Improving Safety with Wireless Safety Shower Monitoring

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Wireless Technologies
Introduction to WirelessHART Industrial Network
WirelessHART Industrial Network

Basic Elements

**Wireless Transmitters**
Field Sensors
- Pressure, Temperature, Acoustic, Flow, Level, Corrosion, etc.

**Application**
One or more transmitters monitoring equipment
- Safety Shower, PRVs, Pumps, Heat Exchangers, etc.

**Gateway**
An interface between Wireless Transmitters and Host System
WirelessHART Industrial Network

- Based on the same wired HART Standard that the instrumentation team is already familiar with
- Transmitters send field information to the Gateway (WirelessHART® protocol)
- Gateway is connected to the System (HART-IP, Modbus, TCP-IP, etc.)
WirelessHART Industrial Network

How can it expand to cover long distances in complex installations such as refineries?
WirelessHART Industrial Network

WirelessHART is NOT a star or point-to-point topology network

Control Room, Security Room or 24/7 Location

WirelessHART® Gateway

Pressure

Acoustic

Temperature

Discrete I/O

Safety Shower Eye Wash Station

Corrosion

WirelessHART® Gateway
WirelessHART uses a Self-Organizing Mesh Network configuration

- Each transmitter is also a repeater!
- Reliable data transmission due to multiple path communication
- Easy to cover long distances
WirelessHART Industrial Network

Tech Notes Overview:
• Up to 100 devices per Gateway
• Update rates from 1 to 3600 seconds
• Up to 10 year power module life
• Standard range between devices is 200 meters
• 3+ kilometers with remote antenna
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Control Room, Security Room or 24/7 Location

WirelessHART® Gateway

Pressure

Acoustic

Temperature

Discrete I/O

Corrosion

Safety Shower
Eye Wash Station

What happens if the communication path is lost?
WirelessHART Industrial Network

Advantages of Self-Organizing Mesh over Other Mesh

- **Self-Forming**
  - Adding Devices
  - Removing Devices
- **Self-Mitigates Obstacles**
  - Standard Instrument Locations
  - No RF Survey
  - No Manual Link Configuration
  - Native Redundancy
- **Self-Heals to Environment**
  - Weather
  - Infrastructure Changes
  - Device Location Changes
Wireless Technology is the Lower Total Cost Solution for Missing Measurements

- 51 Emerson Wireless products available today
- 32,100+ wireless networks operating globally
- 10+ billion operating hours
- 4100+ Emerson Wireless experts
- 11 major automation suppliers
- 146 operating in countries

- 9 Emerson has won wireless infrastructure category 2009-2017 (9 consecutive years) Control Readers' Choice Awards

Improving Safety with Wireless Monitoring of Safety Showers
Improving Safety with Wireless Safety Shower Monitoring

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What is an effective alarm system for material exposure?

• Light, siren or individual radio-based alarm systems may not be effective when an operator is in distress

• Every operator has a radio; if an incident occurs, protocol requires him/her to radio in with the nature of the event

• Timely location of the affected personnel and the mitigation of exposure are critical to minimizing the effects

• In stressful moments, the person needing assistance may forget to share the exact location of the incident to responders
Causes of Problem and its Consequence

• When a Safety Shower is used for emergency purposes, it can be difficult to pinpoint an exact location without proper monitoring devices.

• Plant personnel have to investigate and report an event, depending on severity.
  • Recordable injuries must be reported to OSHA.
  • Every plant has to report its injury rate.
    • Number of man-hours vs. injuries.
    • Severity of the injuries.

• Production can be affected.
  • First responders will stop doing their regular jobs to respond.
Business Impact

• In general, not having safety showers monitored can result in
   • **Injuries** – not being able to get aid to those needing it in a timely manner
   • **Disruption of production** activities – taking time away from what you’re doing
   • **Increases** in the company/plant’s **exposure** to serious injury

“You never know what is actually happening with someone using the safety shower – they could have other medical issues as well, including a heart attack. The quicker we get a first responder to somebody, the better.”
Improving Safety with Wireless Monitoring of Safety Showers

