

White Paper

Built to Last: Maintaining Reliability and Uptime of Critical Connected Systems in Industrial Settings

*By Tim Senkbeil
Product Line Manager,
Lumberg Automation
Timothy.Senkbeil@Belden.com*

Table of Contents

Executive Summary	1
The Challenges of Connectivity in Industrial Settings	2
Protecting Cordsets and Cabling Components in Industrial Settings ...	2
Achieving Peace of Mind: What to Look For in a Connector	3
Wash-Down Connectors at Work	3
How Do You Know if You're in Need of Wash-Down Connectors?	4
Conclusion	4
References	4

Executive Summary

In the last several years, the financial success of many industrial-based businesses – including food and beverage, oil and gas, power utilities, manufacturing, pharmaceutical, cosmetics and others – has hinged on maximized productivity and streamlined production. For example, [according to KPMG](#)¹, 42 percent of food and beverage executives feel losing share to lower-cost producers is the biggest threat to their business model, and 46 percent say costs of inputs or merchandise is the greatest threat to their company's profit margins.

To optimize operations, these industries have invested in automated, sensor-heavy systems that help keep plants running at top capacity. These automated systems are critical to a plant's performance and, as a result, businesses' tolerance for downtime is at an all-time low. However, the hazardous settings of many of these industries, due to extreme pressure, temperatures, vibrations or other extreme conditions, increase the risk of system failure and downtime.

If a cord set or cabling component fails in a [food or beverage processing](#)² facility, for example, the repair or labor costs alone could be 15-20 times the cost of the component itself, and, depending on the circumstances, some consumables may even need to be scrapped.

Downtime can also reach an astounding 500 hours annually, leading to overall costs that some studies put in the range of \$20,000 to \$30,000 per hour.

With hundreds of thousands, if not millions, of dollars, as well as the physical well-being of employees and equipment at stake, businesses in industrial settings require cabling components that are built to last, and can be depended upon. In this white paper, we outline the specific challenges connected systems face in these extreme industrial settings, the benefits of new solutions that help maintain uptime, and steps and strategies for finding the best products that meet your unique needs.



For many businesses, the industrial cord sets and cables used to connect their machinery and systems aren't suited for the extreme conditions created by their plants.



The Challenges of Connectivity in Industrial Settings

For many businesses, the industrial cord sets and cables used to connect their machinery and systems aren't suited for the extreme conditions created by their plants. The extreme environments of these industrial settings can damage cables in three ways:

- Physical stress: Vibrations, contact with people, machinery, bacteria, food and microorganisms, or use of high-pressure water cleaners can damage or weaken cables and connectors.
- Chemical stress: Caustic materials used to clean and sanitize industrial settings can corrode cables and connectors.
- Extreme or varying temperatures: Many industrial settings are exposed to extremely low or high temperatures that can wear down cables and connectors, causing them to crack, or compromise protective covering.

Since highly automated systems are essential for many industries, wear and tear on equipment and systems presents several significant risks and challenges, including:

- Increase in maintenance costs: The extreme conditions of certain industrial settings can require businesses to replace their components as often as every three months – if they don't fail beforehand. Traditionally, companies hardwire these systems – an expensive process that requires the work of a specialized electrician, and can take several hours to complete. In some cases, this downtime can cost businesses several hundred thousand dollars in a single day.
- Significant risk of unplanned downtime: Even with regular replacements, traditional hardwired systems are still very much at risk of failing unexpectedly – often at the worst possible time, like at the height of production, or when electricians aren't readily available to replace the damaged cables. The productivity and material losses caused by this downtime can lead to even higher costs than planned downtime.

- Compromised safety standards: As cables wear down, the risk of a fire increases – and many cables don't have the fire-retardant properties needed to minimize damage, which means a fire could create devastating damage before being extinguished. For food and beverage manufacturers, food safety is another top concern, and a compromised system could lead to contamination of the product.

Protecting Cord Sets and Cabling Components in Industrial Settings

Applications, like in food and beverage, chemical or pharmaceutical manufacturing, as well as at biotechnology and medical companies, have specific processes for wash-down or splash zones – locations where equipment is frequently and rigorously cleaned to kill bacteria and other micro-organisms. These wash-downs help ensure product quality and customer satisfaction, while complying with government regulation.

