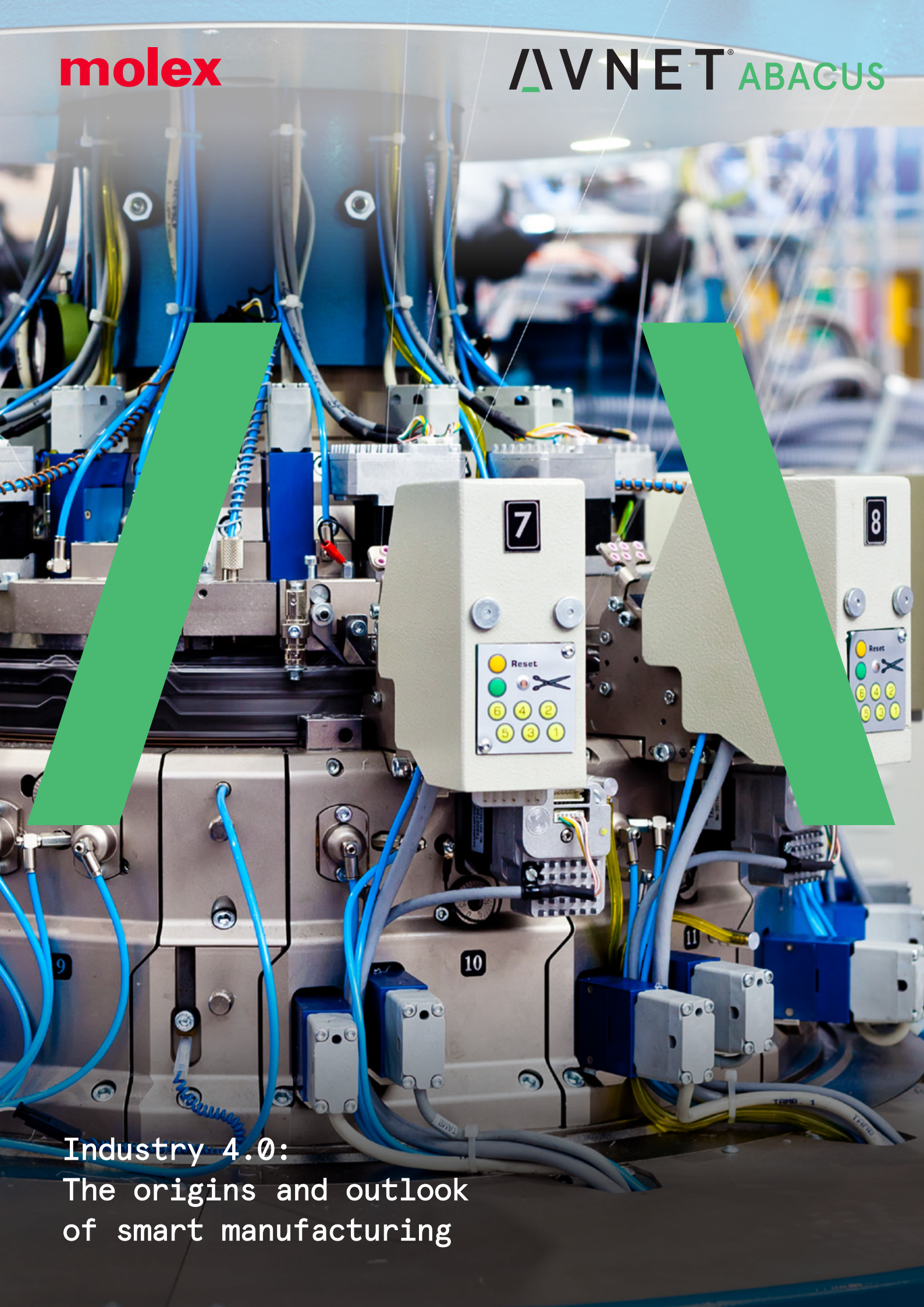


**molex**

**AVNET** ABACUS



Industry 4.0:  
The origins and outlook  
of smart manufacturing

# Industry 4.0: The origins and outlook of smart manufacturing

**Simply put, the now popular term 'Industry 4.0' refers to the next stage in the development of the manufacturing process. Whether you're familiar with the phrase the 'Industrial Internet of Things' or the fourth industrial revolution, there's one thing that these have in common – they allude to a significant digital transformation that ventures beyond the automation of production.**

The first industrial revolution at the end of the 18<sup>th</sup> century introduced water and steam powered production. Since then manufacturing has reaped the benefits of the first assembly line and the first programmable control system, both enabling further automation and mass production. The fourth industrial revolution offers an even greater promise of freedom and flexibility across the factory floor.

The advancement of modular technologies is now making industrial machines and robotics more connected than ever before, leveraging increased intelligence and functionality. As new innovations change the devices, machines and people that fuel manufacturing, how will Industry 4.0 continue to revolutionise the manufacturing as we know it?



