



**CROFT**



// **SAFE AND INNOVATIVE SOLUTIONS** FOR THE TRANSPORT,  
STORAGE AND DISPOSAL OF **RADIOACTIVE MATERIALS**



# // WELCOME

At Croft we develop solutions for the safe transportation of radioactive materials, and for the long-term storage and final disposal of radioactive wastes. A responsibility we take seriously by ensuring we provide safe, reliable and economic solutions.

We provide a broad range of specialist services including design, testing, licensing, supply and maintenance of packaging. We understand that no two projects are the same; so our services include the provision of packaging from a comprehensive range of standard products

through to bespoke solutions to support specific customer requirements. Everything we produce is in line with the IAEA Regulations for Safe Transport of Radioactive Material, and our processes and products are approved by regulatory bodies.



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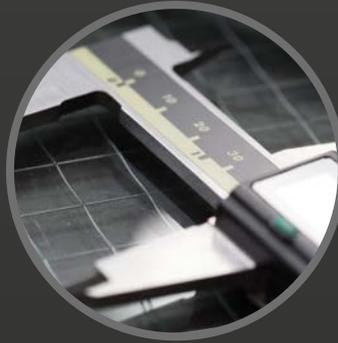
## // About Us

We specialise in all aspects of the transport, storage and disposal of radioactive materials. Since our founding in 1980, we have established a solid foundation of knowledge, expertise and experience. This foundation supports our focus and ability to be able to provide innovative, robust solutions that meet our customers' needs and protect people and the environment.

We have developed a range of over 50 standard products that continue to be supplied worldwide, operating from our offices in the UK and USA.



Our customers range from governmental organisations to private companies in the nuclear industry. In addition, research reactors, hospitals and medical equipment suppliers use our products to transport radioactive materials.



Our Quality Management System, covering all aspects of the design, manufacture, testing and licensing of packaging for radioactive materials, is certified to ISO 9001 and is audited by the British Standards Institution and the UK Competent Authority (Radioactive Materials Transport Team at the Office for Nuclear Regulation).

The Quality Management System is also certified to 10 CFR Part 71 by the United States Nuclear Regulatory Commission.



Without doubt, our biggest asset is our people. As professional engineers, and scientists our capabilities, skills and extensive industry experience enable us to deliver innovative solutions time after time. We also take a lead role in setting UK industry standards, and input to the review and update of regulations.

Globally, as industry leaders, our approach and ethos has made us influential in the way radioactive materials and wastes are managed today. This recognition benefits all our customers and provides confidence in our services.

# //Sectors

We supply packaging to all sectors of the nuclear industry that require the transport, storage and disposal of radioactive material.



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**Bulk movement** of fissile and non-fissile radioisotopes associated with nuclear plant operations



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**Radiotherapy sources** used in medical applications



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**Nuclear medicine** used to provide diagnostic information



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**Transport** of irradiated fuel samples



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**Samples used** in academic, medical and industrial research and analysis



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**Radioisotopes in bulk form** transported from place of isotope production (following irradiation) for subdivision and formulation elsewhere into medical and research products



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**Bulk movement and storage** of Intermediate and Low Level radioactive waste



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**Radiation sources** used in industrial applications such as radiography, gauging applications and analytical equipment



