24V vacuum pump for compressed air-free production. The internal ejector version has a multichamber ejector with a blow-off function. The standard version has a connection for companies with an existing external pump.

FIPA GmbH

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Autonomous Pallet Jack

Part of the PickPal product line, **PickPallet** provides case-to-pallet pick assisting and pallet movement throughout the warehouse. Handling closed and open loop pallets with a load capacity of 3,300 lb. (1,500 kg), it fits standard U.S., European, and Australian pallet sizes. Its navigation picks the most efficient route while detecting obstacles to avoid collisions.

Tompkins Solutions

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Automotive Software Development Kit

The world's first ready-to-use kit for Software Defined Vehicle creation, the **SDV Kit** addresses automakers' critical demand for faster vehicle software engineering. It allows engineers to develop vehicle software 2x faster, reducing time-to-market with 4x less cost, with no compromise on quality, safety, and security. AI-powered tools assist engineers from requirements to certification with 200+ ready-to-use vehicle features with requirements, architecture, software, and tests. An electrical/electronic architecture with a SODA-approved electronic control unit and a full range of vehicle engineering services support development needs.

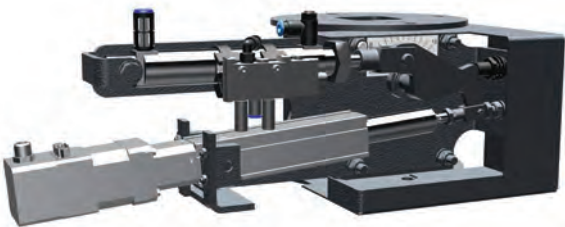


SODA.Auto UK Ltd.

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Valve Creates Intelligent Shot Blasting

PowerLine valve is the first blast media flow control based on AI. The intelligent shell valve automatically adjusts the blast intensity of turbines for different shot blasting requirements and takes place independently from the turbine RPM without manually adjusting the blast media flow. Users can automatically create separate programs for each turbine within a few minutes by entering optimal operating parameters—throwing speed, blast media flow, or amperage draw—at the operating panel. Blast media flow can be increased or decreased depending on requirements.

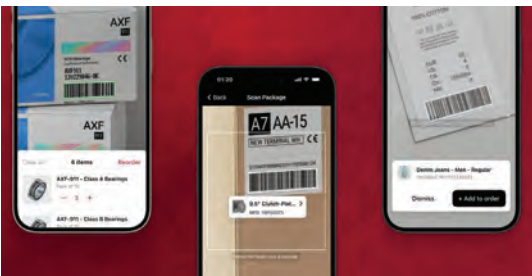


Rösler

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Integrate Barcode Scanning Into Mobile Apps

Barcode Scanner SDK—a solution that turns mobile devices into barcode scanners—offers ready-to-use UI Components for iOS and Android, letting companies provide scanning interfaces without building them from the ground up. **RTU UI v.2.0** offers configuration options to quickly adapt its visual appearance including a color palette to match branding as well as wording and position. It also supports single and multiple barcode scanning along with scan & count to scan multiple barcodes at once while identifying repeated ones.



Scanbot SDK GmbH

More online: newequipment.com/21284833

Safety Data Platform for Exosuits

Verve Logic, a software and data analytics platform, integrates into the company's wearable robotics SafeLift exosuit to pinpoint critical areas that pose injury risks to workers. Sensors embedded in the exosuit collect 3D motion and force data while the suit is in use to deliver actionable reports and insights such as ergonomic risk analysis, trend analysis, exosuit utilization, lift count, usage duration, and weight offloaded, as well as identifying risky movements, such as prolonged bending, excessive forward bending, twisting, and side bending.



Verve Motion

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Wheeled Li-Ion Battery Cabinet

The **Lithium-Ion Battery Cabinet** combines mobility with stringent safety standards, meeting and exceeding IFC24 storage requirements and lasting 10+ years. Constructed from aircraft-grade aluminum and stainless-steel hinges and hardware, each battery is able to be isolated within the cabinet, reducing the risks of thermal incidents. It can be customized for various shapes and sizes of batteries, components, and other solutions, protecting against thermal runaway scenarios

Americase

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Additive Neutralizes Odors in Asphalt Applications

The **1300 series** provides manufacturers in the asphalt and paving industry with an improved response to strong odors associated with operations. By using plant oils to address hundreds of odor-generating compounds, such as hydrogen sulfide and mercaptans, the additive neutralizes airborne chemical compounds that cause offensive odors. Users can simply apply by directly blending into hot mixes or distributing in the air via vapor phase systems.

OMI Industries

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Advancements in Industrial Bearings and Seals

by Sheila Kennedy, CMRP

How bearings and seals are constructed and managed makes all the difference in their performance and life span. New monitoring and maintenance aids and distinctive designs improve bearing efficiency, effectiveness, and reliability. Purpose-built sealing solutions meet complex requirements for uniquely challenging applications.

Novel Bearing Solutions

Bearing condition assessments and predictive maintenance help prevent downtime. **OnTrak Wireless from UE Systems** unifies the effort with a multiparameter, bearing-health monitoring sensor and automated precision lubrication. The remote sensor monitors friction in real time, an AI-driven UE Insights platform supports early detection of anomalies, alerts are generated, and automatic lubrication is optimized for the condition.

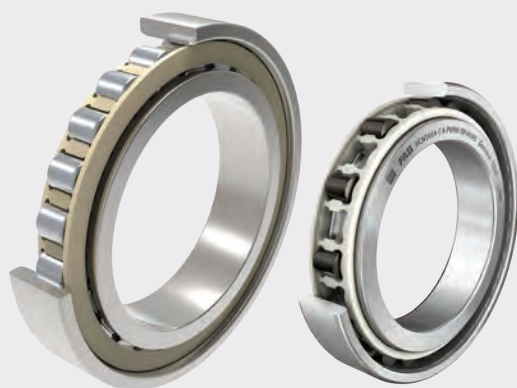
OnTrak Wireless uses an “ultrasound-first strategy complemented by advanced vibration and temperature metrics through the 950BT sensor,” says Blair Fraser, VP at UE Systems. “By incorporating autonomous precision lubrication, the system prevents up to 80% of premature bearing failures.”

The new **Bearing Toolbox calculator from SDT Ultrasound Solutions** is an upgrade for the company’s Ultranalysis Suite 3 (UAS3) software platform. The calculator provides a database of more than 50,000 bearing references with fault frequency cursors from major bearing manufacturers, helping technicians who are analyzing ultrasound and vibration data trends to identify and diagnose bearing faults and take action more efficiently.



Part of the Ultranalysis Suite 3 (UAS3) software platform, the Bearing Toolbox calculator helps you diagnose bearing faults by identifying which ones have defects, where they are, and what kind they are.

© SDT Ultrasound Technologies



The N10 Cylindrical Bearing Series feature a new cage construction that simplifies pneumatic oil lubrication and leads to a more uniform temperature behavior for longer spindle and machine life.

© Schaeffler

Faults in any of the four bearing components generate specific frequencies based on the bearing geometry and rotating speed.

These four fault frequencies are commonly termed:

- BPFO – Ball Pass Frequency, Outer Race
- BPFI – Ball Pass Frequency, Inner Race
- BSF – Ball Spin Frequency
- FTF – Fundamental Train Frequency

“The Bearing Toolbox simplifies ultrasound data analysis by reducing the amount of time it takes, not to mention the monotony and human error aspect of having to perform these calculations manually,” says Matt Jeffrey, reliability technician at SDT Ultrasound Solutions. “Working with a wide array of bearings across several plants, I appreciate the ability to add custom bearings to the existing bearing reference database.”

A new bearing cage design for the **N10 cylindrical roller bearing series from Schaeffler** was developed to deliver greater performance and reliability. The cage construction simplifies pneumatic oil lubrication for the super-precision bearing series, allowing for more uniform temperature behavior of the bearing, longer grease operating life, and an expanded application range.

“Schaeffler optimized the guidance system of the PEEK cage in our N10-series bearings to deliver better high-speed stability, lower friction, and improved lubricant flow with either grease or oil,” explains E.R. Muntz, senior application engineer for industrial automation at Schaeffler. “The result is a cylindrical roller bearing product

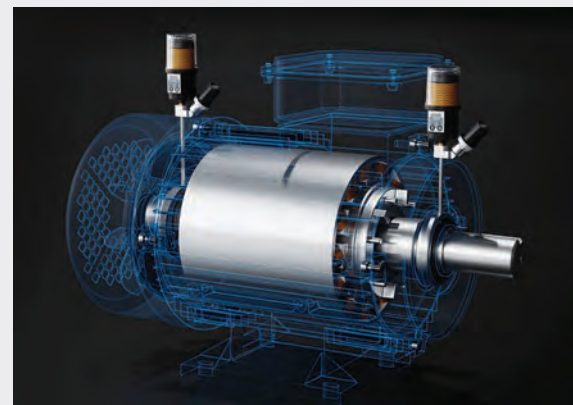
family with higher permissible speeds, lower noise, and reduced operating temperatures.”

Targeted Seal Designs

Sealing requirements vary by application. The **Type SB2/SB2A USP seal from John Crane** is designed for pumps and other rotary process equipment used in environmentally hazardous and abrasive applications in the pulp & paper and mining industries. It combines the company’s Type SB2/SB2A heavy-duty dual cartridge seal and Upstream Pumping (USP) seal face technology to improve reliability and reduce water and power consumption.

Type SB2/SB2A USP is “designed to operate in harsh conditions, handling abrasive fluids and slurry duties, while combating severe-service conditions such as high-heat generation, low-lubricity, and dry-running,” says Minhal Rizvi, global product manager at John Crane. “Our unique USP technology virtually eliminates cooling and flush water requirements and generates considerable energy savings.”

For rigorous oil and gas industry requirements, products such as **DuPont’s Kalrez OG193** perfluoroelastomer parts and Vespel parts and shapes enable high-performance, mission-critical sealing. Kalrez OG193 combines best-in-class rapid gas decompression (RGD) performance and chemical resistance with good low temperature and thermal stability, as well as excellent versatility, says Shyamal Desai, global product manager for DuPont Kalrez.



OnTrak Wireless combines ultrasound, vibration, and temperature monitoring in one sensor—proactively safeguarding bearing health by automating lubrication based on actual conditions.

© UE Systems



The Safeseal Type SB2/Type SB2A is a dual-cartridge seal with a double-balanced design for use with environmentally hazardous and abrasive fluids, most often used in pumps in pulp mills, minerals processing, and other slurry duties up to 40% solids by weight and a solids hardness of 8 Mohs.

© John Crane

“DuPont Vespel polyimide parts and shapes offer consistent low permeability and exceptional sealing properties, making them ideal for valve stem packs and valve seats and enabling significant reductions of fugitive emissions in applications such as gas pipelines,” Desai adds.

Collaborative robots, or cobots, have unique sealing needs. A manufacturer needed a sealing solution to reliably protect the joints of its cobot from dust, splash water, and other contaminants over the cobot’s life. “Based on



Kalrez OG193 perfluoroelastomers is a 95 durometer (Shore A), FFKM compound that combines Rapid Gas Decompression (RGD) performance and chemical resistance with low temperature and thermal stability for the oil & gas industry.

© DuPont

this requirement, we designed a new sealing geometry, a z-profile, with a second groove,” says Alexander May, product developer at Freudenberg Sealing Technologies. “This significantly reduced the contact pressure and resolved the customer’s requirement for a moment of friction of less than 1 newton-meter (Nm).”

Freudenberg Sealing Technologies also had its supplier develop a three-component anti-friction coating with a high carbon content to further reduce wear. “The material



The Safeseal Type SB2/Type SB2A is a dual-cartridge seal with a double-balanced design for use with environmentally hazardous and abrasive fluids, most often used in pumps in pulp mills, minerals processing, and other slurry duties up to 40% solids by weight and a solids hardness of 8 Mohs.

© John Crane

used, 92 AU 21101, is very soft and flexible and has a Shore hardness of 92. The tensile strength is well above the required minimum value of 50 MPa,” notes May. **NED**

Technology Toolbox is a monthly feature by **Sheila Kennedy**, CMRP, that appears in our sister publication *Plant Services*. Email sheila@addcomm.com with products for consideration. The full Tech Toolbox library is available at: <https://www.plantservices.com/voices/technology-toolbox>.

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FROM THE COVER KICKER



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The 3D scanner allows users to run different product sizes that call for different film widths, allowing products to be fed without batching or manual changeover. Creating a strong seal through the pressure seal module with only 2 sealing operations, the system creates, deflates, and labels 10 to 20 packages/min.

Tension Packaging & Automation

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100-Ton Lock Grip Puller

The **LGH3100 synchronous lock grip system** delivers up to 100 tons of hydraulic force for pulling medium to large-size wheels, sprockets, bearings, and other shaft-mounted parts. All jaws are moved at the same time, allowing one operator to safely handle the removal of large wheels, bearings, and couplers with ease. Mounted on a rolling cart with large wheels and pockets for use with a forklift, pulling power is provided by an onboard electric 2-stage pump and remote control pendant.



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24TB Hardware Encrypted USB Drive

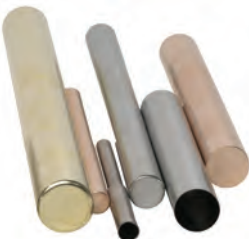
Fully hardware-based and 256-bit AES XTS encrypted, the **24TB Aegis Padlock DT and Padlock DT FIPS Desktop Drive** ensure sensitive data stays secure. Passwords and commands are entered on the keypad and all authentication and encryption processes take place within the device itself as data is written on the drive, never involving software or sharing critical security parameters with the host computer. Due to the encryption, firmware is locked down and can't be updated or modified, defending against malware and is only accessible by the user.

