

How to Select the Right Conduit System for Industrial Automation Applications

Selecting the right conduit system is a critical part of designing reliable industrial automation equipment. In many applications, conduit must protect cables and hoses while accommodating movement, vibration, environmental exposure, and space constraints—all while supporting long-term reliability and serviceability.

This guide outlines key considerations when selecting conduit systems for industrial automation and manufacturing environments, with a focus on real-world application requirements rather than theoretical specifications.

Common Challenges in Industrial Automation Wiring

- Continuous movement and flexing in robotic and automated equipment
- Mechanical stress and abrasion from vibration, debris, and machine contact
- Exposure to oils, coolants, washdown conditions, UV, and temperature extremes
- Limited space and complex routing inside modern machinery and enclosures

Key Factors to Consider When Selecting a Conduit System

- Conduit material selection based on environment and mechanical requirements
- Flexibility and minimum bend radius for motion and tight routing paths
- Environmental ratings for chemical, temperature, and ingress protection
- Fittings and connection systems that support reliability and serviceability
- Installation and long-term maintenance considerations

Fittings and Connection Systems

Reliable fittings are just as important as the conduit itself. Quick-connect fittings can significantly reduce installation time, improve consistency during assembly, and simplify future maintenance or replacement.

Quick-connect conduit fittings feature a built-in locking and release mechanism that allows fittings to be installed and removed without special tools. The fitting is pushed directly onto the conduit, where it automatically locks in place. For removal, an integrated release ring is compressed, allowing the fitting to be disengaged quickly and cleanly.

These fittings are available in common thread standards including NPT, Metric, PG, and UNEF, allowing conduit connections to match device threads directly and eliminating the need for thread adapters.

Installation, Maintenance, and Conduit Performance Considerations

- Flexibility in low-temperature environments

- Durable conduit walls for abrasion resistance
- Visual indication of conduit wear in multi-layer designs
- Fire protection ratings for transportation and mobility applications

Typical Automation Applications

- Robotics and motion control systems
- Packaging and material handling equipment
- CNC and machining centers
- Control panels and electrical enclosures

Applying the Right Solution

No single conduit solution fits every application. Selecting the right system often involves balancing flexibility, protection, installation efficiency, and long-term durability.

Reviewing the application environment, motion requirements, and cable types early in the design process can help avoid costly changes later.

Conclusion

Conduit selection plays a key role in the reliability and service life of industrial automation systems.

By understanding application conditions and focusing on real-world requirements—movement, environment, installation, and maintenance—engineers and maintenance teams can make informed decisions that support long-term performance.

For More Information

Contact IBIS: <https://ibisep.com/contact/>

Additional Application Notes and Resources: <https://ibisep.com/resources/>