

Your Partner for Nuclear Engineering Solutions





Great Experience and Excellent Prospects



NUKEM Technologies GmbH is active worldwide in the areas of radioactive waste management, handling of spent fuel, decommissioning of nuclear facilities, nuclear engineering and consultancy, with 50 years of experience since our predecessor company NUKEM Nuklearchemie- und Metallurgie GmbH was founded. Originally, the company's activities were focused on uranium processing and the production of fuel elements for various reactor types, but NUKEM also gained international recognition for its extensive work in research and development. In the 1970's, NUKEM expanded the scope of its activities to encompass nuclear engineering and design work for various nuclear customers. Today, we are proud to show our extensive international track-record, together with being embedded in a strong and strategically oriented group like Rosatom.

Having recently optimized our internal processes, we now have two companies operating on the market under our well-known logo as umbrella brand and pursuing the following business activities:

NUKEM Technologies GmbH focuses on the turn-key projects and is also responsible for both companies' international sales outside the German-speaking countries.

Its wholly-owned subsidiary NUKEM Technologies Engineering Services GmbH holds responsibility for all projects related to design and delivery of technological solutions, as well as being a sales partner in German-speaking countries.

Consistent customer satisfaction and quality management are essential cornerstones of NUKEM Technologies' corporate philosophy. We place a premium on our individual service, timely project completion, clear and comprehensive documentation, and provision to our customers of superior-quality products.

A visible sign of our commitment is NUKEM Technologies' quality assurance system based on ISO 9001/2000, in addition German energy suppliers have affirmed our compliance with quality standards such as those set forth in KTA 1401. NUKEM Technologies has also obtained certification in accordance with DIN EN ISO 14001:2009 and OHSAS 14001 standards. NUKEM Technologies also holds a number of international certificates issued by authorities of different countries for our work in Russia, Lithuania and France.



Radioactive Waste Management

Radioactive waste accumulates both in the course of normal nuclear facility operations and during decommissioning.

Appropriate conditioning reduces waste volumes thereby saving storage space and helping to limit the costs of interim and long-term storage, making waste less hazardous and ensuring a safe final disposal.

Our customized solutions for all waste problems, and for all reactor types rank amongst the world's leading technologies for the treatment of radioactive waste.

Concept development

In the course of normal operations and decommissioning processes at nuclear facilities, various types of waste with differing radioactivity levels must be handled, conditioned and disposed of.

Depending on the types and quantities of waste NUKEM Technologies has developed suitable processes and facilities e.g.:

- Waste treatment concepts
- Waste treatment systems and complete waste treatment centers
- Final disposal facilities







Technologies and systems

NUKEM has provided appropriate conditioning for all types of radioactive waste and residual materials, for our world-wide clients; processes such as:

- Evaporation
- Concentration
- Microwave drying
- Nuclide separation
- Ultrafiltration /Reverse osmosis
- Biological water treatment
- Cementation
- Vitrification
- High-force compaction
- Incineration
- Pyrolysis / Pyrohydrolysis
- Sorting / Segregation

Monitoring systems for waste treatment tasks

Our portfolio includes:

- Drum radwaste meter
- RAYMOS (γ -ray monitor)
- Release measurement system



Reference Project

Industrial Complex for Radwaste Management at Chernobyl NPP, Ukraine

Following the accident in 1986, Chernobyl NPP shut down the last of its four operating RBMK-1000 reactor units in 2000 by agreement with the G7. As part of the preparations for the decommissioning of the Chernobyl NPP, NUKEM Technologies designed and built the Industrial Complex for Solid Radwaste Management (ICSRM), financed by the European Union Tacis Program with a contribution from the Ukraine. The ICSRM consists of four parts:

- Solid waste retrieval facility,
- Solid waste processing plant,
- Repository for the disposal of short-lived waste, and
- a temporary storage facility for long-lived waste.