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Cambium Networks, Ltd.

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Logistics Management Braces for the Future

The economy looks healthy, but supply chain challenges require greater transparency.
p. 8



**Improve
Replenishment
Efficiency**
p. 12



**Supply Chain's
"New Normal"**
p. 14



**MODEX 2024
Highlights**
p. 16



Logistics Management Braces for the Future

The economy looks healthy, but supply chain challenges require greater transparency.

by David Sparkman

Analysis & Commentary

There is a famous story about President Harry S. Truman which may or may not be apocryphal but seems probable given his inclination towards acerbic observations. He is supposed to have asked his staff to find him a one-armed economist. When asked why, he replied, "Because every time I ask economists about the future they always say: 'On the one hand' and then, 'on the other hand.'"

So far this year most of the economic news has appeared to be glowing, with the stock market setting new records, employment rising beyond previous expectations, and consumer sales that remained strong following a healthy Christmas season, which had been accompanied by stronger consumer confidence.

But there are troubling signs as well, and some of these suggest that the numbers most often trumpeted by the news media may not be telling the full story and in fact could be concealing other factors driving unobserved tectonic shifts developing in how our nation's and the world's economies are heading.

The overall unemployment numbers may seem low in comparison to what they were during the pandemic when many businesses were locked down, but many of the new jobs created since then are part-time, and a large proportion of them are going to immigrants. And unemployed

migrants are not counted in the unemployment numbers because they can't receive unemployment insurance benefits and generally are left out of household surveys.

The labor force participation rate is nearing pre-pandemic levels at 62.5% registered in January 2024. Some economists expect that situation to worsen in the future and many employers continue to have trouble filling skilled positions.

Consumer sales are beginning to flatten out, suggesting that consumers are not quite as confident as earlier reports suggested. Americans are wary of possible future economic shocks, like last year's bank crisis, and remain under pressure from prices that rose dramatically and are still going up, even though at a more moderate pace. It is also impossible to gauge (but can't be ignored) how much anxiety is being created by the current Presidential election-year circus.

Consumers spent more than expected amid high inflation and high interest rates during 2023, but spending growth is likely to slow in 2024, asserts Jack Kleinhenz, chief economist with the National Retail Federation. Total retail sales for all of 2023 were up 5.32% over 2022, and core retail sales were up 4.46%.

Pandemic savings that boosted spending last year are shrinking, revolving debt has risen to pre-pandemic levels, and consumer confidence has risen but remains low, Kleinhenz points out. "Recent surveys show consumers are worried by a number of factors—the outlook for income, business and job market conditions slowing because of higher interest rates, ongoing inflation, and political stress."

Inflation remains stubbornly persistent. It may not be rising at the frightening pace it was a few years ago, but a monthly rate of 3-4% increases on top of the previous steep price hikes is still having a nightmarish impact on all of us, especially lower-income people.

A fact seldom cited is that Americans are carrying record amounts of credit card debt. The assumption among those who analyze the credit card industry is that this is happening not because consumers are choosing to splurge on big-ticket items, but are racking up these debts by using their cards to keep up with inflation. In other words, when consumers can't afford the immediate choice of buying both food and medicine, they get out the credit cards.

When it comes to manufacturers, raw material prices are expected to rise 3.2% during the first five months of the year, and wages and benefits costs are anticipated to increase by 5.2%, according to the Institute for Supply Management.

Consumer spending has appeared to have stalled, and the signals about its future trends are not particularly encouraging, registering tepid numbers in the first months of this year.

For the first time since the administration of President Gerald Ford, inflation has become a major political issue during a presidential election year. President Biden, running for re-election, felt impelled to refer to it in an ad that ran during the 2024 Super Bowl where he condemned "shrinkflation"—where products are reduced in size and weight while their packaging (and price) remains the same.

Inflation has become such a potent concern that when it was reported in February that January saw a 3.1% increase—a number higher than projections had suggested—the stock market crashed more than 500 points

in a single day. The overall inflation rate also does not take into full account the spikes in areas that create ripple effects throughout the economy, such as recent hikes in diesel fuel, building materials and food prices.

Concerns also are resurfacing regarding the burgeoning national debt. Although critics of government spending have raised these concerns before, the United States is nearing the point where simply continuing to borrow the amounts needed to service the debt is seen as endangering the country's ability to raise money in the future or any address unanticipated future needs.

In 2024, the U.S. is projected to spend \$870 billion on interest payments on the national debt. By contrast, the federal government is expected to spend \$851 billion on Medicare and \$822 billion on defense. The overall deficit is expected to rise to \$1.6 trillion in Fiscal Year 2024, and apparently there is little political will to do anything about it.

All of this is making our economic future more precarious. This is not just a concern being raised by right-wing advocates and politicians taking shots at the current administration, but is considered worrisome even by those who would not normally be viewed as raising this issue for short-term political gain.

Planning for Uncertainty

When it comes to how this is impacting the supply chain the most immediate effects stem from the hangover that followed the COVID crisis, resulting in changes in management priorities and an awareness that they need to be able to deal more swiftly with renewed challenges as they arise.

Transportation providers who were making good money while struggling to help retailers fill empty shelves during the pandemic have seen their numbers shrink as post-pandemic freight rates dropped through the floor in almost all modes. Large numbers of smaller truckers who popped up or expanded rapidly have closed their doors, along with Yellow Freight, one of the nation's largest trucking companies for decades. And although industry ranks have thinned, rates have remained depressed.

The freight brokerage industry suffered a similar pattern of boom-and-bust, as last year they experienced a wave of bankruptcies and closures, including Convoy, which enjoyed the backing of tech giants like Jeff Bezos and Bill Gates, along with Surge Transportation and Transplus Freight System. Other brokerage firms announced waves of layoffs throughout 2023. Even industry giant C.H. Robinson, which was riding high just a few years ago, is hurting now.

Throughout last year rail freight saw declines in traffic as well. The industry suffered black eyes from the East Palestine, Ohio, derailment and hazmat explosion and a messy confrontation with its multiple labor unions late in the year. The labor woes and continuing complaints from rail shippers about poor quality service are a hangover from the industry's embrace of the Precision Scheduled Railroading operations model, which some major rail lines are pulling back from. In the meantime, shippers and their customers must continue to deal with subpar and unreliable rail service.

The ocean freight industry is booming but trouble has surfaced because of inefficiencies leading to bottlenecks at some North American ports. Conflict in the Middle East





Rather than simply shifting single-sourcing models to locations closer to home, linear supply chains are also giving way to a much more networked ecosystem with redundancies built in to prevent a single point of failure.

— James Sirk, CEO of Tradeshift

unleashed attacks on shipping in the Red Sea that continues to hurt global trade. Unchecked piracy in the Indian Ocean has forced changes in routing for many ships as well. Nonetheless, ocean freight leaders appear to remain optimistic about their industry's future prospects.

Air freight is another mode that has experienced a bumpy ride since the pandemic. Rates remain depressed but are improving, in part because of the recent disruptions to ocean shipping in the Middle East. The industry's overall numbers were negatively impacted as well by retrenchments by the giant package carriers FedEx and UPS, who are both heavily engaged in air freight. The layoffs of pilots and crews and cutbacks in operations and equipment purchases appear to be prophylactic—designed to protect their companies from rising costs in the face of potentially shrinking demand.

For shippers and others dependent on freight transportation services, trying to manage all of this creates real headaches, not just metaphorical ones. “Many of today's supply chains remain excessively lengthy and shrouded in opacity, making them ill-equipped to adapt to an increasingly turbulent world,” observes James Sirk, CEO of Tradeshift, a U.K.-based firm which provides high-tech solutions for supply chain and other payments.

“Rather than simply shifting single-sourcing models to locations closer to home, linear supply chains are also giving way to a much more networked ecosystem with redundancies built in to prevent a single point of failure,” he adds. “Such reconfiguration requires quick identification, vetting and onboarding of new suppliers, emphasizing the need for efficient systems and processes.”

Sirk and other logistics experts believe the keys to managing today's overextended supply chains buffeted by continual and often unpredictable change are automation and artificial intelligence (AI). And that extends beyond managing daily operations, Sirk believes. “To build supply chains capable of weathering periods of volatility, supply chain operators need to be able to spot problems early. That requires visibility into the status and health of suppliers, often numbering in the tens of thousands.”

The old adage still applies: You can't manage what you can't measure. This means expanding the capabilities of traditional transportation management systems (TMS), according to the 2024 State of the Third-Party Logistics

Industry Report issued by the logistics management software supplier Extensiv.

“Identify how your business can incorporate automated rate shopping into your order fulfillment process to get the lowest possible rates for each shipment,” the company advises. “Furthermore, utilizing advanced shipping software equipped with analytics tools enables you to optimize routing, track shipments in real time, and anticipate potential disruptions.”

Extensiv also contends that in order to collect the necessary fulfillment and order data to train AI-powered demand forecasting programs, retailers and merchants need to be able to access this information through system integrations. “A connected network of AI, machine learning and fulfillment software tools can provide a comprehensive overview of operations, from warehouse management to transportation logistics.”

Their opinions are also held by other logistics experts who agree that transparency is the highest priority for supply chain managers and will be for some time to come. Some customers may want the fastest delivery times while others are willing to wait for shipments to arrive, but one thing they always agree on is that the schedule ultimately must be reliable enough to plan adequately. If it always gets there in two weeks or the next day, they can manage that—it's the inconsistency and unreliability that became more prevalent in recent years that have created havoc.

Warehouse 3PLs Offer Solutions

In the midst of this roiling change is the warehouse third-party logistics (3PL) industry, which boomed during the e-commerce boom prior to the COVID crisis, during which it profited from the need for amped up supply chain management storage services, as well as the burst of economic growth following widespread lockdowns and their customers' desire to build up safety stocks to prevent consumers from being confronted by empty shelves.

But those days are behind us now, and industrial real estate experts are seeing modification of demand in the commercial warehouse and distribution center market. Due to the increased cost of financing and falling demand for new space in some areas, industrial starts declined by nearly half last year, notes Yardi Matrix, a commercial real estate data and research firm.

The global industrial real estate giant Jones Lang LaSalle (JLL) also reported that 2023 was generally sluggish in nature because it confronted obstacles including elevated interest rates, inflation, and reduced sales and leasing volumes. Industrial transactions declined by 54% in 2023 from 2022 levels as elevated interest rates challenged buy/sell decisions, the company said.

However, JLL and others believe that the warehouse industry will remain relatively healthy well into 2024 given the continuing needs for its services, especially when it comes to the highly diversified warehouse-based 3PLs that offer a broad range of supply chain management services.

It's not just 3PL facilities that are adjusting to the slower demand. Retail- and manufacturer-owned fulfillment operations have been under the microscope since last year. Many of these operations that expanded during the pandemic are either being shuttered and/or are shedding employees. Part of the employment reduction also can be attributed to increasing reliance on robots to do the work in fulfillment centers.

Warehousing is expected to be on the rebound in 2024, according to commercial real estate experts like Colliers. It points out that in 2023 the industry was buffeted by the fact that, after experiencing a period of intense demand, record new supply outstripped demand. Last year developers added a staggering 607 million square feet of new space, far outpacing the net absorption of just 231 million square feet.

As a result, vacancies increased during each quarter of last year, culminating in the highest rate since 2016. “The balance between supply and demand looks to gradually return in 2024 as vacancy stabilizes and the market prepares for its next growth cycle,” Colliers predicts. However, the company also sees industrial real estate vacancy rates climbing higher in markets where significant speculative development is still underway, exceeding 10% in some markets. It predicts that with construction starts remaining limited, new supply will fall off during each quarter of 2024, resulting in supply and demand returning to equilibrium by year's end.

One sign of the reconsideration of the shape of supply chains was the effort to make it more responsive and resilient by moving away from the embrace of “mega-warehouses” to make more use of smaller facilities

closer to customers, as well as increased reliance on in-store pick-up and turning to some suppliers to make the deliveries.

Among the Top 100 industrial leases inked in 2023, 43 of them were for at least 1 million square feet, compared with 63 the previous year, according to the industrial real estate management firm CBRE. Last year's top 100 industrial leases totaled 98.6 million square feet, down by 8% from 2022's 106.9 million total. The average lease size among the top 100 fell to 986,744 from 1.07 million square feet.

Also telling were the type of tenants who were involved. The share by traditional retailers/wholesalers fell to 30 from 53, while that of 3PL warehouse operators rose to 29 from 11, the company reported. The food & beverage, automotive, building materials, manufacturing and medical sectors all had a larger share of the top 100 last year when compared with 2022.

