



Omniflex

Advancing the UK's nuclear industry



How Omniflex is advancing the UK's nuclear industry

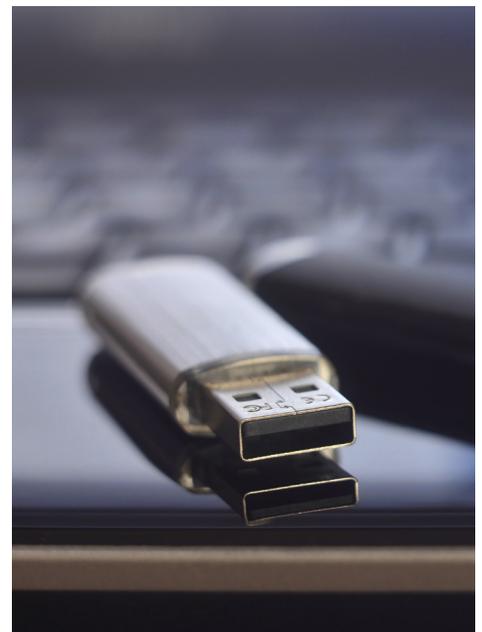
Arguably, there is no industry as highly regulated as the nuclear sector and none where mission-critical safety systems matter more. Here, Gary Bradshaw, director of remote monitoring specialist Omniflex, explains how the nuclear sector can benefit by adopting new systems that save time and money while also improving plant safety.

Commercial off-the-shelf (COTS) products



Commercial off-the-shelf (COTS) products are ready-made, packaged solutions that are available to be bought off-the-shelf and can then be adapted by the end user to meet their needs.

These purchases are often alternatives to custom equipment and one-off developments. To date, the highly regulated environment in the nuclear sector has made many sites reluctant to adopt COTS products, even though they offer some key advantages.



Radiological monitoring systems

Networking radiological monitors

All UK-based nuclear facilities must adhere to strict guidelines for the radiological monitoring systems used to monitor the levels of alpha, beta and gamma radiation in the air.

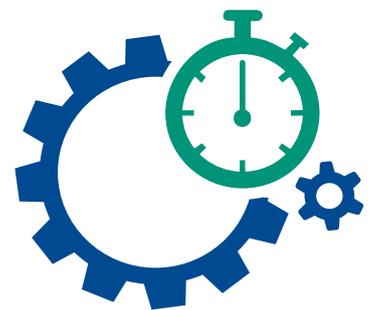


Conforming to regulations

Regulations from the Health and Safety Executive (HSE) and the Office of Nuclear Regulators (ONR), have created demand for real-time and historical data monitoring and the creation of safe areas for operators to collect data without entering radioactive areas. To meet this demand, networking of radiological monitors became the industry standard.

An added layer of complexity

However, networking the monitors adds a layer of complexity. Because traditional nuclear radiation monitoring systems are bespoke, the field of radiation protection instruments needs to be manually networked to a bespoke panel, requiring a skilled professional to spend days wiring and testing each bespoke unit.



Externally verified

Each of these must then be inspected by an external engineer from a regulating authority to check for human errors, before it can be certified for use which, again, can take days to complete.

The RPN1 Gateway

When the National Nuclear Laboratory (NNL) was tasked with installing 130 data collection points to connect large volumes of radiation protection instruments at Sellafield's nuclear site, it was not feasible to use traditional methods. It would have taken months to complete and would add significant cost by installing expensive power and network cabling.

To overcome this problem, We engineered **the RPN1 device**

The RPN1 is a gateway device, developed to simplify the process of data collection from a variety of radiation protection, from different manufacturers, via their RS485 communications ports and connects them to the plant's standalone radiological surveillance SCADA system.



Cost effective

The RPN1 eliminates the need to run miles of expensive power cables to each monitor, because it connects directly to a Fibre+Power ring network.



Secure power

It takes its power directly from the facility's secure mains supply, via distributed power and network interface boxes located around the nuclear facility.



Wired up

It then uses hybrid power/fibre Ethernet data cables to power and network each RPN1 in a self-healing ethernet ring topology.



Real time

This allows the network to maintain uptime and data integrity in the event of any RPN1 or single network failure.

The installation of
the RPN1 across the
Sellafield site helped
NNL save over £1m
in costs

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Fast installation



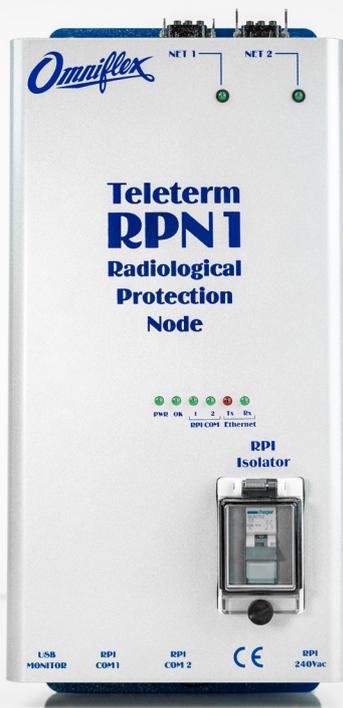
Reduced hours



ISO 9001

The revolution...

