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Assembled vs. Overmolded Cordsets: Understanding the Advantages for Your Application

White Paper - W1009



Connectivity serves as a cornerstone for industrial automation environments, delivering continuous production, data acquisition and communication throughout the enterprise. With the need to monitor, control and communicate with more devices, such as sensors, safety devices and PLCs in a vast range of applications, connectivity solutions must be able to withstand harsher environments to satisfy the current demands for constant production visibility and control.

Cordsets provide the foundation for this connectivity, and to meet today's application requirements, cordsets must be able to adapt to difficult environments and challenging applications. Assembled cordsets are a common connectivity solution, however, in-the-field assembly makes them vulnerable to performance deficiencies, such as mis-wiring and moisture ingress, which can impact the operation of the entire application.

To overcome these challenges, cordsets have progressed to include overmolded options. This improves the integrity of the connection by eliminating the need to assemble connectors and the associated errors that occur with assembled solutions. Overmolding can improve the durability of the cordset, as well as reduce the total cost of ownership by improving uptime and decreasing labor and maintenance, improving overall performance for an enhanced application accuracy and efficiency. This white paper will discuss the differences between assembled and overmolded cordsets, offering a comparison of the technologies and providing a detailed description of the advantages offered with overmolded cordsets.

CORDSET SOLUTIONS

Assembled Cordsets

Assembled cordsets consist of an arrangement of

components that must be hard-wired in the field prior to use. This means the cable and connector must be terminated by conventional field-applied means, such as soldering, or mechanical terminals, including screw, clamp and spring designs. For an effective connection to be established, hard-wiring these cordsets can be time-consuming and labor intensive during installation or maintenance due to the amount of equipment needed to maintain numerous applications. Many hard-wired installations use conduit to house and secure the cables and/or conductors. For control cabinets, hard-wiring typically utilizes simple mechanical cable glands to secure cables.

In addition to the downtime necessary for installation, assembled cordsets are prone to errors. Since wiring is completed in the field, there is a higher likelihood for mis-wiring to occur during installation, which can impact the integrity of the connection as well as the overall performance and operation of the application. This could also result in more downtime for maintenance to correct faulty wiring or faulty connections, which negatively affects productivity and incurs additional labor expenses.

Overmolded Cordsets

Overmolded connectors are typically built using an injection molding process that combines two or more materials with a molded plastic component over them to create a single part. Some overmolding is done through a two-step process where the rigid substrate is injection molded first. Next, the substrate is placed in a mold cavity on another injection molding machine where plastic then covers the substrate completely. Since overmolding consolidates materials and parts, it oftentimes eliminates the need for a secondary assembly application.

For cordsets, this mold is placed over the cable and conductor. This design can provide strain relief and oth-

er mechanical advantages. A properly engineered and manufactured molded cable assembly features a fully encapsulated contact and wire termination point. Molded connectors will often have an internal premold, which is part of a molded connector body that provides an essential element to the overall structure of a properly molded cordset assembly.

Overmolded cordsets offer an alternative to field-wired products that deliver a completely assembled product. This provides operators with easy-to-use, plug-and-play employability, allowing faster connectivity that enables manufacturers to optimize uptime. With a rugged molded body that reinforces and protects that cordset, connection integrity is enhanced for increased connectivity reliability.

ADVANTAGES OF OVERMOLDED

Connectivity solutions provide the basis for virtually any application, and selecting the appropriate solution is necessary for continued operation functionality. Overmolding provides enhanced durability, flexibility and simplicity to improve performance and reduce manufacturing costs.

Faster Installation

Since overmolded cordsets do not require field assembly, soldering and wiring, operators can reduce downtime and start-up costs. Since installation is a significantly simpler process, offering plug-and-play capabilities, much of the initial cost and labor expectations associated are reduced. By expediting installation, systems can be operational faster, which can increase productivity and directly affect a company's profitability.

Error Reduction

Overmolded cordsets deliver a complete, fully assembled solution. Cordsets are factory tested to ensure they meet strict performance standards prior to distribution. This

eliminates mis-wiring concerns or connector failures due to improper assembly. Alternatively, with field-assembled cordsets, wiring is done on-site, making set-up vulnerable to wiring and other installation errors.

This reduction in errors also leads to fewer production halts and associated costs. Downtime alone can cost plants significant dollars in lost profit, in addition to the labor expenses that accompany the maintenance necessary to rectify these issues. By not being prone to the same susceptibility of mis-wiring, applications using overmolded cordsets are not subject to the production halts and excess expenditures resulting from connectivity issues that impact performance.

Durability

Technology has evolved, allowing monitoring and communication devices to withstand harsh environments and be installed outside out of cabinets, resulting in the need for connectivity solutions to be able to operate reliably in these environments as well. With assembled cordsets, achieving the necessary seal to prevent environmental contamination can be challenging, if not impossible, since mechanical means—and in some instances adhesives—lack the sealing qualities of factory applied connector moldings. This can allow elements to permeate the seal and diminish connection integrity.

Alternatively, overmolded connectors are designed to protect critical components from environmental impacts. For instance, overmolded cordsets that are rated IP68 demonstrate that the product can remain fully functional after being submerged in six feet of water for 24 hours. To ensure their reliability in applications involving snow, dirt and wind, some overmolded cordsets are tested to NEMA 6P, which ensures protection against falling dirt, temporary submersion in water, incidental contact

and the external formation of ice on the cordset. This durability increases application suitability and decreases production downtime.

Flexibility

To meet a wide variety of application specifications, overmolded solutions allow enhanced versatility in product design, material combinations and application compatibility, and provide companies with competitive edge in the marketplace. With the advantage of built-to-order, custom capabilities, overmolded cordsets offer a complete, turnkey solution no matter what their application demands. Overmolded cordsets also provide the flexibility to seal to a wide variety of cable types for easy integration into applications with industrial devices and equipment.

Due to their design flexibility, overmolded cordsets can feature custom labeling for seamless machine integration into your machine. In addition, cordsets can be manufactured to accommodate custom mold colors and custom wiring to simplify machine assembly for a solution that can be tailored to individual application specifications.

CONCLUSION

While no two applications are the same, the need for reliable connectivity is virtually universal for industrial automation. Therefore, it is important to utilize a connection solution that offers the scalability to accommodate diverse environmental and performance requirements. Overmolded cordsets are designed to install quickly and accurately and provide the durability to withstand harsh conditions. This allows overmolded cordsets to not only meet connectivity requirements for diverse applications, but also promote factory efficiency, productivity and profitability initiatives.

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