However, CBRE predicts some improvement in mega-warehouse demand over the course of this year as the economy and rental rates stabilize. It also says the large increase in construction last year will provide more opportunities for expansion, particularly in markets with the highest rates of speculative development: Dallas-Fort Worth, Atlanta, Phoenix, Indianapolis and Columbus, Ohio. **MH&L**

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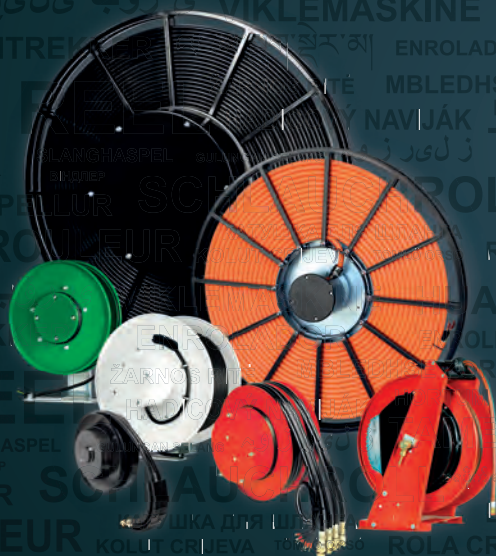


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Using Optimization to Improve Replenishment Transportation Efficiency

Learn how to implement effective solutions that leverage optimization technology.

by Tom Moore

A VP of a \$40 billion company explained a common problem, “We ship a product that may not be needed from our plants, which struggle to ship it, to our DCs, which struggle to receive it, at a premium cost.” He could have added, “And the next day, we may have no volume on that lane.” Another company complained, “Our replenishment shipments are only 85% full—this is a huge waste of transportation payload.” Simply put, operations get plans from their supply planning systems that are not efficient or, in some cases, executable.

Recognizing that good companies create good plans, and great companies execute, this article provides insight into how to take plans from supply planning systems that don’t consider such things as carrier cost and warehouse throughput and space constraints and convert them into easy-to-execute instructions that recognize the realities of the supply chain.

Shippers Schedule Everything Else but not Transportation

Companies schedule operations—production lines and warehouses—but ignore transportation. This lack of planning leads to inefficiencies and increased costs.

When scheduling, most companies consider the capacity in manufacturing, material handling and other operations, but they often assume that carriers’ capacity is unlimited and the price doesn’t change. This is not the case:

- When volume spikes, it’s necessary to go deep into the routing guide to find vehicles, often driving higher costs or requiring a sacrifice in quality or flexibility, and carriers may need to deadhead many miles to meet the tender. This generally comes at a price.
- When volume is down, labor sits idle, and carriers must go elsewhere to keep their trucks busy.

Volatility is rampant and painful, as the following example shows. How can a site or transportation manager cope with a week-to-week variation of 33 loads? (See **Figure 1**.)

This adds to the overall cost of operations, not to mention stress on both the shipping and receiving sites. So, any transportation schedule must also reduce volatility. It must also provide a firm order to the carrier (a tender) because most carriers don’t have sophisticated systems to manage projections—they want commitments.

Including Transportation in the Overall Plan

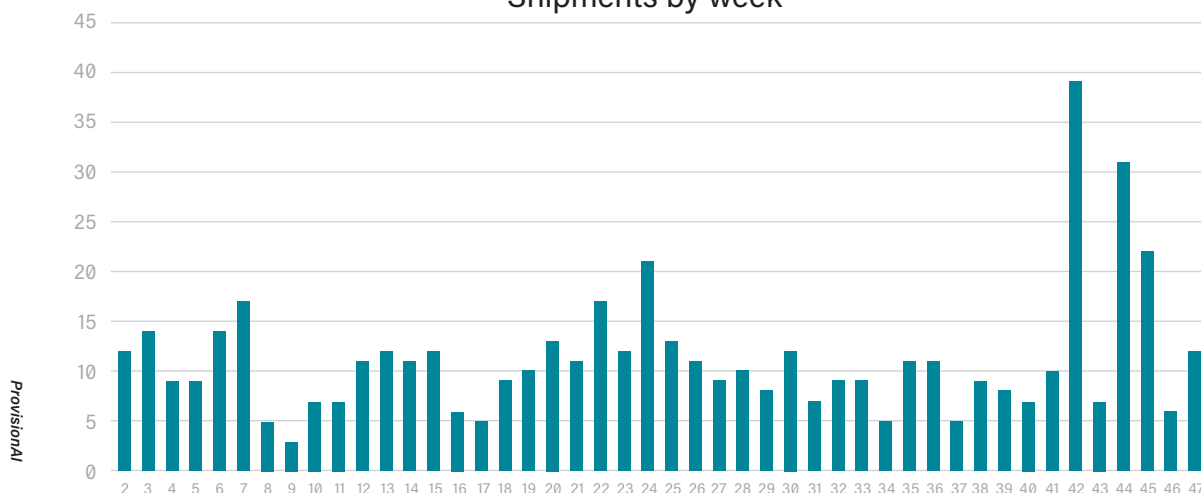
With the aid of load-building software, the deployment plan can be translated into a transportation plan detailing the number of trucks needed on any lane for the next 30+ days.

The solution to these challenges involves optimization that smooths deployment shipments by pulling high-priority volume earlier while pushing less-needed requirements to ship later. This reduces volatility and smooths the need for trucks over the next 30 days.

The beauty of this long-range plan is that it enables securing carrier capacity (trucks) earlier. Ordinarily, when securing equipment, the shipper has predefined the contents. The earlier this happens, the higher the probability that the load is not exactly what is needed days later. But, except for rare cases, the trucking company doesn’t need to know the load contents. Thus, there is significant value in delaying determining load content to maximize the appropriateness of load contents and improve fill rates. It also allows maximizing:

- Trailer utilization—also known as load optimization.
- Shipping the most needed product

Figure 1
West Coast to Midwest
Shipments by week



Doing all this manually is not easy or maybe even possible in today's short planning windows. The sheer volume of data and the reliance on what happens on any day, depending on decisions made on previous days, makes for complex modeling. It's time for mathematical optimization. The process outlined in **Figure 2** shows how one Fortune 100 CPG manufacturer is leveraging optimization today.

Optimization: Key to High-Service, Low-Cost

Software that simultaneously considers all capacity, cost and operational constraints of the whole network is crucial. For example, suppose a warehouse has a space constraint. In that case, all the supplying locations need to understand and coordinate to determine which sites have the highest priority full truckloads that should ship into that location. Fortunately, existing operations research technology is very good at managing all the locations and flows simultaneously.

However, this software is not good at determining what should be on each vehicle. This is critical in the consumer products world because movements among sites are traditionally always on a full truckload basis. Thus, it's necessary to combine multiple technologies to create the mathematical optimization of what truck should ship from where and establish the priority of each load. Such software optimizes order fill, understands and respects priorities, throughput,

and space constraints, and minimizes costs to determine the number of loads from each source to each destination.

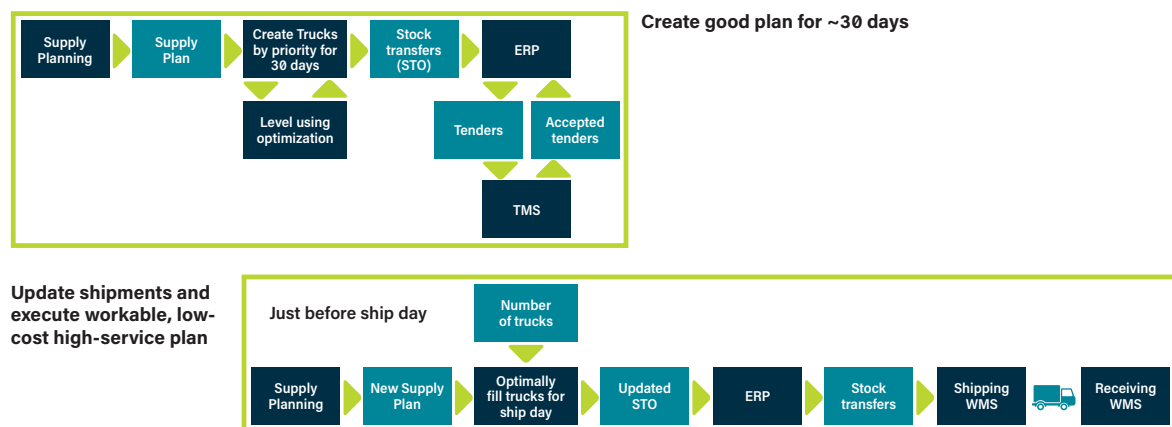
Getting to the Front of the Carrier Line

These loads are tendered with a "dummy" code to reserve the trucks. The carrier has a firm order to supply a vehicle on a given day, while the shipper has multiple days to determine what should be placed on that truck. Later, much closer to the actual shipment date, an optimizing load builder, seeing the number of trucks to be filled and using the latest data, including priority, from the supply planning system, can quickly define what should be on each load. Notably, the loads must be damage-free and ensure the legality of axle loading.

Again, to execute, there is a need for a plan that works in the real world. Knowing what is on the load and understanding that it can be successfully executed, the load builder will update the information in the system of record. There is an added benefit here—using clever mathematics, the optimization successfully matches items on each load to get 5-10% more payload and requires fewer trucks over the long haul.

Focusing on ensuring that the limited number of reserved trucks have the highest-need products ensures that the most critical items are shipped first, improving order fill and enhancing customer satisfaction.

Figure 2



Using Optimization Improves Transportation Efficiency and Cost

The results speak for themselves:

- Transportation is now being scheduled many days into the future in such a way that the plan can economically be executed with high customer service.
- Both shipper and carrier costs are significantly reduced as first-tender acceptance rises to a much higher level. This proves that stretching the time between tender and loading enables shippers to get to the front of the queue.
- Carriers, recognizing significantly less volatility on each lane, are "encouraged" to reduce their rates to reflect the increased ease of doing business with the shipper.
- Detention is substantially reduced.
- Warehouse overtime is reduced.
- Planning staff have less stress with fewer touches.
- With load optimization saving 5-10%, fewer trucks are needed, generating a solid return on investment in both dollars and carbon savings.

In the first installation of such technology, the payback was less than three months. But that's not all: order-fill rates and on-time customer delivery increased.

Optimizing supply chain operations requires a comprehensive approach that minimizes volatility and respects real-world network constraints. Good companies plan; great companies create an executable plan and execute plans that are both high service and work. This can only be achieved by implementing effective solutions that leverage optimization technology. By doing so, companies can significantly improve their supply chain operations, leading to cost savings, improved efficiency and increased customer satisfaction.

Tom Moore is CEO and founder of ProvisionAI, a provider of supply chain optimization solutions.

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Global Disruption: How Supply Chain Leaders Can Adapt to the Latest 'New Normal'

Leaders are using technology to quickly react to global events, changes in demand and production trends.

by Darcy MacClaren

Wanting to check items off your to-do list is human nature. The feeling of accomplishment that comes from completing a task can be extremely satisfying. Where this approach causes problems is when we convince ourselves we don't need to return to those items for a long while.

This is especially true for supply chain managers today. It can feel good to implement a new strategy or software solution or system or whatever it might be. But

that doesn't mean your work is done. The recent attacks on ships in the Red Sea have served as yet another reminder of that, in delivering an all-too-common shock to global trade, shipping, and distribution.

It is, of course, complicated. Iran-backed Houthi rebels in Yemen, seeking to stop Israel's offensive against Hamas in Gaza, are attacking cargo ships navigating the waters connecting Asia with Europe and the United States, forcing traffic away from the Suez Canal and around the southern

tip of Africa. This disruption is causing delays and driving up costs, all while the world continues to fight off inflation. At the same time, halfway around the world, passage through the Panama Canal is restricted due to low water levels caused by drought. Not to mention, Chinese factories will be closed in mid-February for the Lunar New Year holiday. Like I said, it's complicated.

Despite all this complexity, the reality is straightforward: Supply chain simplicity

is an oxymoron. Leaders and strategists must view the work of supply chain maintenance and optimization as never-ending and always evolving. It's as vital as ever that they continue finding ways to reinvent and transform supply chain practices, processes, and strategies to be prepared for any unforeseen circumstances. The old world, as much as some people like to think otherwise, just isn't coming back.

In this article, we'll discuss some ways supply chain executives can plan and

respond to disruption — in a day and age where the exception is, in fact, the rule.

20/20 Vision, Just-In-Time

Many supply chain managers today are playing a dangerous game. A monthly survey of them (courtesy of the Logistics Managers' Index) found that inventory levels across organizations declined in December for the seventh time in eight months. This shows that — despite the never-ending turbulence — a “just-in-time” inventory management strategy is coming back into style in some places.

However, things aren't always as simple as they seem. What looks like shortsightedness by some in this survey is actually — in some cases — smart thinking made possible by technological advances in supply chain strategy. Put another way, the visibility into leaders' full supply chain picture is better than ever thanks to today's software and solutions.

Best-in-class executives aren't just reverting to a state of “back to normal” when it comes to supply chain strategy. They're using technology to keep up with the new normal — in a way that enables them to quickly react to production trends, changes in demand, and global events. They can easily shift between “just in case” and “just in time,” because they truly know what's happening.

More so, the tools built to enable this kind of targeted, real-time approach are advancing further. Forecasting and understanding of consumer sentiment is continuing to improve — meaning companies can more accurately predict demand every day. This equals better lead times, more effective executive review cycles, and more reactive inventory levels.

Putting the 'R' in Data

Not only is visibility improved in today's supply chain, what decision makers are visualizing is better as well. In other words, getting it right is now possible through leveraging detailed, actionable data. Think of the breadth and depth of the kind of information that is available in real-time these days, including: • Current demand needs • Ongoing production schedules • Shipment status updates • Clear timelines for delivery

Live data also enables predictive — rather than reactive — insights to fuel the supply chain planning necessary for an enterprise to align its strategy with genuine demand for its products and services.

Data must also drive resiliency for a global enterprise. This means having relevant data that speaks to your business

needs and decision-making priorities, responsible data that respects the privacy of sensitive information and avoids bias, and reliable data that justifies its own business value with the benefit it provides. This will help build a risk-resilient operation.