The RPN1 device is an off-the-shelf product that can be installed in minutes and eliminates thousands of man hours of work. Furthermore, it is standardised to meet ISO 9001 quality levels so there is no need for additional third-party inspections during the installation and testing of the system.



The NNL project

The installation of the RPN1 across the Sellafield site helped NNL save over £1m in costs, ensured that the time spent by personnel in the active areas was greatly reduced, and greatly accelerated the delivery and active service of the system.

The units have since been used on other Sellafield buildings at the site and are specified to be used on new projects planned over the next five years. The technological developments of the RPN1 led to Omniflex winning the Nuclear Decommissioning Authority's Innovation Award in 2016.



Switching to wireless

Sellafield Ltd. recognised that, for ongoing projects during its decommissioning phase, connecting its radiation protection instruments (RPIs) wirelessly offered several key advantages over traditional wired networking methods.

They don't require an infrastructure overhaul or third-party certification and can be easily moved between different locations. Crucially, they also reduce operator radiation exposure by eliminating the need for onsite inspections.

Sellafield Ltd. engaged Omiflex to design and manufacture a suitable wireless interface to all its RPI manufacturers' monitors, leading to the creation of the W3 Wireless Interface Node.

The W3 is a plug-and-play system that was commissioned for use at the Sellafield nuclear site to meet the demands of the industry. It offers many advantages over traditional monitoring systems, all of which lead to greater on-site safety and significant cost savings.

In a nuclear plant,
acting decisively
in the moments
following an
emergency can
mean the difference
between averting
danger and a major
catastrophe

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Universal interface

With a universal interface it can be set up in minutes, eliminating thousands of hours spent installing and testing systems in active areas on-site.



Reduces radiation

It reduces personal radiation dose-rates that operators are exposed to because they can now monitor radiation levels remotely.



Standardised product

There is no need for additional third-party verification because it is a standardised product, made to ISO 9001 standards.

Pushing the boundaries

The nuclear industry must continue to push the boundaries of what COTS systems can offer by working with manufacturers to develop innovative new technologies that meet industry demands.

Networking radiological monitors isn't the only way that nuclear sites can improve on safety, they must upgrade their alarm systems to better alert operators in the event of a crisis.

An alarming situation

Alarm annunciators are panel-based alarms that are hard-wired directly into relevant processes by a series of cables.

In the event of system failure, the relevant window on the panel lights up and the alarm emits a sound, immediately giving operators the necessary information to act quickly. Many alarm annunciators in use today were installed decades ago and do not meet the current IEC 61508 safety integrity levels (SIL).

Many sites rely on control systems teeming with complex visualisations to warn operators of imminent danger. This can be overwhelming for operators and sometimes counterproductive. In the event of imminent danger, it is vital that the safety systems alert operators quickly and efficiently so they can respond appropriately.

Operator response times are an important part of the SIL-rating, making it vital that alarms maximise, rather than impede, the operator's ability to respond and act quickly. Physical alarm annunciators must be kept up to date and must only display the safety, health and environmental alarms that plant operators must respond to.



Updating your alarms

Plant managers looking to update their alarm annunciators should bear in mind two key considerations.

Hardwiring

Firstly, you must ensure that they are directly hardwired into the process.

The importance of this cannot be overstated. Digital alarms that are displayed in lists on the control screen are at the mercy of network outages. If the network goes down, so do all the alarms.

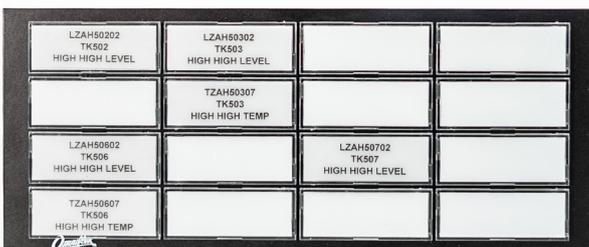
If they are directly hardwired, and you lose one wire, you only lose one alarm.



Annunciators

The second point to consider is that the annunciators must have a panel of windows permanently dedicated to specific processes.

This enhances operator familiarity and increases their awareness when the panel sounds an alarm.



The Omni 8/16
range of alarm
annunciators is the
world's first range of
alarm annunciators
substantiated by
EMPHASIS for use
in SIL applications in
the nuclear industry

Omniflex



Industry approved

When Sellafield Ltd. needed to upgrade its on-site alarm annunciators to SIL standards, in accordance with the requirements of the Nuclear Installations Inspectorate, it turned to Omniflex for help. The Omni 8/16 range of alarm annunciators is the world's first range of alarm annunciators substantiated by EMPHASIS for use in SIL applications in the nuclear industry.

Omniflex has over 55 years of experience specialising in instrumentation, remote monitoring and safety-critical alarm systems, and is now the standard approved supplier of SIL-rated alarm annunciators for the UK's nuclear industry.

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In the nuclear industry, where saving money and
improving safety don't often go
hand-in-hand...

Omniflex is bringing the two together.