But the requirements of wash-down processes illustrate how the continual increase of automated and intelligent, sensor-enabled systems presents new challenges in extreme industrial environments. Wash-down processes can wreak havoc on the mission-critical systems tasked with conveying signals between measuring instruments and control devices by subjecting cord sets to frequent high-pressure, high-temperature cleaning, along with caustic chemicals.

To ensure these systems aren't subjected to unplanned downtime, the industry has introduced wash-down connectors – an effective alternative to typical hardwired cord sets. Uniquely designed for all varieties of extreme settings – including wash-down industries, as well as other manufacturing facilities – these connectors significantly reduce the risk to industrial plants.

For one, wash-down connectors enable streamlined cord set installation and replacement. With wash-down connectors, technicians can quickly and easily attach cables to receptacles on a sensor at one end of a system, and the control cabinet at the other. This means technicians can replace or install damaged or outdated cord sets in a fraction of the time of hardwired systems – often in as little as 15 or 20 minutes – without requiring the assistance of specialized electricians.

Wash-down connectors are also designed and built to withstand the extreme temperatures, shock, vibrations and pressure of industrial settings, as well as the wide range of caustic cleaning agents frequently used in many industries (see details on ECOLAB certification on page 3). This dramatically lowers the risk of unplanned downtime, as well as the maintenance costs of having to continually replace outdated or damaged cables. At the same time, the fast and easy nature of removing and installing wash-down connectors allows businesses to efficiently perform preventative maintenance and replacements at whichever intervals fit their specific needs.

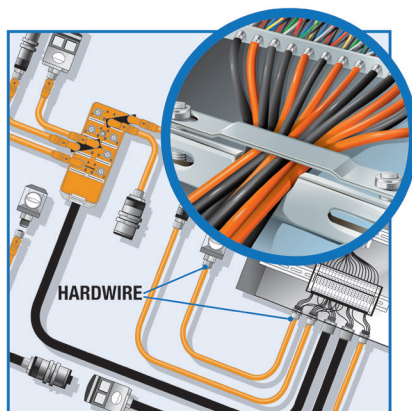


Figure 1. Traditional Hardwired System

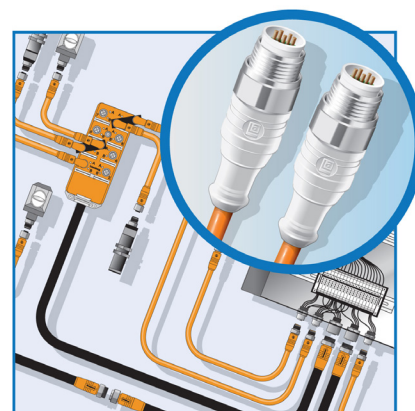
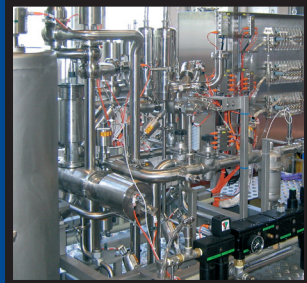


Figure 2. Washdown Connectors Installed



Achieving Peace of Mind: What to Look for in a Connector

Connectors can be a critical component of industrial businesses' plans to drive down costs and prevent future risk – and plant operators need to ensure that the cord sets they employ can be depended upon to perform as advertised.

When selecting a connector for extreme industrial settings, business should first look to see if the product is inspected and approved by a number of the industry's

top third-party certification organizations. This will help ensure that the cord sets can withstand any and all challenges of hazardous manufacturing facilities.

These certifications can include [ECOLAB](#)³, for example, which guarantees that the connectors can withstand the most common caustic chemicals and disinfectants used during cleaning and other industrial processes, and also [UL approval](#)⁴, which demonstrates that the cord sets are suited for temperatures ranging from -40°C up to 90°C and can protect against the outbreak and spreading of fires.

In addition to undergoing rigorous testing and certification processes, dependable wash-down connectors are 100 percent factory-tested before installation. This dramatically reduces troubleshooting during the installation process – expediting the time the systems are up and running and ensuring that the product will perform as expected throughout its lifetime.