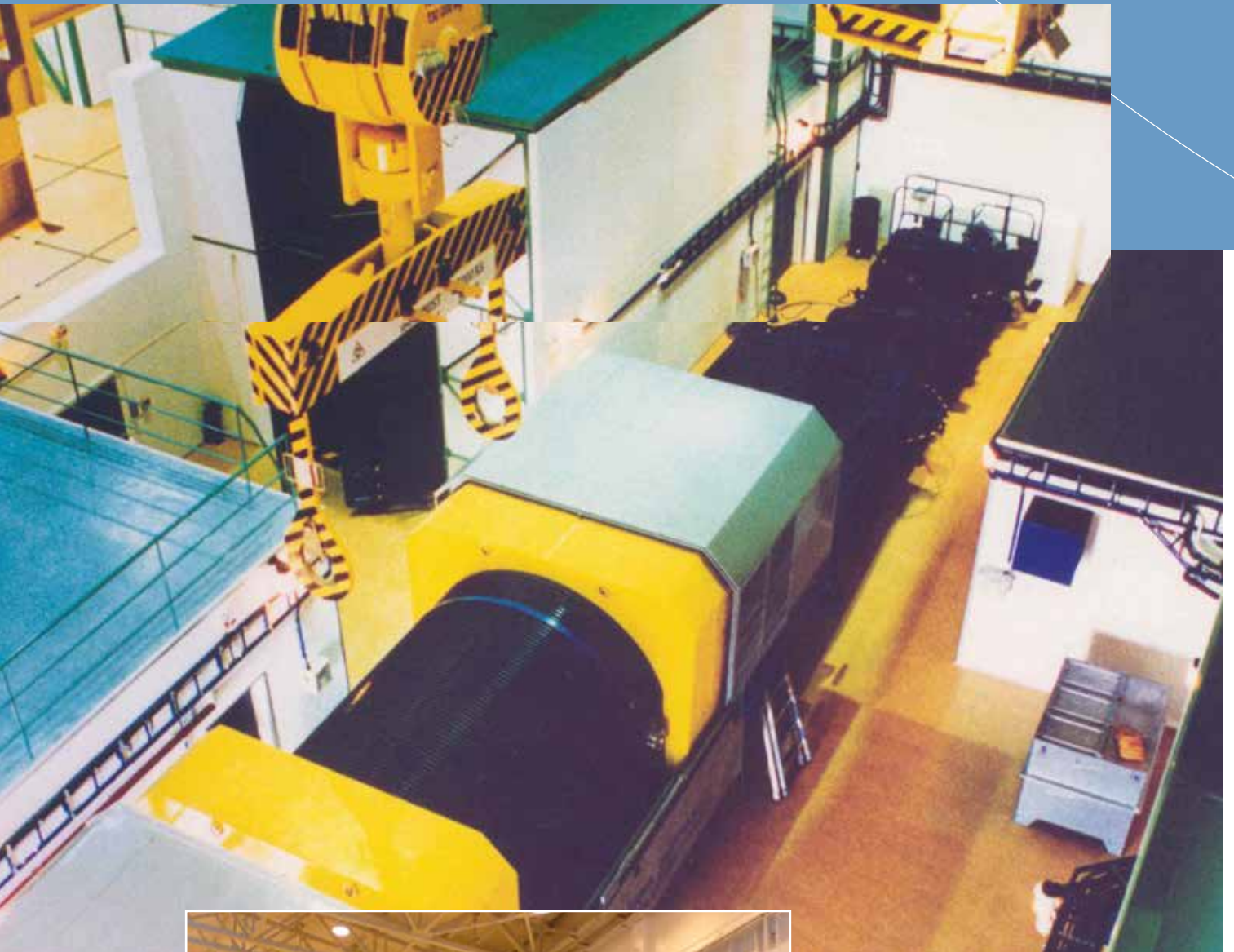
The waste processing facility has an annual throughput of over 3500 m³ waste. The following processes are executed:

- Sorting and segregation
- Radiological characterization into different waste categories
- High-Force Compaction
- Incineration
- Grouting

As General Contractor NUKEM Technologies implemented the ICSRM on a turn-key basis with overall responsibility for the facility, including such tasks as:

- Overall Project Management and on-site Supervision
- Basic, Detailed and Working Engineering
- Quality Assurance
- Safety Analysis Reports and other licensing documents, as well as licensing support
- Procurement, Civil Construction, Installation and Commissioning of all buildings, systems and equipment

With the hand-over of the facility in spring 2009, NUKEM Technologies is the first Western Contractor to successfully finish a waste treatment project at the Chernobyl site.



Spent Fuel Management

The management of spent fuel is a challenging task during reactor normal operations as well as in times of preparation of the decommissioning phase of the plant.

