

Helping Achieve High Performance Safety using Intelligent Industrial Mobility at Marathon Petroleum Company

EXECUTIVE SUMMARY

In plants across the oil and gas industry, the single biggest challenge for safety and operations managers is how to keep employees safe. Marathon Petroleum Company teamed with Accenture to develop the Accenture Life Safety Solution—a wireless-enabled multi-gas detection system that helps protect workers in potentially hazardous environments. The solution combines Wi-Fi and location-based technologies with gas detectors to allow companies to remotely monitor incidents in locations previously not suited for wireless networks.

THE CHALLENGE

In plant environments across oil and gas, chemicals, metals, mining, forest products and utilities industries—one of the biggest priorities for management is to understand how to reinforce safe work practices and support the safety of employees throughout their shift.

For example, a major safety concern is protecting individuals from hazardous gas exposure. Current industry solutions have a distinct gap in achieving this effectively. When abnormal gas levels are detected, safety devices set off alarms by way of loud beeps, strobe flashes and vibration, but they only alert individuals locally. Standard safety procedures require the alarmed individual to immediately leave the area and report the incident. In some cases, however, individuals are unable to leave the area and/or report the alarm. This situation limits the ability to continuously improve the safety of the facility and jeopardizes both individual personal safety and the safety of the entire plant workforce.

In response to these life-critical situations, Accenture, together with AeroScout, Cisco and Industrial Scientific, has developed an innovative new technology to automate gas exposure reporting and to remove the human factor of managing safety risk. Recently recognized as the industrial hygiene product of the year by Occupational Health & Safety magazine¹, the Accenture Life Safety Solution is one of many applications that can be deployed over the

¹ Award from Occupational Health & Safety, 2012, Computer Weekly News, "Accenture Life Safety Solution named new product of the year." Nov 8, 2012, <https://global.factiva.com>

wireless plant network to improve operational business processes and help keep employees safe.

THE SOLUTION

Drawing on the combined capabilities and experience of Accenture, AeroScout, Cisco and Industrial Scientific, the Accenture Life Safety Solution is a comprehensive approach of services, technologies and processes (see Figure 1)—which is differentiated from other safety solutions on the market by its breadth and innovative capabilities.

Accenture	AeroScout	Cisco	Industrial Scientific
Industry-specific experience	Exciter hardware	Wireless infrastructure	iNet™ - Gas Detection as a Service
Integrated business processes	Integrated Wi-Fi tags		Multi-gas detector
Project management	Operator interface		
Unprecedented design process			

Figure 1. Accenture Life Safety Solution built by strong capabilities and years of experience.

Employees wear a single, multi-gas detector (within 10 inches of their breathing zone) that is able to detect multiple gases (see Figure 2). If abnormal levels of gas are detected, similar to traditional solutions, the device immediately alerts the employee. However, with the innovative Accenture Life Safety Solution, the device also simultaneously transmits the gas-level information and personnel location over a wireless infrastructure using an integrated Wi-Fi tag located in the Industrial Scientific device to control board operators. Until recently, wireless networks have been unable to provide reliable coverage, limiting the ability to determine an individual's exact location in the plant. Accenture has been able to demonstrate that this is now possible based on an actual refinery-wide deployment. The gas detection information is sent to a control room that continuously monitors abnormal condition alarms 24 hours a day, 7 days a week. Additionally, the software indicates a separate alert if the individual either activates the panic button or exhibits lack of motion ("man down"). In the case of lack of motion, a local alert occurs first. The individual has the opportunity to acknowledge the alert and, if left unanswered, the alert is sent to the central control board operator.

Once alarms are wirelessly transmitted, the control room operator can pinpoint the location of the employee in danger within very close proximity of their exact location.

- Hydrogen sulfide (H2S)
- Carbon monoxide (CO)
- Lower explosive limit (LEL) hydrocarbon gases
- Sulfur dioxide (SO2)
- Nitrogen dioxide (NO2)
- Oxygen (O2)

Figure 2. Gases available in a single, multi-gas detector.

If rescue is required, the control board operator is able to advise the rescue team, not only of the location of the individual, but also of the environmental conditions in that area before they enter.

