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Technology for Greater Personnel Safety at BASF Freeport

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Summary

Safety of field personnel is the highest priority for process manufacturers. However the enormous size of many plants and the growing complexity of their field operations leaves most plants struggling to improve field safety and emergency procedures beyond past practice.

In 2014, BASF operations in Freeport (Texas) deployed a new personnel safety mustering system that uses the facility's existing outdoor networks and access control systems. BASF also plans to extend these tracking capabilities to more of the plant workforce and to contractors.

In an abnormal or accident situation, three questions always become critical: Are people in any danger or risk? Where are our people? If all are not accounted for, where and when were those missing last seen?

In such situations timely and accurate answers to these questions may mean the difference between safety and injury or even loss of life. Plant staff develop speed and accuracy through frequent practice and drills of their mustering procedures. But some plants are now deploying electronic mustering applications which they believe further improve the performance and accuracy of these procedures.

Deploying outdoor network infrastructures is the enabler that offers plants an opportunity to develop an electronic mustering capability. In 2014 the Freeport (Texas) operations of BASF deployed an electronic mustering application for personnel safety that leveraged the plant's earlier investment in a plant perimeter network infrastructure.

Leveraging Network Infrastructure Investment

At the 2014 ARC Orlando Forum, BASF Freeport presented the story of its outdoor network infrastructure. This network was built to cover the pe-

rimeter of the plant to improve the plant's physical security. At the ARC Forum, BASF stated that the company's policy going forward for green-field plants would be to treat such network infrastructure investments as an investment in plant utilities rather than trying to justify the network based on specific new applications.

A New BASF Mustering Station

BASF's 2014 mustering project was a natural follow-up to the perimeter security program, because the plant's mustering points for outdoor workers were also located at points on the plant perimeter, which now all had network coverage. This would simplify and reduce the cost of an improved mustering system. BASF felt that an improved mustering system would enable the company to begin using real-time data at its emergency operations center, rather than making the center manually integrate reports from multiple mustering points and sources.

Project Description

Even though the network wireless coverage was in place, the project required a significant design and integration effort. Most of this work centered on the design and functions of the 19 automated personnel assembly stations being deployed. These represented such a major technological upgrade from the existing paper-based system that the design required considerable thought and several iterations.

Clearly, the assembly stations needed to include a card reader for personnel check-in. BASF also added voice communications (Land Mobile Radio) at each station so that plant emergency and security staff could speak directly with people at any assembly point. A backup redundant power source was provided at each station, usually a solar-battery system. The station design was iterated so that each station was clearly visible and presented a uniform appearance.

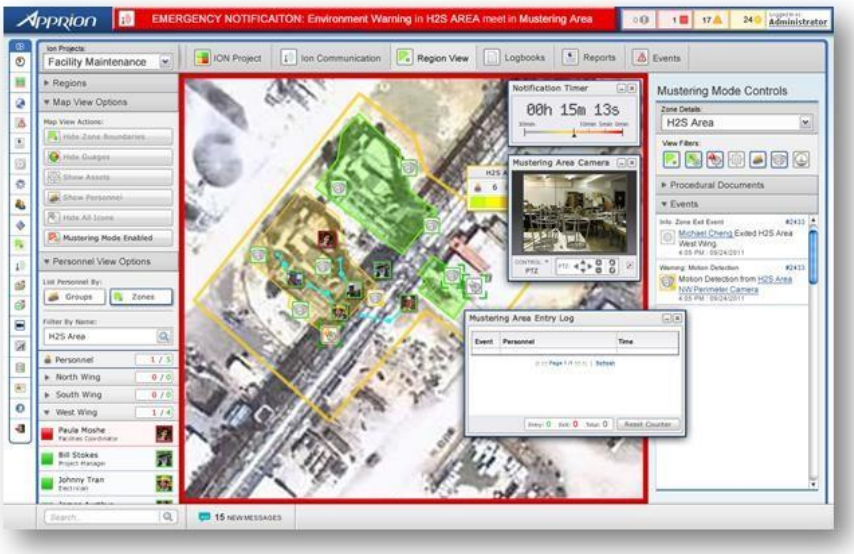
Supplier	Supplier Project Roles
1	Networks, readers, mustering application, system integration
2	Land Mobile Radio (LMR) emergency communications equipment
3	Plant access control application software
4	Mustering station design and construction

Supplier Scope in the 2014 Mustering Project at BASF Freeport

From the standpoint of software integration the main task was to integrate the mustering application with the existing plant access control software. Personnel are now tracked when entering and exiting the plant, but cannot presently be tracked continuously while inside the plant. Readings at the assembly stations are checked against the real-time data from the access control system to provide a continuous and accurate accounting.

Future Development of Personnel Tracking at BASF

The new application represents a big improvement in tracking response times (and thus improved safety in emergency conditions), but BASF has plans to extend and improve this capability. Emergency response procedures call for many workers in indoor locations to "shelter in place." These workers have access to emergency communications where they are, and – unless conditions dictate otherwise -- are safer staying in place. BASF wants to extend the new mustering application to these shelter-in-place locations so these workers can also be tracked and accounted for automatically. This will extend coverage to nearly three dozen new locations beyond the 19 outdoor mustering points currently deployed.



Mustering Application Typical Operator Interface
Source: Apprion

Beyond that, BASF plans to extend the tracking software within the plant as the wireless network coverage expands beyond the plant periphery to include most of the plant's internal space. The company is also working on plans to extend the mustering application to large contractor workforces that are on site during major maintenance and turnaround activities, especially since these kind of activities involve unusual and abnormal operating line-ups. The combination of a large contractor force with abnormal operations inevitably creates a risk factor in plant operations. BASF feels it is important to eventually extend the mustering capability broadly over all workers who may be on site, even if for relatively short periods.

Recommendations

ARC believes the mustering capability BASF has developed represents a big improvement in personnel safety compared to what most plants actually use today. While all parties involved hope that this capability is never needed, the inclusion of the new tracking system into BASF's emergency drills is designed to make sure that all field and emergency personnel become familiar with using the system so that it becomes an integral part of emergency response training. ARC believes that plant owner-operators should take these lessons from BASF's experience:

- Take an incremental approach to personnel tracking and plan to improve coverage and capability in steps over time. This can provide quick benefits as opposed to maintaining paper systems while waiting for a more comprehensive solution. The caveat is that all system capabilities will need to scale up easily.

- Adopt a multidisciplinary approach to the project and include the existing communications infrastructure in the new solution. BASF used both the new network and the existing LMR capability. The company also re-worked the design of the stations extensively before broad deployment. The rework included areas like power supply reliability, voice communications with emergency centers, and ergonomics.

- Plan to work with a range of suppliers, as BASF did, and to integrate with existing applications. No one supplier can deliver 100 percent of the solution, and it falls to owner-operators to manage the collaboration for a successful overall system design and deployment.

- Update emergency procedures and practice all your drills using the updated tools. Obviously this makes sense because it familiarizes personnel with the new capability and also will indicate any problems as the deployment expands over time.

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