## HOW IS INDUSTRY 4.0 PROGRESSING?

If we think about the modern machine like a human body, a sophisticated computing device acts as the brain, with the framework (skeleton) supporting the machine. The combination of conveyors, motors, and robotics represents the muscular system of the body – these allow movement and 'circulation' around the machine. The five senses are represented by the copious amounts of sensors that constantly assess the surrounding environment. At the core of the machine is the programmable logic controller (PLC), communicating inputs and outputs, and harmonising motion.

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But how are each of these technologies and processes going to evolve with Industry 4.0? Some initial changes are already clear:

- Machine builders will begin to move away from PLC-centric devices that limit the scope for machine-to-machine (M2M) communication and remote access
- Manufacturing will require an increased use of sensors at every step in the process. These sensors will drive the communication of raw data and provide feedback to the control systems
- The next phase will make more use of distributed control systems, meaning each PLC within the network can coexist and communicate in real-time. With integrated security and safety, distributed control systems will improve efficiency and reduce response times
- Connected devices will be smarter than ever and easily accessible; the challenge will be programming them to optimise productivity, safety and efficiency

Just as the human nervous system connects the brain, spinal cord and sensory organs, the combination of power, signal and data points on a machine enables continuous communication.

A particularly complex machine may have hundreds of these points, with each I/O requiring a stable connection to a panel or cabinet to ensure reliability. Molex's portfolio features a wide range of both in-cabinet power, signal and data solutions, as well as modular on-machine products.



#### **BRAD INDUSTRIAL AUTOMATION CONNECTORS**

Ruggedly designed to provide infrastructure solutions for harsh-duty manufacturing environments, Brad connectivity products provide solutions for industries such as food and beverage, material handling, automotive and commercial vehicles. Brad M12 connectors provide superior reliability in challenging environments, providing quality connections for control elements.

The Brad Ultra-Lock system is M12-compatible and provides a safe and reliable connection through patented 'push-to-lock' technology. This connection is IP67/IP68/IP69K rated, with seal technology that outperforms the seal reliability of traditional threaded connectors. Based on a circular M12 threaded-coupling design, Brad Hybrid Connectors integrate power and signal data lines, taking up less space in equipment designs.

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## BRAD HARSHIO MODULES

Brad HarshIO Modules provide a machine-mountable solution that supports all major industrial communication protocols and network systems, including PROFIBUS-DP, PROFINET IO, Modbus TCP, EtherNet/IP and DeviceNet. HarshIO Modules deliver status updates on network, power and I/O via diagnostic LEDs, and are compatible with the Brad M12 connector family. The IP67-Rated HarshIO Modules provide quick and reliable solutions for connecting industrial controllers to I/O devices in harsh environments where liquids, dust or vibration may be present.

## HEAVY DUTY CONNECTORS (HDC)

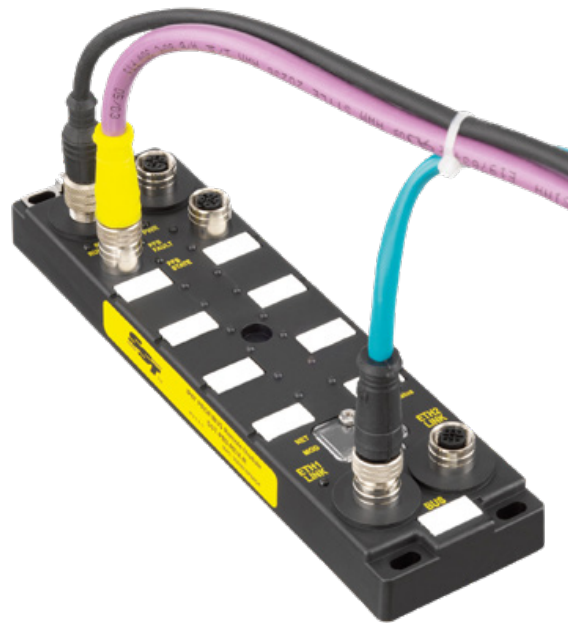
Molex Heavy Duty Connectors deliver reliable performance in demanding industrial applications. These modular connectors are designed to protect against the ingress of water, dust and other potential contaminants on the factory floor.

## REVOLUTION OR EVOLUTION? TACKLING ONE MACHINE AT A TIME

Whilst the term Industry 4.0 hints at a fourth industrial revolution, this is not an entirely accurate statement. Technology such as this changes or updates one machine at a time. Maintaining pace will mean overcoming any delays to migration and embracing the changes presented.

Whilst the technologies may be readily available, the focus should be on how manufacturers are positioning such technologies to transform the industrial automation market. Despite some solutions being readily available, the cautious approach of many manufacturers may lead to delays in improving automation systems. Challenges such as safety for workers and consumers, contamination prevention, adhering to regulations and critical environmental conditions may impact incentives to change.

The earlier industrial revolutions did not happen overnight, and Industry 4.0 is unlikely to break that trend. Regardless of whether the 'industrial internet' is referred to as evolutionary or revolutionary, the principles of Industry 4.0 are the natural next step to on-going improvements and innovation activities within the manufacturing industry.



For more information visit  
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