

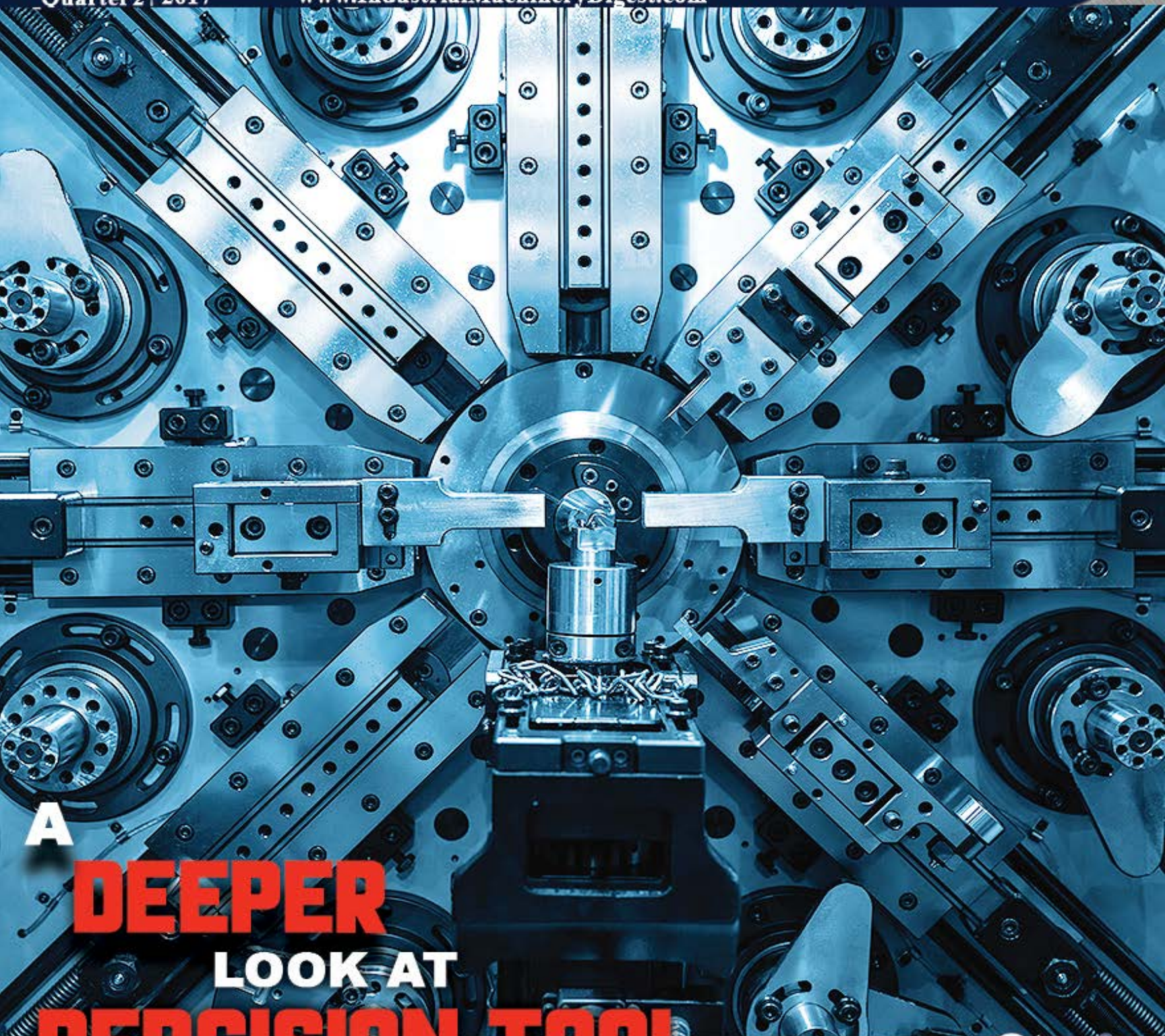
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Circulation & Subscriptions
IMD, 3590-B Hwy 31 South, Suite 233
Pelham, AL 35124
Fax: 866-826-5918 • circulation@indmacdig.com
Reprints To purchase article reprints please call
800-366-0676 ext. 103 or email
wstrickland@indmacdig.com



A publication of:
Source 360 Media LLC
3590-B Hwy 31 South PMB #233
Pelham, AL 35124

INDUSTRIAL MACHINERY DIGEST (ISSN 1542-5223) is published 12x per year by Source 360 Media. POSTMASTER: Please send change of address to INDUSTRIAL MACHINERY DIGEST, 3590-B US Hwy 31 South, PMB 233, Pelham, AL 35124. Printed in the U.S.A. SUBSCRIPTION POLICY: Individual subscriptions are available without charge in the U.S. to qualified individuals. Publisher reserves the right to reject nonqualified subscribers. One-year subscription to nonqualified individuals in the United States: \$96⁰⁰. Single copies available (prepaid only) \$20⁰⁰ each.

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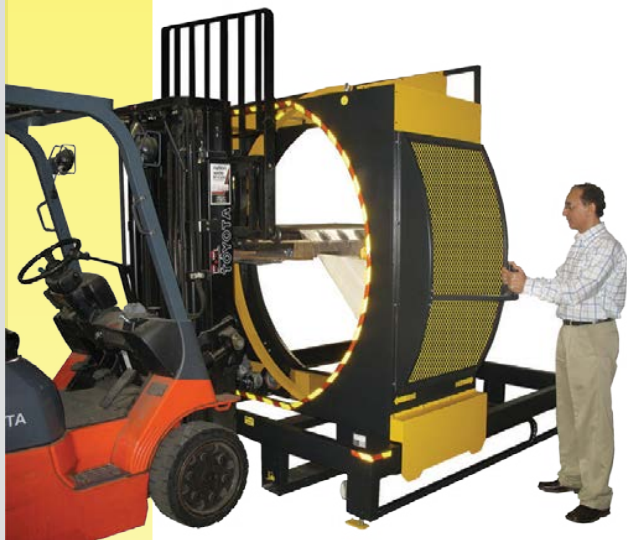


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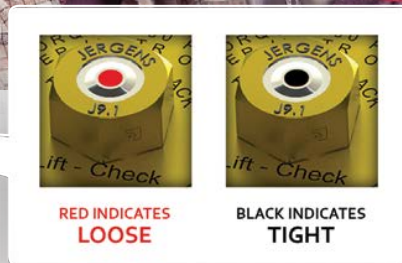
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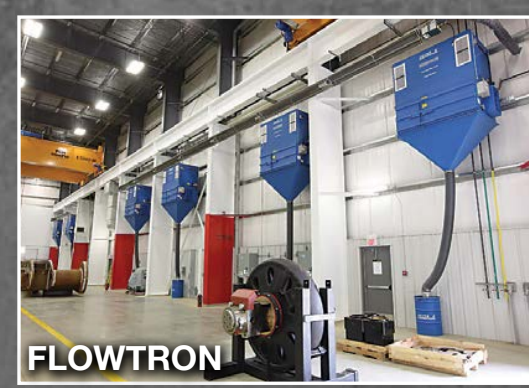


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A Deeper Look at

Precision Toolholders

Quality of machining and quality control differentiates "standard" toolholders from precision



Although toolholders are known to be critical components in the precision machining process, the unique details that differentiate a "standard" toolholder from one that is designed for more precise, high speed work can be subtle.

Like the parts they are used to create, precision toolholders are machined to exacting tolerances to create the optimum fit within the spindle, concentricity and balance. The more precise the work, the more these factors come into play.

If not properly machined, a toolholder that doesn't fit securely in the spindle or is improperly balanced can vibrate, wobble or fret, leading to out-of-tolerance parts, oversized, tapped holes and inconsistent, unrepeatable results.

As such, there is value in taking a deeper look at the elements of fit, balance, application of coolant, and other aspects of precision toolholders. For many, doing so may be the key to maximizing the speed and accuracy potential of their machining centers.

AT3 Certified Tapers

The toolholder is the essential connection between the machining center and the cutting tool. The toolholder fits into and is secured by the machining center's spindle, and in turn, secures the cutting tool such as a drill or end mill by clamping onto its shank.

Toolholder tapers are often conical, including CAT and BT taper specifications. A different kind of taper, HSK, is not tapered at all, but instead includes a variety of flanges for securely locking the toolholder in place.

For free-releasing toolholders with tapered flanges, the quality of the fit between the spindle and the holder is critical for accurate location and proper hold. Unlike those that require a drawbar, free-releasing varieties must maintain firm contact over the entire conical surface so the forces of drilling can be resisted and the tool remains in the spindle when idle.

"If the toolholders don't seat in the machine properly...you can't make a good product," says Ron Fulks, tool room manager for National Oil Varco. The company manufactures reciprocating pumps used in midstream oil and gas transportation. According to Fulks, he began purchasing precision toolholders for several CNC boring mills after switching from tension compression tapping to a more rigid approach.