Workers outside plant “boundaries” can also be covered with the wireless solution. Many plants have operators that need to go outside the plant to operate other remote facilities such as water intake facilities and tank farms. The Accenture Life Safety Solution is able to provide these personnel with the same coverage as if they were in the plant through a combination of Wi-Fi, global positioning systems and cellular communications within vehicles.

One of the most important features of the Accenture Life Safety Solution is assurance that all alarms get reported. When an alarm is sent to the control board, workflow is triggered through the automatic creation of an incident in the incident tracking system.

“This solution not only alerts individuals to potential gas hazards via a wireless network but also allows us to identify incidents and quickly attend to endangered workers. As a cost-effective solution, it can help to transform on-site safety in a wide variety of industrial plant situations.”

- Don McCord, Operations Manager Illinois Refinery Division,
Marathon Petroleum Company LP

RESULTS

The Accenture Life Safety Solution can help safety and operations managers—in industries such as oil and gas, chemicals, petrochemicals, metals, utilities, mining and others—deliver more comprehensive and effective safety programs, including:

Improved 24x7 safety monitoring and timely responses

For the individual:

- A gas detector alarms with abnormal exposure.
- A lack-of-motion sensor triggers when left unacknowledged.
- There is a “panic button” on the device.
- The alarm goes to the control board operator or others, as required.

For the broader plant workforce:

- Gas-level monitoring is continuous and automatic, and thus notifies the rescue team of the environmental conditions before they enter the area.
- The automatic reporting helps to prevent placing other plant personnel at risk if an individual fails to report alerts.

Greater and more accurate safety incident reporting

Reporting of exposures is automatically recorded in the plant incident tracking system, which eliminates self-reporting avoidance or incident data errors. Because every alarm is related to the individual and the solution integrates the gas detector with the site entry security system, more accurate incident tracking is enabled.

With tighter incident reporting and more information on exact gas levels overlaid with location specificity, plant staff can more effectively determine the root cause of the specific incident, take quicker and more accurate corrective actions to remediate the risk, and perform continuous improvement across the plant facility.

Improved compliance through personnel location monitoring

In any plant environment, operating personnel need to know who is in their unit at all times. There are many ways to meet this requirement, but it is often managed by a paper sign-in and sign-out process. This approach can be challenging and ineffective, especially in an emergency situation when time is of the essence. With most control room operators outside the incident zone, central controllers do not have visibility of who is in their units of responsibility. With the Accenture Life Safety Solution, central controllers have this visibility and can therefore assist outside operators with the location of individuals requiring evacuation.

Optimized and more effective mustering procedures

If a major incident were to occur, accounting for all plant personnel is likely to be a major undertaking as there may be several muster points and accounting for personnel is typically a manual process. Mustering points are typically used to help account for missing personnel in these situations. However, in these circumstances the concern is for those personnel who do not get to the muster spots. The Accenture Life Safety Solution helps to pinpoint individuals still missing and helps to identify if they are in potential danger.

Ability to drive safety operational process improvement

Most plants typically do not have personal lower explosive limit (LEL) gas detectors. There are times, however, such as the steam-out process during a shutdown where potential LEL gas exposure is greatest. In an actual refinery unit shutdown, the Accenture Life Safety Solution was used successfully to identify exposure issues. On a subsequent shutdown, operators were able to take corrective action that resulted in a redesign of the steam-out process to minimize exposure. The alarm rate was reduced by approximately 90 percent, demonstrating the benefit of having immediate feedback in a plant environment and how the Accenture Life Safety Solution can be used to change behavior and drive safety process improvement.

The Industrial Internet in Action

Accenture uses a well-refined wireless network design approach for accurate location detection. With a location-based design, numerous workforce efficiency opportunities are possible to extend the return on the initial investment. Potential opportunities include:

Improved contractor management and better maintenance planning

Contractor spend can be a significant plant expense that needs to be balanced along with the drive for plant efficiency. Understanding the location of your contractors and performing analytics on maintenance planning processes can help promote higher “time on tools” for your workforce.

