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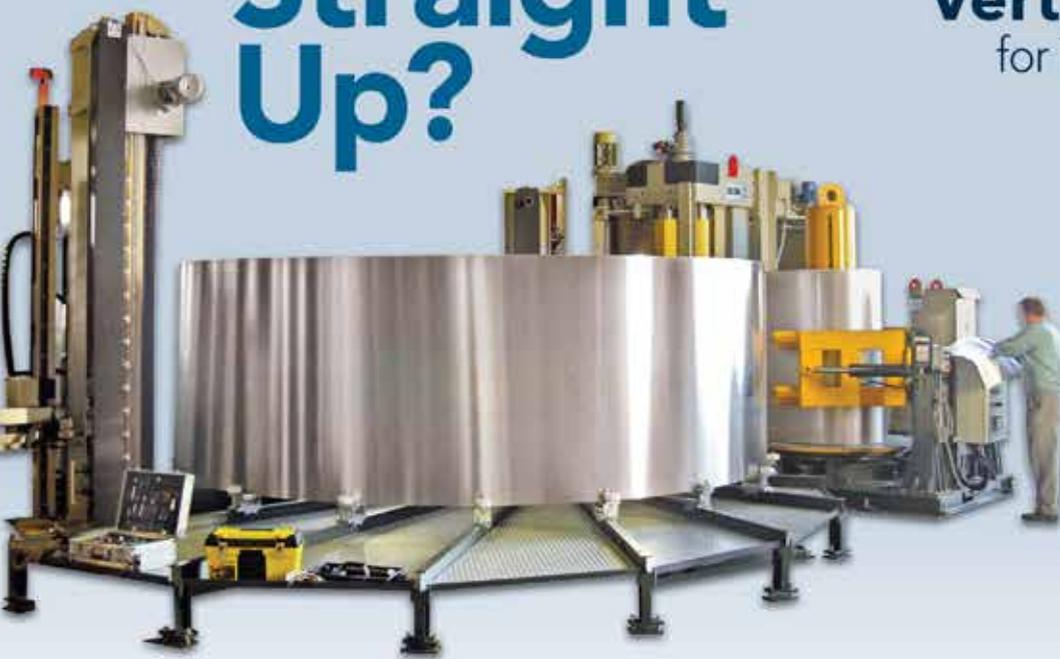


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TIPS CONTENTS

- PG 4 Advanced PLC Addresses Emerging Challenges in Machinery Control
- PG 8 CNC Systems Gain MTConnect Interface
- PG 14 Why Manufacturers are Over Paying for Electromechanical Assemblies
- PG 18 Cylinder Hone Proves its Value for Field Repairs
- PG 22 New Product News
- PG 24 Ad Index

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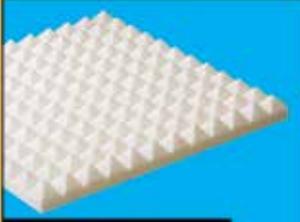
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Advanced PLC Addresses Emerging Challenges in Machinery Control

Today, ABB is extending the capability of one of the most popular PLCs in the world - the AC500 - with a very high performance version. The brand new AC500 PM595 features a multi-processor system with the performance to handle the most demanding machinery and motion automation control and communication tasks.

The new AC500 PM595 Machinery Controller is optimized for robust, high performance industrial control, and is built around a 1.3 GHz processor with four 32-bit RISC processors plus an embedded double-precision floating point processor, 16 MB of user program memory and a large array of communications interfaces. The very high level of computational capability allows the new controller to handle extremely complex control tasks, involving complexities such as precision coordinated motion with very large quantities of axes, and mathematics-intensive computation such as real-time trigonometric calculations for robotics or other advanced kinematic applications. The controller also has a built-in interface to allow ABB's advanced safety PLC to be connected for high risk applications.

