



CHALLENGE:

Lift it, shift it: An alternative approach to asbestos removal

Sellafield Ltd requires a safe and cost-effective means to remove asbestos-containing materials from its site. This challenge is seeking solutions that provide encapsulation of these materials prior to their removal for decontamination and disposal. This would reduce the extent of on-site dismantling required, provide significant cost savings and speed up decommissioning.

Introduction

At Sellafield, there are a substantial number of buildings and pieces of equipment that were constructed before 1999, when asbestos was widely used. These are due to be dismantled and demolished as part of the decommissioning plan.

Asbestos is a generic term for a group of six silicate minerals: chrysotile, amosite, crocidolite, actinolite, tremolite and anthophyllite. These have been widely used in industry owing to their valuable properties that include thermal insulation and fireproofing. Applications for these materials include insulation board, cement and corrugated roofing tiles, to name a few.

The use of asbestos is now banned due to the severe health risks it poses; fibres inhaled into the lungs can lead to severe tissue damage

causing asbestosis, mesothelioma and other lung diseases. There is a high potential risk of operators inhaling asbestos fibres when dismantling asbestos-containing materials (ACM), so the building dismantling process at Sellafield is conducted under strict protocols for handling and transporting ACM to reduce operator risk. This adds to the time and cost required for decommissioning.

Any solution that can provide sufficient containment of ACM to allow transport of larger components for off-site disposal would be hugely beneficial to Sellafield Ltd and other nuclear facilities. This would reduce the need for on-site dismantling and the inherent risk to operators.



Figure 1: Asbestos-containing material

Current Practice

Decommissioning ACM is an exceptionally challenging process due to the stringent control measures that must be implemented to carry out the work safely. If ACMs are identified during decommissioning operations, an exclusion zone must be established before dismantling work can begin. This task is carried out by a team of three to five people wearing full Personal Protective Equipment (PPE). This is a labour-intensive operation that requires careful planning.

ACMs are currently transported by skip on the back of lorries for final disposal. In order to fit the ACM into a skip, substantial on-site dismantling is required. The existing dismantling methods can be very intrusive, lengthy and potentially lead to excessive exposures which need to be minimised for operator safety during such work. The use of specialist asbestos contractors for these tasks further increases the associated costs.

A paint coating has previously been used to contain ACM; however, as this coating poses a risk of sensitisation, which can cause allergic reactions upon repeated exposure, additional control measures are required during its use. It is critical that any proposed new solution must not cause additional hazards.

Challenge Aims

The solution should be able to encapsulate larger sections of ACMs that do not fit in a UN approved bulk bag, such as whole cement sheets and >1 m sections of pipework, so that they can be transported as a whole and without further containment.

It is critical that the solution must:

- Be compatible with the demolition methodology currently employed at Sellafield. This will require approval from licensed asbestos removal companies
- Adhere to the following regulations that apply to transport and demolition contractors:
 - ADR refers to the “European Agreement concerning the International Carriage of Dangerous Goods by Road”, commonly known as ADR. It is a multilateral treaty that governs the transport of hazardous materials (dangerous goods) by road in Europe.

A copy of the regulations can be found at https://unece.org/DAM/trans/danger/publi/adr/adr2017/ADR2017E_web.pdf

- CAR2012 the Control of Asbestos Regulations 2012 is an Approved Code of Practice that provides guidance for employers about work which disturbs, or is likely to disturb, asbestos, asbestos sampling and laboratory analysis. The Regulations set out legal duties and give minimum standards for protecting employees from risks associated with exposure to asbestos. A copy of the regulations can be found at <https://www.hse.gov.uk/pubns/priced/l143.pdf>
- CDM the Construction (Design and Management) Regulations govern the way construction projects of all sizes and types are planned in the UK, with the aim of improving the overall health, safety and welfare of those working in construction. A copy of the regulations can be found at <https://www.legislation.gov.uk/ukxi/2015/51/contents/made>
- Provide adequate encapsulation that allows an SP168 exemption to be adopted. This exemption states that “Asbestos which is immersed or fixed in a natural or artificial binder (such as cement, plastics, asphalt, resins or mineral ore) in such a way that no escape of hazardous quantities of respirable asbestos fibres can occur during carriage is not subject to the requirements of ADR”.

A solution which can be implemented as soon as is practicable is preferred.



Figure 2: Large section of pipe with asbestos-containing insulation residues

Benefits to Sellafield

A successful solution to this challenge will bring the following benefits:

- Reduced decommissioning costs
- Accelerated decommissioning
- Reduced HSE risks to operators by limiting the amount of on-site dismantling, thereby reducing the potential for inhalation of asbestos fibres
- Reduction in the need for PPE and other disposable waste materials

These benefits could be applied across the wider nuclear industry and any sector that requires the decommissioning of ACM.

Constraints

Any proposed solutions to this challenge need to:

- Be deliverable as soon as is practicable
- Adhere to transport and contractors' regulations (ADR, CAR 2012 & CDM)
- Be compatible with Sellafield demolition methodology and waste streams
- Be easily decontaminated after use and be able to be safely stored or be able to be disposed of after use

Functional Requirements

Any proposed solutions should have the following features:

Essential

- Be capable of safely encapsulating and containing ACM
- Adhere to asbestos transport and contractors' regulations (ADR, CAR 2012 and CDM)
- Allow for the transport of large sections of ACM without the need for additional containment
- Be readily deployable on site in a variety of environments. Work at height, in areas without lighting and congestion are to be expected in some areas
- Be able to be used in a variety of environmental conditions; will be required both indoors and outdoors throughout the

year, therefore solutions should be capable of working in all UK weather conditions

- Application equipment must be able to be easily decontaminated or be sacrificed with the ACM
- Not create an additional airborne contaminated waste risk
- Satisfy site or local regulations where required

Desirable

- Can be used by maintenance teams rather than specialists
- Application method can be transported to site easily
- Capable of remote application



Figure 3: Large section of pipe with asbestos-containing insulation residues

Find Out More

Game Changers are hosting a workshop for this challenge where delegates will have the opportunity to meet challenge owners. Details are available on the Game Changers website www.gamechangers.technology.

If you have new ideas or innovations which can be applied to address this challenge, we invite you to join us. If you'd like more information about the funding available through the Game Changers programme, please visit [Our Funding Process \(gamechangers.technology\)](http://OurFundingProcess.gamechangers.technology).

The deadline for applications for this challenge is 3pm on Thursday 14th November 2024.



Delivered by



Email: apply@gamechangers.technology

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