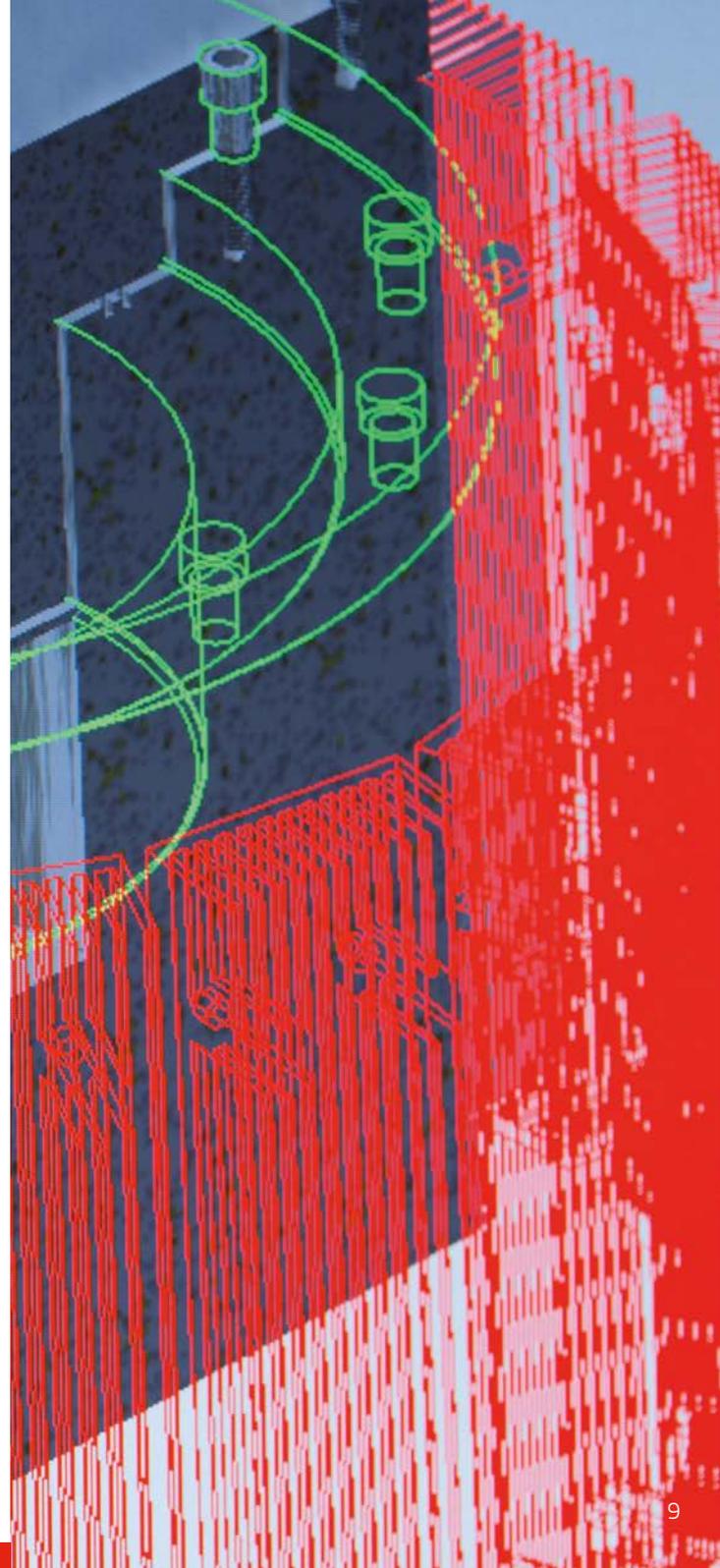
# //Services

We have over 35 years of in-depth experience in the design, development and testing of packages for the transport of radioactive materials.

Over this period of time the company has developed an extensive range of services in support of its key activity, which is the supply of packaging for the transport, storage and disposal of radioactive materials.

These services fall into the following broad areas:

- // Products
- // Systems Engineering
- // Design & Development
- // Licensing
- // Nuclear Technical Services
- // Manufacturing & Procurement
- // Maintenance
- // Transport & Shipping
- // Hiring of Packaging



# //Products

We offer numerous types of products to meet specific transportation, storage and disposal needs. Our solutions are suitable for a wide range of materials.



Industrial Package (IP)



Type A



Type B



Fissile



Non - Fissile

In addition to offering standard products, we design, test, obtain Certificates of Approval for, and supply packaging to meet particular customer requirements.





# // System Engineering

As a company, we are able to offer a complete solution to many situations where transport is of paramount importance in the execution of an overall process. This process may be, for example, isotope production, waste management, decommissioning or a research-based activity.

By understanding the complete process, we can often provide a more cost effective solution than simply addressing the need to supply packaging for transport, storage and disposal. This approach has been employed successfully on a number of projects resulting in significant savings.

# // Design & Development

In the development of package design, consideration is given to:

Safety Requirements

Radiation Shielding

Nuclear Criticality

Internal Heating

External Heat Sources

Containment and Sealing

Heat Transfer

Vibration Analysis

Engineering Substantiation

Disposability

Storage Requirements

Lifting and Handling



Development of special packaging to suit customers' requirements



Modifications to standard package designs to meet specific requirements

## TYPICAL DEVELOPMENT WORK UNDERTAKEN INCLUDES



Continual development of packaging components and materials



Measurement systems for leak testing

# //Licensing

We offer a complete licensing service including:

**Obtaining Competent Authority** Approval for package designs and shipment

**Assessment** of safety documentation and the issue of certificates where appropriate

**Preparation** of technical documents

**Management** of approval applications

**Obtaining** validations and Competent Authority Approvals in other countries

The Quality Management System is certified to ISO 9001 and 10 CFR Part 71

# //Nuclear Technical Services

We offer an extensive range of nuclear technical services, including the following:

Shielding calculations

Peer review

Engineering substantiation

**Mechanical and thermal stress** analysis for packages when subject to normal and accident conditions of transport, and for extended tests and customer specific requirements

**Support to licensed site** operations (e.g. safety case preparation / review covering probabilistic risk assessment, safety management, and in particular movement of radioactive materials within the licensed site)



# // Manufacturing & Procurement

We offer numerous types of products to meet specific transportation needs.