Natural Benefits of Artificial Intelligence

Another vital element of a modern supply chain strategy is, of course, artificial intelligence (AI). It's still the talk of the town, and it's widely accepted that it will aid managers and executives in making informed, confident decisions about the challenges they face every day.

But what will this actually mean? Outside of general data improvements, what benefits will AI offer to supply chain leaders? A few things jump out:

- **Process Optimization:** Enterprises will be able to use AI, for instance, to quickly analyze vast amounts of data from manufacturing processes — helping to identify patterns, bottlenecks, and workflows, and then working to optimize them. This can lead to not only reduced downtime but improved overall efficiency and productivity.
- **Predictive Maintenance:** AI will also enable real-time equipment monitoring, anomaly detection, and prediction of potential failures. By identifying maintenance issues and lifecycles in advance,

AI can improve equipment lifespans and ensure smoother operations across company facilities. • **Quality Control:** AI should even enhance quality control capabilities — by analyzing data from sensors, cameras, and other areas to properly identify defects and challenges as they arise. This will enable manufacturing teams to address issues promptly, meaning reduced waste and better overall product quality. • **Risk Assessment and Predictions:** Algorithms designed to analyze historical data, current events, and security intelligence can also be created using AI to better assess risk in both the present and future. • **Real-Time Monitoring and Alerts:** This is another way AI can keep decision-makers up to date on shipments so they can take immediate, decisive action that benefits their enterprise. • **Security Analytics:** AI can analyze data from various sources, such as surveillance cameras, radar, and satellite, to help detect anomalies and potential security threats. • **Natural Language Processing:** Chatbots and virtual assistants, powered by AI, can serve instant information to anyone in the chain, meaning quicker access to relevant information and faster, more informed decisions.

There are clearly myriad ways AI can help enhance productivity, efficiency, and decision making thanks to its ability to perform large-scale analysis in an accurate,

automated fashion. Leaders must simply keep in mind that AI is best used as a tool that augments human decision making and wisdom — not one that intends to replace it.

Connect, Contextualize, Collaborate

When adopting, implementing, and optimizing AI for your organization, remember the importance of the “Three Cs”: Connecting, Contextualizing, and Collaborating. Everything you implement from a technology perspective must flow across your entire supply chain strategy. One-off forays into transformation or change won't make a lasting impact. You also must keep things in context if you want to avoid making decisions that can come back to bite you. Something that makes sense on paper might not make sense in reality. Lastly, you must remember that successful supply chain operations are a team sport. Collaboration — across your business and your broader networks — is integral to success.

In the end, it's all about consistent, dedicated effort — so that you're built to succeed no matter what's happening in the world that day. So, throw away that to-do list; it's time for a strategic approach that's a little more high-tech. **MH&L**

Darcy MacClaren is chief revenue officer at SAP Digital Supply Chain.



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A More Intelligent Way to Handle Materials: Highlights from MODEX 2024

Is AI ready for prime time in the warehouse?

by Dave Blanchard

One of the dominant themes of MODEX 2024, a recent trade show focused on material handling and logistics solutions, was how collaborative robots, autonomous vehicles and machine learning-based software can speed up the movement of products through a warehouse or distribution center. In fact, according to the 2024 MHI Annual Industry Report produced by trade organization MHI (which hosted the MODEX show in Atlanta) and consulting firm Deloitte, “Artificial intelligence adoption and interest are at historic levels, with 84% of survey respondents now reporting plans to adopt AI technologies within the next five years.” AI solutions, in all their many flavors, featured prominently in the report as well as throughout the MODEX exhibit halls.

Two of the reasons for AI’s emergence (or reemergence; the core technology itself dates back at least to the 1950s) are directly related to the top two supply chain challenges cited in the report:

1. Price increases from inflation,
2. Talent shortages.

The report is based on a survey of 1,700 supply chain and manufacturing leaders, and focuses on the immediate need of companies to find solutions that are both cost-effective as well as human-centric. “The key question is: How do you bring the technology and the people together?” asked John Paxton, CEO of MHI.

“AI has the potential to create more resilient supply chains and transform the role of human workers in the space—creating a variety of new jobs and improving real-time decision-making and efficiency,” said Paxton. He noted that AI can help supply chain managers make better decisions faster, while using the technology to train workers more effectively and improve their overall skill level.

In fact, the collaboration between AI and workers was the theme of a panel discussion centered on the results of the survey. “There’s a fear that AI and robots are going to replace people,” pointed out Archana Wunsch, head of global strategy and transformation with Cook Medical, a manufacturer of medical devices. “We need to focus on how AI can enhance and improve workers’ jobs, and their company’s ability to serve their customers’ needs.”

Many people today believe that AI is something new, and in part they’re right if by “AI” they’re thinking specifically of generative AI tools, such as ChatGPT, which are aimed mostly at consumers who are intrigued by Google-on-steroids types of answers to their search engine questions. But research into AI has been ongoing for decades, and for almost that long various types of AI have been promoted as “the next big thing,” whether it was expert systems, neural networks, fuzzy logic, speech recognition, virtual reality, or numerous other technologies that were in search of solutions. And in fact those solutions did arrive, although not necessarily advertised as AI.

For instance, everybody today has access to and in fact regularly implements AI-based tools. Search engines (and not just the GenAI types) are AI-based. Smartphones, too, use AI in various ways, the most obvious being the intelligent agent Siri on Apple’s iPhone. And focusing more specifically on supply chain solutions, supply chain planning and forecasting tools are all based on AI technology.

At the MODEX panel discussion, the focus wasn’t so much on the familiar uses of AI technology as it was on new applications of the technology in material handling and logistics situations—in other words, what sorts of supply chain problems are best solved with AI? As Chaneta Sullivan, director of facility development and safety at fast-food retailer Chick-fil-A Supply, observed, “It’s important to know what problem you’re trying to solve with technology. You can spend a lot on solutions, but still not gain any answers if you don’t know what problem you’re trying to solve.”

“And, if you don’t bring your people along on the technology journey, you’re going to fail,” added Wunsch, who emphasized the importance of focusing on how to keep the workforce engaged at every step of the way.

Part of that comes from the ability of AI-based tools to mimic human decision-making. “Solutions with a bilateral exchange that pairs humans and technology together have the best use cases,” explained Randy Bradley, associate professor of supply chain and information systems management at The University of Tennessee. “They allow the workforce to become more flexible and less task-oriented, and they become a decision-support system and not a decision-making mechanism.”

So what kind of uses are AI being put to right now within the supply chain? According to the MHI-Deloitte report, the most frequent area is within logistics, shipping and transportation (34%), followed by supplier selection and due diligence (33%), and inventory management (27%). When asked about their adoption of AI technologies for any type of supply chain task, 27% said they are currently using AI; 58% said they plan to use AI within the next five years; and 15% said they are unlikely to adopt AI any time soon.

In terms of technology adoption in general, the MHI-Deloitte survey indicates that 55% of those polled have increased their supply chain technology investments from last year (although they didn’t indicate by how much). Of the 1,700 respondents, 88% plan to spend over \$1 million, and 42% plan to spend over \$10 million on supply chain solutions in 2024. According to the survey, this level of spending “indicates that the majority of surveyed businesses recognize the value of investment in a robust and efficient supply chain in ensuring smooth operations, reducing costs and improving customer satisfaction.” **MH&L**

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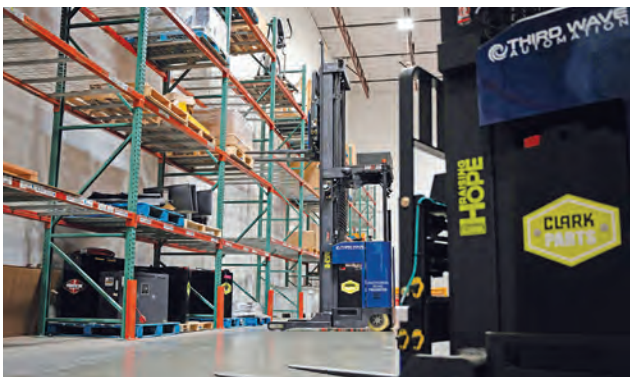


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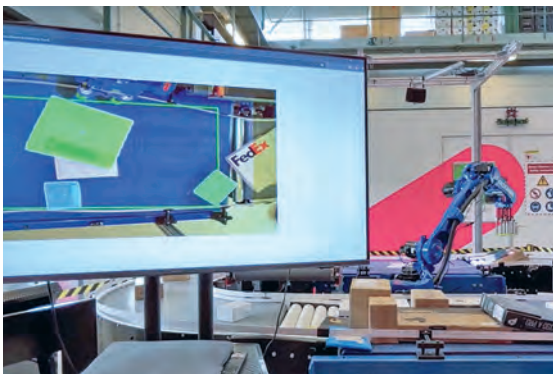


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Out-of-the-Box AI Robot Vision

Certified Vision Packs, using Fizyr's industry-leading Vision AI software for robots, reduces integrators' expertise, time, and cost requirements to implement automated warehouse robotics solutions. Ready to go right out of the box, the vision packs address 5 of the most complex automation challenges: pick & place, singulation, palletization/depalletization, detection, and trailer/container unloading. Each pack is validated, supported, scalable, and guaranteed. They also work with robotic cell setups of any type and make.

Fizyr



More online: newequipment.com/21284101

Wireless, Continuous Chargers for AGVs

The **NexSys AIR wireless charger** and the **NexSys+ Outdoor charger** are engineered for a wide range of AGVs. The NexSys AIR wireless charger has a space-saving design that eliminates charging connections and provides advanced safety features. Designed to withstand the elements, the NexSys+ Outdoor charger is protected by an IP54-rated enclosure for environments exposed to the weather.

EnerSys



More online: newequipment.com/21284120



Automatic Void Fill Dispenser for Packing

To use with HexaFil void fill, the **AutoHexaFil** automatic dispensing solution provides fast packing speeds and several programming modes. With a programmable screen and electric operation via a foot pedal, the machine quickly dispenses fill to the desired length. Four programming modes are available for supreme cushioning, blocking, and bracing: cut-to-length bulk bin filling, preset quantity, or hold until pulled by the operator, and manual continuous length—cut when the foot pedal is released.

HexcelPack LLC

More online: newequipment.com/21284205



Automatic Label Printer-Applicator Offers Out-of-the-Box Compatibility

The **6974 Label Printer-Applicator** can be used for all types of automated labeling applications and offers print speeds up to 18 in/s (457 mm/s). Eliminating label tracking or breakage, its heavy-duty backing rewind system, 16-in. (406 mm) OD label roll capacity, and intuitive color control display help achieve extended-run label printing. It prints 200, 300, and 600 dpi with optional RFID modules to enable encoding, printing, and application of RFID tags.

Fox IV Technologies, Inc.

More online: newequipment.com/21284020



Collision Prevention for AGVs and AMRs

Preventing collisions between transport systems in the warehouse, the **ELOshield forklift safety and pedestrian detection system** now offers a new ELOshield module for AGVs and AMRs. With ultra-wideband wireless sensors that offer a 360-deg. range of up to 82 ft (25 m), the radio-based module acts as a stand-alone antenna that can be easily installed on these vehicles due to its small size.

Elokon Inc.

More online: newequipment.com/21284008

Customizable Robt AS/RS Shuttle Systems for the Warehouse

HWArobotics launched 4 customizable shuttle robot systems that deliver high throughput for a wide range of industry sectors and can be quickly deployed.

The **SLS300 series standard tote shuttle storage system** delivers up to 24 hours of continuous operation, speeds of up to 9 mph (4 m/s), and handles up to 120 boxes/h. The **SLS400 series variable tote shuttle system** can mix and store containers of different sizes and can be configured to meet different efficiency requirements. The **SLS600 3D tote shuttle system** meets the needs of low-traffic, high-efficiency environments, such as spare parts, publishing, and e-commerce sites. The **FPSS1500 series pallet robot shuttle system** is a 4-directional, advanced AS/RS designed for pallet handling and storage, with global standard CE and UL certification.



HWArobotics

More online: newequipment.com/21284662

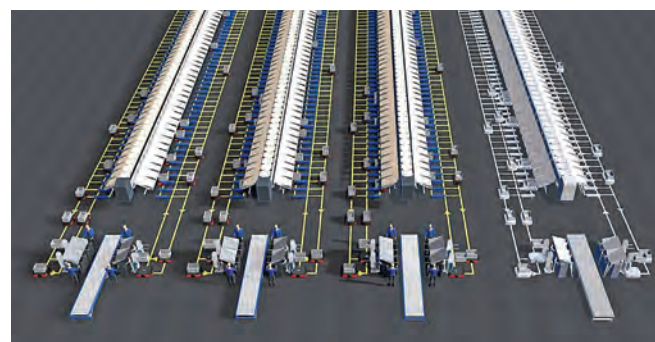


Flow Wrapper for Soft, Delicate Product

A servo-driven flow wrapper with a lower reel design for feeding soft or delicate products, the **FW 650SI flow wrapper** features high speed, little maintenance, and easy setup. Its end seal jaws use a box motion design for faster seal time on many different materials. With a 13.5-in. (343 mm) wide end seal jaw, it accommodates products up to 12-in. wide or 8-in. tall (305 mm or 203 mm) and handles up to 80 packs/min.

PAC Machinery

More online: newequipment.com/21284107



Post-Processing Automation for DCs

Fortna OptiSweep consolidates and transports small orders away from sorting systems autonomously in high-volume distribution centers. It uses Geek+ robots to collect orders from sorter divert locations and brings them to goods-to-person locations to deposit orders for bulk consolidation and outbound processes. Workers no longer have to bend and reach into bags to move items or walk great distances throughout the warehouse. It easily integrates with sorter systems and matches a range of throughput requirements, from 4,000 to more than 34,000 pieces/h.