NUKEM Technologies has successfully executed a number of spent fuel management projects for clients around the world. Our portfolio comprises:

- Comprehensive spectrum from concept study to delivery of Turn-key projects
- Differing kind of storage technologies:
 - Casks (in collaboration with our partners)
 - Vaults
 - Underground
- Handling facilities
- Technologies for characterization of spent fuel elements
- Fuel assembly monitoring systems
- Classification systems for defective fuel
- Systems for handling and preparation for storage of defective and heavily damaged spent fuel elements

Reference Project

Interim storage facility for spent fuel at Kozloduy NPP, Bulgaria

Together with its longtime partner GNS Gesellschaft für Nuklear-Service mbH, NUKEM Technologies built an interim storage facility for spent nuclear fuel at the Bulgarian Kozloduy NPP. The project was funded by the Kozloduy Decommissioning Support Fund, which is managed by the European Bank for Reconstruction and Development. The new storage facilities are designed to accommodate approximately 2,800 VVER-440 fuel assemblies.

The contract covered the design of equipment, preparation of licensing documentation, manufacturing and delivery of facilities as well as the construction, installation and commissioning of the interim storage facility. NUKEM Technologies was responsible for the construction of the storage building, the delivery of handling and transportation equipment inside the storage building as well as the radiological monitoring systems. Up to now, GNS provided 34 CONSTOR® casks and handling equipment within the area of the adjacent wet storage facility.

In May 2011, the interim storage facility at Kozloduy NPP was officially opened by the Bulgarian Prime Minister and the Energy Minister of the country.



Decommissioning

Every nuclear facility is destined to be decommissioned at some point in time. For these complex tasks we develop comprehensive concepts for decommissioning solutions, relying on NUKEM Technologies' broad base of technical knowledge and experience in dealing with both technical and regulatory issues. Our services cover the entire decommissioning process i.e. from concept development to realization, from partial solutions to complete project and contract management.

Concept development

Concept development and clarification of regulatory matters go hand in hand during nuclear facility decommissioning; a time-consuming and cost-intensive process that can be facilitated with our support in:

- Development of appropriate decommissioning strategies
- Studies and technical restoration concepts
- Planning for regulatory approval
- Support for or management of licensing processes

Facility upgrading

As nuclear facility decommissioning operations progress, parts of facility infrastructure must be removed and replaced with new components. We design and deliver compact component systems adapted to meet the latest requirements e.g.:

- Electrical and conductor systems, security systems
- Ventilation and air-conditioning systems
- Waste-water and exhaust monitoring equipment
- Waste-water treatment plants



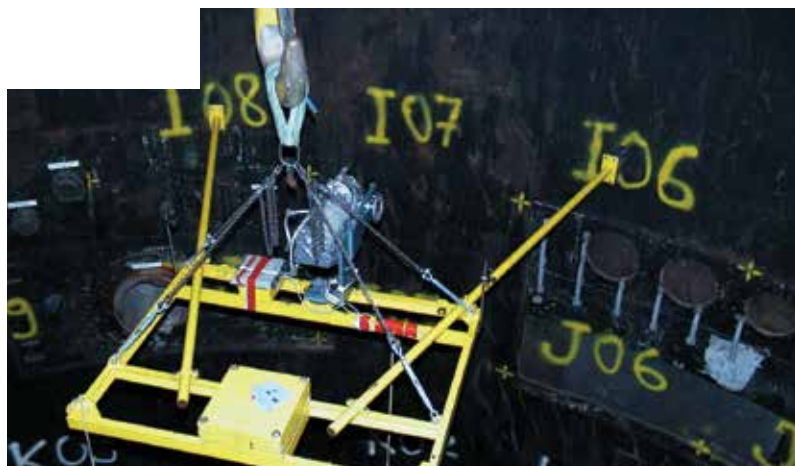


Dismantling technologies

The dismantling of components for nuclear facility decommissioning poses a special challenge. Component radioactivity, complicated geometries and material dimensions place extraordinary demands on dismantling processes.

With due consideration of all aspects of health physics, we accept the challenge to work efficiently and economically in every respect and offer tried and tested technologies for a wide range of applications:

- Underwater cutting modules
- Underwater shears
- Water-jet cutting systems
- Plasma cutting systems
- Dry cutting processes (sawing, shearing, etc.) as well as suitable remote manipulator systems





Decontamination

Decontamination measures help prevent unnecessary exposure to the effects of radiation, minimize the quantity of radioactive waste and residual materials and make it possible to recycle or reuse plant components.