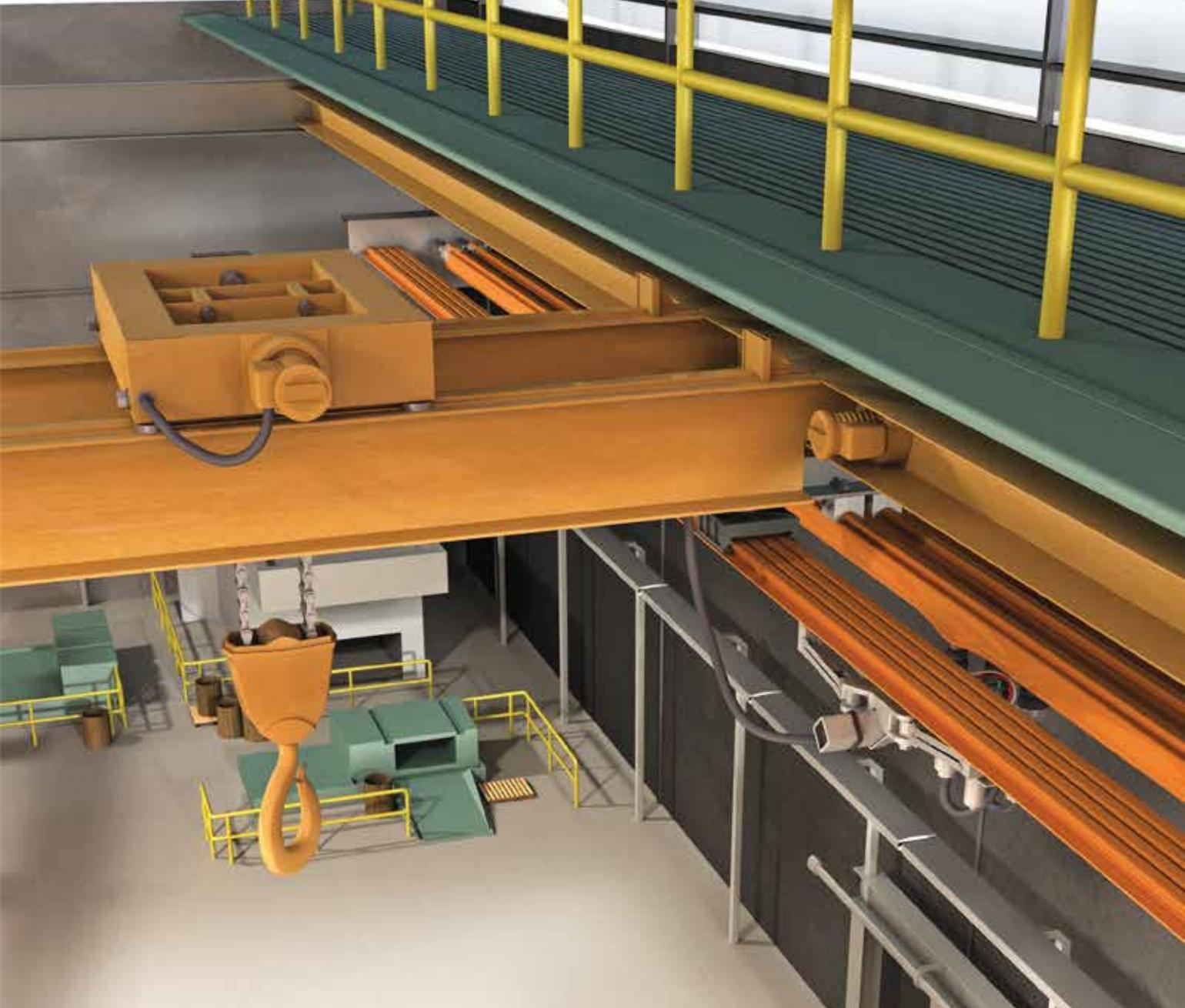
"Machinery and motion control applications are becoming much more complex as machinery becomes more capable, smarter and safer, and as demands for more sophisticated human interfaces and communications grows," says ABB's product marketing manager, Wangelis Porikis. "The sheer computational capability of the AC500 PM595, with its rich feature set and versatile communications capability, provides enormous flexibility for automation builders. It provides a controller that can handle virtually any application, but also one that is highly software-configurable - giving OEMs a single control platform for a very broad range of applications."

Versatile connectivity is central to the new machinery controller's design. This allows it to be used with both legacy systems and today's favored networks - as well as providing a soft architecture that can handle future demands. Four independent Ethernet interfaces and an integrated network switch are built in. Two of these interfaces are programmable, supporting different Ethernet based protocols such as EtherCAT and PROFINET - allowing the PLC to be connected to control two different types of network simultaneously. TCP/IP, UDP, CAN/CANopen and two RS232/485 serial interfaces complete the on-board connectivity. Further networking and fieldbus interfaces may be added via the PLC's dual expansion ports. This variety of communication possibilities gives users the means to evolve control networks easily, to add new machinery or equipment into control system networks for example, even if located on another process line or location.