"The tapping procedure is very important, because if there is runout it will make the tap cut bigger, so your hole won't gauge," says Fulks. The items he purchased included tapered toolholders for the taps as well as straight ID shank toolholders for end mills for several CNC boring mills.

To ensure the toolholders would fit optimally, Fulks says he selected Collis Toolholder. Founded in 1901, the company manufactures and distributes over 4500 tools and toolholders.

For its tapered toolholders, Collis is known for exceeding the industry "AT" standards for precise fit in the spindle. These standards are a specification of ANSI/ASME standard (ASME B5.50-2009) and indicate the tolerances that must be met in relation to the taper angle.

Since most CNC machine spindles are manufactured to an AT2 tolerance, toolholder manufacturers often provide tapered products that are "AT3 or better."

However, while some providers claim to offer AT3 toolholders, Collis is the only manufacturer that goes through a process of quality control testing to certify and document its products actually meet the specification.

Precision balancing for high speed machining

When RPMs increase to 20,000 to 30,000 or higher in high speed machining, the toolholder must be balanced more precisely.

Starting at about 8,000 RPM, the spindle begins to expand and can diminish the contact with the toolholder taper.

This can result in vibration that leads to out-of-tolerance parts. The generated "whipping effect" can stress spindle bearings and ultimately reduce tool life.

To prevent this from occurring, manufacturers often specify the level of unbalance by a G number with units in millimeters per second (mm/sec). For these reasons, machine-tool spindles and machine-tool parts usually are specified with vibration levels of G2.5 and G6.3.

According to Waylan Deen, President of Erosion Technologies, concentricity along the centerline is the most critical characteristic of a toolholder. Otherwise, runout can alter the size or width of drilled holes or slots, ruining the cut.

Imperfections such as these can be particularly costly when working with titanium or other exotic metals, often used in the aircraft industry.

Since 2005, Erosion Technologies has added three high-speed vertical machining centers to complement its wire EDM services. Deen also turned to Collis for tapered and standard end mill holders and quick-change toolholders for taps, which are balanced to the higher G2.5 standards.

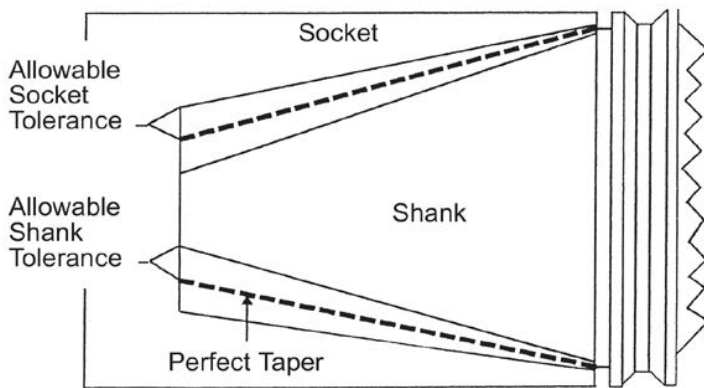
"I purchase from Collis because the toolholder are always spot-on in terms of balance and concentricity," says Deen.

Coolant-induced toolholders

Machining centers designed for through-spindle coolant application have been standard for years. When used in boring or tapping operations with hollow cutting tools, excess metal scrap and shavings must be flushed from holes and bores.

However, when there is no provision for feeding coolant through the machine spindle, there are alternatives where coolant can be introduced through the collar of the toolholder.

Although coolant-induced toolholders are available on the market, they can be quite expensive.



For toolholders with tapered flanges, AT3-certified products ensure the ideal fit between the spindle and holder for accurate location and proper hold.

Fortunately, there are options that cost much less – in the several hundred dollar range – from manufacturers such as Collis for Cat V-Flange, BT, NMTB, Morse Taper and R8 style shanks.

Difficult-to-Find Toolholders

For machining operations that have been around for a long time there is a high likelihood that equipment purchased decades ago is still being used – even if newer CNCs have been added to the mix. This can include drill presses, manual milling machines, and automotive transfer line equipment.

If this is the case, the necessary toolholder may be otherwise difficult to obtain except from a provider that offers a broad catalogue of options. Collis, for example, continues to offer hard-to-find toolholders for automotive transfer lines, Bridgeport R8 milling machines, a Rapid Switch line interchangeable with Universal's Kwik Switch, and others.

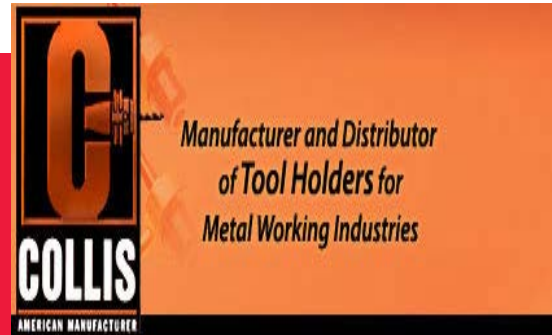
If the correct toolholder cannot be located, a replacement can be machined by those with the in-house capability.

Custom toolholders for those with special requests or proprietary dimensions can also be produced, in just about any combination of shank, collar, and collet in a variety of lengths can be created – often using information already on file.

Another option is for the customer to purchase “blanks” and then machine them to the requirement specifications themselves.

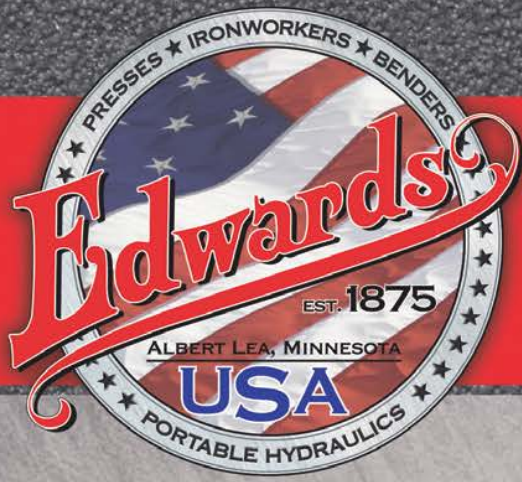
“When I need a specialty toolholder, I purchase a blank from Collis and I can modify it to suit our needs,” explains Fulks of National Oil Varco.

Although there are a myriad of other considerations when selecting a toolholder, by utilizing options with superior fit and better balance, more accurate work and better surface finishes can be achieved while extending the life of the equipment itself.



In 1901, a small pattern shop known as the Collis Pattern Works was founded in Dubuque, Iowa. This was our beginning. For more than 100 years, we have continuously serviced the machine tool industry with a full line of tool holders. We are the only manufacturer to certify AT3 or better holders. Collis Toolholder Corporation is ISO compliant. This registration supports our Mission Statement to be customer need-driven and devoted to improving productivity in the metal working industry. We design and manufacture each of our tool holders to precision tolerances, maximizing repeatability, accuracy, and durability. Collis Toolholder Corporation will continue to be the leader in our industry and have committed ourselves to a higher level of customer service performance and as always, to be the best. We are the only US manufacturer that carries a full line of tool holders where you can one stop shop for all your needs. Heartfelt thanks to you, our customers, for over 100 years of partnership.

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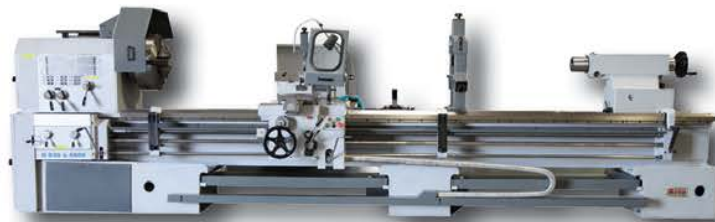


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The Rise of Steel Prices & What You Can Do to Avoid It



Prior to EonCoat, Merrick Alpert served in increasingly senior executive positions at R&D Altanova, Colt's Manufacturing Company, Turbine Generator Maintenance, Eceptionist, Enron Energy Services, Pacific Gas & Electric and Smith Cogeneration International.

In 2009 Merrick Alpert ran a grassroots campaign challenging then incumbent United States Senator Christopher Dodd (D-CT) to a primary election, forcing Dodd to drop out of the race and give up the Senate seat Dodd had held for 30 years.

Prior to his business career, Merrick Alpert served in the United States Military. He enlisted in the National Guard in 1994, eventually earning his commission as a First Lieutenant. In 1998 Merrick Alpert volunteered for deployment to Bosnia as a Captain in the 129th Rescue Wing and for his lifesaving actions in a valley outside of Sarajevo, he was awarded the Joint Service Commendation Medal.

With the currently rising cost of steel in the U.S., replacing this material has become a pricey endeavor for domestic organizations. As steel prices skyrocket, it becomes more important than ever to preserve the integrity of steel and employ corrosion prevention methods to keep steel purchasing to a minimum.