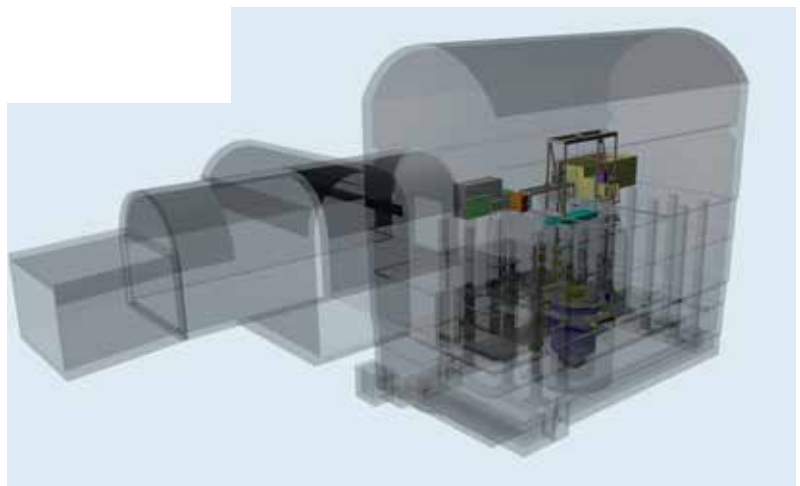
NUKEM Technologies can offer our clients:

- Procurement and supply of decontamination equipment
- A broad range of mechanical and chemical decontamination processes
- Full decontamination and dismantling services

Site characterization and remediation

During the decommissioning process, it is necessary to measure and assess contamination levels of plant systems, buildings and outdoor areas. We can supply and use the following measuring systems:

- In-situ free-release testing of buildings and outdoor areas
- γ -spectrometry of individual containers, buildings and outdoors areas
- Supporting the release of facilities from regulatory control





Reference Project

Dismantling of Kahl Nuclear Power Plant, Germany

The 16 MWe plant Kahl Nuclear Power Test Plant (VAK) was the first German BWR, built and operated with the purpose of obtaining practical experience with boiling water reactors and to test various fuel element designs. VAK went critical in 1960 and remained in operation for 25 years, with dismantling work beginning in 1988.

All licensing as well as the dismantling of major nuclear systems and components was initially performed by the operator's staff. This work included dismantling of the primary systems, segmentation of the reactor pressure vessel, and also of several sub-systems, e.g. the steam converter and the fuel pool.

In 2001, NUKEM Technologies was contracted to complete the decommissioning. Our scope of work covered the dismantling of the biological shield, decontamination of all structures, including the reactor building, outdoor site remediation, the conditioning, packing, and shipping of all radioactive waste and other residual materials. Due to the stringent dismantling procedures, the amount of radioactive waste was confined to an absolute minimum, with a significant amount of material being 'free-released' in order to be deposited in an industrial landfill.

Engineering and Consulting

Based on its long-term experience NUKEM Technologies perfectly knows the requirements of operators of nuclear power plants or other nuclear facilities and offers a broad range of engineering and consultancy services, such as:

- Process & Mechanical Design Solutions
- Waste Flow & Facility Optimization
- Radiation & Fire Protection
- Safety Assessment and Licensing support
- Instrumentation & Automated systems development
- Technical Documentation
- Project Management Services

In addition, NUKEM Technologies emphasizes two engineering technologies: Firstly, we offer various monitoring systems for different applications, e.g.:

- FAMOS (fuel element monitoring system)
- FEMOS (fissile material monitoring system)
- CAMOS (can monitoring system)

Secondly, NUKEM Technologies is the only world-wide supplier, based on our in-house design and experience for fuel plants with High Temperature Reactors, one of the key technologies for Generation IV reactor types.

Reference Project

Design services for URENCO

As part of the renovation of particular areas of the wastewater treatment facilities in the uranium enrichment plant Gronau, NUKEM Technologies provides engineering services ranging from approval planning to procurement of various process systems.

In the approval planning phase, all documents required for obtaining governmental approval for the renovation of particular areas of the wastewater treatment facilities are prepared.

The execution phase ensures that the documents provide sufficient detail for issuing a call for the relevant tenders based on these documents.

The decommissioning plan covers all logistical and material planning for disassembly (dismantling concept), equipment removal from the current building, fragmentation, release control and disposal of old components. Furthermore, this plan also includes placement and installation concepts for the new components. Ultimately, the service specifications are drawn up based on the previously written documents and the inquiry documents are compiled. Moreover, NUKEM Technologies renders support to the client URENCO regarding the subsequent contract award procedure.



Innovation  Solutions  Excellence

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