Case study

When lightning strikes twice

What happens when fire destroys a ‘mission critical’ piece of equipment? Pulse takes a look at the consequences of dealing with such an event and the steps that may be taken to minimise future risks.

Whether located internally or externally, in-cabinet fires remain a significant risk to the resilience of mission critical machinery or enclosures in any business or public service. This risk may be reduced by the rapid suppression of fire and rapidly deployed fire enclosure, no matter how small, and combustible materials co-exist employed, where a source of ignition is present.

One particular English NHS Trust originally suffered the loss of a sterilisation machine, caused by an internal fire. Sterilisation machines are a little like an industrial dishwasher, except they operate at normal room temperature using highly concentrated chemicals, and a significantly more sophisticated automatic cleaning process. This machine was one in a bank of three, each providing two sterilisation cleaning facilities. The machines were in constant use to sterilise medical equipment for the provision of patient care services within the hospital.

Each machine was finished in stainless steel, with access to operator controls and utensils only at the front, rather like a large microwave oven. Special tools were required to remove the external access panels to provide alternative access to the interior. The original fire event occurred in the latter half of 2013 and was discovered when black smoke was seen coming from the top of one of the machines. Staff activated the hospital’s fire alarm system manually and the hospital wing was evacuated. Attempts were made to extinguish the fire using portable CO₂ fire extinguishers. This proved ineffective, as the access panels could not be removed without the special tools.

The Fire & Rescue Service attended rapidly, and subsequently extinguished the fire by safely isolating the machine’s power supply and deploying hundreds of litres of water.

The fire event caused significant disruption to the hospital. It necessitated the evacuation of the wing, resulted in the complete loss of the sterilisation machine and loss of subsequent patient care services.

Extensive post fire clean-up and redecoration was necessary, as well as re-establishment of the room itself and the two floors below the incident, which suffered from water damage.

Advice was sought

Before commissioning a new sterilisation machine the Trust consulted FirePro UK about what steps it could take to help minimise the risk of repeat events and, should there be a future fire, prevent such disastrous consequences re-occurring.

FirePro is a condensed aerosol fire suppression system, which is manufactured and supplied in modular sized units. This modularity enables it to be adapted to protect a number of risk types and sizes, from the very smallest to significantly large spaces.

FirePro will function with most types and makes of early warning fire detectors, such as aspirating systems, linear heat detection, conventional smoke detection or even ultra-violet flame detection.

For in-cabinet protection, FirePro provides a very simple ‘one shot’ fully engineered solution for the protection of the new replacement machine, as well as the existing two machines.

The solution

FirePro UK, in conjunction with a local approved FirePro distributor, tabled a bespoke engineered solution for the protection of the new replacement machine, as well as the existing two machines.

It was decided that the most appropriate and suitable method to provide early warning of fire within the machine would be to utilise linear heat detection cable set at 68°C. Linear heat detection cable may be installed at low cost to cover all parts of the machine internally, including control gear, printed circuit boards, power supplies and solenoids.

With the early warning detection all set, the next engineered system component to specify was the actual fire suppression agent. Based on the internal cabinet’s cubic capacity and FirePro’s modularity, it was determined that the internal risk would be adequately protected by installing two FP200 (200g of agent) FirePro aerosol generators. As FirePro is not a pressurised gas, it does not have to be stored in pressurised cylinders. Besides mounting the units internally, saving space, the end user also benefits from the total cost of ownership being much lower than alternative fire suppression agents, the speed of installation, and a 15-year independently certificated fire expectancy for the FirePro agent.

FirePro also boasts environmental benefits. It is certified under the US SNAP initiative as a green product with zero ozone depletion factor and zero global warming potential. It is designed to extinguish fire by causing a chemical reaction at molecular level.

The product is also performance certificated by a number of test laboratories against recognised standards, including Underwriters Laboratories (USA & Canada), British Standards Institute and KIWA in the Netherlands.

With early warning detection and fire suppression in place, the next step for this bespoke engineered solution was to ensure that, in the event of a fire being detected, not only would the FirePro fire suppression agent be released immediately, but a further sequence of measures would be set in action. Via dedicated external interface relays it was ensured that, common to any fire signal, the system would immediately interrupt the power supply to the machine; signal the closure of all...
local fire doors; signal to the BMS system which would stop all local plant, including air conditioning and signal to the main building fire alarm system for alert, and Fire & Rescue attendance via the appointed alarm receiving centre.

This was all simply achieved by utilising the local on-board signal relays from the FPC-2 fire suppression control panels, which in turn were connected to control relays configured externally to the respective signal destinations. This included full fault monitoring outputs for fire detection system mains power or battery failure, open or short circuit on the detection line and all circuits serving the FirePro units.

A local lamp/buzzer key switch system isolate facility was also installed to enable periodical maintenance within the sterilisation machine by others.

Putting it to the test
It is said that lightning doesn’t strike twice, however, in this case a second fire incident in the replacement machine occurred within less than seven months of installation. Subsequent events were significantly different to those following the first fire.

When a repeat machine malfunction occurred, the significant increase in the internal temperature caused the activation of the internal automatic linear heat detection cable. This immediately resulted in the internal discharge of the two local FirePro fire suppression units and correctly triggered the series of measures already described. When Fire & Rescue arrived there was no fire for them to deal with as it had already been automatically extinguished by the FirePro fire suppression system. The Fire & Rescue role was purely post event to ensure the area was safe for re-occupation, checking the status of the machine and surrounding areas, and naturally venting the room by opening the windows.

There was minimal post fire smoke damage and the room was put back into service as soon as the machines were deemed fit to return to operation the next day.

Labour to redeploy the spent FirePro units was available the next day as were the units themselves, meaning minimal downtime, (with spent gas cylinders, redeployment and re-commissioning may take significantly longer).

The verdict
Both the Fire & Rescue Service and the Hospital’s Chief Engineer were highly satisfied and complementary of the engineered fixed internal fire detection and automatic fire suppression system. It operated exactly as its design had intended, and enabled immediate pinpointing of both the room and the machine with the fire, thus minimising the loss of critical patient care services and post fire damage clean-up, and avoiding the expense of a replacement machine.

The client’s total investment cost, with the installing distributor, Titan Fire & Security, which designed the entire system, was less than £8,000, a small price to pay to achieve significantly improved resilience to fire damage and potential threat to life.

FirePro UK is the licenced master distributor of the FirePro product in the UK and Ireland. It offers collaborative fire systems technology to meet challenging risks and applications to a fully trained network of independent BAFE SP203 or LPS 1014 third party certificated fire systems engineering businesses located throughout the UK, meaning FirePro is neither a single source or closed protocol product.