The Rising Cost of Steel

The rising cost of steel prices is due, in part, to the duties placed on steel imports by the United States. The loose and large amounts of steel imports previously enjoyed by domestic organizations have been drastically reduced in recent times on account of more stringent duty trade laws, and an easier process of filing future cases against foreign steel. These laws have discouraged foreign countries from continuing to export steel to the U.S.

Prior exports were finding their way to domestic purchasers at unreasonably low rates, making competition by domestic producers a challenging feat. These new laws to reduce the "dumping" of steel ring especially true for exports from China.

By succeeding in commissioning higher duties on foreign exporters (and taxing them as much as 266% on their steel exports) U.S producers hope to regain a stronghold on the steel market. This effort has diminished steel exports to the U.S., reducing them from over 32% in mid-2015 to just under 24% only a year later, according to "Steel Market Update".

But despite new U.S. trade laws, economic growth and increases in housing construction in China have led to an upturn in the steel market. Steel buyers who were destocking inventories in 2015 when steel market conditions were less promising are now restocking their inventories, leading to an overall higher demand for steel.

As the global prices of steel rise and demand is high, and foreign exports to the U.S. are subject to new, prohibitive duties and trade laws, domestic steel mills have been given the opportunity to grab additional pieces of the market, as well as the opportunity to raise their set prices.

How Can Organizations Focus on Corrosion Prevention?

The rise of steel prices is concerning for organizations who rely heavily on carbon steel, such as the energy, industrial, infrastructure, and heavy equipment industries. And because many of the products made of steel are exposed to harsh environments yet are expected to last a long time, this metal must be properly protected from corrosion.

Corrosion of steel is an electrochemical process caused by the combination of moisture and oxygen. Iron in the steel becomes oxidized and produces rust. Rust diminishes the integrity of the structure, compromising its strength and durability. Corrosion prevention and control is important to preserve materials, manage costs, and avoid catastrophic events that can occur without proper preventative measures.

Effects of Corrosion

Corrosion can cause many issues, including minimizing the safety and efficiency of steel and lowering the integrity of the equipment and structures it is a part of. Replacement of corroded metal can be expensive and time-consuming, slowing down production and raising the cost of doing business. Instead of falling prey to the changing conditions of the steel market, organizations can level the playing field by taking steel preservation into their own hands.

Corrosion can:

- Reduce the thickness of metal, lowering its strength
- Crack and weaken otherwise sturdy structures
- Pose safety risks to people on, in, or near these structures
- Cause contamination of fluids when heavy metals are released, or pipes are perforated and liquids escape
- Cause loss of surface properties, reducing the ease of fluid flow, conductivity, heat transfer, etc.
- Cause operational slowdowns because of metal replacement and repair needs
- Reduce the value of structures or equipment

Preventative Conditioning

Preventative conditioning can help stop or slow the process of corrosion. By conditioning the metal and the environment, organizations can limit the risk and loss attributed to carbon steel corrosion.

Conditioning Options

Coating - Conditioning the metal can be accomplished by coating the metal to create a corrosion-resistant coating between the metal and its environment. This coating often consists of a coating of another metal, a permutation of the same metal, or a resin, plastic, paint, oil, or another organic coating. This common method isolates the metal from the environment, eliminating the opportunity for corrosion. But this method only works as long as the coating remains intact. Air pockets, scratches, and general wear will cause this method to become less effective over time.

Galvanizing - Steel can also be galvanized with anodic or cathodic inhibitors or other retardants that inhibit the electrochemical process of corrosion. The most common method of galvanizing is to apply a protective zinc coating by dipping steel parts into a bath of molten zinc.

Alloying - Steel can also be alloyed with other metals to produce a more corrosion-resistant layer. In the case of EonCoat, an amorphous magnesium iron phosphate layer chemically bonds to the steel. A white ceramic layer then forms on top of the alloy layer, providing a second line of defense.

Conditioning the Environment - This is another option to reduce the opportunity for corrosion to creep in. By removing oxygen from water systems, one of the two components of corrosion (oxygen and liquid) becomes absent. Corrosion inhibitors can also be introduced into the liquid surrounding metal structures via a chemical to reduce the rate of steel degradation.

The rising cost of steel is one of many reasons for organizations to focus on corrosion prevention. Better preventative measures can help retain the integrity of steel structures and equipment, helping them keep their value and function longer and more efficiently.

For More Information on EONCOAT visit www.eoncoat.com

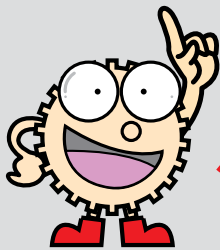


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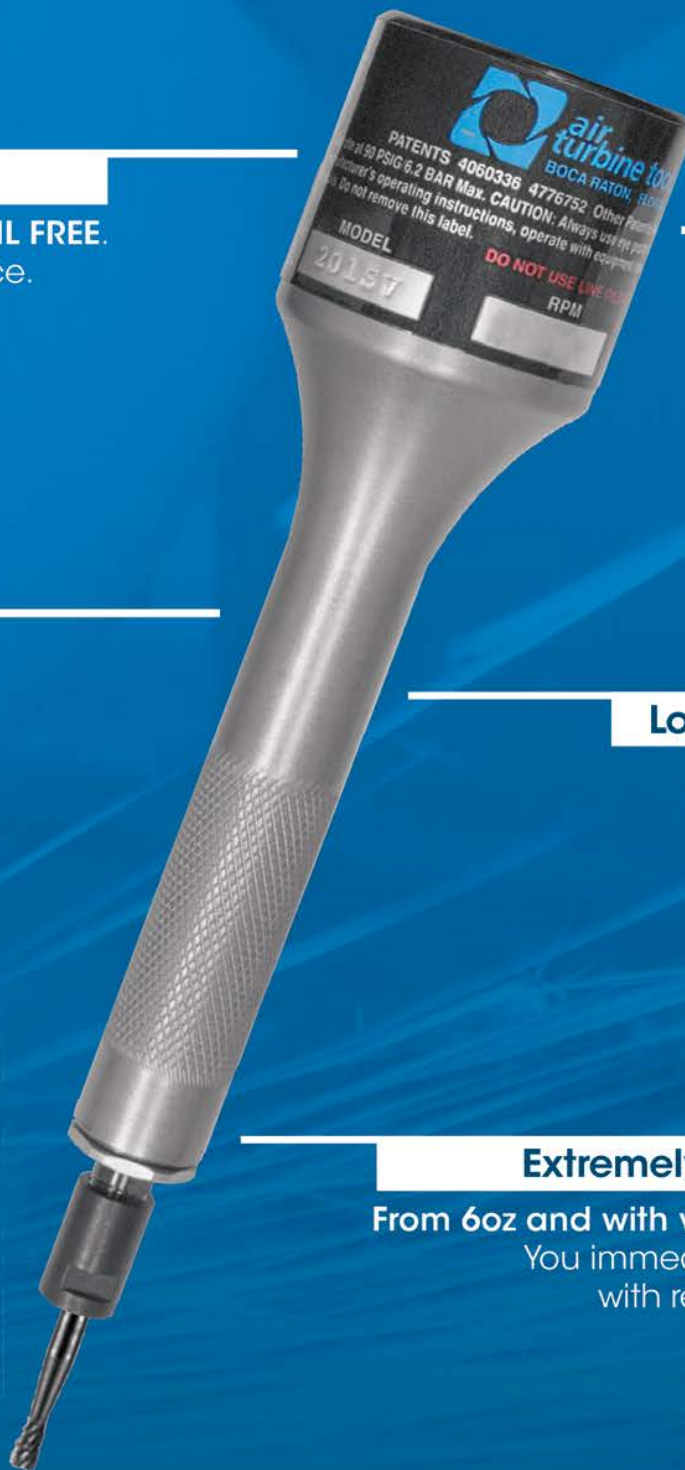
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ADVANCED CONTROL

Hotset America utilizes advanced control products for plastic injection machine cabinet builds

Hotset America Corporation (Swainsboro, Georgia) is a subsidiary of Hotset GmbH located in Lüdenscheid, Germany, offering a full line of cartridge, coil and flexible tubular heaters plus temperature sensor products for the plastics and machine industries. In addition, the company builds control cabinets for a global leader of injection molding machines. Hotset has standardized on the Siemens line of power distribution and motion control products,

including drives, breakers, power supplies and other control hardware for its cabinet builds.

As Hotset President David Cieslica explains, “We’ve now built between 500 and 600 control cabinets for our customers, with practically no issues, due to a combination of factors. Our supplier Siemens does an excellent job, helping us with application engineering assistance, product support and, a real key for us, hands-on training for their products and software from their Atlanta offices, so we can



maintain a consistent flow of finished units to our customers.”

