Camdroid: The future of asset inspection

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Asset maintenance is a core part of Sellafield’s work and relies on regular inspections to understand the condition of facilities.

Asset maintenance is a key aspect of what we do at Sellafield.

Essential facility maintenance requires completing a variety of inspections to determine asset condition.

Sellafield is now using bespoke technology that utilises an everyday smartphone camera. This makes inspections faster, easier and safer in hard-to-reach areas.

The challenge:

Sellafield has a wide range of facilities across the site. Many of these have assets that are difficult to access. This includes confined areas, such as tank rooms and duct spaces. As a result, carrying out inspections in these environments can be particularly challenging.

Some of these areas are only accessible through small diameter ports. They need the same level of maintenance and inspection as our other facilities, to ensure long-term confidence in their condition.

Our old inspection technology had several limitations: limited flexibility, a partial field of view, unreliable parts and low-resolution black-and-white imagery.

The solution: Camdroid

It can take high-resolution photos and video, giving us detailed information from areas on site that are hard to reach.

This enables faster, proactive maintenance decisions during operations and into long-term decommissioning. It also gives us more confidence in the condition of our assets.

The technology:

The device is small but powerful. It combines a smartphone camera, built-in LED lights, and a flexible tip in one unit. It can fit through ports that are 19 millimetre in diameter, and currently has pole lengths of 1.5 metres and 2 metres.

The articulated end allows for greater flexibility and manoeuvring once Camdroid has been deployed in the area. All the components sit within one unit. This means the technology is less likely to fail, break, or disconnect during use.

When it connects to the user interface, the operator can control brightness, rotation, and focus. They also see a live feed of the area.

The Benefits:

Camdroid provides a variety of benefits:

More detailed information

Camdroid captures high-resolution, full-colour imagery and video. This gives us a much clearer understanding of our facilities than we had before.

Better decision-making

When we understand our facilities better, our teams can make more informed decisions.

At Sellafield, we have to plan our post-operational clean out and decommissioning work in advance. Having better quality information helps us prioritise the most important tasks.

Additionally, higher-quality data supports more efficient and effective strategy and decision-making

Greater efficiency

Inspections using Camdroid take an average of 10 minutes.

Our older technology was much more time-consuming. This technology lets us complete inspections on site much faster. This also helps our decommissioning teams gather information on asset condition more quickly.

Greater reliability

Camdroid provides a much lower risk of equipment malfunction or damage. This is due to the technology being custom-built, and internally stored.

Additionally, the higher quality footage means post-inspection analysis happens much faster. This means inspections are much more reliable, and programme timelines have improved.

Cost savings

Each inspection using Camdroid saves around £10,000. This is due to the increased reliability and shorter inspection time.

Camdroid was recently tested in the Fuel Handling Plant on the Sellafield site. With another 12 inspections estimated during the facility's lifetime, Camdroid will save around £120,000. As Camdroid is rolled out to more facilities, these savings will increase.

Supports innovation

As the UK's most complex nuclear site, Sellafield's challenges have always driven innovation. The technology developed with Camdroid will benefit the Sellafield site, the Nuclear Decommissioning Authority group, and the wider nuclear industry.

Camdroid also offers the opportunity for commercialisation within other endoscope-using industries.

Safety

As Camdroid becomes a standard inspection tool, we will have a greater variety of options for

information gathering. Therefore, we can use the technology to limit the occasions where operators have to be present in active areas.

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Collaboration:

The creation of Camdroid is thanks to participation in the Game Changers programme.

Game Changers is the UK's main nuclear innovation programme. It tackles some of the hardest problems in nuclear decommissioning.

It is sponsored by Sellafield Ltd and delivered with FIS360 and the United Kingdom National Nuclear Laboratory (UKNNL). The programme brings together industry, researchers, and the supply chain.

Our key delivery partners are:

Design Driven Solutions / Ice9:

These companies provided the 2 initial solutions that we combined to create Camdroid.

FIS360:

As co-deliverers of the Game Changers programme, FIS360 helped in the development and testing of the technology.

UKNNL:

The United Kingdom National Nuclear Laboratory (UKNNL) were part of the review panel for the early feasibility studies.

They also offered their expertise for inspections and demonstrations.

They then supported the development of Camdroid based on their inspection experience. As the end users, their feedback was vital to make sure Camdroid met the needs of the job

Progress so far:

The development of Camdroid has taken place over 3 years.

The programme has undergone several important elements:

2023/2024 – Game Changers challenge

Teams from Sellafield Ltd and UKNNL approached the Game Changers programme.

The challenge posed was: providing a suitable method for inspecting through 19 millimetre ports with colour HD capability.

2023/2024 – Feasibility studies commenced

Four feasibility studies were funded as part of the initial Game Changers challenge. Two of those

studies, Ice9 and Design Driven Solution's, were combined to create the first proof of concept for Camdroid.

2024/2025 – RAICo inactive demonstration

Camdroid was successfully demonstrated at RAICo (Robotics and Artificial Intelligence Collaboration).

This trial gave the development teams the confidence that Camdroid could work in some of the tight and unusual spaces on our site.

The success of this non-active trial allowed us to improve the technology before progressing to an active trial.

2025/2026 – Active demonstration

Inspection teams on the Sellafield site are currently performing active demonstrations of Camdroid.

These demonstrations will capture high-quality images and data from our facilities. This will help operators continue maintenance and show that Camdroid can also work in areas where radiation is present.

Future work:

Further testing in active environments

The next step is to carry out more trials in areas where radiation is present. These trials will help prove that this technology can work safely and reliably in harsher conditions.

Expanding use across more facilities

Once testing is complete, we plan to use the technology in more buildings, including those with tight spaces and challenging access. This will help reduce the need for complex entry work and cut down on time spent preparing for inspections.

Improving the design

Feedback from operators will guide improvements to the camera, lighting, and control systems. This will make the tool easier to use and increase the quality of the data we collect.

Developing new attachments and features

We will explore options for new tools. These additions could widen how the technology is used in future decommissioning work.

Supporting wider innovation

We will continue to work with the Game Changers programme and our partners. We will share learning and test how Camdroid can support other inspection tasks in the nuclear industry.

https://www.gov.uk/government/case-studies/camdroid-the-future-of-asset-inspection