Regulations

• ANSI Z358.1.2009 - Weekly inspections and annual functional tests
• EN 15154 (Europe) - Weekly inspections and annual functional tests
• OSHA 1910.151B - Response within 4 minutes or less
Solving the Problem

- There is a need for individual electronic Safety Shower and Eyewash Station monitoring
  - The system alarm should not require any action from the operator using it
  - The key is to have the Safety Shower send the alarm to the security room and/or control room, or any other 24/7 location

- Hard wiring to every safety shower with switches on them is an option; however, it’s cumbersome and expensive to implement

- Wireless is easy, fast and cost-effective compared to wired technologies, eliminating engineering, design and implementation concerns

- **Temperature control** from 60 °F to 100 °F is recommended* in order to not cause additional possibility of injury due to the hot water temperatures

* ANSI/ISEA Z358.1
Scalable and Easy to Test Technology

- Wireless Technology removes typical financial and implementation project road block seen in wired solution

- Traditional wiring system would cost $100.00 per foot of cable
  - Engineering
  - Digging trenches
  - Installation
  - DSC I/O & memory space

"Wireless was much more cost-effective. With an old plant that’s about 60 years old, it’s not easy to go back and rewire it. We were looking at all 100 originally, then decided to just do a pilot"
Safety Shower and Eye Wash Wireless Monitoring Solutions

Wireless HART Gateway

Rosemount Wireless
702 SS01 Kit
Safety Shower and Eye Wash Station Wireless Monitoring Kit

- Rosemount **Wireless 702 Discrete Transmitter**, **TopWorx Magnetic GO™ Switch** and Mechanical Brackets

- How does it work?
  - When the shower is actuated, the **Go Switch senses the movement** of the valve lever
  - Go Switch **lashes in “on” state** and the **702 sends the switch “on” state to the Gateway and on to the monitoring system**
  - Even if the shower valve is shut, the **latching Go Switch and 702 keep reporting the “on” state**
    - System must be manually re-set

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Challenges to Implementing a Solution

• **Customers can implement themselves, or the Emerson Service Group** team can manage an entire project execution, even if custom fabrication is needed.

• **Temperature valve** can be added to the showers to meet the ANSI/ISEA Z358.1 water conditions specification.

![Rosemount Wireless 702 Discrete Transmitter](image)

![TopWox Magnetic GO Switch](image)

![Water temperature control valve](image)
How the System Works

- **Safety alarms** are handled with the same importance as a process alarm
- Every safety alarm has to be treated with a high level of importance – the **priority is very high**
- When an alarm goes off, the control room operator is responsible for every alarm that happens on his/her watch
How the System Works

• Once the **safety shower alarms** and it’s confirmed as a real alarm, the board operator calls out to all radios saying there is an emergency situation

• Then, the board operator tells plant personnel **very specifically what the safety shower number is**, and where it’s located (on the deck on the AOW structure, for example)

  • He/she asks for **emergency responders to respond**

  • **One third** of the plant’s operators are **emergency responder trained** (and every year, they get refresher courses) in EMT, fire, and first aid
Differentiate a Functional Test vs. Real Use

- Traditional method. The operator:
  - Goes out and does an audit of a section of the plant
  - Pulls the handle to make sure water is coming out, and activates the eye wash station as well
  - Checks the station tag - manually (for auditing purposes)
Differentiate a Functional Test vs. Real Use

- **Wireless Monitoring System:**
  - It still works the same way, except operators radio to the control room and let the control room know which safety showers they’re checking, and that it’s not an emergency.
  - The confirmation that those showers have been checked is logged into the Safety Shower System electronically.
    - History of safety shower activation for record keeping.
    - Information accessible for HSE personnel review.

“The wireless system provides a second level check to make sure safety showers are being checked on a regular basis”
Commitment to Safety

• Personnel are aware that if something happens, they’ll be able to get aid quicker

• Personnel satisfaction can’t be measured, but it’s real and tangible

“Our overall safety culture is a big deal – this is part of our layers of protection for our personnel. We take it seriously. We want everyone to go home safely by the end of the day”
Where To Get More Information

- Visit Emerson **Booth 629**
- Visit Emerson Wireless Safety Shower and Eyewash Monitor online page

Thank You for Attending!
Enjoy the rest of the conference

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