The Hotset competitive advantage, according to Cieslica, is their ability to deliver high quality control cabinets in a short assembly time at a competitive price and be made in America. The company currently builds control cabinets for injection molding presses, and other electrically-powered machinery, as well as turnkey solutions related to thermal processing.

The Hotset mantra reads “Controlled Energy Flow” and the company subscribes to a build-where-used philosophy, making the Georgia location far more than a distribution outlet, as Cieslica relates. “We have over 50 employees here in Swainsboro, having grown from 14, just a few years ago.

The Hotset team comprises design and mechanical engineers, thermal specialists, quality personnel and a crew of installation technicians I’d put up against anyone in the industry.”

He further notes all the control cabinets are fully run-tested and consistently shipped on time to the Hotset OEM customers.t.

Over many decades, the corporate brand Hotset has primarily stood for hot runner technology, and for the production of industrial heating elements – predominantly for plastics processing.



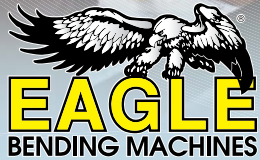
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However, for a long time now, this image has ceased to correspond with reality. Over the past years, Hotset has not only expanded geographically, but has also developed beyond the boundaries of plastics technology. And during this, their systems expertise and engineering competencies have been significantly extended.



The new Hotset brand is key to ongoing success.

"We take the brand concept very seriously. We strive to be a true value-adding supplier to our customers and we see the same attitude from Siemens, as they are constantly offering us suggestions on more efficient implementation of their products into our cabinet designs," says Cieslica. In this context, he further cites the advantage of collaborative engineering with the company's controls supplier. Cieslica notes, "While we utilize almost entirely standard products, implementing them into our CAD formats, we often require assistance in the configuration of the controls inside the cabinet, given our frequent customer challenges for more compact cabinet footprints and machine integration specifics."

Shifting to the reasons Hotset moved from its original location in Vermont to the relatively remote, southeast Georgia town of Swainsboro, Cieslica explains, "We were attracted by many factors, starting with the Savannah Port Free Trade Zone, but we quickly discovered something else that strongly influenced our decision and, I suppose, appealed to a personal belief of mine. The Georgia Quick Start program is internationally renowned for its workforce development strategies that provide training for qualified new, expanding and existing businesses.

Our company had a great desire to help rectify the unemployment situation locally, so we've brought a number of people into the operation, trained them and watched them grow, often with amazement." He cited the case of one employee, who was previously a delivery driver and, since joining Hotset, has become a highly skilled cabinet builder and now is the company's production supervisor.

"All it took was somebody giving him an opportunity to demonstrate his talents and it all started with proper training. It's been such a joy to watch him prosper with our company," Cieslica beamed. The program has existed for over 40 years and "... provided customized workforce training free-of-charge to qualified businesses in Georgia. Today, the program is one of the state's key assets for supporting new and expanding industries. Quick Start delivers training in classrooms, mobile labs or directly on the plant floor, wherever it works best for a company."

David Cieslica would certainly agree it's worked quite well for Hotset.

As he further notes about the relationship between Hotset and Siemens, "We've entered into a very long-term contract with one customer, so we knew we needed a reliable supplier who could support us growing our cabinet manufacturing business in America," he said. He also mentioned another OEM who currently has a contract with Hotset for 105 control cabinets. "Siemens has been here to help us in many ways and we appreciate their commitment to our business."

Global, constant, economic success is not something regarding which you can rest on your laurels. Not only technologies, but also markets are permanently changing and this at a breath-taking speed; in constant transition. Those wishing to be successful, must be quick, through the adaptation of production processes and through process optimization, quality improvement or innovations.

Global, how does it work? Simple: Increase energy efficiency; reduce cycle times; reduce production costs; optimize workflow. We at Hotset will be delighted to show you what is possible and how it works. We will help to make wishes become reality through sound analysis of your processes and procedures and intelligent change.

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**Carey Smith, CEO
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Siemens Corporation is a U.S. subsidiary of Siemens AG, a global powerhouse focusing on the areas of electrification, automation and digitalization. One of the world's largest producers of energy-efficient, resource-saving technologies, Siemens is a leading supplier of systems for power generation and transmission as well as medical diagnosis. With approximately 348,000 employees in more than 190 countries, Siemens reported worldwide revenue of \$86.2 billion in fiscal 2015. Siemens in the USA reported revenue of \$22.4 billion, including \$5.5 billion in exports, and employs approximately 50,000 people throughout all 50 states and Puerto Rico.

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About Hotset

Hotset has been selling products in the U.S. since 1985. Founded in 2010 in Vermont, Hotset America today supports the U.S., Canada and Latin America markets. With the 2011 move to Georgia, the company maintained representation of the parent company's full heater product suite, plus it today provides other services such as the control cabinet builds, focusing on the plastics, rubber, packaging, metal forming and diecasting industries, to name a few. David Cieslica has been the president of the company since its inception and brings over 30 years of experience, growing businesses, to the task.

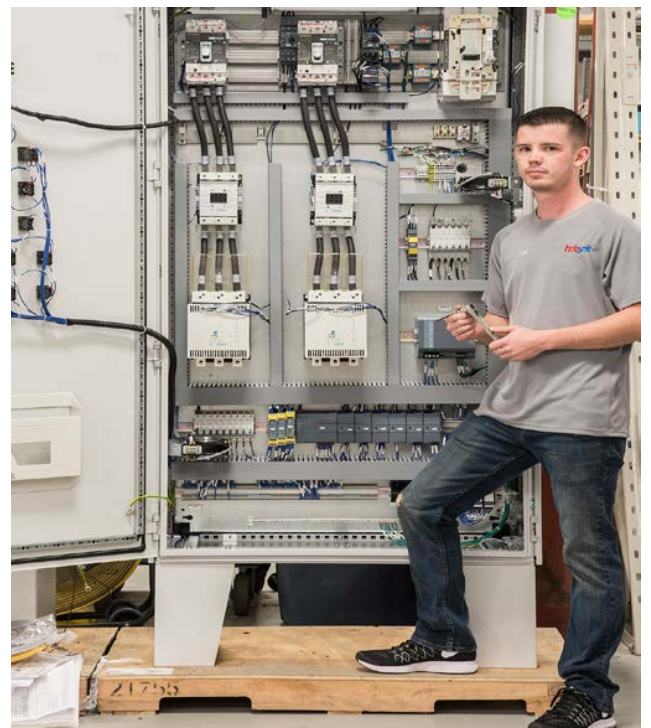
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JM Performance Products' Patented High Torque Retention Knobs Spearhead Productivity & Reshoring Solution.



The easiest and most cost-effective way to achieve the highest level of performance from existing CNC mills and tooling is to eliminate toolholder expansion. Toolholder expansion occurs when a standard retention knob is installed into a toolholder. Pressure exerted by thread engagement, coupled with the elastic properties of the steel used to manufacture the toolholders creates a bulge at the small end of the holder. Once expansion occurs, the holder will not pull all the way into the spindle, and the toolholder can't make contact with upwards of 70% of the spindle surface.

Because this bulge stops the toolholder from making full contact with the taper of the spindle, a wide range of CNC milling issues surface: vibration and chatter, poor tolerances, non-repeatability, poor finishes, shortened tool life, excessive spindle wear and tear, run-out, and shallow depths of cuts.

By eliminating the bulge and subsequent problems, reduced downtime, extended tool life, and increased speed and feed rates can be realized on existing machinery.

JM Performance Products, Inc., a leading manufacturing innovator of CNC mill spindle optimization products since 2009, introduced their Patented High Torque Retention Knob several years ago. Recognizing the design flaw inherent in CNC v-flange tooling that was responsible for costly CNC milling and boring issues, JMPP designed a retention knob that can be used in existing toolholders to eliminate the bulge.

A Southern California leading aerospace engineering shop, Hansen Engineering Company, has embraced the High Torque knobs to overcome ongoing production issues.

By converting to the High Torque knobs in their 14 CNC machines, requiring approximately 120 total High Torque retention knobs per machine, HEC has realized an approximate 15% increase in productivity and decrease in downtime respectively since their implementation.

Deformation Profile

Established in 1962, HEC is an approved ATA (Air Transport Association) manufacturing supplier of precision NC machined multi-axis parts, assemblies, and major structural assemblies. HEC specializes in complex MDI surface geometry, statistical process control, and electronic probing of part surfaces.

Two buildings on their 43,000 square foot facility campus boast a wide array of major CNC equipment including: high-speed 5-axis machining centers, heavy-duty 5-axis machining centers, horizontal machining centers with dual tombstones, 3-axis machining centers, and one with dual shuttle tables.

Focused on staying LEAN and practicing the industry 5S methodology (Sort, Set-In Order, Shine, Standardize, Sustain), HEC's shop is designed for maximum productivity. The majority of HEC's state of the art, high-speed enclosed CNC machines operate within a 10-15K RPM range, running titanium, stainless steel, and aluminum at high speeds—cutting large blocks of material for a wide array of aerospace products.

