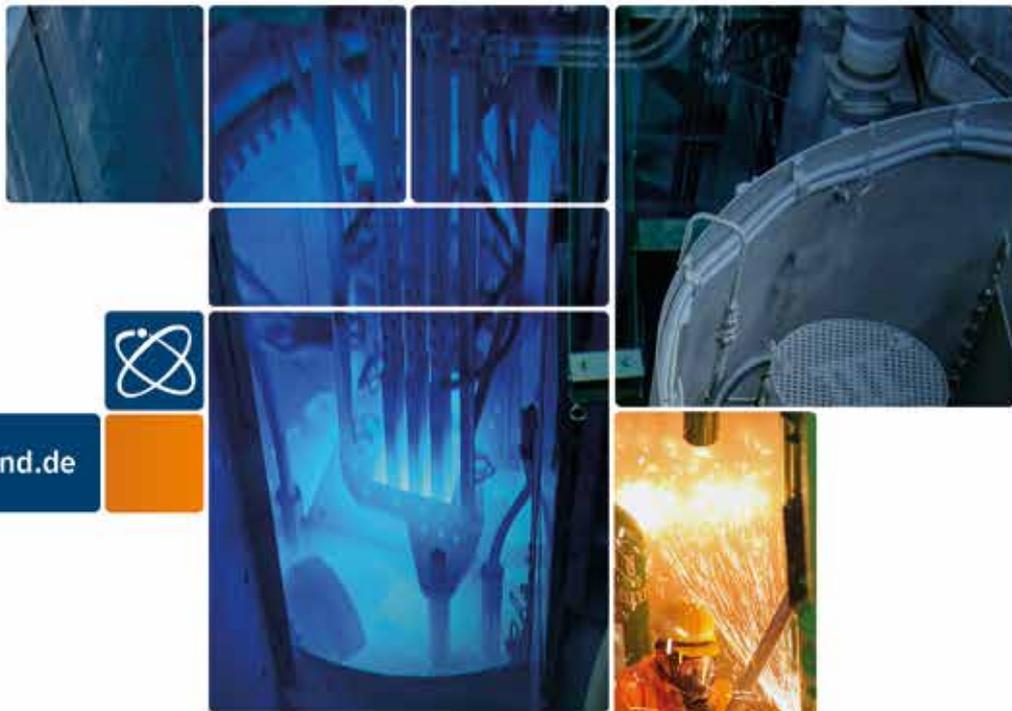


2022

Edition

IC&ND

BOOK of ABSTRACTS



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# ic&ND

International Conference on  
Nuclear Decommissioning

11<sup>th</sup>  
Edition



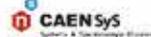
# BOOK *of* ABSTRACTS

November 2022

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# iC&ND

International Conference on  
Nuclear Decommissioning

**27. - 30. NOVEMBER 2023**

VERANSTALTER 

12<sup>TH</sup>  
EDITION



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## IMPRINT

  
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ABOUT ICOND

PROGRAM

SPEAKER ABSTRACTS

SPEAKER ABSTRACTS



## HINTERGRUND

Die Stilllegung kerntechnischer Anlagen stellen alle Beteiligten vor hohe planerische und genehmigungstechnische Anforderungen. In der laufenden Dekade werden sowohl in Europa als auch weltweit zahlreiche Kernkraftwerke aufgrund ihrer Laufzeit und politischen Entscheidungen außer Betrieb genommen. Dieser Umstand erfordert optimierte bzw. zwischen allen Beteiligten abgestimmte Rückbaustrategien. Die Fachveranstaltung fokussiert den rechtlichen Rahmen in Deutschland, vergleicht Stilllegungsstrategien und nimmt die verschiedenen Teilaufgaben des Rückbaus in den Blick. Neben den unterschiedlichen Genehmigungs- und Finanzierungstrategien spielt das Personalmanagement beim Übergang vom Kernkraftwerksbetrieb zum Rückbauprojekt eine wichtige Rolle. Ebenfalls wird die Zwischenlagerung und Entsorgung radioaktiver Abfälle thematisiert, die für den Rückbau eine wesentliche Randbedingung darstellt.

