PUBLISHED ARTICLE

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SMART SOLUTIONS FOR COMPLEX MACHINES

Advanced modular technologies are instrumental in simplifying and making highly complex industrial machines and robotics more functional, intelligent and connected.

BY JEFF BARNES | MOLEX, LLC.

Much like the evolution of the human body, modern machines have evolved to comprise a host of sophisticated technologies and processes.

A specialized computing device serves as the brain, the machine framework is the skeleton, and machine motors, conveyors and robots are the muscle doing the heavy lifting, propelling, assembling and palletizing. Ubiquitous sensors represent the five senses vigilantly monitoring the environment. At the heart of the machine, the programmable logic controller (PLC) synchronizes motion, provides logic, and functional safety to protect plant personnel, materials and machines.

COMPLEXITY

The plethora of power, signal and data points on a machine might be compared with the human nervous system. Each power, signal and data point (I/O) on a machine requires a reliable and secure connection to a power panel or control cabinet. On a complex machine or assembly line, the I/O may count in the hundreds or more. Traditional hardwiring of a machine can be highly labor-intensive, resulting in a virtual maze of point-to-point contacts requiring stripping, soldering and possibly crimping.

Before even shipping out, each connection must be fully wired and tested, then disassembled and reassembled again at the customer site. Commissioning often involves electricians and engineers. Moreover, each iteration of the wiring and unwiring process adds layers of risk for the machine builder. Routine maintenance or troubleshooting in a plant with multiple motors and drives might require disconnecting and reconnecting hundreds of contact points to address an issue.

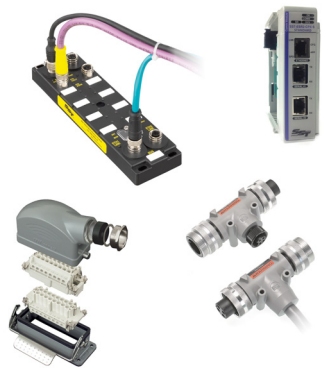
MODULARITY

Machine builders have a vested interest in streamlining machine commissioning and maintenance. Modular connectivity delivers important advantages.

- Significant reduction in commissioning time
- Excellent mechanical stability and performance, IEC standardization
- Expedited maintenance and troubleshooting
- Less downtime and higher productivity

Technicians can quickly disconnect machines using modular assemblies with custom configurations, and plug directly into portable testing equipment. Modularity provides the flexibility and scalability to quickly configure, modify, or expand machines and lines.

The Molex portfolio features an array of modular on-machine and in-cabinet power, signal and data solutions. Figure 1.



Ruggedly designed for the manufacturing environment are the Brad Harsh IO module, PAC/PLC Communication Module, Brad Power Tee and GW-connect Heavy Duty Connector (HDC) solutions.

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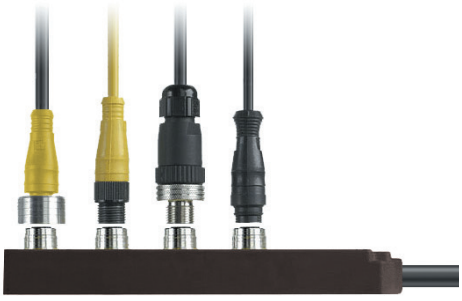
MOLEX HEAVY DUTY CONNECTORS (HDC)

Industrial plants and processes can be tough environments with the risk of liquids, dust, and other contaminants making their way into the connector housing. Specialized modular connectors are designed and constructed to provide secure connections and protect against ingress. Molex HDC solutions deliver reliable performance in demanding applications. A locking mechanism provides a secure seal, and coupling stability prevents accidental disconnection due to vibration or impact.

BRAD CONNECTORS FOR INDUSTRIAL AUTOMATION

Robust Brad connectivity solutions are a trusted brand and mainstay in machine design and industrial automation. Brad M23 solutions are used primarily for power applications in automation and material handling. Brad M12 connectors are designed to withstand harsh industrial and weather environments with superior quality that assures very reliable connections for control elements in automated equipment. These high-quality connectors allow fast and simple replacement of sensors, encoders, switches and other input and output devices in industrial machinery. (Figure 2)



The Brad M12 cordsets and rugged MPIS Safety Box simplify wiring in harsh factory environments.

The M12-compatible Brad Ultra-Lock system is designed to bring the ease of a push-pull connector to IP67/IP68/IP69K rated sealed connections in industrial environments. The patented “push-to-lock” technology of this Push-Pull connector provides a safe, reliable connection of sensors, actuators and other control devices. The Ultra-Lock technology provides a seal that surpasses the performance and reliability of traditional threaded connectors.

The Brad Hybrid connector series based on a circular M12 threaded-coupling design, occupy less space in automation control equipment and machine designs, and reduce cabling requirements and installation time by integrating power and data signal lines.

BRAD HARSHIO MODULES

Machine-mountable Brad HarshIO Modules support all major industrial communications network PLC connections and protocols, including PROFIBUS-DP, DeviceNet, CANopen, Modbus TCP, EtherNet/IP and PROFINET IO. Compatible with M12 connectors, Brad HarshIO Modules come equipped with diagnostic LEDs to provide status information on network, power and I/O. Featuring QuickConnect for EtherNet/IP and fast start-up technology for PROFINET, HarshIO modules bring exceptional speed and precision to automatic tool change robots in repetitive tasks.

Brad IO-Link Master Modules on EtherNet/IP and PROFINET combined with IO-Link Digital Hubs meet the needs of machine builders looking for cost-effective, high-density, high performance and seamlessly integrated fieldbus connectivity in harsh environments. The modules support the IO-Link communication standard to extend the digital link down to the sensor and actuator level. The module capabilities are enhanced when used in combination with Brad IO-Link digital IO Hubs and analog adapters. Concentrating machine information into one network functional node, the Brad IO-Link Solution is ideal for conveying line, robotic, filling station, labeling, palletizing, and end-of-arm tools.

Modular power and connectivity solutions are designed for rapid commissioning of complex machines and robotic systems. Reduced labor and faster time to commissioning are just the beginning of return on investment. Over time the operational and business benefits grow, including up to an 80 percent reduction in electrical commissioning time of industrial machinery and automation systems, and up to a 50 percent reduction in total installed cost.

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