Over time, everyday heavy-duty machining operations began to present increased issues. Toolholders were getting stuck in the spindle due to deformation factors evidenced by wear marks at the top and bottom of the holders, fretting appeared on contact surfaces, and increasingly long cycles developed. These persistent problems lead to increased production shut downs to allow the machines to cool off for significant periods of time. Additionally, poor finishing and chatter problems were recurring when roughing aluminum, titanium, and stainless steel for forging jobs.



High Torque Results

Seeking a solution to their production issues, HEC engineering personnel initially met with JMPP's Technical Team at a WESTEC show in Los Angeles, where they were given a demonstration on the benefits of how the High-Torque retention knobs would work with their 50 taper V-flange toolholders. JMPP's patented High-Torque retention knob design features a knob that is longer and reaches deeper into the holder's threaded bore. As a result, all thread engagement occurs in a region of the toolholder where there is a thicker cross-section of material to resist deformation.

Intrigued by their potential, HEC initially bought 25 High Torque knobs and properly installed them, following calculated torque specs and using a retention knob socket and torque wrench. Immediately, they noticed a 5% spindle load decrease using a 3.0" hi-feed insert mill running titanium. HEC also installed them on an aluminum forging job they were running that had consistently produced chatter problems. Among the tools tested for this job were a 1-1/4" diameter knuckle rougher and 2.0" diameter finisher.

According to HEC's Curtis Sampson, Shop Lead-Man, "Again, the results were positive as the chatter was eliminated and it produced the best finish we have ever seen on these parts. After that, we bought 50 more pieces and immediately noticed improvements all around the table—we've been increasing their use over time ever since."

In noting the progressive conversion over time for HEC's machines since these initial tests, HEC's Buyer Tool Crib, Jose Campos, stated, "Productivity has continued to increase by approximately 15%. The same rate applies for downtime as there is less change out of tool cutters across the board." Campos also provided a key example for a HEC machine running at a speed of 10,000 RPM, 350 in/min feed on aluminum parts for speed, accuracy, and repeatability. In 2015 they used 170 High Torque retention knobs for the year; in 2016 they used 300 High Torque knobs.

Campos also noted usage on HEC's latest Mazak 5-axis CNC machining center, featuring 160 length with dual shuttle tables, and a tool changer which is designed to run one table full of parts while the other is being loaded—eliminating down time.

Campos stated, "Our Mazak machines used to make a loud noise when changing tools, and JMPP's High Torque retention knobs solved that problem. The machines are much quieter now when roughing titanium and stainless steel.

The images below represent HEC's after-use images of standard vs. High Torque retention knobs. The first image shows taper deformation which prevents a toolholder from properly mating with the CNC machine's spindle. The second image reflects JMPP's patented High Torque retention knobs' design elements (see list below) that dramatically improve taper contact quality, as the tool holder has close to 100% contact.

Key Design Elements

Longer than traditional retention knobs, with a precision pilot to increase rigidity, a relief below the flange forces threads into a deeper cross section of the toolholder. The knobs are hard turned to ensure precision fit and are balanced by design with threads cut to start and finish 180 degrees from each other. The High Torque knobs will work in existing toolholders.

Productivity and Reshoring Potential

Ultimately, the progressive conversion over time to JMPP's High-Torque retention knobs allowed HEC to overcome long-standing productivity issues for their entire fleet of high-speed CNC mills.

For HEC's demanding aerospace products production, these retention knobs have shown lower spindle loads, which is better for the machine. Additionally, when roughing titanium and stainless steel with the knobs, HEC's power meter showed a significant reduction in power consumption and overall tool life was improved.

HEC's Sampson advised, "I would like to put a word out to the people who are not quite convinced yet, they are worth the small investment. You may not want to jump in with both feet, but just try them on a job or two and I am sure that you will notice improvements. In this competitive world we live in today, we can use a product like these retention knobs. They are something that we can just screw in our tools to give us an upper hand on our competitors."

Hansen Engineering Company is an ideal example of conversion success. Other manufacturing entities serving the automotive, aerospace, and medical device markets have been achieving similar results by implementing JMPP's patented High Torque retention knobs.

According to JMPP President, John Stoneback, "By significantly increasing the speed of machines via eliminating the problems that were designed into v-flange tooling, conservative estimate savings of 10-15% can be achieved. The High Torque knobs transform v-flange tooling into the most cost effective, reliable, and precision tooling system available."

Stoneback also noted the reshoring potential these substantial savings can represent in bringing machine tool die/milling jobs back to the US stating, "Most US manufacturers are running machines 20-40% slower than they should be. With the ability to jack up the speed of CNC machines via minimizing the expansion/deformation that happens at the small end of the taper when a standard retention knobs is installed, significant increases in tool life, production rates, and revenue can be achieved. The climate is now for US manufacturers to take advantage of adopting and converting to these productivity advantages."

All JMPP retention knobs are manufactured and material sourced in the United States and made from hot rolled, 8620H or 9310H Fine Grain Steel. H13 tool steel is also available upon request. They are shot peened to relieve stress, and hard turned for superior fit-and-finish. Only the High Torque knobs are balanced by design. They meet all 5 World Standards: ANSI, JMTBA, ISO or DIN, and JIS.

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CANbus Rotary Position Sensor

Curtiss-Wright's Industrial division launched the NRH27C, a non-contact rotary position sensor which is suitable for use on specialty on- and off-highway vehicles utilizing CANbus communications. Developed by Curtiss-Wright's legacy brand of Penny & Giles, the NRH27C extends the company's recently-introduced NRH271 and NRH272 family and shares many similar features and benefits. These include a low-profile sensor body, small footprint, CANbus J1939 communications and a fully encapsulated, IP69K-rated design that offers exceptional performance against water, dust, shock, vibration and temperature.



For more information, visit www.curtisswright.com

DESTACO's New GTB Series Servo Positioning Rotary Tables

The GTB Series of Servo Positioning Rotary Tables are the first products to be launched as part of DESTACO'S technical partnership with Techno Dynamics, Inc. (TDI), a Japan-based company and leader in the development of motion solutions. The GTB Series features a roller-gear drive and is a lifetime-lubricated solution that has been designed and engineered to deliver high torque, with high speed and motion flexibility to meet the demanding payload requirements in a wide variety of general industrial rotary table applications.



For more information, visit www.destaco.com

Dispense Works Inc. larger Work Area for our RP Series Robot

Dispense Works Inc. now offers the popular RP Series robots with a generous 36" x 20" work area in a truly compact, space saving bench top package. These robots feature machine tool quality construction with pre-loaded leadscrews, ball slides and brushless servo motors on each axis. This translates to accuracy and high payload capacity for multiple and custom dispense heads as well as the larger meter / mixing systems. The large ground machine bed surface provides the ideal stable foundation for your fixturing / tooling. Your parts remain stationary while the dispense head moves from overhead on the high speed gantry.



For more information, visit www.dispenseworks.com

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Combi 150R from DS Smith Packaging Systems



The Combi 150R, forms, packs and closes cases with a new robotic mandrel case former. It enables flat cardboard die-cuts to be shaped around a mandrel in the shape of the box, resulting in uniquely formed boxes every time. The new machine combines many of the latest packaging production technologies and offers numerous technical, financial and commercial advantages including significantly speeding up throughput times (producing 60 cases per minute) and reducing waste. It has the capability

to produce boxes in innovative new shapes, such as cases with handles, eight faces or rounded edges and has improved performance in terms of strength and durability.

For more information, visit www.dssmith.com

Precision Deburring, Finishing, and Engraving Variable Speed Pencil Grinder

The Variable Speed Pencil Grinder, from Dynabrade, allows you to easily adjust the speed from 0 – 60,000 RPM to suit a variety of grinding applications. This new Pencil Grinder offers precision deburring, finishing and engraving with an easy, adjustable speed flow control. Simply set your speed with the touch of a dial. The tool remains at the desired speed until the operator changes it. The tool features a high-quality air-line, an overhose assembly that helps direct air away from the operator, and an Ergonomic Tactile Grip for a non-slip, comfortable operation.



For more information, visit www.dynabrade.com

Esco FLANGE HOG 110® Delivers Precise Phonographic Finish

The Esco FLANGE HOG 110® is a manually operated hand tool with a rigid I.D. clamping system and a 1" to 10" I.D. range that provides a facing diameter up to 14". Suitable for re-facing a variety of flange materials including cast iron, carbon steel, stainless steel, aluminum, and many alloys, a user simply swings the tool in a circular motion which advances the facing blade outward and creates a perfectly precise phonographic finish. Featuring 0.005" alignment accuracy, the Esco FLANGE HOG 110® incorporates a worm gear that smoothly drives a lead screw to produce a continuous and true spiral finish.