The AC500 PM595 PLC is compatible with the range of AC500 expansion modules - providing unlimited flexibility for industrial control and monitoring applications. Users can also build systems with integrated functional safety, connecting ABB's safety PLC directly onto a second expansion port. This provides great flexibility for implementing safety-critical applications.



AC500 PM595 is intrinsically robust. The PLC uses non-volatile MRAM memory, and operates without fan cooling - giving great flexibility of location to equipment designers and process automation engineers. An alternative variant of the AC500 PM595 is additionally available for controlling equipment operating in harsh conditions and extreme climates. The XC or 'eXtreme Conditions' version of the PLC adds further protection against a wide variety of threats



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to reliability including high and low temperatures, high humidity, low air pressure, salt mist and hazardous gases, and vibration and shock. This can greatly reduce industrial control system building costs by eliminating the need for sophisticated protective enclosures with special seals, HVAC, shock absorbers, EMC protection, etc.

To handle the increasing complexity of industrial control applications and the rapidly-escalating costs of developing software, the new PLC is compatible with ABB's renowned Automation Builder programming capability. This remarkable engineering development environment provides an integrated tool-suite for control and motion systems based on PLCs, safety PLCs, motion control and related automation components - reducing software complexity, and cutting time to market and cost of ownership. All the tools required for configuring, programming, debugging and maintaining automation projects are provided via a common intuitive interface.

"PM595 offers control engineers a single platform for today's and tomorrow's applications," adds ABB's Porikis. "The associated Automation Builder engineering tool completes the solution for developers and owners - providing the means to simplify control engineering and standardize on one development platform for all projects - regardless of scale."

The applications potential of ABB's new PLC is extensive. It is especially suited to larger-scale process control applications, with the controller able to offer the same kind of performance levels as an industrial PC for example, but with a much higher level of robustness. Advanced multi-axis motion control systems is another major target, with the PM595 being capable of controlling over 64 motion axes within a 1 millisecond cycle. The versatile communications and security capabilities of the PM595 also suits 'telecontrol' or SCADA supervisory control and data acquisition applications - as required in areas

such as power system monitoring and control. The controller's intrinsic robustness, the availability of a ruggedized variant, and the easy means of integrating advanced safety - also makes ABB's new PLC ideal for many of today's most difficult applications, from maintenance-free controllers in applications such as wind turbines or at remote SCADA nodes in deserts or Arctic conditions, to safety-critical applications in equipment such as cranes, mining hoists or automatic guided vehicles.

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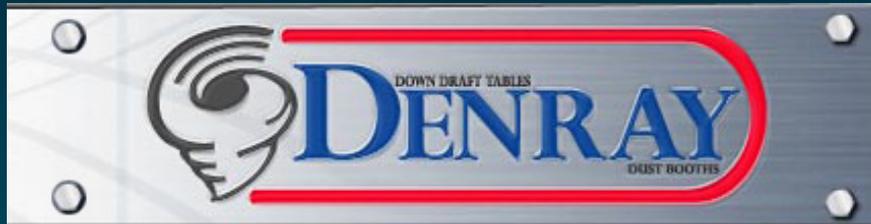


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Systems Gain New Interface



NUM has developed a new communications interface option for its CNC systems that fully complies with the open MTConnect interoperability standard. Known as NUMConnect, the interface can be fitted to new or existing systems and simplifies the integration of CNC machine tools with third party manufacturing management software. It enables users to implement powerful productivity-enhancing real-time data collection and retrieval facilities for production monitoring and analysis purposes.

NUMConnect allows CNC machine tool builders to add further value to their products very easily and cost-effectively, by providing uncompromised connectivity for manufacturing data. Manufacturers are increasingly making use of data retrieved from CNC machine tools on the shop floor to improve the efficiency of their production processes. However, until recently, the lack of a vendor-neutral data communications standard within the industry meant that CNC machine tool companies could only provide their customers with proprietary solutions for collecting and retrieving manufacturing data.

To compound the problem, most CNC systems have a closed architecture and only provide a data link via their PLC, limiting data collection to the PLC's scan rate. The inflexibility of this approach – which also demands custom client software for each machine type – drove an industry initiative to bring Internet style connectivity to manufacturing equipment.

