

Monitoring Fixed Suppression Syst



Carl Hunter

Coltraco

One of the key challenges facing business currently is business continuity, particularly in high asset and hazardous environments. With the growth in awareness on this particular subject over the last ten years or so, one thing has become apparent, namely that many fixed suppression systems globally have suffered from accidental discharge or slow seepage. Often this occurs without the knowledge of the business owner. Many business owners will only have their fixed suppression system checked once a year in order to meet their safety criteria.

Historically, the checking of a fixed fire suppression system involved shutting the system down and weighing each individual cylinder using scales. Ten years ago Coltraco developed the Permlevel Single Point single point system for the UK's Atomic Energy Authority, building on its development 20 years ago of a portable liquid level indicator called Portalevel. This system was designed to allow the monitoring of up to five individual fire suppression cylinders monitoring the applications on a 24/7 basis. This system was first used by the US Navy & Royal Navy, which are two of the most safety aware organisations on the planet.

One of the key challenges that has faced the fire suppression industry over the last few years has been the growth in size of facilities such as data centres. If a data centre for an organisation such as Google was to be damaged by fire, it would affect not only Google but also the millions of people who use it on a daily basis. This industry along with the oil and gas industry, which is particularly safety conscious, and high rise buildings in Dubai has driven the development of the Permlevel Multiplex system.

As we have seen, one of the main challenges facing the industry is how to keep both high-rise residential buildings safe and industry running in ever more challenging environments. Therefore how can we overcome those challenges?

The Permlevel Multiplex system is designed to provide 24/7 monitoring of anything from five to 700 cylinder level points. One of the key drivers during development came from Dubai. There were concerns with regard to some of the high-rise tower blocks, and the integrity of their fire suppression systems was questioned due to a number of fires occurring in these developments. From talking to the developers of these tower blocks the aim therefore became to develop a system whereby enough modules could be produced and networked in order to monitor 700 cylinders.

This is the first fixed system worldwide that is capable of monitoring the liquid level of critical fire suppression systems that use liquid suppressant agents such as FM200, Novec 1230 and CO₂ on a constant basis. The equipment is also rated to withstand temperatures of 70°C and relative humidity of 95 percent. This makes it particularly

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suitable to the type of industries such as data centres, offshore oil and gas platforms and drilling ships, high rise buildings, shipping and power generating facilities. These high-value high risk industries, where a fire would have a major detrimental impact on the day-to-day running of their business, recognise the added safety value that comes from being able to monitor the contents of their fire suppression systems 24/7. The system is designed to ensure that fire suppression systems are always fully operational with no accidental discharge ensuring business continuity for companies who operate in these environments.

Due to the sophistication of the system, for example with an RS232/485 computer interface it allows a computer operator in the control room to call up cylinder numbers 21 and 623 to check what the live levels actually are. With this level of awareness it was necessary to add a complex data logging system in order to record on a 24/7 basis. The Multiplex system is designed to be user friendly so that the on-site maintenance team can quickly identify and rectify any issues. As an example of this, each module has a set of green and red LED lights that act as a local display and allow the maintenance team to go into a room and identify which cylinders have issues quickly and easily.

One of the key development issues that had to be overcome was how to mount the sensors in such a way that they will not be dislodged by somebody walking past. Once achieved, it was then possible to guarantee a maintenance program to ensure those sensors are working properly. It was obviously essential to work closely with the in-house maintenance team to ensure that a maintenance program was put together they could understand and implement.

The system is designed to be as user friendly as possible, and accuracy is a major driver. The Multiplex system has industry leading accuracy figures of $\pm 1.5\text{mm}$, which helps to ensure that facilities are protected and safe.

Historically, downtime when performing maintenance checks on a system was an issue particularly in high risk environments such as offshore oil & gas because of the risks involved in shutting the system down. With Coltraco's equipment an otherwise 30-minute to 60-minute job of dismantling, weighing and re-installing a cylinder takes 30 seconds to 60 seconds with a Portalevel unit, but using Permalevel Multiplex even this aspect is made redundant, as it is monitoring the cylinder 24/7/365.