Fortna Inc.

More online: newequipment.com/21285263



Lithium-ion Batteries Provide Longer Power

Second-generation, lithium-ion battery packs for Class II narrow aisle forklifts and Class I 4-wheel counterbalance forklifts provide more sustained lithium-ion power for extensive work shifts. The **M36-G2 lithium-ion battery solution** and the **X48-G2 lithium-ion battery pack** offer 630 and 840 Ah capacity options to bring more power and longer run times to warehouse operations.

Flux Power

More online: newequipment.com/21284015



Intelligent Sliding Shoe Sorter

TrewSort Sliding Shoe Sorter delivers high-capacity, high accuracy, gentle positive divert sortation of cartons, totes, jiffys, and polybags. The AI high-performance, self-learning actuators and inherent design for operations, maintenance, and installation deliver sortation capabilities to keep systems running reliably at peak performance. It offers intelligent high-density product spacing, catch-free transportation surface and divert elements, and high-performance materials that eliminate snag points and "walls" seen in other designs.

Trew, LLC

More online: newequipment.com/21285259

SPRING 2024

LEADERS MANUFACTURING

Fueling growth across the industry, these top powerhouse companies provide the tools, equipment, technologies, and solutions to unlock new capabilities and efficiencies from design to delivery.

Michael Annino | Shutterstock AI

LEADERS PROFILE

ACE CONTROLS INC.

**Control Motion and Vibration With ACE**

ACE Controls Inc., headquartered in Farmington Hills, Michigan, is a leading innovator in deceleration, vibration and motion control technology. Our quality and performance make us the first choice for the industry. Outstanding service, short development times, reliability and fast on-site availability make the difference to keep things running. Highest performance without compromise is our promise you can rely on.

ACE components can be used in a variety of applications and industries such as aerospace, aviation, machine building, marine, medical, oil & gas, packaging, and robotics. From up in the air to under the sea, ACE products:

- Slow down moving loads
- Increase efficiency and throughput
- Reduce vibration and noise
- Protect against wear and tear
- Reduce downtime
- Increase throughput
- Increase safety

With over 250 distributors across the globe, there's always an ACE expert nearby. Visit our website to find your nearest supplier, www.acecontrols.com.

Automation Control**Optimum tuning for any design**

ACE universal damping solutions convert kinetic energy in to heat. This makes machines faster, quieter, more durable, lighter, and therefore, more competitive and profitable. Here you will find the perfect selection of machine elements, which turn damaging forces into harmless heat. These solutions from ACE smoothly decelerate moving loads. This involves the lowest possible stress on machines, which makes the damping products from ACE so valuable.

Motion Control**Custom control of hand forces**

The ACE products in this segment enhance the quality of any type of movement. Anyone who wants to raise or lower loads, regulate the feed of an object

to the precise millimeter or gently decelerate rotating or linear movements will find the right solution here. ACE delivers industry leading quality. Our innovative solutions correspond with stringent requirements for ergonomics and individuality, including custom pressurized gas springs.

Vibration Control**Isolate unwanted vibrations**

This ACE product group includes innovative solutions to provide customers with the best assistance in isolation technology and vibration isolation. These machine elements are also distinguished by their light design and wide variety. The product range extends from extremely low frequency isolating pneumatic leveling mounts to ready-to-install rubber-metal isolators and damping pads. With this portfolio, ACE is capable of offering you customized vibration isolation for almost any application.

Safety Products

Protection for all machine designs under any condition. This ACE product group provides emergency braking to safely slow down moving loads and reduce damaging forces. Although the safety shock absorbers, TUBUS elastomer bumpers and clamping elements differ so much in design, every single ACE component provides the best protection for your machine. They demonstrate their main advantages in Safety Products emergency stop situations and, based on the protection they provide, are very cost-effective. Furthermore, they can all be easily integrated into existing design and largely work independent of energy supplies.

Engineering Tools & Resources

ACE has simple solutions to make your job easy, including a host of online resources and one-on-one assistance. Connect with ACE's application engineers who will work with you to calculate and select the right product for your needs. Or, take advantage of our online tools:

- Configuration and sizing tools
- Standard products available to buy online
- CAD library
- Blog featuring case studies
- VibroChecker iPhone app



A STABILUS COMPANY

CONTACT

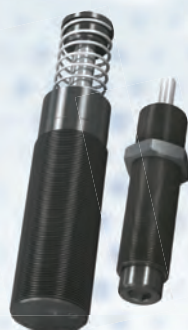
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www.acecontrols.com

WHEN PERFORMANCE MATTERS

trust ACE Controls with your motion and vibration control problems

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- INDUSTRIAL SHOCK ABSORBERS
- MINIATURE SHOCK ABSORBERS
- HEAVY DUTY SHOCK ABSORBERS
- PROFILE DAMPERS

MOTION CONTROL



- INDUSTRIAL GAS SPRINGS
- HYDRAULIC DAMPERS
- HYDRAULIC FEED CONTROLS
- ROTARY DAMPERS

VIBRATION CONTROL



- VIBRATION ISOLATION PADS
- LOW FREQUENCY PNEUMATIC
LEVELLING MOUNTS

SAFETY PRODUCTS



- SAFETY SHOCK ABSORBERS
- SAFETY BUMPERS

VISIT WWW.ACECONTROLS.COM TO LEARN MORE

LEADERS PROFILE

ADVANCE LIFTS

Our state of the art 120,000 square foot building houses all operations including sales, design, and manufacturing. Our company is ISO 9001:2015 certified and we also have a UL listed panel shop in-house.

Advance Lifts was founded in 1974 and quickly became the leading dock lift manufacturer in the country. We have maintained that position through innovative design, quick deliveries, and superior service. Our goal is to make the entire process of buying, installing, using, and servicing of our products as easy and trouble free as possible for each and every customer.

We are also dedicated to the principle of producing the most durable products in the industry. Our loading dock lifts, industrial scissors lift tables, industrial turntables, container tilters, container dumpers, work access lifts, multistage lifts, and reciprocating conveyors all have the longest and best warranties in their respective product groups.

Responsiveness is a key driver in our operations. More than 80% of the calls for quotations are satisfied during the initial phone call. Our service department is staffed so that knowledgeable people are available on initial calls and rarely require return calls.

Additionally, our services include the most complete website in the industry. Our website is available 24/7 and contains interactive product selection aids, photos, videos, operational specifications, architectural specifications, installation drawings, product manuals, and a listing of our nationwide distributor network. Therefore, if you have questions about our industrial lifts, you can get answers by calling a local distributor, calling the factory direct or by visiting our website.

The final element of our value package is our nationwide network of knowledgeable distributors. We routinely service nationwide retail chains, manufacturers, and government agencies with seamless coordination between our distributors to provide outstanding sales, installation, and operational service.

We offer the best value in the industry by providing the lowest total cost of ownership. Explore our line of industrial scissor lift tables and dock lifts for sale!

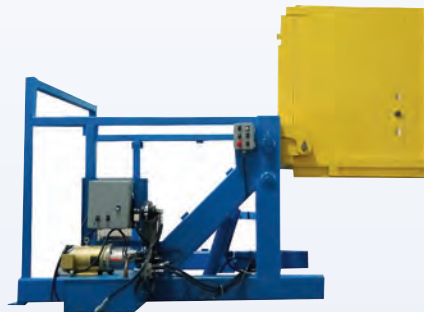


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1-800-843-3625

LEADERS PROFILE

EMH OVERHEAD CRANES

Looking for a manufacturing solution source with cranes you can trust, trouble-free, and able to withstand the test of time?

Look no further than Engineering Material Handling.

Since 1988, EMH Inc, headquartered in Valley City, Ohio, has continued to serve a wide range of industries; designing, manufacturing, and selling a wide range of durable.. robust, and heavy-duty overhead material handling equipment solutions—for loads of 25 lb. to 300 tons. Our overhead material handling solutions include Bridge Cranes, Gantry Cranes, Jib Cranes, Self-Standing and Workstation Cranes, Crane Kits, and custom and standard Wire Rope Hoists and End Trucks. EMH is ISO 9001:2015 certified.

Count on global coverage with manufacturing in the USA, India, and Germany; and a network of strategically located distributors, providing local sales and service support.

Looking for local service and support you can trust? EMH offers a total service program designed with your individual service needs in mind. It's just another part of our total commitment to excellence in the material handling industry. Aptly called the EMH Total Service Program, it was created to provide any (or all) of the maintenance-related service, repairs, parts, and inspections you need—resources vital to your company's continued productivity.

At EMH Cranes, we build cranes and relationships that last, standing the test of time. It's why we take great strides to ensure that all of our customer needs are responded to in both a timely and professional manner, minimizing crane downtime. For more information, contact us today.

Engineered Material Handling®

Looking for a manufacturing solutions source with cranes you can trust, trouble-free, and able to withstand the test of time? Look no further than Engineered Material Handling.



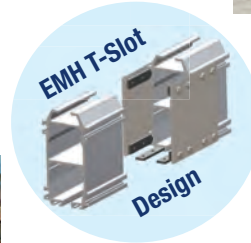
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YOUR WORKSTATION & FREE STANDING CRANE SOLUTION SOURCE... LOADS FROM 25 LBS. TO 20 TONS

Why AL SYSTEMS™ Workstation Cranes Work Better

With light weight track profiles and an exclusive EMH T-Slot design, AL Systems safely and efficiently handle a wide variety of lifters and handling devices. They are also easily configured to suit almost any application need. Plus, because the rail sections are surface treated and anodized, AL Systems Workstation Cranes are virtually maintenance-free.

AL SYSTEMS Workstation Cranes are ideal for lighter weight installations, from 25 lbs up to 2,200 lbs. Also, ask about new AL-1 lightweight aluminum rails with capacities up to 500 lbs.



How NOMAD® Free Standing Cranes Provide Flexibility

When manufacturing needs change, crane needs may change as well. Don't lock in your decision for crane location into a building structure. Modular NOMAD® Free Standing Crane Systems are also flexible solutions when overhead crane installation is either difficult or impractical. With bolted assembly, the NOMAD is easily dismantled, relocated and reassembled.

NOMAD® Free Standing Cranes easily handle capacities up to 10 tons. For even more capacity, up to 20 tons and 60-foot spans, ask about new NOMAD® XW Free Standing Cranes.



550 Crane Drive
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Email: info@emhcranes.com

E·M·H®
Engineered Material Handling

LEADERS PROFILE

EXAIR



Static Control Products

EXAIR's new **Varistat Benchtop Ionizer** is a mountable hands-free device for static elimination at assembly stations for benchtop applications. It is designed to neutralize static charges on surfaces in demanding industrial settings where static can become troublesome. With the help of ionizing technology, the Varistat supplies a constant stream of ion-balancing airflow to keep products static-free and particulate-free with hands-free operation and without the need of compressed air.

The Varistat Benchtop Ionizer is just the latest in EXAIR's large selection of Static Eliminators. These include the **Intellistat® Ion Air Gun** and **Ion Air Nozzle** for sensitive processes. They both carry a Class 5 rating for cleanrooms per ISO 14644-1. EXAIR also offers **Gen4 Static Eliminators** including the Super Ion Air Knife, Ion Air Guns, Super Ion Air Wipes, Ion Air Cannons, Ionizing Bars, all in stock. These allow you to neutralize static and clean at distance up to 20 feet. Learn more about our static eliminators at https://exair.co/61_static.

Super Air Knife Replaces Noisy Blowers

EXAIR's **Super Air Knife™** delivers a uniform, high volume, high velocity sheet of air for blowoff, cooling and drying applications. The Super Air Knife offers a more efficient way to clean, dry or cool parts, webs or conveyors. Energy use is 1/3 that of typical blowoffs, comparable to a blower without the costly downtime and maintenance. Noisy blowoffs become a whisper when replaced with the compact Super Air Knife. Even at high pressures of 80 PSIG, the sound level is quiet at 69 dBA for most applications. Air knives are CE compliant and available in one piece construction up to 108" (2743mm). Special lengths and materials are available to fit existing machines and environments. Learn more about Super Air Knives at https://exair.co/61_sak_prf.



EXAIR Profile

EXAIR manufactures Intelligent Compressed Air® products that provide innovative ways to blowoff, dry, cool, vacuum, convey, lift, and eliminate static electricity. Since 1983, EXAIR products have been engineered to improve the overall efficiency of a wide range of industrial processes. Their staff of qualified application engineers is familiar with a wide variety of manufacturing processes and offer help to individuals trying to find the best solution to their problems.

With the world's largest selection of engineered, intelligent compressed air products we offer the widest variety of material and sizes to match your requirements. Download 3D models, CAD drawings and installation manuals from our website's knowledge base. Design compressed air conservation and safety into your coating, cooling, conveying, cleaning and more applications with EXAIR.

EXAIR products are made in Cincinnati, OH and can be modified (special lengths, materials and sizes) to suit specific application requirements. All of the catalog products have a 30 Day Unconditional Guarantee and ship from stock.

EXAIR.com
MANUFACTURING INTELLIGENT COMPRESSED AIR PRODUCTS SINCE 1983

CONTACT

11510 Goldcoast Dr.
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(513) 671-3322
techhelp@exair.com
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Choose Your Liquid Spray Solution from EXAIR's Award Winning Atomizing Nozzles

EXAIR

Air Atomizing Spray Nozzles

EXAIR has a large selection of Air Atomizing Spray Nozzles in stock. Available in a range of spray patterns for a variety of uses. They combine liquid and compressed air to create a mist of atomized liquid that can be easily adjusted to meet the needs of your application. Stainless steel for durability and corrosion resistance.