Wash-Down Connectors at Work

Specially-designed wash-down connectors are an ideal fit for any industrial setting – regardless of company size, location or age. By offering flexibility, reliable performance and global consistency, the right wash-down connectors can be used to improve the operations of companies in an endless number of situations:



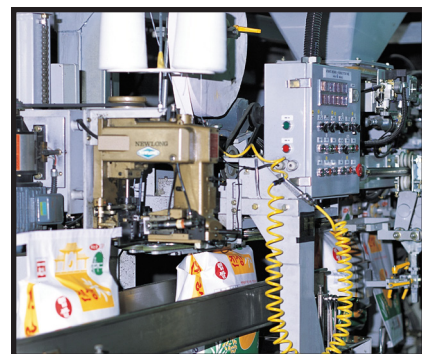
1. **Scenario 1 – Food and Beverage:** An upstart brewery installing a new bottling system, which needs to withstand frequent, high-intensity cleaning processes that submit cord sets to extreme pressure (IP67, IP68 and IP69 degree of protection) and caustic materials on a regular basis.

Using connectors designed for the wash-down environment, the brewery can ensure maximum uptime for its bottling system, without spending significant amounts of its start-up capital on time-consuming installation or expensive regular maintenance and replacements.



2. **Scenario 2 – Automotive:** A global automobile manufacturer installing new equipment to increase automation in its facilities internationally. With such a massive investment, the manufacturer needs to ensure that its systems will operate uniformly around the globe, and will perform to consistently high standards.

By mandating the use of wash-down connectors in its new machines, the manufacturer is assured that its cord sets are 100 percent compatible with its systems internationally. This lowers the costs of new cord set purchases, while streamlining installation, maintenance and training costs. Additionally, it ensures that its investment in automation is not undermined by unplanned downtime or excessive maintenance costs.



3. **Scenario 3 – Machine Builder:** A machine builder looking for upgrades to offer in its latest portfolio, with the goal of improving revenue, customer satisfaction and installation time.

By enabling compatibility with wash-down connectors, the machine builder is able to offer a highly durable and reliable product with faster installation times – helping to get the customer up and running more quickly with lower maintenance costs for the future, and enabling the machine builder to fit more installations into the quarter.



How Do You Know if You're in Need of Wash-Down Connectors?

Ask yourself the following questions:

- Have you experienced unexpected cord set failure in the past?
- Do you operate in a harsh, extreme industrial environment?
- Are your facilities – including your cord sets and cables – exposed to a wide range of potent, caustic chemicals used for cleaning and sterilization?
- Does your industry require stringent wash-down processes to meet cleanliness or hygiene standards?
- Are the costs and frequency of replacing cord sets in your plant too high?
- Are you a global company with plans for expansion, and need to ensure your cord sets will work reliably and consistently across the world?
- Are you building new facilities or upgrading legacy systems, and need to get up and running as soon as possible?

If you answered yes to any of these questions, leveraging wash-down connectors will help ensure that your industrial systems are installed and maintained in the fastest, easiest and most dependable manner possible.

Lumberg Automation's Wash-Down Connectors are uniquely and specifically designed for industries in harsh environments, including food and beverage, chemical and pharmaceutical manufacturing, energy, and more. These cord sets can withstand the most extreme conditions caused by vibrations and chemical exposure, and are the only such cables UL-certified up to 90°C.

For more information on how Lumberg Automation can provide durable and reliable wash-down solutions, please visit: http://www.lumberg-automationusa.com/product.php?db=con_foo

Conclusion

In today's financial landscape, unplanned downtime is a risk many businesses simply cannot bear. As systems evolve to increase productivity and automation, the cord sets used to connect those systems need to evolve as well, to withstand the severe industrial settings.

With Lumberg Wash-Down Connectors, businesses are assured that their cord sets can endure the most extreme pressures, temperatures, chemicals and vibrations – while making installation and replacements faster and easier than ever.

For more information on Lumberg Wash-Down Connectors, call **1-800-BELDEN1 (1-800-235-3361)** if you are in the U.S. or Canada to reach a Belden representative. Alternatively, complete the form at info.belden.com/contact-us.

References

1. KPMG 2013 Food and Beverage Industry Outlook Survey
<http://www.kpmg.com/us/en/topics/2013-outlook-surveys/pages/2013-food-beverage-industry-outlook-survey.aspx>
2. Belden.com Solutions for the Food & Beverage Industry
http://www.belden.com/resourcecenter/catalogs/upload/Food-and-Beverage-Brochure-Food-and-Beverage-Brochure-Food_Beverage_Brochure.pdf
3. ECOLAB Website: EcoSure Solution
<http://www.ecolab.com/solution/ecosure/>
4. UL Website: Product Certification
<http://www.ul.com/global/eng/pages/offerings/perspectives/newtoul/ulmarkproductcertification/>