

The Next Gen manufacturing

In robotic applications, cable flexibility is important to consider, since the cable must follow the robot's movements. **Marc Jarrault** elaborates on the role of cables in robotics.

The last 20 years has witnessed technology changing the nature of manufacturing. In the past, starting from fabrication to manufacturing where done by humans. Now computers and technology have penetrated the industry, automation has become the competitive advantage in today's manufacturing world. Automation has allowed for companies to mass produce products at outstanding speeds and with great repeatability and quality. Automation has become a determining factor in whether or not a company will remain competitive within the manufacturing industry. Still automation is setting the standards for the industry.



Cable flexibility is important to consider in robotic applications.



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Automated systems in manufacturing line environments are capable of working more tirelessly, faster, and more exactly than humans. Robots are now used in almost all the industries today, since they have become a crucial component for complex production process due to its superiority. Robotics is also preferred by manufacturers today because:

- They help in maintaining consistent quality
- They help in maintaining precision and accuracy
- They help in keeping the manufacturing cost as low as possible
- Maintain short cycle times
- Rapid payback

Industrial automation in manufacturing is the use of 'intelligent' machines in factories so that manufacturing processes can be carried out with minimal human intervention. It involves the application of various control systems to enable operating equipment to carry out on their own, with little human intervention, tasks that require speed, endurance and precision. But does one know what component plays a very prominent role in running 'intelligent' machines in factories? Cabling is one of the important items to think about. Some may think that any simple cable, such as a communication cable or a power cable, would do the job for whatever you need. However, there are existence of many different types of cables and not all of them are suitable for robotic applications.

In robotic applications, cable flexibility is important to consider, since the cable must follow the robot's movements. Since even the smallest interference can lead to high costs when it comes to production failures, cable manufacturers today work towards manufacturing cables which ensures smooth and reliable operations. Hence, cables are manufactured keeping in mind:

- Continuous flexibility
- High resistance to torsion and reverse bending
- Application specific and long lasting
- Slim in construction and light in weight
- EMC and loss less transmission
- Plug and play/complete connectivity solution
- Composite cable solution

KEY APPLICATIONS

Cost reduction and increased safety are necessary for incorporating robots into more manufacturing floors. On one hand, current advances have driven the cost of hardware and software down. On the other hand, incorporating safety measure inherently within the robot eliminates the need for and consequently the cost of fenced-off areas. As such, the additional costs associated with safety equipment, external circuitry, and space requirements are avoided with these robotic arms. Robots today can be seen working alongside their human counterparts in almost all branches of industry, often taking on the work that is too difficult, too dangerous. They can be seen lifting heavy loads, accurately applying paint into each little nook and cranny and repeating the same production steps millions of times with the same exact precision.

Some of the applications that robotics is used for are:

- 3D-applications of all kinds
- Industrial and lightweight robots
- Industrial communication
- Factory automation
- Sensor technology
- Identification systems
- Palettisers
- Mechatronic systems
- Intelligent imaging technologies
- Handling systems

CHALLENGES

When we look at a bigger picture, there are various challenges that are faced by manufactures who have installed robots as part of their manufacturing unit. Principal activity, with exceptionally challenging applications being sought for which off-the-shelf products often simply cannot deliver the perfect solution. Each robot type carries out different movement sequences and is constructed in a different way, meaning the cable systems face all manner of challenges too. Some of the challenges that are faced are:

Flexibility and stability: Cables need to be highly flexible, have a very small bending radius and be able to withstand high torsional loads. Add to this, the need for high quality to ensure the durability of components. Today, for example stud welding machines are used in robots which

are used in automotive manufacturing. The stud welding machine is automatically positioned by the robot and sets the studs for wiring harness assembly in the body shells. This requires the highest levels of efficiency and precision in terms of the executed movements and system productivity. Cabling would need to be laid over all of the robot's axes and would therefore need to be able to follow all of its angular movements and rotations.

Slim in construction and light in weight: To avoid restrictions to the robot's movements, various cables are usually laid over the robot axes in the smallest of spaces. This is to avoid any confusions with other cables such as e welding cable, the data network and signal cable as well as the air and protective gas conduits. The cables need to be slim in design and light in weight which would ensure that cables occupy a small cross section among the rest.

EMC/loss less transmission: Another challenge faced usually by cable manufactures is electromagnetic compatibility (EMC) in relation to the large current load through the copper cable and the resulting electromagnetic field. The delicate data network and signal cables need to be protected with additional copper screening for this. When using suitable insulating material it is particularly tricky to achieve the high bending radius and torsional strength requirements. In combining all these components in complex hybrid cable shall offer robot-compliant flexibility and torsional strength, with a durability of more than two million bending cycles.

THE FUTURE

Automation in industrial manufacturing units has a bright future. Industrial robots of the future will be multi-functional so that the same machine can be put to several different uses. They will have many capabilities associated with human workers, such as the ability to make decisions and to work autonomously. They will also have self-diagnostic and predictive maintenance capabilities.



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