EXAIR's Patented No Drip Air Atomizing Spray Nozzles have the added benefit of positively stopping liquid flow when the compressed air is shut off. No Drip Spray Nozzles are ideal where liquid conservation and product finish are priorities.

Liquid Atomizing Spray Nozzles

Pressurized liquid nozzles increase liquid flow for cooling, washing and rinsing. Liquid Atomizing Spray Nozzles are engineered with a vaneless tangential flow design that resists clogging and produces a uniform distribution in a full cone or hollow cone spray pattern.

- FullStream™ 1/4, 1/2, 3/8 NPT
- HollowStream™ 1/8, 1/4, 1/2, 3/8 NPT

Air Atomizing Nozzle Families

Internal Mix and No Drip Internal Mix:

Internal mix nozzles mix the liquid and air inside the air cap and produce the finest atomization. Both air and liquid sides are pressure fed.

1/8 NPT, 1/4 NPT and 1/2 NPT sizes available.

External Mix and No Drip External Mix:

External mix nozzles have the highest flow rates and allow the air and liquid flows to be adjusted independently. These nozzles are best where precise liquid flow is needed. Both air and liquid sides are pressure fed.

1/8 NPT, 1/4 NPT and 1/2 NPT sizes available.

Siphon Fed and No Drip Siphon Fed:

Siphon fed nozzles require no liquid pressure and can be used with gravity fed liquids or lift liquids from a siphon height as much as 36 inches (91cm).

1/8 NPT, 1/4 NPT and 1/2 NPT sizes available.

Advantages

- Fully adjustable
- Maximizes liquid dispersion
- Minimizes liquid consumption
- Many liquid flow rates within each spray pattern
- Compact
- Versatile
- Minimizes air consumption
- Fine atomization

An **INTELLIGENT COMPRESSED AIR** Product

CE

MADE IN THE USA

Narrow Angle Round Spray Pattern



Wide Angle Round Spray Pattern



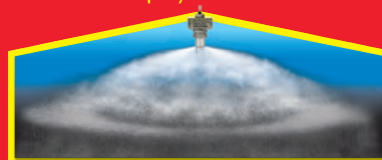
Narrow Angle Flat Fan Spray Pattern



Flat Fan Spray Pattern



360° Hollow Circular Spray Pattern



90° Right Angle Spray Pattern



Cone Spray Pattern



You will find the perfect atomizing nozzle at EXAIR. Choose your nozzle family. Choose your standard or no drip nozzle type. Choose your nozzle sizes. Perfect for your specific application! EXAIR's Application Engineers are ready and waiting to help you choose exactly what you need!

Hollow Cone Spray Pattern



EXAIR.com
Manufacturing Intelligent
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If you would like to discuss an application,
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CHOOSE EXACTLY WHAT YOU NEED

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Liquid Atomizing Spray Nozzles
https://exair.co/61_4183



THE QUALITY LUBRICANTS YOU NEED ►



Lubriplate is your one source for a complete line of premium quality lubricants. Each one is engineered from the ground up to provide a wide range of benefits that include: extended lubrication intervals, multiple application capability, reduced friction, extended machinery life and reduced downtime.

Available Products Include:

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SYNTHETIC HYDRAULIC FLUIDS

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THE EXTRA SERVICES YOU WANT



Lubriplate is also your source for a wide range of complimentary services designed to help improve and simplify your maintenance program. Lubriplate's lubrication experts will custom tailor a complete lubrication maintenance program just for you.

Complimentary Services Include:

COLOR CODED LUBRICATION CHARTS

COLOR CODED MACHINERY TAGS

COLOR CODED LUBE STORAGE SIGNS

COMPLETE PLANT SURVEYS

LUBRICATION TRAINING PROGRAMS

FOLLOW-UP OIL AND GREASE ANALYSIS

TECHNICAL SUPPORT HOTLINE AND E-MAIL

LUBRIPLATE		LUBRICATION CHART		CUSTOMER LOGO	
LUBRIPLATE PRODUCT		APPLICATIONS		DESCRIPTION	
OILS / FLUIDS					
FMO-85 AW* PART NO. L0880-060 / 5 GALLON PAIL		AIR LINE OIL		ISO 22 GRADE USP WHITE MINERAL OIL *NSF H1 FOOD MACHINERY GRADE	
FMO-150 AW* PART NO. L0879-060 / 5 GALLON PAIL		HYDRAULIC SYSTEMS		ISO 32 GRADE USP WHITE MINERAL OIL *NSF H1 FOOD MACHINERY GRADE	
SFGO ULTRA 46* PART NO. L0916-060 / 5 GALLON PAIL		AIR COMPRESSORS		ISO 46 GRADE SYNTHETIC PAO-BASED AIR COMPRESSOR FLUID *NSF H1 FOOD MACHINERY GRADE	
RCO-68FG* PART NO. L0818-060 / 5 GALLON PAIL		REFRIGERATION COMPRESSOR		ISO 68 GRADE SYNTHETIC PAO-BASED REFRIGERATION COMP FLUID *NSF H1 FOOD MACHINERY GRADE	
FMO-350 AW* PART NO. L0882-060 / 5 GALLON PAIL		CHAIN OIL		ISO 68 GRADE USP WHITE MINERAL OIL *NSF H1 FOOD MACHINERY GRADE	
SFGO ULTRA-100* PART NO. L0983-060 / 5 GALLON PAIL		VACUUM PUMPS		ISO 100 GRADE SYNTHETIC PAO-BASED LUBRICATING OIL *NSF H1 FOOD MACHINERY GRADE	
SFGO ULTRA-220* PART NO. L0985-062 / 55 GALLON DRUM		HELICAL GEAR BOXES		ISO 220 GRADE SYNTHETIC PAO-BASED LUBRICATING OIL *NSF H1 FOOD MACHINERY GRADE	
SFGO ULTRA-460* PART NO. L0985-062 / 55 GALLON DRUM		WORM GEAR BOXES		ISO 460 GRADE SYNTHETIC PAO-BASED LUBRICATING OIL *NSF H1 FOOD MACHINERY GRADE	
GREASES					
SYNXTREME FG-2/220* PART NO. L0309-098 / CARTRIDGE		GENERAL GREASE BEARINGS		NLGI #2 GRADE MULTI-PURPOSE, SYNTHETIC CALCIUM SULFONATE GREASE *NSF H1 FOOD MACHINERY GRADE	
CLEARPLEX 1* PART NO. L0350-035 / 35 lb PAIL		CENTRALIZED GREASE SYSTEMS		NLGI #1 GRADE USP MINERAL OIL BASED ALUMINUM COMPLEX GREASE *NSF H1 FOOD MACHINERY GRADE	
Lubriplate® Lubricants Company Corporate Headquarters: 129 Lockwood Street / Newark, NJ 07105 Tel: 800-733-4755 / Fax 973-589-4432 / Fax 800-347-5329 Midwest Office & Plant: 1500 Oakdale Ave. / Toledo, OH 43605 Tel: 419-591-2491 / Fax 419-593-3806 / Fax 800-347-5348 www.lubriplate.com / Email: LubeXpert@lubriplate.com		*NSF H1 Registered Food Machinery Grade			

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PROGRAMS



FROM THE COVER KICKER

Problem-Solving Workbench Tools

The **IQ Vise System** includes the maneuverable multi-axis bench-mount **IQ Vise**, 5 task-specific **IQ Vise Jaws**, and **IQ Connect plug & play accessories** and mounts.

Allowing up to 130 ft-lb (176 Nm) of torque, the vise's ball and socket design allows 360-deg. rotation at any angle and a compression lever allows it to lay flat, lock at any angle, or rotate for the best positioning.

Double-sided, textured vise jaws let users tailor their grip needs for different projects, securing materials such as wood, pipe, or fine/delicate items.

A work light, a cellphone holder, and a magnifying glass can be mounted to the vise via the IQ Connect Clip with flexible, extended arms for hands-free working conditions.



Work IQ Tools

More online: newequipment.com/21284454

Ceramic Abrasive Consistently Cuts Sharp

RazorStar Fiber Discs, Quick-Change Discs, and Belts feature engineered shaped ceramic grain, a breakthrough technology for tough grinding applications. The razor-sharp grains combined with a supersized grinding aid reduce heat generation for cooler cuts and longer life on a range of materials. Enabling high cut rates, the RazorStar has a consistent shape from grain to grain along with razor-sharp cutting points and its geometry ensures the grain stays sharp by exposing new cutting points when the grain fractures.



Norton | Saint-Gobain Abrasives

More online: newequipment.com/21281544

High-Speed Camera for Airborne Applications

Phantom Miro C321 Air high-speed camera for airborne testing applications is a 2-MP camera with 1,480 fps at full HD (1920 x 1080) resolution and up to 94,000 fps at reduced resolutions. It also features a 10-μ pixel size for high sensitivity, low noise, and high dynamic range to capture critical test events with minimal motion blur. It operates down to -67°F (-55°C), includes conformal-coated boards, and offers a removable CFast SSD.



Vision Research

More online: newequipment.com/21285052

High-Strength AS/RS Pallet

Designed for Automated Storage/Retrieval Systems, the **Odyssey 3-runner pallet** offers a high strength-to-weight ratio capable of unsupported rack loads up to 3,000 lb. (1,360 kg). The pallet uses built-in reinforcement and a flow-through design for easy cleanability, keeping plants and equipment sanitary. The permanent molded-in frictional elements reduce load-shifting, minimizing damage to product packaging.



ORBIS Corporation

More online: newequipment.com/21285089

Mechatronic Hydrogen Pressure Regulator

For mid and heavy-duty commercial vehicles with hydrogen-powered ICEs, the **EM-H mechatronic pressure regulator** manages and calibrates hydrogen delivery pressure according to the vehicle's requirements. A mechanical input stage reduces pressure from high to medium and a subsequent electronic stage lowers pressure from average to desired value. The system features special valves to protect the pressure regulator and downstream fuel line.



Landi Renzo

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Cordless Impact Set

Portable Heavy-Duty Impact Sets provide everything technicians need to transport their impact tools on the job site. The 25-piece set comes with an assortment of tools, including a socket set with Flank Drive technology, a universal joint, drive extensions, and a MonsterLithium cordless impact wrench set. The case is all-weather resistant with a collapsible handle and wheels and the red and black tool control foam securely holds the tools.

Snap-on Tools

More online:
newequipment.com/21285043

Commercial EV Charger

The **MaxiCharger AC Elite G2 EV charger** provides fast charging capabilities for a wide range of commercial vehicle brands. With a charging power of up to 19.2 kW (80 A), it surpasses the charging power of most household chargers at 11 kW (50 A). It's engineered with the latest intelligent vehicle technology, wireless networking, and AI-driven optimization features.



Autel Energy

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newequipment.com/21284374



Level & Flow Controller Reduces Waste

Preventing overflow and water waste in water, wastewater, and process applications, the **Rosemount 3490 controller** provides control functionality for 4-20 mA or HART-compatible transmitters. Its configuration wizard guides user setup, simplifies report and documentation handling, and enables a variety of flow measurements to be totaled, differentials to be calculated, and data to be easily logged and shared with regulatory authorities through a web interface via Ethernet connectivity.

Emerson Electric Co.

More online:
newequipment.com/21285087



Adjustable, Portable Whiteboard Stand

A multipurpose rolling portable whiteboard stand, the **Mobile Whiteboard Stand** is a powder-coated steel stand that holds large whiteboards, chalkboards, and monitors without special mounting hardware. Featuring 2 adjustable arms and a clamp system to hold boards and monitors, it's adjustable to any dimensions needed. It accommodates up to 200 lb. (90 kg), has 5-in. (127 mm) lockable rubber wheels, can be stored in a closet or storage space, and holds markers, remotes, and other writing utensils on its 2.75-in. (70 mm) tray.

MyWhiteboards.com

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Mechanics Truck Sets New Industry Standard

Optimized for Class 5 chassis applications, the **PAL Pro 58 Mechanics Truck and PSC 8600 TEC Service Crane** deliver extended reach, weight reduction, and superior performance. The truck is available in 11-ft (3 m) body configurations, caters to a wide range of needs, includes bolt-on mounting for accessories, and has lighting to support remote and nighttime work.

With an 8,600-lb. (3,900 kg) lift capacity and a 58,000 ft-lb (78,600 Nm) moment rating, the crane's design relocates the winch to a boom-mounted position, streamlining operation and addressing cable concerns. It's available with 22 or 31 ft (7 or 9 m) of reach and Load Moment Indication provides real-time, load-on-hook information.

PALFINGER

More online: newequipment.com/21284469

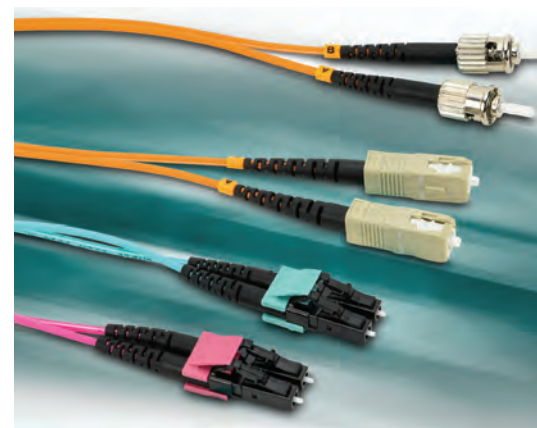


AMR Easily Configures Routes and Jobs

Flexley Tug T702 AMR with AI-based Visual SLAM navigation technology and its AMR Studio software enables users to easily program and operate entire fleets of mobile robots. Combining AI and 3D vision, Visual SLAM technology helps AMRs make intelligent decisions, differentiating between fixed and mobile objects. The robots can create a map that's used to operate independently and is constantly updated and shared across the fleet for instant scalability without downtime.