**Manufacturing of a complete range** of packaging from small industrial drums to large irradiated fuel flasks

**Manufacturing of standard** package designs that meet the IAEA Transport Regulations

**Manufacture of specialised** packages to meet all relevant regulations and standards

**Rigorous quality assurance** is applied to all stages of manufacture and procurement

# // Maintenance

We offer a complete maintenance service including:

**Annual inspection and maintenance** of IP, Type A and Type B packages covering:

Leak testing of containment vessel and seals

Replacement/ refurbishment of defective parts

**Repair/refurbishment** of packages supplied by the company that have become damaged in use

**Calibration and servicing** of CALT leak testing equipment

**Inspection and maintenance** of Croft IP-2 reusable ISO freight containers

# //Transport & Shipping

We offer a complete service to support shipment of radioactive materials within the UK and internationally, including the following:

## Provision of suitable packaging by:

- ✓ Hiring of existing packages
- ✓ Use of existing standard packaging
- ✓ Supply of customised packagings

Identification of shipping agent

Packaging identification, certification and documentation

Assistance with transport and shipping arrangements

Quality Management System certified to ISO 9001 and 10 CFR Part 71

## //Hiring of Packaging

We hold a stock of more commonly used transport packages which can be made available for immediate hire (depending on stock level).

# //Case Studies

## Containerisation of Low Level Waste for Transport, Storage and Disposal at LLWR

Croft was prime mover in the establishment of IP-2 containers for use for Low Level Waste. The design specification and features established over 25 years ago by Croft represented a significant cost benefit over alternative designs, and the same design standards established by Croft are still in use today.

## Self Shielded Ductile Cast Iron Boxes (Safstores)

Croft recognised the benefits that Self-Shielded Boxes provided in the packaging of problematic legacy radioactive wastes. These packages offer opportunities for accelerated hazard reduction; lower upfront capital, transport and operational costs, and provide flexibility in managing such wastes. Croft Safstores have been designed for the UK regulatory environment.

## Transportation of bulk and research grade radioisotopes

Two designs of Type B transport packages were developed for the University of Missouri for shipping radioisotopes and radiochemicals used principally in medical applications. These are the first general purpose Type B packages to be approved by the NRC for many years and they replace the DOT Spec 6M package (authorization now expired).

## Transportation of bulk fissile materials

Extended drop testing, simulating a package being released from an aircraft in a mid-air incident at high altitude, was carried out on Croft Type B package Design No 2816. The tests demonstrated complete containment of the contents when dropped from a height of 1500 feet onto a solid concrete target.

## Design and licensing of an IP-2 container for SGHWR and Dragon decommissioning

Croft designed, manufactured, tested and licensed an IP-2 container for decommissioning waste from the Dragon and SGHWR reactors. The design of the box compatible with RWM specifications featured a stainless steel containment system with concrete lining for shielding, with a leak testable lid sealing system capable of being replaced whilst protecting the operator from the contents.

## IP-2 package containing plutonium contaminated slag pots

Croft carried out the licensing of an IP-2 package for transporting four plutonium contaminated slag pots weighing up to 60 tonnes each. The nature of the contamination meant they had to be packaged and transported intact. Challenges were faced when licensing preventing physical drop testing of the package which was proven with analytical analysis.

**“ We will be using the Safkeg-LS to transport bulk amounts of a variety of radioactive materials used to formulate radiopharmaceuticals for cancer therapies. We will also use the package for shipments of a wide range of research radioisotopes across the globe allowing us to expand occasional shipments of limited quantities of fissile materials. - Missouri University (MURR). ”**

**At Croft we develop solutions for the safe transportation of radioactive materials, and for the long-term storage and final disposal of radioactive wastes.**

### **//Our Quality Assurance**

Our work is carried out under the control of our own Quality Management System which is certified to ISO 9001 and covers all aspects of design, manufacture, testing and licensing of packaging and support services.

In addition to internal audits, our systems are regularly audited by the British Standards Institution and the UK Competent Authority.

Our Quality Management System is also certified to 10 CFR Part 71 by the United States Nuclear Regulatory Commission.

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