Workforce enablement of handhelds, tablets and ruggedized notebooks

Whether plant personnel need to view data sheets, drawings, procedures, operating information, turnaround progress reporting or enhance the permitting process, the Wi-Fi infrastructure helps facilitate these activities.

Enablement of other technical benefits:

- Expansion of radio systems by using voice over internet protocols (VoIP) technology.
- Improvement of operator rounds and the transmission of local field information in real time.
- Installation of wireless video cameras for fence line surveillance.
- Establishment of lower-cost video collaboration methods through the reduced installation costs of underground hard wires for video cameras.
- Installation of motion sensors on the fence line to enhance security measures.
- Deployment of mobile video in the field to transmit continuous video feed to the control room and emergency control centers (ECC).

“Once we have the Wi-Fi infrastructure in place for the Accenture Life Safety Solution, we will have the capability to include a number of other applications where the same infrastructure could help to increase productivity and efficiency.”

- Kevin Bogard, Illinois Refining Division Manager, Marathon Petroleum Company LP

ABOUT AEROSCOUT

AeroScout is the market leader in Unified Asset Visibility solutions. Customers improve operational efficiency using AeroScout products that leverage standard Wi-Fi networks to track and manage the location, condition and status of mobile assets and people. AeroScout's global customer base consists of leading hospital, manufacturing and logistics organizations, including many of the Fortune 500. The company invented the first Wi-Fi-based Active RFID tag, and

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today is widely recognized as leading the market in number of deployments and tags shipped. Headquartered in Redwood City, California, AeroScout has offices in Europe, the Middle East, Asia, Australia and Latin America. For more information, please visit www.aeroscout.com.

ABOUT CISCO

Cisco Systems, Inc. is the worldwide leader in networking for the Internet. Today, networks are an essential part of business, education, government and home communications, and Cisco Internet Protocol-based (IP) networking solutions are the foundation of these networks.

Cisco hardware, software and service offerings are used to create Internet solutions that allow individuals, companies and countries to increase productivity, improve customer satisfaction and strengthen competitive advantage. The Cisco name has become synonymous with the Internet, as well as with the productivity improvements that Internet business solutions provide. At Cisco, our vision is to change the way people work, live, play and learn.

ABOUT INDUSTRIAL SCIENTIFIC CORPORATION

Industrial Scientific Corporation is the world's leading provider of Gas Detection as a Service. With more than 965 people working in 22 countries, Industrial Scientific is dedicated to eliminating death in the workplace by the end of this century. Achieving this goal requires dedication to delivering highest quality and best customer service in all transactions. Industrial Scientific also focuses on providing analysis of data from equipment use and maintenance to identify problems before they happen. Industrial Scientific has operations based in Pittsburgh (USA), Arras (France), Dortmund (Germany) and Shanghai (China). The company provides technical services to customers from local service centers around the world, and has additional offices in Australia, Belgium, Brazil, Canada, Chinese Taipei, Czech Republic, India, Indonesia, Italy, Netherlands, Panama, Poland, Qatar, Russia, Singapore, Thailand, United Arab Emirates and the United Kingdom. Industrial Scientific is the parent company to Oldham (www.oldhamgas.com) and Predictive Solutions Corporation (www.predictivesolutions.com). For more information, visit www.indsci.com.

ABOUT ACCENTURE

Accenture is a global management consulting, technology services and outsourcing company, with approximately 261,000 people serving clients in more than 120 countries. Combining unparalleled experience, comprehensive capabilities across all industries and business functions, and extensive research on the world's most successful companies, Accenture collaborates with clients to help them become high-performance businesses and governments.

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The company generated net revenues of US\$27.9 billion for the fiscal year ended Aug. 31, 2012. Its home page is www.accenture.com.

ABOUT THE INDUSTRIAL INTERNET CONSORTIUM

Accenture has been a member of the Industrial Internet Consortium (IIC) since April, 2014. The IIC is an open membership organization, with over 140 members, formed to accelerate the development, adoption and wide-spread use of interconnected machines and devices, intelligent analytics, and people at work. Founded by AT&T, Cisco, General Electric, IBM and Intel in March 2014, the IIC catalyzes and coordinates the priorities and enabling technologies of the Industrial Internet. Visit www.iiconsortium.org.