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High Lift Chip Trapper Moves Liquid Farther and Higher

EXAIR's new patented High Lift Chip Trapper offers a fast, easy way to clean coolant sumps, waste oil pits or wells. High Lift Chip Trapper removes the solids such as chips, swarf and shavings out of used coolants and other liquids with up to 15 feet of lift or 20 feet of horizontal vacuum. Metal chips in a machine sump can block the intake of the coolant pump which reduces the coolant flow and causes heat-related damage to the expensive parts and tooling. Regular cleaning of the sump with a High Lift Chip Trapper eliminates this problem, the lost production and downtime.

For more information, visit www.exair.com



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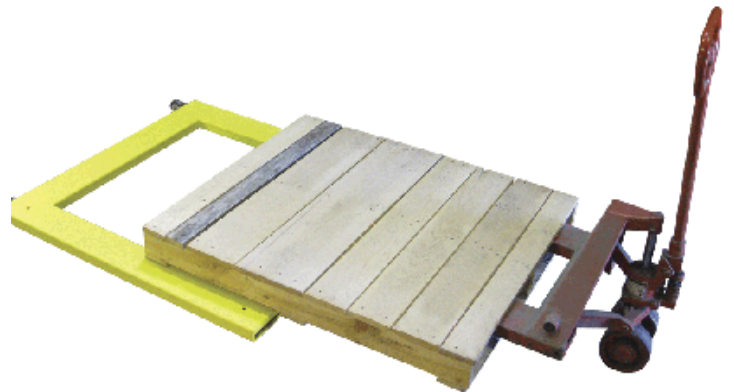
PRECI-FLEX toolholders offer a fast, accurate and cost-effective solution for turning machine tooling changeovers. The modular system is the first tooling system on the market with a single base holder and multiple tooling adapters that use the ER collet pocket. The system's conical and flat face planar interface allows the use of either an adapter or a standard ER collet and enables collets, endmill holders, expanding collet chucks and shrink fit tooling to be mounted on a single base holder. The Swiss-manufactured pL LEHMANN 500 series of modular multi-axis rotary tables allow users to upgrade a vertical machining center to significantly increase productivity without incurring the expense of a new machine



For more information, visit www.exsys-tool.com

FAIRBANKS SCALES LOW-PROFILE U-SHAPED FLOOR SCALE

The new Yellow Jacket U-Shaped floor scale is an ideal alternative to traditional floor scales in manufacturing and warehouse applications where floor space is at a premium. The Yellow Jacket U-Shaped floor scale allows material handlers to capture the weight of standard and non-standard pallets and skids without removing the pallet jack. Operators can simply move the pallet into place over the scale, lower the pallet jack so the load is resting on the scale, capture the weight, and then raise the pallet jack to easily move the pallet or skid to its next location.



For more information, visit www.fairbanks.com

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CMT upgrade for TPS/i Robotics Power Source from Fronius

Fronius is expanding the range of functions of its intelligent TPS/i Robotics power source. This system can now be equipped with the extremely stable Cold Metal Transfer (CMT) welding process using a new additional package. With TPS/i CMT Robotics, Fronius combines the advantages of its latest MIG/MAG power source platform with the most stable arc. The intelligent, modular system consists of interconnected and fully synchronized components and is specially designed to meet the demands of robot-assisted welding.

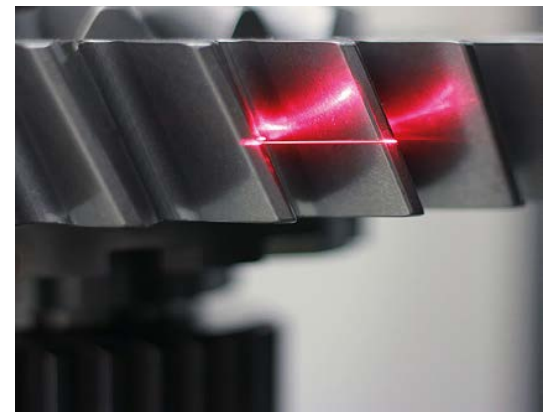
For more information, visit www.fronius.com



300GMSL Multi-Sensor Gear Inspection

The versatile platform of Gleason's 300GMSL Inspection System provides the classic tactile probing methods for inspecting conventional gear data on spur and helical cylindrical gears as well as straight, spiral and hypoid bevel gears with a diameter of up to 300 mm. In addition, the new inspection system allows non-contact laser sensor scanning of tooth flanks to support gear development. Complete topography data can be recorded far more rapidly than with conventional tactile probing, with comparable results. The integration of laser scanning and associated 3D graphics with CAD interface considerably expand both the functionality and the range of applications for this machine platform.

For more information, visit www.gleason.com



500°F Inert Atmosphere Walk-In Oven From Grieve

No. 1038 is a 500°F (260°C), inert atmosphere walk-in oven from Grieve, currently used for annealing polyurethane tubing at the customer's facility. Workspace dimensions of this oven measure 60" W x 72" D x 84" H. 40 KW are installed in Incoloy-sheathed tubular heating elements, while a 4200 CFM, 3-HP recirculating blower provides vertical downward airflow to the workload. This Grieve walk-in oven has 6" insulated walls and an aluminized steel exterior with white epoxy paint. Type 304, 2B finish stainless steel interior with continuously backwelded seams and inert atmosphere construction are also onboard.



For more information, visit www.grievcorp.com

Metal Dust Collector from Grizzly Industrial

The G0818 Metal Dust Collector will help keep your shop safe and clean. This sturdy steel-constructed dust collector features a removable chip clean-out drawer for easy disposal of metal chips and collected particulate. Incoming air from the dual 4" inlets must pass through a three-stage filtering system that includes a 30-micron stainless steel filter, 5-micron active carbon filter, and a pleated 1-micron filter. An industrial-duty 220V, 1.5 HP direct-drive motor powers the 12-3/4" aluminum impeller for 755 CFM! The G0818 also features locking caster wheels and a push handle for easy placement and positioning.

For more information, visit www.grizzly.com



iBumpTest app for the Apple iPad

Determining the natural frequency of a mechanical system with a Bump Test is a controlled measurement. It is important to understanding the resonance of a system and the effect of a change of mass, a change in stiffness or a change in damping. GTI Predictive Technology is continually developing new apps for our powerful VibePro family. iBumpTest is also available as a standalone kit for new users. Additional hardware is required for standalone kits. iBumpTest includes the iBumpTest app, an impact hammer with modular heads for different applications and a cable for use with either our GTI-220 wireless sensor or our wired DAQ solution.



For more information, www.gtipredictive.com

Enviromax HEPA Filtered Enclosures

Enclosures are designed to isolate powder handling, sample weighing, high throughput screening, and other lab automated processes. Enclosure can feature HEPA filtered exhaust or HEPA filtered systems to protect users or product depending on the process. Available in unitized or modular models, HEMCO EnviroMax enclosures are offered in standard sizes or can be built to meet your exact size and design specification. Horizontal slide, vertical moving, or hinged sash access and work surface, table / cabinets, electrical, plumbing and ventilation systems are options. HEMCO offers a wide selection of standard sizes in vented or HEPA filtered models.



For more information, visit us at www.HEMCOcorp.com.

Honeywell Headset Integrates Bluetooth



The new Honeywell Howard Leight™ Sync® Wireless protective earmuffs integrate Bluetooth wireless technology allowing workers to talk on the phone, connect with co-workers, get instructions and perform tasks without sacrificing hearing protection in noisy or dangerously loud environments. The headsets connect wirelessly via Bluetooth to most smartphones and features a boom microphone that enables workers to answer calls and carry on clear phone conversations while keeping the phone safely in a pocket. The wireless format eliminates the need for cords or cabling that can pose trip, slip or hand hazards.

For more information, visit www.honeywell.com

JDN-RC from J D Neuhaus



J D Neuhaus has developed an innovative and robust new concept for controlling hoists and cranes. The company's JDN-RC (Radio Control) receiver is designed for long-lasting performance in rigorous operating environments commonly found in industrial and offshore applications, including ATEX (explosive atmosphere) zone 2/22 conditions. Featuring a solid and extremely compact receiver to suit even hoists with low-carrying capacity, all components are accommodated in a shock-resistant GRP casing offering protection class IP65. This means that the device is totally protected against the ingress of dust, and can withstand low-pressure water jets from any direction, thus making it resistant to seawater in offshore applications.

For more information, visit www.jdngroup.com

LASERDYNE 606D



The 606D system is composed of two completely independent laser machines within a single unitized structure. A main design goal of the system was to maximize throughput per unit of manufacturing floor space. One of the ways that it accomplishes this is to incorporate two completely independent laser machines within a single unitized structure. The throughput goal also is accomplished through a machine design that gives high dynamic performance and takes full advantage of the capabilities of high power QCW fiber lasers. In addition, the two LASERDYNE S94P controllers provide integrated control of the laser, motion, process gases, and process sensors in both workstations providing smart solutions for cutting, welding and drilling.