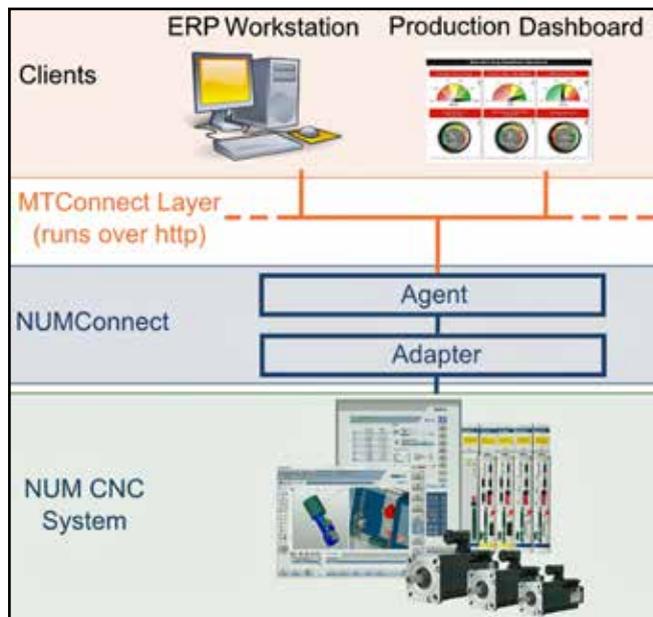
MTConnect is an open, royalty-free communication standard that can be used by anyone and it is rapidly becoming the preferred choice of the machine tool industry. The standard is managed by the MTConnect Institute – a not-for-profit organization that seeks to improve the use of real-data in manufacturing industries. A growing number of machine tool manufacturers are adopting the standard, which is also now supported by many leading suppliers of enterprise resource planning (ERP), manufacturing operations management and production dashboard software. NUM was one of the first CNC manufacturers to offer an MTConnect compliant interface for an entire product range which does not require the use of third-party or custom adapters. The company originally introduced the interface on its Axiom product line in 2008 and is now making it available as an option across its entire range of CNC systems.

The underlying technology of the MTConnect standard is the same as that used by the World Wide Web. It is based on Extensible Markup Language (XML) for capturing data that is readable by both humans and machines, with the format of all data transfers defined by hypertext transfer protocol (HTTP). NUM's open

architecture CNC systems already use similar software technology for their human-machine interface (HMI), which is based on HTML and JavaScript and employs standardized server functions to facilitate the exchange of data between the CNC kernel, PLC, drives and motors. As a consequence, NUMConnect can read anything that is capable of being displayed on the CNC system's HMI, regardless of whether it is in analog or digital format. Even detailed low level machine data, such as motor, drive or encoder error messages, can be retrieved and used for monitoring machine performance, preventative maintenance or diagnostics.

Developed by NUM Corporation in the US, NUMConnect is fully compliant with the latest 1.3.0 version of the MTConnect standard and is available ready fitted or as a retrofit option for all of the company's Axiom, Flexium and Flexium+ CNC systems, as well as its earlier generation Power 1000 series. The software can be installed on any standard PC equipped with Windows XP or later, and it runs in the background on any NUM industrial PC panel. As a member of the MTConnect Technical Advisory Group (MTCTAG), NUM Corporation is committed to keeping NUMConnect up-to-date with the latest developments in the standard and to helping machine builders best exploit its benefits.

The NUMConnect software interface essentially comprises two main components: an MTConnect Adapter



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and an MTConnect compliant information provider or lightweight webserver known as an 'Agent'. The Adapter collects data from the CNC system, associates it with defined MTConnect data items, filters out any duplicates and then pushes the data to the Agent, where it is held in a buffer store until overwritten by fresh information. To help minimize response times, MTConnect does not require the establishment of a formal data transfer session, and under normal use there are no log-on or log-off sequences. When the Agent receives a request for information from any client application software, it transfers the appropriate data over the network, using HTTP. The system is inherently secure; MTConnect is a read-only standard designed to facilitate the retrieval of data from manufacturing equipment – it does not control or instruct a CNC machine tool to take action.

NUM's CNC systems are renowned for their open architecture hardware and software, which provides machine builders with unlimited customization opportunities and simplifies machine integration.

These same attributes also make the systems a popular platform for educational purposes – NUM's products are used by several leading universities to familiarize engineering students with CNC technology and advanced machining techniques.



