

Sustaining the availability of obsolete systems critical to the safe management of the UK's nuclear deterrent

Customer

Supporting the UK's defence by managing its nuclear deterrent

AWE is an organisation funded by the UK's Ministry of Defence (MOD) to maintain the country's nuclear deterrent. This includes manufacturing, managing and developing the country's Trident nuclear deterrent. Ultra has worked with AWE for more than 20 years, assisting its operation with a range of safety critical monitoring and detection solutions.

Challenge

Maintaining the availability of ageing and obsolete critical systems

AWE's work is mainly carried out across two large sites, Aldermaston and Burghfield in Berkshire. The sites are located close to one another and cover an area of almost 1,000 acres. Both sites host multiple buildings, each having been specially constructed and equipped to carry out AWE's highly specialist activities.

The systems within some of its buildings were manufactured in the 1980s. Because of their significant age, maintaining their continuous availability had become challenging. Any faults that occurred, as they inevitably would, risked causing significant system downtime, which would negatively impact AWE's ability to meet its commitment to national security.



Maintaining the safety of nuclear facilities and maximising their lifetime value

The people who built the systems had long since left the industry so their knowledge and expertise were unavailable. New parts were rare. Repairing failed parts was difficult, as they were manufactured using technologies, standards and processes that are now obsolete.

While the development of new safety critical systems had been initiated, it can take decades for such work to progress from scoping requirements to opening a fully equipped modern facility. Complex development and engineering programmes are required for systems to be delivered that meet AWE's requirement for safe, effective and economic operation, and gain the approval of the Office for Nuclear Regulation.

The challenge for AWE was how to keep its existing systems running in a safe and controlled manner until replacements could come online. Additionally, with the managed lifecycle of a nuclear deterrent being at least 100 years, the issue of ageing and obsolescence (AO) in critical systems would repeat over time. A solution to lifecycle management was required.

Solution

Practical options to deliver a further 15 years of systems life

Given the technological change that will occur over the long time periods associated with all nuclear programmes, maintaining the effectiveness of critical systems over their full lifecycle is a significant challenge for the entire industry.

Ultra has unparalleled depth of experience and expertise in supporting nuclear organisations in this area. We lead the market in our ability to determine requirements and specifications in accordance with the latest standards, as well as refurbishing, reverse engineering, redesigning and remanufacturing electronically controlled systems. Due to this capability, AWE contracted Ultra to extend the service life of its critical systems.

To help AWE effectively assess and move forward with preferred solutions, we framed our programme to comply with the organisation's own 'gated' project structure. Proposals needed to pass AWE-defined criteria associated with a development milestone for it to be approved for the next phase of development and gain funding. Ultra consultants were embedded within the organisation to support AWE team members throughout this internal process.



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The first phase of the programme involved analysing what was in place. This included reviewing existing requirement documentation associated with each element of the systems to understand the engineering choices that had been made in the past. Where documentation was unavailable or incomplete, we reverse engineered systems to generate new documents.

With a complete portfolio of requirements documents, our team was able to progress to a technology discovery phase. Where replacement technology existed that met requirements, Ultra was able to recommend that it be purchased 'off the shelf'. However, where it did not exist, new electronics were needed. Ultra's report proposed a range of practical options, including refurbishment and replacement, that would ensure the availability of electronics components and circuit board assemblies to sustain AWE's systems for a further 15 years.

With AWE selecting its preferred options from the report, our design and manufacturing specialists undertook to produce and deliver the required outputs.

Benefits

Critical systems sustained to help AWE fulfill its MOD commitment

Ultra removed the risk that AWE couldn't fulfill its responsibility for the safe management of our nuclear deterrent due to irrecoverable failures in safety critical legacy systems. The organisation gained certainty that its existing systems will remain operational for at least 15 years, providing it with more than enough time to develop and deliver the new systems that would replace them.

Future

Complete lifecycle management of nuclear deterrent safety systems

Ultra's help securing the availability of AWE's existing critical systems, as well as further support in designing and building the systems that will succeed them, provides the organisation with the long-term management plan it requires. AWE is now on a more sustainable path to meeting its responsibility for the country's nuclear deterrent over the full term of its managed lifecycle.



Maintaining the safety of nuclear facilities and maximising their lifetime value

About Ultra Energy

Organisations working with nuclear technologies have a responsibility to safeguard people, the environment and infrastructure. We provide solutions that give our customers complete, long-term protection and control of safety critical systems, while helping them increase the net value derived from nuclear investments over their total lifespan.

Part of Curtiss-Wright, Ultra Energy has worked with nuclear customers for over 60 years. We're embedded in strategic national infrastructure and helping organisations develop future nuclear applications. We support continuous operation of nuclear sites with protection and control solutions that monitor and manage factors such as radiation, neutrons, temperature and pressure within safety critical systems.

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