For more information, visit www.primapower.com

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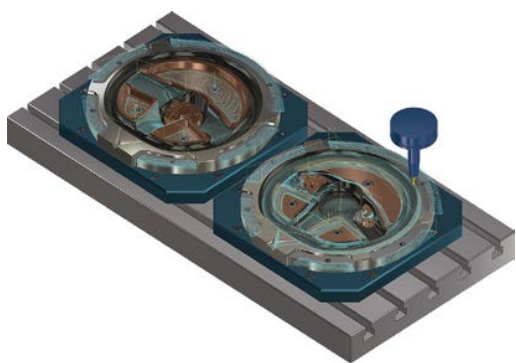
MarSurf PS 10 and MarShaft SCOPE 250



The MarSurf PS 10 from Mahr is an economical and practical roughness measuring unit for mobile use. Using a smartphone-like 4.3" TFT touch screen display, operation is fast, intuitive and user-friendly. The new generation MarSurf PS 10 design measures 31 roughness parameters, offers a convenient list of "favorite" functions in the display, and provides laboratory level performance on the shop floor. The MarShaft SCOPE 250 is designed to provide fast, accurate, fully automatic measurement of smaller shafts and turned parts directly on the shop floor, the MarShaft SCOPE 250 plus features a highly accurate matrix camera with four million pixels

For ore information, visit www.mahrexactly.com

Mastercam 2018



Mastercam 2018 offers new 2D/3D Milling features. Stock awareness has been added to select 2D toolpaths. The tool motion can now use the top, bottom, or both values of the stock, and all the linking parameters can be set to adapt to changing stock values. Finish passes now have more options to choose from. Now you can add or remove finish cuts, based on the number of rough depth cuts specified on the Depth Cuts page. The workflow for all 3D High Speed toolpaths has been streamlined and gives you fine control over exactly where to cut. You can also assign variable stock to leave values on its walls and floors.

For more information, visit www.mastercam.com

Muller's Octopus Load Containment Solution

Muller's Octopus™ "1825 B" automatic rotary ring stretch wrapper. The Octopus 1825 B is able to accommodate a wide range of pallet load sizes and a variety of applications. With its simple installation and durable aluminum frame structure, the Octopus 1825 B requires minimal assembly, less maintenance and boasts a smaller footprint compared to most other styles of wrappers. The modular design of the machine allows for numerous innovative options to solve nearly any stretch wrapping challenge.

For more information, visit www.mullerlcs.com



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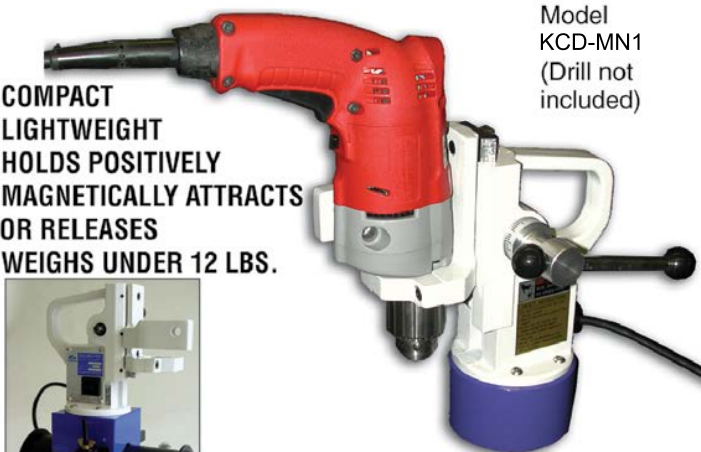
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NOARK Electric Introduces 3- And 4-Pole DP Contactor Line



Available in 20-40A range in 3- and 4-pole configurations, the Ex9CKT Series features an optional mounting plate, making it a direct replacement for popular DP contactors. The Ex9CKT Series is UL 508 and UL 60947-4-1 Recognized and compliant to CSA C22.2, IEC/EN 60947, CE, RoHS and ARI-780 HVAC standards. It features a Double E magnet assembly for increased performance and reduced power consumption. The newly redesigned body has a high arc-resistant polyester base assembly, allowing for space savings, while the quick-connect spades speed install time. Users can select terminal options, screw or lug connection.

For more information, visit www.noark-electric.com

MicroMAX Gen 2 from OMAX



Contributing to the ultra-high precision capability of the MicroMAX is OMAX's proprietary linear traction drive system that utilizes optical encoders. Protective bellows seal off all precision components inside the MicroMAX and the machine's rigid construction minimizes vibration, enhancing its accuracy. The MicroMAX can machine virtually any material in a wide variety of thicknesses. The cold-cutting nature of waterjet machining means there is no heat-affected zone (HAZ) and therefore no change to the material properties. Waterjets can handle materials that are difficult to cut with lasers and EDMs and make an excellent complement to other machine tools.

For more information, visit www.omax.com

Palmgren's 2-Speed Belt Grinders

Palmgren's 2-Speed Belt Grinders' provide the ultimate flexibility from roughing, to intermediate grinding and blending, to final finishing. By changing the belt, the grinder quickly converts from heavy stock removal to shaping, forming, snagging, deburring, chamfering and finishing operations. The grinder features a production duty 2-speed motor, direct drive design with oversized shaft and bearings, fully enclosed adjustable guarding, tool rest and simple easy belt tension and tracking. The grinders are available in 6-inch and 8-inch models and all are complete with a safety electrical package and heavy duty steel floor stand.



For more information, visit www.palmgren.com.



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TITANIUM cut burs from PFERD INC.

PFERD INC. has introduced TITANIUM cut burs, the latest addition to its high-performance Carbide Bur line-up. TITANIUM cut is specially designed for machining hard titanium alloys (with tensile strength greater than 500 N/mm²). With an innovative tooth geometry, TITANIUM cut generates stock removal rates up to 60% higher than conventional cross-cut burs. This results in a smooth milling action with significantly reduced vibrations and noise for comfortable, ergonomic working conditions. TITANIUM cut's superior surface finish and higher metal removal rates also results in longer tool life and reduced labor costs.



For more information, visit www.pferdusa.com

Model 4460 Sit-Down Counterbalanced Forklift

The Raymond Corporation introduces the Model 4460 3-wheel sit-down counterbalanced truck. With dual entry and exit, a lower step height, a larger entry opening and a larger operator compartment, the Raymond® truck gives operators increased foot, leg and headroom, allowing for improved ergonomics. The Model 4460 includes several unique features to maximize efficiency and productivity. These features include an open view mast design with integral side shift, which is combined with a three-stage mast and full free lift. The Model 4460 has oil-cooled disc brakes that reduce cost of ownership by keeping the brakes free of dust and debris.



For more information, visit www.raymondcorp.com

Rego-Fix Tooling Solutions



The powRgrip system relies on the interference between holder and collet to generate its clamping force. Unlike other clamping systems where heat or hydraulics are used to expand the material, the powRgrip uses the mechanical properties of the holder material to generate tremendous gripping force with run-out below 0.0001". Available in standard and ultra-precision varieties, REGO-FIX's ER collet system is ideal for a variety of machining applications including boring, milling, reaming, tapping and grinding. Invented by REGO-FIX in 1973, the innovative and flexible collet system is the most widely used and accepted clamping system in the world.

For more information, visit www.rego-fix.com

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Rocklinizer® Model 950

Through a proprietary electronic spark deposition process, the Rocklinizer deposits Titanium Carbide (80 Rockwell C), Tungsten Carbide (70 Rockwell C), and Rockhard electrode (60 Rockwell C) onto and underneath the surface of metals, tools and dies. This process alleviates metal-on-metal wear, enhances gripping, maintains dimensions, and ultimately extends the useful life of machinery to delay or even avoid new equipment purchases. The recently launched Rocklinizer® Model 950 deposits as little as .0001" to .010" and higher onto the base material, all controllable within .0001" by digital machine setting for a precise application.



For more information, visit www.rocklinmfg.com

Roland monoFab™ ARM-10 Rapid Prototyping 3D Printer

With the advanced, precise and user-friendly monoFab ARM-10 rapid prototyping 3D printer, complex parts which previously required multi-axis milling, such as those that are hollow or require undercuts, can be built quickly and easily. The ARM-10 uses Digital Light Processing (DLP) stereolithography 3D printing that prints layer-upon-layer of resin material which, once exposed to UV light, hardens into a semi-transparent object. This layered projection system of adding and curing converts a digital image created in 3D software into a solid object. By using a suspended build system, resin usage is kept to a minimum, making model production efficient and affordable.



For more information, visit www.rolanddga.com

PrimeTurning™ from Sandvik Coromant



Unlike conventional turning operations—which have remained largely unchanged for decades—PrimeTurning™ allows machine shops to complete longitudinal (forward and back), facing, and profiling operations with a single tool. The methodology is based on the tool entering the component at the chuck and removing material as it travels towards the end of the component. This allows for the application of a small entering angle, higher lead angle, and the possibility of machining with higher cutting parameters. Furthermore, conventional turning (from part-end to chuck) can be performed using the same tools.