As Steven Schilling, General Manager of NUM Corporation US, points out, "Our policy is to use open, industry standard interfaces wherever practicable and the new NUMConnect interface option is a case in point. We believe that MTConnect compliant communications will become widespread, to the point where the technology will be regarded as the 'Bluetooth of manufacturing'. NUMConnect will help our customers, who tend to be small to medium sized OEMs, to compete with some of the larger players in the market by producing CNC machine tools that are ready for the trend towards even smarter manufacturing." •

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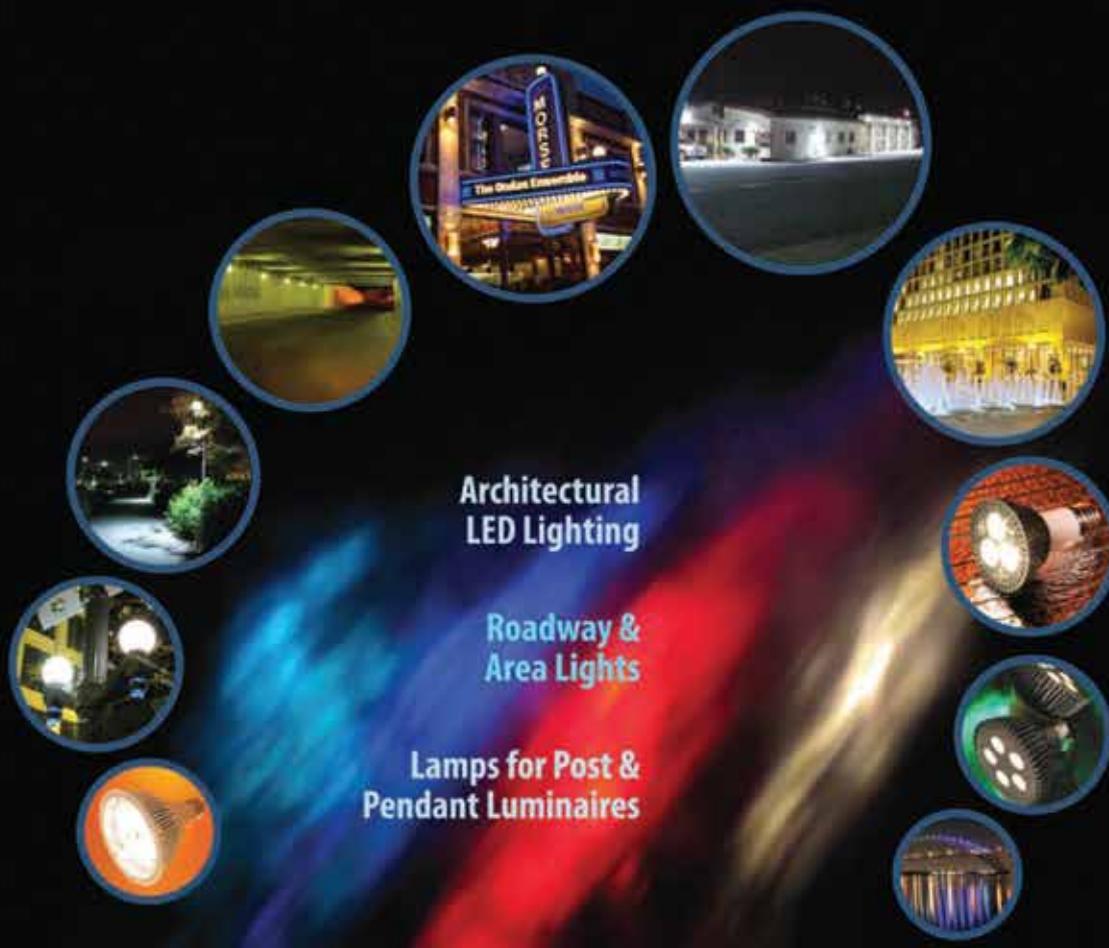
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Why Manufacturers are Over Paying for Electromechanical Assemblies

When in-house work is outside an OEM's core competency, too costly or cumbersome, strategic domestic outsourcing can cut cost, improve quality, and even speed delivery

For OEMs making and inventorying electromechanical assemblies, wire harnesses, cable assemblies, or even box-builds in-house, holding too tightly to every aspect of production can be a costly mistake.

The intended benefits of doing all the work in-house must be measured against its costs: higher facility overhead, including additional required inventory, manufacturing space, equipment, trained labor, as well as engineering and purchasing resources.