ABB Robotics

More online: newequipment.com/21285036



Fiber Optic Ethernet Patch Cables

AchieVe brand fiber optic Ethernet patch cables provide low-cost, multimode fiber connections. They contain optical fibers that transmit data signals as light—offering higher transmission speeds than copper cables—and are naturally immune to electromagnetic interference. 250 μ m (0.01 in.) cables in lengths up to 33 ft (10 m) are available in OM1, OM2, OM3, and OM4 versions with numerous connector options.

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Robotic Induction System for AS/RS

ROBiN, a Robotic Induction System, uses AI, machine vision, and intelligent algorithms to improve and speed up the induction of cases into AS/RS. The flexible material handling solution is engineered to handle a diverse range of case sizes and shapes, without prior knowledge of the number of cases on a layer, their specific location, or orientation.

Applied Manufacturing Technologies (AMT)

More online: newequipment.com/21284382

Compact Stud Cam Followers

CFC-B Series short stud cam followers' hexagon socket head bolt and dedicated flange nut mounting structure reduce required mounting space. By providing greater design freedom, this series has a sealed structure and crowned outer ring and is available with cage or full-complement rollers. It offers O.D. of 0.7 to 1 in. (19 to 32 mm) and stud diameters of 0.3, 0.4, and 0.5 in. (8, 10, and 12 mm). Cage type rpm is 8,400 to 84,000 and full complement rpm is 4,200 to 42,000.

IKO International, Inc.

More online: newequipment.com/21285139

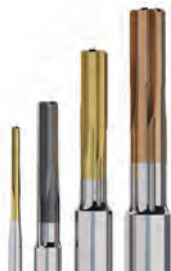


Reamers Eliminate Scrapped Parts

Nanojet Solid Carbide Reamers enhance chip control with a through-coolant outlet for better evacuation. Delivering a powerful, precise stream of lubrication directly to the cut zone, they eliminate scrapped parts, jamming, and edge damage. Eight grades and 10+ geometries are available along with custom sizes and tolerances. Working with any precision tool holder, they hold tolerances from 10 to 15 μm (0.0004 to 0.0006 in.) and produce surface finishes from Ra 0.2 to 1.2 μm (Ra 8 to 50 $\mu\text{in.}$).

Seco Tools, LLC

More online: newequipment.com/21285030

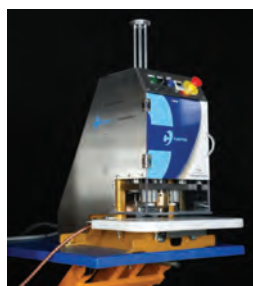


High-Frequency Eyelet Welder

Carmo and Forsstrom HF have partnered to develop a high-frequency (HF) welding machine. The **CP9 eyelet setter** is a fast, single-sided punching and welding machine that automatically feeds eyelets for extremely short cycle times. Replacement kits allow different eyelet sizes to be welded with the same machine. The CP9 is for high-volume production where large quantities of plastic tarpaulin eyelets or plastic banner eyelets need to be mounted in minimal time with minimal hassle.

Carmo A/S

More online: newequipment.com/21285149



Improve Indoor Air Quality

Sentry XL continuously combats harmful pathogens in the air and on surfaces by converting oxygen and humidity into dry hydrogen peroxide, which then circulates through the air to remove bacteria, mold, viruses, and VOCs. It provides an extended temperature range, a long-lasting LED bulb, and simplified maintenance. Used as a stand-alone device or as a wall-mount unit requiring a 120V AC outlet, it safeguards indoor areas of up to 3,000 ft^2 (280 m^2).

Synexis

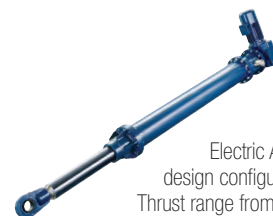
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RACO Electric Actuators provide a reliable solution for all of your linear and rotary motion needs. A variety of design configurations provide a multitude of thrust and speed ratings. RACO Electric Actuators are designed to be robust with virtually no maintenance while also being economical to operate and friendly to the environment.



RACO MA-Series

The modular design of RACO ACME and Ballscrew Electric Actuators allow for a variety of design configurations while offering a Linear Thrust range from 70lbs to 225,000lbs, Linear Rod Speeds from 0.2"/sec to 30"/sec and Linear Travel (stroke) up to 20 ft.

RACO LM-Series

The RACO LM-Series is designed for high speeds and long travel (stroke) with capabilities that are frequently found in today's automation processes. The LM can be used as a single axis system or can be combined to form a multiple axis system.



RACO Rotary-Series

The Rotary Actuator is designed to automate the operation of valves, gates, dampers, louvers and other positioning applications requiring partial or multi-turn rotational movement.



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Southco, Inc.

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NPV-7 high-flow pinch valves provide a longer stroke for applications requiring greater flow or viscous or particulate-laden media. Each valve comes pre-installed with 12 in. (300 mm) of standard medical/laboratory grade or sanitary food grade silicone tubing. The valves are solenoid-operated, offer an unobstructed flow path, have a high flow and long stroke, and have replaceable tubing.



Clippard Instrument Laboratory, Inc.

More online: newequipment.com/21285034

Fraud Prevention for Freight Industry

RateCon Shield and Facility Shield, part of Transfix Shield's suite of fraud-prevention tools, help shippers, carriers, and brokers protect their business, carrier partners, and consumers from freight fraud. RateCon Shield combats freight broker impersonators by automating a QR code to validate the authenticity of loads and brokers. Facility Shield helps shippers protect facilities and loads through a validation system and process that verifies carriers before they enter a facility.



Transfix

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Non-Toxic Pipe Joint Lubricant

Blue Monster LUBE-JOB lubricates pipe joints and simplifies the assembly of all types of pipelines without swelling gaskets. Its biodegradable blend of lubricity enhancers and soaps creates a lubricant that flows into cavities when mating abutting pipes to seal joints. It spreads easily and handles temperatures from -10 to 150°F (-23 to 65°C). Petroleum and phosphate-free, it's non-toxic, dissipates, and doesn't leave a residue when flushed.

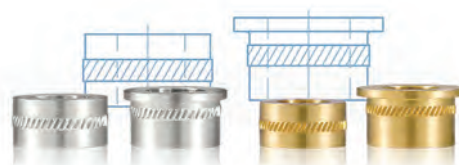


Mill-Rose | Clean-Fit Division

More online: newequipment.com/21285019

Compression Limiters for Plastic Assemblies

Series CL6000 Aluminum Precision Machined Compression Limiters are lightweight, lead-free, and reinforce high-stress joints in plastic assemblies where bolts connect two components. They absorb the load when the bolt is tightened, ensuring the joint stays durable and reliable. Machined from 2024 grade aluminum, they're 40% stronger and 1/3 the weight of the same limiter manufactured from brass.



Spirol

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Portable Circuit Breaker Timer

The **CBT-1203 circuit breaker timer test set** confirms proper breaker speed and clearing times as part of a maintenance program or arc-flash validation study. It performs 3-phase timing tests, charges spring-charged circuit breakers, opens/trips and closes breakers, and captures and stores millisecond trip and close times and duration of contact bounce.



Vacuum Interrupters

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Elevāte, Inc.

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An all-in-one mobile computer designed for real-time tracking and visibility into the location and status of items throughout the supply chain, the **XR2 UHF RFID Reader** can scan more than 1,000 EPC Class 1, Gen 2 tags/s from up to 60 ft (18 m) away. Featuring a Honeywell 1D/2D imager for high-throughput capture of difficult-to-read barcodes, it ensures every barcode is detected and decoded quickly and accurately.



Janam Technologies LLC

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The X-ray System for Small, Medium Packages

The **X12 X-ray system**, designed for small and medium-sized packaged products, detects hard-to-find glass, metal, stone, rubber, and bone. Additionally, it checks that products are correctly placed in their packages to improve product quality. Its front-opening design gives users easy access for cleaning and maintenance.



Mettler-Toledo Ltd.

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Multiaxis Motion Controller

Titanium Maestro motion controller offers advanced, real-time management capabilities for multiaxis machines. Embedded with a computational Quad-Core CPU and extensive memory, it enables a cycle time of 100 µs for each axis. It combines AI, image processing, and advanced Python programming.



Elmo Motion Control

More online: newequipment.com/21285136

Star Key Wrench Kit

With 2, 7/16-in. (11 mm) hex sockets and an LQ & LB Slam Key, the **SSK-600 star key wrench kit** is for opening LQ & LB outdoor pedestals. The 2 hex sockets are 1.5-in. (38 mm) deep on either end and can be used to open enclosures that need a 7/16-in. socket. This kit is also compatible with all of Jonard's SSK star keys and its SSK P key insert.



Jonard Tools

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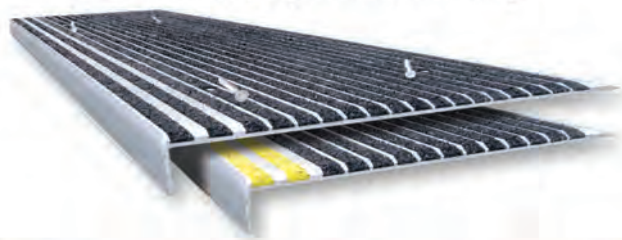
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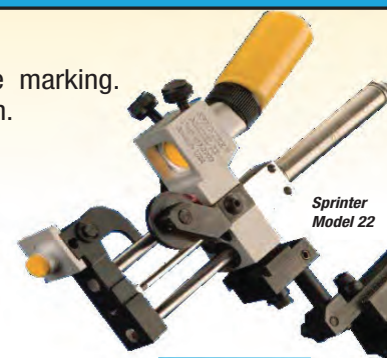
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ADHESIVES & FASTENING

Adhesives/Sealants/Lubricants

Adhesives	37
Epoxies	37
Lubricants	28, 29, 34
Lubrication Systems	28, 29
Sealants	34
Assembly/Fastening	
Bolts	33
Fasteners	33, 34
Hardware	1, 33, 34
Hinges	34
Joining	34, 36
Seals & Rings	4, 5
Spring & Isolation Devices	1
Tensioners	1, 34
Washers	6

AUTOMATION

Automation Systems

Material Handling	17, 18
Packaging	6, 17, 18
Robots	
Automated Guided Vehicles	2, 17, 18, 30
Collaborative	17, 18
Grippers	2, 39
Material Handling	2, 17, 18, 33
Mobile	17, 18, 30, 32
Packaging	17
Vision Systems	18
Sensors	
Alarms	31, 37

CONTROLS & INSTRUMENTATION

Actuators	33
Calibration Equipment	37
Cameras & Vision Systems	30
Controllers	31, 38
Counters & Recorders	1, 2
Data Acquisition	2, 37
Data Recorders	2
Gauges	37
Inspection Equipment	2, 35
Measurement Equipment	2
Meters	1
Quality Control	2, 35
Regulators	30
Test Equipment	37
Timers	1

ELECTRICAL & ELECTRONICS

Electrical

Batteries	2, 3, 18
Battery Chargers	17, 31
Cables	32
Cable Management	11, 34
Circuit Breakers	34, 39
Electrical/Power Distribution	2, 37
Energy Management	2
Fasteners & Contacts	37
Reels	11, 34
Wiring	37
Electronics	
Circuit Components	2
Connectors	37
Power	2, 37

FACILITY/OPERATIONS

Facility Maintenance

Air Handling & Cleaning	33
Cleaning & Maintenance	6
Vehicles	2, 32
Workstations	31
HVAC	
Filters	33
Furnaces	36
Ventilation	33

HYDRAULICS & PNEUMATICS

Actuators	33
Fittings	36
Fluid Conductors	2
Seals	4, 5
Systems & Assemblies	6, 36
Valves	34

MACHINE TOOLS & METALWORKING

Machine Tools & Equipment

Cutting Tools	33
Drills	33
Metal Cutting	33
Metal Removal	33
Toolholders/Workholders	30
Metalworking	
Dies & Accessories	6
Extruding	1FC
Metal Treatment	3
Welding Equipment	33

MATERIAL HANDLING & PACKAGING

Barcode/Labeling

Camera/Vision Systems	17, 30
Labeling	17, 32
Marking & Printing	36
RFID	35
Scanners/Readers	3, 35

CONVEYORS

Belt	1, 6, 13
Components	1, 13
Live Roller	13
Roller	1, 13
Lift Trucks	
Automated Guided Vehicles	2, 17, 18, 30
Chargers	17
Forklifts	17
Jacks	2
Pallet Trucks	2, 17
Scissor Lifts	22, 23

Lifting/Positioning Equipment

Cranes	24, 25, 32, 1BC
Dumpers	22, 23, 35, 1BC
Hoists	24, 25
Lift Tables	22, 23, 1BC
Tilt Tables	22, 23, 1BC
Upenders/Inverters	22, 23, 1BC

Packaging

Filling	17
Labeling	17
Marking	36
Pallets	30
Shipping	6, 17
Wrapping	6, 18

Sorters

Sliding Shoe	18
--------------	----

Storage

Automated Storage/Retrieval Systems	18, 33
Bins & Baskets	5
Cabinets/Drawers	3
Carts	5, 30
Containers	3
Picking Equipment	33
Racks	15
Shelving	15, 30
Storage Labeling & Organization	32