For more information, visit www.sandvik.coromant.com

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Schweiss Doors now offers quick, easy ‘Splice Connections’

Schweiss Doors has invented the new hydraulic door Splice Connection system. Schweiss engineers came up with this one-of-a-kind Splice Connection that allows the doors to be broken down, shipped and easily assembled at a fraction of the cost. The highly engineered, patent pending Splice Connection allows the installer to easily slide both hydraulic door sections together and secure corresponding splice plates with bolts. No welding is necessary and the splice connection is literally self-aligning for effortless and quick field assembly.

Customers like the fact the door can be easily shipped or picked up from the factory.

For more information, visit www.bifold.com



Seco End Mills Boost Material Removal Rates for a Wide Range of Materials

Seco Tools recently released two new solid-carbide end mills that significantly boost metal removal rates and offer exceptionally long tool life for a variety of today’s challenging workpiece materials. The Jabro®-HFM JHF181 is an excellent choice for high-feed milling strategies in hardened steels and nickel-based alloys, while the Jabro® -Solid2 JS564 and JS565 represent Seco’s continued focus on developing tools for optimized roughing strategies for materials such as steels, stainless steels and titanium alloys. The JHF181 is especially effective at machining complex parts that require long tool overhangs and a mix of multiple axial and radial machining operations.

For more information, visit www.secotools.com



WiFi USB Connect

The WiFi USB Connect from Shop Floor Automations is a wireless USB solution for the manufacturing shop floor. It emulates a USB stick, allowing you to share data from a PC to your machines. No drivers are required - after a quick web configuration, plug it in and it’s ready. The device serves as an easy and economic shop floor upgrade. Data can be stored on a remote PC, or locally in the device’s memory, with the device itself providing up to 128 MB of storage. Floppy drive emulators and CNC machines with a USB port can now have wireless abilities.

For more information, visit www.shopfloorautomations.com



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Sinamics V20 Smart Access web server module

Siemens announces the launch of its Sinamics V20 Smart Access web server module, designed to mount directly onto the drive, transforming a mobile device or laptop into a virtual operator panel for drive control. By providing a wi-fi hot spot, the wireless connection on this module facilitates setup, programming, commissioning, production monitoring and maintenance on a variety of machines and production equipment. A simple, embedded graphical user interface (GUI) enables easy use of the Sinamics V20 in every phase of operation. No separate app is required.



For more information, visit www.usa.siemens.com/sinamics-v20

Single Axis MEMS VC Accelerometers

Silicon Designs, Inc. developer and manufacturer of industrial-grade MEMS capacitive accelerometer chips and modules, announced the added versatility of its Model 2210 Series, to include measurement capabilities on one, two, or three orthogonal axes. Low-noise single axis Model 2210 accelerometer modules integrate a MEMS VC accelerometer chip with high-drive, low-impedance buffering for reliable, repeatable measurements. When used with a Silicon Designs mounting block, such as the Model 2330-BLK, the Model 2210 can effectively measure on either one, two, or three axes, allowing for the specification of a single part number for multiple requirements, thereby reducing in-house inventory counts.



For more information, visit www.silicondesigns.com

Simonds Saw Introduces QUAD™ 7 Carbide Tipped Band Saw Blades.

Fitchburg, MA, U.S.A. (April 3, 2017) – Simonds Saw, inventor of carbide tipped band saw blade technology, introduces QUAD 7™ Carbide Tipped Band Saw Blades for demanding production cutting operations such as steel service centers, foundries and aerospace sawing applications. QUAD 7 blades are ideal for alloy; high chrome alloy; Inconel and other nickel-based alloys; titanium block and plate; stainless steels; and mold, tool and bearing steels. QUAD 7 Blades feature a positive rake angle four-tooth pattern that produces seven distinct chips. This provides exceptionally high material penetration for faster cutting in production sawing alloy applications.

For more information, visit www.simondsint.com



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Stäubli introduces TX2 Line of Collaborative Robots



Stäubli introduced its new TX2 line of collaborative robots to the North American market at the Automate trade show in Chicago. The features of the new models comply with the stringent requirements of the highest safety category and excel in every facet of automation, including high-volume manufacturing as well as collaborative scenarios. To ensure maximum safety, sensors monitor every movement of the robot, while the robot's coordinates, speed and acceleration are recorded in real time.

For more information, visit www.staubli.com

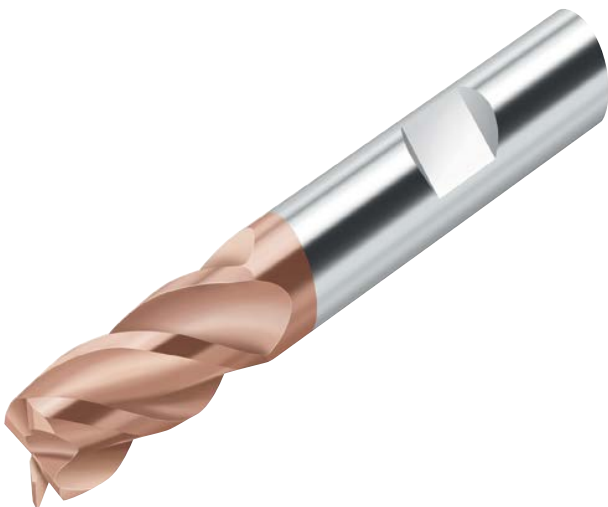
Rotomax from Suhner

Suhner introduces the Rotomax flexible shaft machine, a unique unit with interchangeable hand pieces that allow a user the freedom to perform a wide variety of machining operations with a single machine. The Suhner Rotomax functions as an angle grinder, straight grinder, drum polisher, belt sander, tube polisher or die grinder, simply by changing the hand piece. This new machine has myriad applications in industrial steel fabrication, polishing operations, sheet metal assembly, food processing and foodservice equipment builds, appliance manufacturing, various stainless steel fabrications including medical and more. The Suhner Rotomax offers users a range of power from 2.0-4.7HP and features electronically-controlled speeds ranging from 500-15,000 RPM in increments of 100 RPM at the touch of a button.



For more information, visit www.suhner-abrasive-expert.com

MC232 Perform from Walter



Walter's new MC232 Perform solid carbide milling cutters are particularly suitable for shops that frequently machine small and medium lot sizes. Walter has added to its range of solid carbide milling cutters with the introduction of its MC232 Perform product line. This versatile, cost effective new cutter type is available with 2, 3 or 4 flutes, in a diameter range of 1/8 in. to 5/8 in. (2 to 20 mm). Smaller diameters are offered with cylindrical shank and larger diameters with a Weldon shank of higher horsepower cutting.

For more information, visit www.walter-tools.com/us

New WD-40® Specialist® Greases

WD-40 Company is introducing WD-40® Specialist® Greases, a family of convenient solutions for automotive, construction and farming professionals dealing with a variety of specialized lubrication challenges. The WD-40 Specialist Greases line includes Superior Performance True Multi-Purpose Grease, Heavy-Duty High Temperature Grease, Heavy-Duty Extreme Pressure Grease and Marine-Grade Water Resistant Grease. The products are interchangeable with each other, meaning they won't cause cross-contamination issues that compromise performance and effectiveness. The greases also excel in extreme conditions and protect against rust and corrosion.



For more information, visit www.wd40company.com

Yaskawa HC10 Collaborative Robot

Yaskawa Motoman's new six-axis HC10 robot works safely with, or in close proximity to humans by stopping the robot in the event of contact with an operator. Dual torque sensors in all joints constantly monitor force to quickly react to contact; something typically only found in more expensive systems. It is designed to eliminate operator pinch points while through-arm utilities hide cabling and increase safety by reducing the risks of snagging or interference with other equipment. Utilizing Easy Teach software, the user can hand-guide the HC10 robot when teaching new program paths. This allows the HC10 to be quickly deployed or redeployed on demand.



For more information, visit www.motoman.com



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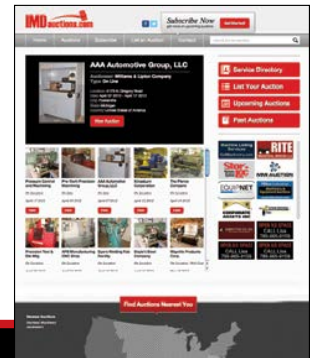
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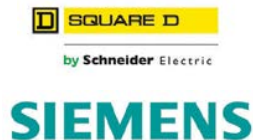


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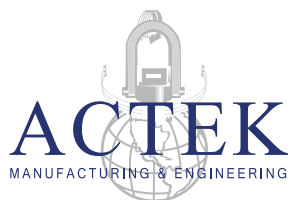


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