Too often, such in-house work is not actually the OEM's area of expertise, but instead a low margin activity that can consume precious corporate resources to little effect. When the in-house work performed is outside an OEM's core competency, too costly or cumbersome, strategic domestic outsourcing can cut cost, improve quality, and even speed delivery.

For instance, to focus on its core competency of system design, Evoqua Water Technologies domestically outsourced a junction box electromechanical assembly and wire harness to power its line of industrial water purification modules, according to Rahoul Bhagat, Engineering and Quality Assurance Manager at its

Lowell, Mass. facility. The company is a wastewater treatment products, systems and service provider for industrial and municipal customers.

"With lower required overhead, inventory, equipment, manufacturing space and labor training compared to doing all the junction box work in-house, we realized about a 20% overall cost savings and gained the ability to go straight from the sub-assembly to the finished product," says Bhagat. "The streamlined process helped us to meet demand for the product line, which grew over 50% last year."

Overcoming In-House Challenges

When an OEM considers which areas are actually core to its business, and which should be outsourced, producing and inventorying every component down to the smallest electrical wire or electromechanical assembly does not always make the list.

"We didn't have the in-house infrastructure to build every component and sub-assembly from scratch," says Bhagat. "We would've had to expand our existing facility or add an offsite location, buy additional production equipment, as well as hire and train specialized labor. Building all that extra in-house infrastructure would have been too costly and inefficient."

Technical electrical expertise can be a barrier to doing such work in-house. In fact, it has been shown that 44 percent of electronic failures are the result of poor quality control. Electronic failures due to faulty solder joints, improper wire crimps, nicked or cut wire strands, wrong wire gauges, or unauthorized material substitutions can not only impact the final assembly's quality, reliability, and durability but also cause delay, taint reputation, and even create serious liability.

"Quality and durability in the field was critical, says Bhagat. "If the wire were the wrong size, too thin, improperly rated, or had a poorly rated terminal block, it could compromise the junction box assembly, which is unacceptable."

Evoqua Water Technologies domestically outsourced the junction box electromechanical assembly and wire harness to power its line of industrial water purification modules to Wareham, Mass.-based Electro-Prep a turn-key and consignment contract manufacturer of wire harnesses, cable assemblies, electro-mechanical assemblies, and box-builds.

In looking for a capable supplier of electrical components, it is important not only to choose one that maintains industry standard internal quality assurance and auditing programs but also is subject to regular onsite inspections and outside audits.

"A key element in ensuring quality is assuring the supplier has their ISO 9001:2008 certification (quality and strong process controls)," says Skip Sullivan, President of Electro-Prep. "Combine this with IPC/WHMA-A-620 training and certification (indus-

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try assembly standards), as well as J-STD-001 training and certification (soldering certification), and you have a good idea that your supplier is a true professional that takes their partnership with you seriously.”

Sullivan adds that UL listing in the U.S., CSA certification in Canada, as well as RoHS (and non-RoHS) capabilities are also increasingly vital designations for electrical components.

According to Bhagat, “When used as intended, we’ve had no junction box failures on our industrial water purification module since we put it in the field six years ago.”

Bhagat credits his supplier for cooperating with Evoqua Water Technologies to produce an improved design. “Electro-Prep offered a number of ideas for improvement that we incorporated into our design. For instance, they helped to secure a din rail in the terminal block, preventing a potential quality issue during assembly. This

helped with quality control and manufacturability.”

According to Bhagat, his domestic contract manufacturer has a significant delivery advantage over offshore outsourcers. By working with them, he avoids the long shipping lead times of typical overseas outsourcing. He also resolves any issues more quickly, with easier logistics and coordination within the same time zone, language, and culture.

For OEMs looking to expedite delivery on outsourced electromechanical assemblies, wire harnesses, cable assemblies, or even box-builds, working with a flexible partner can be important. Sullivan, for instance, suggests that OEMs work with a supplier that offers flexible delivery options such as JIT, rush deliveries, third party drop ships, Kanban (for very short turnaround for ongoing requirements), as well as pull-ins or push outs (without the hassle of unnecessary, additional charges).

“While Electro-Prep typically turns product around for us in four to five weeks, they will rush us product if needed and can supply on a JIT basis,” says Bhagat. “We’re not relying on JIT delivery now, but it could be useful if we have a further surge in demand or want to further expedite our delivery. We’ve never run out of parts they’ve supplied us.”

