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Tank Storage MAGAZINE

THE STORAGE OUTLOOK

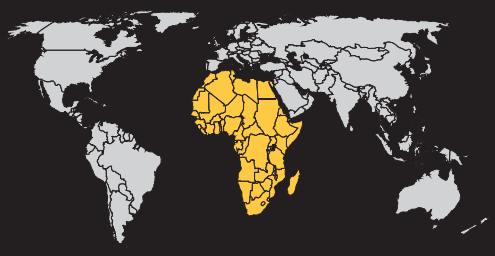
Five international operators review developments from 2018 and exclusively share what they think lies ahead for the market in 2019

A GLOBAL STORAGE HUB NETWORK

GPS Group aims to become a leading independent hydrocarbon & chemical storage company & is acquiring & developing assets in key hub locations

Navigator

REGIONAL FOCUS: AFRICA



The voice of the storage terminal industry

FILLING THE MISSING SAFETY GAP IN FIRE PROTECTION

Ensuring the highest standard of functional safety in fire protection is at the heart of SA Fire Protection's development strategy. Identifying a gap in the safety integrated level loop, the Italian-based company focused on filling this gap to not only achieve the desired level of system reliability for its automated systems but also save time in terms of maintenance, shut down and emergency actuation in case of failure. Tank Storage Magazine speaks to business development manager Babak Rashidi about how functional safety is driving product developments.

Terminal operators seem to be well advanced in the shift away from manual systems to automated systems, how does reliable fire protection design benefit the owner and the operator?
Using the automatic fire suppression systems allows operators to respond to fire conditions faster and reduces the exposure to risks associated with fire or gas incidents. Reliable systems also increase the availability of the overall system, further reducing the risk of injuries, fatalities, explosions, shutdown time, damage to property or other monetary losses for owners. These automated systems allow owners to have a peace of mind that their fire protection system will be effective when called in to action.


SIL 2 double coil actuator for gaseous and DPC systems

Can you give me an overview of how functional safety affects the design and development of firefighting systems?
There are many variables that need to be addressed when designing and developing firefighting systems because these systems need to warn operators/occupants while simultaneously lessening the accident's effects on the facility to the best of their ability. You should know that functional safety is the portion of general safety that is centred around a system or components responding to their commands properly. Meanwhile, the safety availability (SA) relates to the probability of failure on demand (PFDavg therefore the SA = 1-PFDavg). It is the PFDavg that measures the safety integrity level (SIL) of the system. Hazard analysis should be carried out to determine if there are considerable system related hazards. If there are, then functional safety is required to execute specific safety functions which reduce the risk of an accident, these systems are also known as safety instrumented systems (SIS) which are one of the most vital layers of protection.

What is the best way to reduce the risk of failure on demand during fire conditions?
In my opinion, one of the worst things that can happen in the oil & gas industry is for a fire to break out, the second worst thing is for the firefighting system in place to have a failure that is only detected when the system is called in to action, because at that moment the facility is heading toward catastrophe. It's important to discuss reducing failures with clients, especially for critical hazards in oil & gas and offshore industries because they require highly reliable equipment for their firefighting systems that can:

- Act quickly preventing the escalation of the incident
- Mitigate against failure when called in to action
- Respond accordingly to their commands.

As a fire engineering and manufacturing company, we normally issue a risk and failure probability analysis based on the site's conditions (e.g. are there any factors preventing the extinguishing agent from being effective, such as is wind moving the gaseous agent away from the targeted area or is there an opening stopping the dry chemical agent from accumulating? what are the limits of the fire mitigation design? what happens if the hazard exceeds the expected design limits?). This activity helps us to understand the most critical points at the facility and to identify components which have the possibility to impair the system. Therefore, using the risk analysis as a base, we can propose highly

SIL 2 electric Niagara monitor

SIL 2 electric Niagara monitor

reliable components which can avoid failures during fire conditions and as a result lead to reliable systems. These solutions are then designed to mitigate against the risk of failure on demand and other potential hazards by using equipment that increases availability and increases the overall reliability of the system. Together reliable detectors, logic solvers and mitigation system perform one or more safety instrumented function (SIF), designed to significantly reduce or prevent hazardous incidents. In this way, the system's effectiveness is connected to the safety availability of all its components.

What makes a reliable fire detection & suppression system?

There are many parameters to be considered to ensure a fire detection and suppression system is reliable. But put simply, you are only as strong as the weakest link and so if there are components in the system which weaken it then those components should be substituted with more reliable equipment to improve the overall reliability of the fire detection and suppression system.

How has SA Fire Protection's portfolio evolved to meet industry needs and requirements?

When doing our risk analysis, we noted that often there were highly reliable detectors and logic solvers installed in fire detection & suppression systems with a SIL of either SIL 2,3 (higher SIL levels are associated with higher safety levels as well as a lower probability of failure on demand). However, the mitigation systems themselves (deluge system, gaseous system etc), did not meet the same reliability criteria. Also, in demanding environments like the North Sea, the Norwegian technical safety standard S-001 calls for the fire system to be operable at all times including times of maintenance. At the time, we did not have any equipment in our own portfolio that could close the SIF loop with a SIL mitigation system and so our R&D team set out on a mission to develop the missing components to fulfil the safety requirement needed to truly achieve the desired level of system reliability. Therefore, over the years we developed a SIL 2/3 double chamber deluge valve (Mod. VDD), a SIL 2 electric monitor (Niagara Series) and a SIL 2 double coil actuator (for gaseous & DCP systems etc), all validated by Bureau Veritas. So now we have addressed the issue of continuous operability and closed the loop by ensuring the key components in the system are all SIL certified.

Why is SA Fire focusing on SIL systems?

Because of our experience and acknowledgment of the gap we saw in the market, coupled with the requirements stated in international standards like IEC 61508; we understood that a portion of the SIL system, known as 'final elements' were missing. Another reason that we have been focusing on SIL is to ensure that we deliver reliable systems that not only increase availability but also save time in terms of maintenance, shut down time and emergency actuation in case of failure. For instance, in traditional deluge systems the time to respond to a failure can be anything from a few minutes to much more, while the fire condition is worsening. We didn't want to accept that as the only scenario and so, by using the redundancy principle for our deluge valve model VDD, the valve can respond to failure in zero time preventing the fire condition from escalating.

Are there any misconceptions with regards to compliance with international regulations for designing firefighting solutions?

It is good practice to base all fire system design on international standards such as NFPA, IEC, UL etc. But it is also wise to consider additional guidelines which go a step further when addressing optimal solutions for firefighting systems and equipment such as OLF070. In doing so you can consider the international standards as the cornerstone of effective firefighting solutions.

A lot of designers believe using a SIL component in the assembly of one portion of the SIF can achieve the required SIL level (e.g. adding a SIL certified solenoid valve a non SIL deluge valve). However, after further analysis of IEC 61508 and IEC 61511, it is understood that the deluge valve and the actuating system need to be considered as a whole unit in order to be considered as a truly SIL certified mitigation system. In addition, guidelines such OLF 070 call for a certain amount of water to pass through deluge valve for the function to have been a success, placing the emphasis on the deluge valve itself rather than the solenoid or any other component in the deluge assembly.

FOR MORE INFORMATION

www.safireprotection.com

SIL 2/3 double chamber deluge valve model VDD