MATERIALS & CHEMICALS

Abrasives

Abrasive Belts	30
Abrasive Locking Discs	30
Cutoff Wheels & Abrasive Saw Blades	30

Fluids

Fuels	2
-------	---

Metals/Alloys

Metals Ferrous	6
Metals Non-Ferrous	6
Stainless Steel	6

Chemicals & Raw Materials

Additives	3
-----------	---

Plastics & Polymers

Plastics	5
Polymers	5

MOTION CONTROL

Bearings	4, 5
Belts	1, 13
Controllers	35
Cylinders	33
Encoders	1
Linear Motion/Positioning	33
Seals	4, 5
Shock & Vibration Control	20, 21

PROCESS EQUIPMENT

Air Compressors	BC
Air Knives	26, 27
Alarms	31, 37
Antistatic Devices	26, 27
Cooling Equipment	BC
Flow Meters	31, 38
Food & Beverage	2, 35
Heating Equipment	36
Ovens	36
Pipe Tools	34
Plastics	1FC
Pressure & Temp Indicators	30
Process Controllers	31, 38
Process Equipment	1FC
Rubber Processing	1FC
Surface Treatment	3, 6
Valves	34

SAFETY

Electrical

Test Equipment	37
Wiring Devices	37

Environmental Management

Air Filtration	33
Drums	5
Hazardous Material Storage	3
Safety Cabinets	3

Ergonomics

Exosuits	3
Office	31
Workstations	31

Fall Protection

Lanyards	1
----------	---

Lifelines

Stair Treads	35, 36
--------------	--------

Fire Protection

Arrestors	38
Detectors & Alarms	31, 37
Explosion Suppression	38

Extinguishers

Machine & Tool	
----------------	--

Presence Sensing	18
------------------	----

Security

Alarms	31, 37
--------	--------

SOFTWARE & COMPUTERS

Computer Peripherals & Accessories

Access Points	6
Data Storage	6, 38

Computers

Industrial Computers & Embedded Systems	6
---	---

Software

Accounting & Financial	34
Application Development & Deployment	3
Artificial Intelligence	15, 16, 17
Equipment Management	35
Industrial & Engineering	3
Logistics	34, 35
Quality Assurance, Testing, & Compliance	3, 34
Safety	3
Security	34
Tracking	35

Mobile Devices

Apps	3, 34
------	-------

TOOLS

Hand Tools

Screwdrivers	37
Wrenches	30, 37

Power Tools

Electric Tools	30
Hydraulic Tools	6

GENERAL PRODUCTS

Universal Flashback Arrestor

Providing protection against deflagrations and stable detonations of flammable gases and gas mixtures, the **F53Ndeto** is certified for Group IIA, IIB, and IIC flammable gases and gas mixtures. It has a temperature-sensitive element that extinguishes sustained flashbacks long before internal temperatures become hazardous. If temperatures spike beyond a threshold, a specialized plastic component melts, sealing the valve and halting gas flow. It comes with G1/4 female thread connections and operates at temperatures up to 140°F (60°C).



Witt Gas Controls LP

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Mass Flow Controllers for Semiconductors

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SmartRack modular data centers combine IT rack, cooling, and service enclosures to create a solution for critical IT equipment with up to 150 kW of equipment load. Featuring easy-to-transport and durable modular enclosures, the data centers can be sized, configured, commissioned, and deployed in a matter of days. They're available in 13 standard configurations that ship pre-built with pre-installed, in-row cooling units.



Eaton

More online: newequipment.com/21285037

AD INDEX

ACE Controls	20-21
Advance Lifts, Inc.	22-23
Aigner Label Holder Corp.	FC, 32
Air Technical Industries	IBC
Arnold Machinery	8a-b
Atlas Copco	BC
Benko Products, Inc.	36
Boker's, Inc.	6
Coxreels	34
Creform Corp.	30
*Demac Srl	11
Dura-Belt	1
*Dura-Belt	13
*Dyna-Rack Div	15
EMH, Inc.	24-25
ENM Company	1
EXAIR LLC	26-27
Floyd Bell, Inc.	31
IMADA	37
Jesco Industries, Inc.	35
Lubriplate Lubricants Company	28-29
MAIN Manufacturing Products	36
Master Bond, Inc.	37
Mercotac, Inc.	37
Mill-Rose Co.	6
Ming Tai Industrial Co., Ltd	1
RACO International, L.P.	33
Spprinter Marking, Inc.	36
Transducers USA	37
Uline	5
Versa Machinery	1FC
Wooster Products, Inc.	35, 36

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FROM THE COVER KICKER



QR-Code Air Circuit Breaker

MasterPac MTZ Active, a low-voltage air circuit breaker, enables real-time power monitoring and measurement to inform decision-making, reduce downtime, and accelerate sustainability goals.

By featuring a QR code on the control unit, operators in mission-critical industries and data centers can quickly identify the root cause of delays and issues and take action quicker. Data center operators can scan the code to access instructions on the most effective restorative actions to take, to reduce data center downtime. Instead of searching through a 200-page document, users are quickly instructed to redistribute loads more evenly between circuits in an overload event.

Schneider Electric

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Manual Robot Tool Changer

The **MC-50 Manual Tool Changer** features an intuitive and ergonomic lever operation to quickly change end-of-arm tooling by hand. It's designed for cobots that support payloads up to 55 lb. (25 kg) and small industrial robots with payloads up to 22 lb. (10 kg). Featuring an ISO 2-in. (50 mm) mounting interface, it mounts directly to most cobots and integrates with common grippers and end-effectors.

ATI Industrial Automation

More online: newequipment.com/21277478



Is It Just My Imagination?

On a recent episode of “Great Question: A Manufacturing Podcast”, hosted by Endeavor’s Manufacturing Group, the Plant Services editors and I were discussing movies that made us think about the industry or reminded us of the industry. We discussed movies that were rife with OSHA violations, inundated with reliability problems, and futuristic technology that made us pause for its real-life possibilities.

Of course, mine was the futuristic technology one.

The movie I discussed was “Ex Machina”, a 2014 film about humanoid robots and the turing test. Essentially, it follows the story of Nathan, an employee of a tech company, who tests a humanoid robot developed by his CEO—in a super remote location of course. Tasked with interviewing the robot to gauge if she could pass as a human in the real world, he ends up forming a bond with her and wants to help her escape, unaware that was her plan all along. The CEO had planted the idea for her, but she manipulated him, flirted with him, and was able to make him empathize with her all on her own.

Despite recognizing and being in awe of her intelligence, Nathan still underestimated her, and—surprise, surprise—she escaped, leaving Nathan stranded in a remote location, while she blended into a city, her true identity unknown.

With the surge in AI, I can’t stop thinking about this movie. Realistically, we won’t have humanoid robots taking over like in the Will Smith movie, “iRobot”. What we’re more likely to have is an AI that’s integrated into every device that already exists and will exist. At what point—and it will happen—will AI start teaching itself new skills without needing us to feed it data? What happens then? It’s now in every device with the possibility of writing its own rules.

Real life is never as fantastical as the movies or even my imagination, but with the way we’re creating, developing, enhancing, and implementing AI at an exponential pace, I wonder about the unintended repercussions.

Last year at this time, I could count on one hand the number of products that came across my desk that were using AI. Today, I would say it’s about 25% and growing. In this issue alone, there are 11 products integrated with AI, making up around 17% of the 68 products in this issue.

On page 3, there’s the Rösler Power Line Valve that automatically adjusts the blast intensity of the turbines for intelligent shot blasting. On page 31, Autel’s AC Elite G2 EV charger uses AI to optimize the charging process based on vehicle criteria. And on page 33, the ROBIN Induction System from Applied Manufacturing Technologies (AMT) uses AI to increase the number and type of cases and shapes it can handle.

As we see AI popping up more and more in products, it’s clear that true AI independence is on the horizon. With every step forward, we’re inching closer to a world where machines not only execute tasks but also innovate independently. **NED**

— **Laura Davis**, Editor-in-Chief

7 Methods Used for Securing Gears to Shafts

by Brian Dengel, KHK USA, Inc.

Did you ever have someone “give you the shaft”? This insult is defined as ignoring or putting someone down. In gearing, giving you the shaft is just the beginning part of constructing your gear train. Each gear in a system is going to be resting on a shaft as the purpose of each gear is to transmit motion through the shafts of the mechanism.

Just as there are many types of gears, there are also many types of methods to attach a gear to a shaft.

Typically, when keys are used with gears, they’re accompanied by set screws (also known as grub screws). The tapped holes to accommodate these screws are commonly positioned above the key slot and at 90 degrees to the key slot. This allows one set screw to hold the key in place and the other screw to press into the shaft.

However, a better solution is to have two tapped holes set at 120 degrees from the centerline of the key slot, as this balances the gear and reduces noise at higher speeds.

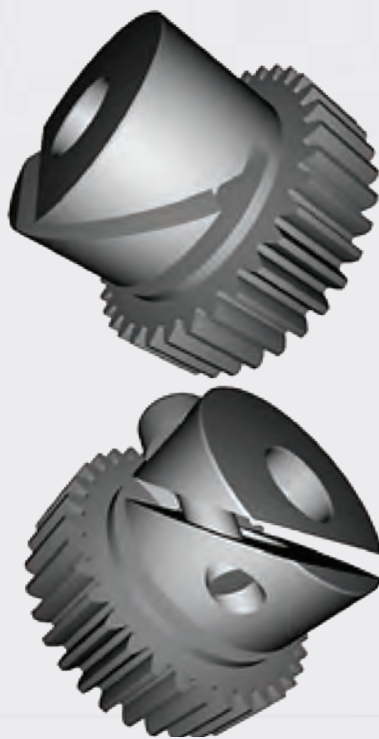
Although set screws and keys are the most common form of attaching a gear to a shaft, there are many other methods, and each of these methods makes sense depending on your application.

1. Press-Fit

Just as it sounds, it’s possible to press a gear onto a shaft. If the tolerances between the bore of the gear and the diameter of the shaft are properly sized, (the bore is undersized, and the shaft is oversized) then you can use a press to force the gear onto the shaft and the resulting pressure will hold the gear in place. This method works best if you never need to remove the gear from the shaft and if you do not need to have a specific alignment between the gear teeth and the shaft.

2. Drill & Pin

This is one of many permanent methods of fixing the gear to the shaft. This method involves drilling a hole through the side of the hub, through the shaft, out through the opposite side of the hub, and then fixing a taper pin or a cotter pin into the hole. This method is infrequently used because it does not permit alignment, creates noise and vibration at high speeds, and will fail if the pin falls out.



3. Welding

It’s possible to weld a gear to a shaft. This method is not very common because heating the gear and the shaft can result in distortions that will cause the gear to either be noisy or fail prematurely. It does, however, guarantee a strong bond between the gear and the shaft.

4. Shrink Fit

This method is preferable to both press-fitting and welding. In this method, you use an induction heater to warm the gear nearest to the bore and then you slide it onto the shaft. As the gear cools, the bore shrinks, and the bond between the gear and shaft is formed. This method works well when the gear needs to be repeatedly removed for maintenance, or for replacement, as it does not distort the gear teeth, nor does it warp or score the shaft.

5. Keyless Shaft-Hub Locking Mechanism

There are several styles of locking hubs that exist. Their primary purpose is to allow for the repeated repositioning of the gear and to prevent any damage to the shaft

during installation or removal. Thus, they perform the same action of a shrink fit, but they use mechanical means instead of heat.

One such style uses two hubs in which the inside hub presses against the shaft when the screws are tightened, and the outside hub presses against the bore. Together these two hubs force equal pressure on the bore and shaft and hold the gear in place.

What’s great about this style of mechanism is that it allows for infinite positioning of the gear teeth in relation to the shaft. The downside is that they add mass to the mechanism and require additional space for installation.

6. Concentric Maxi Torque Keyless Shaft-Hub Mechanism

Another style integrates a locking mechanism directly into the bore of a gear. This style is marketed as the Concentric Maxi Torque keyless shaft hub mechanism. It combines a proprietary hub with a tapered insert. As a set screw is tightened between the insert and the hub, the mechanism presses on both the bore and the shaft, generating the necessary holding force. This item is also excellent for repositioning, and neither mars the shaft nor does it take additional space.

7. Integrated Locking Mechanism

A third style integrates a locking mechanism into the hub of a gear. This style uses two intersecting slots in the gear hub to generate a wedge section. The wedge is closed by a cap screw, which forces the free section of the hub to clamp onto the shaft. This mechanism is excellent for repositioning but is limited by the holding strength of the wedge.

These are some of the many ways that you can fix a gear to a shaft. Each has its pros and cons, both mechanically as well as cost.

Hopefully, the next time someone hands you a shaft, it’s for assembling a gear mechanism and they’re not “giving you the shaft.” NED

Brian Dengel is the general manager and gearing executive of KHK USA Inc., which is based in Mineola, New York. Visit www.khkgears.us.

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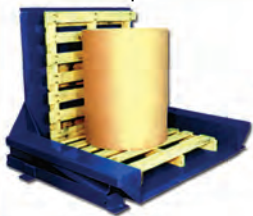


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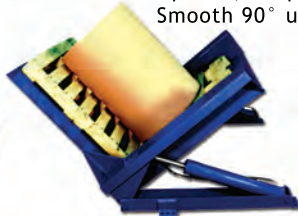
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