Bhagat says that ultimately, “Domestic outsourcing to a trusted partner helps us stay in control of our process. By focusing on system design and working on modules rather than many individual components, we leverage our core competency and outsource what’s not core.”

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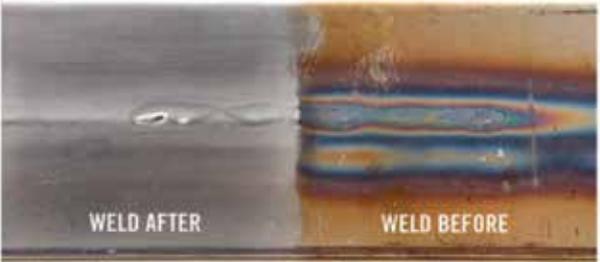
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Using this relatively inexpensive tool, parts such as carbide bushings, bore sleeves, hydraulic and pneumatic cylinders, and other cylindrical cavities can be resurfaced using a standard drill.

For two industrial equipment manufacturers, it was precisely this type of field repair work that allowed them to salvage equipment that was damaged – through no fault of their own – and save their customer tens of thousands of dollars in replacement parts.

Scarred Valve Housings

For Elmar, a food processing company that designs and manufactures filling machines for the food, beverage, petrochemical, personal care and pharmaceutical industries, a flexible cylinder hone saved the customer \$30,000 in damaged valve housings after unexpected damage was caused prior to production.

The company offers a variety of models, including rotary piston, bottom fill, gravity and pocket for filling liquids, high viscosity and solid particulates into plastic, glass, composite or metal containers.

The rotary piston models have a large, rotating bowl for product with 6 to 72 filling stations. Each station is built with a valve housing and rotary

valve that dispenses a metered quantity of product. The tolerance between valve and housing must be within 1/1000th of an inch.

It was this type of machine, a 45-station piston filler, that Elmar sold to a customer for apple sauce and other food products.

The food processor had recently taken delivery of the new equipment. However, construction continued within the facility, one floor above. As a result, a small amount of concrete and metal shavings had fallen into the filling bowl.

When the equipment was started, the concrete particles and metal chips moved from the rotating bowl into the rotary valves, scarring the housings and damaging the valve plugs.

The damage was significant enough that each of the 45 valve housings and plugs had to be replaced. The estimated cost for replacement was \$60,000.

“In this case, the machine hadn’t even run its first product yet,” says Thomas Dahlquist, Special Projects Manager for Elmar. “When you have a capital improvement project and the customer is looking at an expensive bill for replacement parts before production even begins, they want a quick solution that is cost effective.”

Unfortunately, the valve plugs were damaged



Although the Flex-Hone can be used in automated production equipment, it can also be used with a handheld electric drill. The tool is ideal for field applications because it is self-aligning and self-compensating for wear, which facilitates close-tolerance finishing work.

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beyond repair. This comprised approximately half the estimated replacement costs.

However, Dahlquist suggested an alternative solution. By honing each cylinder to remove any raised lips or high points and then inserting new valve plugs, the customer could save half the cost – approximately \$30,000.

The company was familiar with cylinder hones, having used them in the past in the manufacturing of the valve bodies. In the past, they had used the Flex-Hone, specifically, in the field to hone out undersized or out-of-tolerance cylinders from time to time.

The Flex-Hone, from Los-Angeles-based Brush Research Manufacturing, is a highly specialized abrasive tool that is instantly recognizable by its unique appearance.

Characterized by the small, abrasive globules that are permanently mounted to flexible filaments, the product is a flexible, low cost tool.

Versatile and easy-to-use, the cylinder hone can deburr and clean out passages or provide IDs with a super-smooth plateau finish free of cut, torn and folded metal. It can also be used for edge blending, plateau honing, polishing and chamfer operations.

Although the Flex-Hone can be used in automated production equipment, it can also be used with a handheld electric drill. The tool is ideal for field applications because it is self-aligning and self-compensating for wear, which facilitates close-tolerance finishing work.

To assist in the repair, Dahlquist travelled to the customer's site with several 2.25" Flex-Hones. The total cost of the hones was less than two hundred dollars. In just over 4 hours, Dahlquist was able to hone each of the 45 housings to the appropriate specifications. To achieve the tolerance required between valve and housing, he utilized a dial bore gauge.

"With the Flex-Hone, drill and a drill holder, we were able to rework each of the valve housings on the machine by hand," says Dahlquist. "We were able to smooth out all the high points and insert the new valves."