As an example of the safety risks involved in the maintenance of fixed fire suppression systems, on



the 23rd May 2010 the general-purpose oilfield support vessel *Marsol Pride* was conducting underwater operations within the Tui oil and gas field off the west coast of New Zealand. *Marsol Pride* was fitted with a fixed carbon dioxide fire smothering system for its engine room. Late that night a valve on one of the CO₂ pilot cylinders developed a leak and charged the system ready for release. A second leak in the main control valve then caused the entire system to activate resulting in an uncontrolled release of CO₂ gas into the engine room.

An automatic alarm in the engine room had warned the duty engineer of the impending release, so he had left the engine room to investigate the reason for the alarm. The incident caused one of the two main propulsion engines to shut down due to air starvation; other than that there was no damage to the vessel and no one was injured. An uncontrolled or inadvertent activation of an engine room fixed CO₂ gas fire smothering system is a serious event because the CO₂ gas displaces any air in the space so that it cannot sustain human life, and it can immobilise the ship's propulsion and generator systems at a critical part of an operation.

The lessons learned from this incident were: any component in a fixed CO₂ gas fire-fighting installation, the failure of which can cause serious harm or immobilise a vessel, should be inspected and tested often enough to detect any deterioration in performance so that remedial action can be taken to avert a failure; additionally, the conditions under which control valves or any other component in a fixed CO₂ system are tested should be the same as or greater than the normal operating conditions for the system.



A safety recommendation was made to the Director for Maritime New Zealand to forward this report to the International Maritime Organization (IMO) and the International Association of Classification Societies. The aim was so that they could draw on the lessons learned from this incident and consider amending the current guidelines that currently suggest an inspection of control valves only once every five years.

As another example of the risks involved in the maintaining of fixed fire suppression systems, just over a year later in August 2011, a shore-based service engineer was seriously injured while testing components of the tug SD Nimble's fixed carbon dioxide extinguishing system. Six cylinders were accidentally discharged after the tug had slipped her berth at Her Majesty's Naval base in Falsane Scotland. This led to the depletion of oxygen levels in the cylinder room following the accidental discharge. The engineer quickly lost consciousness and the tug was manoeuvred back to her berth so that the engineer could be removed to the open deck where cardio pulmonary resuscitation was started. The engineer was subsequently transferred to hospital where he made a full recovery.

These two separate incidents show the dangers involved in maintaining fixed fire suppression systems. In particular the *Marsol Pride* was compliant with IMO requirements. This illustrates why companies that operate in high risk environments specify Permalevel Multiplex™. Having an automatic monitoring system reduces the risk when maintaining fixed fire suppression systems and makes sure they are monitored more regularly than required by the IMO.

This system allows its users to operate with much less downtime than they would previously have had to factor in, allowing them to optimise profits against downtime and doing so in a safe environment.

This system, as outlined, is aimed at companies that operate in industries that have identified the risks involved in the environments in which they operate and can justify the expenditure of using a system that monitors their fixed fire suppression system 24/7 365 days a year. We believe the industry as a whole needs to move away from the idea that having fire suppression system checked once a year is adequate. That leaves a probability of 364 that the fire suppression system will lose integrity over the course of the year. What we have seen in the past however is that where industries, such as offshore oil and gas lead from a safety perspective other industries follow in time.

We understand that a system such as Permalevel Multiplex is not suitable for everybody, but it can be used to help educate the industry further as to why monitoring and checking a system more frequently than currently required is good for business continuity. It ensures that the fire protection system has full integrity should the worst happen and it is needed to put out a fire.

To conclude, as companies are forced to operate ever further from home and in more challenging environments where help may be two or three days away, it is vitally important to have a fire suppression system that they are confident will be effective. By using a system such as Permalevel Multiplex they are ensuring the integrity of their systems and can have confidence in it if the worst happens and the fire suppression system is needed. By monitoring the system continuously 365 days a year 24/7 it enables workers to have full confidence in their safety and ensures business continuity. Over time, this may be one of the key drivers behind the industry moving forward in terms of the testing and maintenance of fixed fire suppression systems. In an ideal world rather than it being acceptable to have your system checked once a year it will be checked maybe once a quarter.

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Carl Hunter is Managing Director and CEO of Coltraco

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