As a result, the customer was able to begin production within a few weeks.

"This was a unique application that saved a customer a lot of money. They were very happy and were able to get on with their production," adds Dahlquist.

Poorly Machined Cavities

For Vektek, a manufacturer of hydraulic and pneumatic clamping systems, improperly machined cavities from an overseas third party not only impacted the performance of the product they were providing, but also created a potential safety issue.

As a global supplier to the metalworking, tool & die and mold industries, Vektek must rely on their customer to ensure that the cylindrical product they supply is installed into a cavity with a proper surface finish, or it will not seal and function properly.

The consequence of a leaking cylinder could be very serious since these Vektek devices hold workpieces stationary on machining fixtures. If the oil pressure in the cylinders drops due to leakage, the grip on workpieces would fail, requiring the machine to be shut down and production to halt.

This became a very real issue when Vektek began having some problems with a major heavy equipment manufacturer customer in China that was not machining a cavity suitable for installation.

"The trouble was that the customer's cavities were not machined suitably for installation, a flaw in their finishing process was missed," says Rod Nelson, Vice President of Vektek International Sales. "As a result, it appeared that the Vektek seals were leaking, a problem that was not a shortcoming in the cylinder design or quality, but nevertheless had to be solved at the customer's site or these very expensive fixtures would not be useable."

Vektek advised technicians at the manufacturing plant in China to use the Flex-Hone Tool to properly surface finish the cylinder cavities so that the sealing problem would be eliminated.

Nelson says the flexible hone is so useful to his customers in properly preparing cavities for his company's products that Vektek has for many years specifically recommended the Brush Research tool in its product catalog and data sheets.

"In all, 300 cavities were Flex-Honed, and 299 of the 300 cavities were saved and polished exactly to specification," explains Nelson. "One cavity was slightly out of spec, but it also provided an adequate seal. So, in the end, we saved 300 very expensive holes."

For more information, contact Brush Research Manufacturing, Brush Research Mfg. Co., Inc., 4642 Floral Drive, Los Angeles, CA 90022; Phone: (323) 261-2193; Fax: (323) 268-6587; email: info@brushresearch.com or visit the web site: www.brushresearch.com. •



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More Power & Features in a New Lightweight Two Speed Mag Drill

Hougen Manufacturing, Inc (Swartz Creek, MI) has released a new model of portable magnetic drill, the HMD905. This new model offers a major performance improvement to the mid-range line of Hougen magnetic drills. The HMD905 fills the gap with great power to weight ratio by giving steel fabricators more strength and torque while still maintaining the small lightweight footprint.

The HMD905 has a number of new features and innovations not seen on previous models of Hougen drills. The newest innovation is the mag drill pilot light. The LED light is built into the base of the magnet and allows the operator to more efficiently and quickly line up the pilot with the holes center location in low light or no light conditions. Powering the drill is a propriety two speed Hougen motor. The two speeds help maximize tool life and increases torque when using larger diameter cutters. The addition of a two stage magnet increases magnetic holding power by 30% when the drill motor is turned on. This saves energy and increases magnet life. A new arbor system utilizes a 5/8" slot drive for more rigidity, hole accuracy and quicker use of accessories such as drill chucks and tapping attachments.

The HMD905 has many additional features that make the drill easier to use; an integrated coolant bottle which is conveniently located and does not add to the width of the drill, a more robust housing design with an ergonomic carrying handle, a spot to hold the hex wrench, reversible feed handles and a d-ring on the back of the magnet for quickly attaching the safety chain. The drill also includes positive slug ejection and carrying case. A swivel base magnet is also available.

The HMD905 weighs just 35 lbs., measures 22-13/16"H x 7-11/16"W x 11-3/4" long and provides drilling capacities from 7/16" up to 1-5/8" (12-41mm) diameter and 2" (50mm) depth of cut. The drill has an electrical rating of 10A and 250/450 RPM motor.

For safety the HMD905 incorporates Hougen's exclusive features to insure a safe work environment—in-

cluding a no-adjustment safety switch, which shuts down the drill motor if lift of the magnetic base is detected...plus an LED indicator that monitors this sensor and alerts if an unsafe operational condition exists. A two stage power on switch prevents drill rotation unless the magnet has first been engaged, and, in the case of a power interruption, safety circuitry will keep the drill motor off after power is restored until the start button is manually depressed. The HMD905 is made in USA.

For additional product or corporate information, visit www.hougen.com





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