## ZIELGRUPPE

Die Konferenz richtet sich an Betreiber von kerntechnischen Anlagen, die die Verantwortung für die Projektsteuerung und die Reststoffentsorgung von Rückbauprojekten haben. Weitere Zielgruppen sind Unternehmen, die mit der Planung und Durchführung von Rückbauprojekten beauftragt sind. Es werden Behörden und Sachverständigenorganisationen adressiert, die in Genehmigungs- sowie Aufsichtsverfahren und die Begutachtungen von Rückbauprojekten eingebunden sind. Ausgehend von Fachvorträgen diskutieren die Teilnehmer/-innen die Herausforderungen des Rückbaus sowie Planungsvarianten für individuelle Rückbaufgaben. Alle Beiträge werden simultan übersetzt (Deutsch/Englisch).

## BACKGROUND

The decommissioning of nuclear power plants, particularly power reactors, present high demands regarding planning and authorization to all parties involved. In the ongoing decade several nuclear power plants will be shut down due to their operating life and political decisions, not only in Europe, but also worldwide. As a result, optimized decommissioning strategies will need to be well-coordinated among all participants.

The ICOND focuses on the relevant legal parameters in Germany and compares decommissioning strategies worldwide. This includes roles of authorization, financial planning, and change management in the transition from nuclear power plant to decommissioned project. Furthermore the different options for interim storage and disposal of radioactive waste are discussed.

## AUDIENCE

ICOND addresses operators of nuclear plants and companies who are working on the planning, implementation and supervision of decommissioning projects; authorities and technical experts whose focus includes the approval and supervisions procedure of decommissioning projects; and research institutions which are responsible for the dismantling of research reactors and the storage and/or disposal of radioactive hazardous waste. ICOND will enable participants to proficiently discuss the challenges of the decommissioning of nuclear plants in a practical way, and to define optimal planning variants for decommissioning implementation. Simultaneous translation (German/English) will be available.



## RÜCKBLICK

## iCND 2021

## REVIEW

Jubiläum für die ICOND! Die nunmehr 10. ICOND konnte im Oktober 2021 wieder als Präsenzveranstaltung im Eurogress Aachen stattfinden. Während 37 RednerInnen über die Marktentwicklungen und Ihre Erfahrungen bei internationalen Rückbauprojekten referierten, präsentierten 45 Unternehmen in der vollends ausgebuchten Ausstellung ihre Produkte und Dienstleistungen. Pandemiebedingt fanden sich weniger internationale TeilnehmerInnen ein, jedoch nutzten die Anwesenden rege die Möglichkeiten für neue Kontaktschließungen beim bewährten Business Speed Networking, dem Get Together oder der Aussteller-Road Show. In der Aussteller-Road Show wurden die TeilnehmerInnen durch die Ausstellung geführt und die Ansprechpartner der Unternehmen präsentierten Ihre rückbauspezifischen Services und Produkte.

Der Pre-Conference Workshop fokussierte die Themen innovative Produkte und Prozessdigitalisierung. Es wurden u. a. innovative Produkte zum Laser Cutting, Laser Decontamination und im Bereich Robotics sowie zur zerstörungsfreien Charakterisierung vorgestellt.

Die Konferenz eröffnete David Peattie, CEO der Nuclear Decommissioning Authority UK, mit seinem Vortrag zu den aktuellen Marktentwicklungen in Großbritannien. Wie Unternehmen im wachsenden weltweiten Rückmarkt erfolgreich navigieren wurde von Dr. Jochen Latz von McKinsey & Company, Inc. vorgestellt. Die Vorträge von Frau Dr. Gabriele Greifeneder von PreussenElektra und Herrn Prof. Hartmut Gaßner vom Anwaltsbüro Gassner, Groth, Siederer & Coll. thematisierten die Deponierung von freigemessenen Abfällen aus dem deutschen KKW-Rückbau und rundeten die zahlreichen internationalen Beiträge ab.

Anniversary for the ICOND! The 10th ICOND could again take place in October 2021 as a presence event in the Eurogress Aachen. While 37 speakers lectured on market developments and their experiences with international dismantling projects, 45 companies presented their products and services in the fully booked exhibition. Due to the pandemic, there were fewer international participants, but the attendees made good use of the opportunities for new contacts at the proven Business Speed Networking, the Get Together or the Exhibitor Road Show. During the Exhibitor Road Show, participants were guided through the exhibition and the contact persons of the companies presented their decommissioning specific services and products.

The pre-conference workshop focused on the topics of innovative products and process digitalization. Among others, innovative products for laser cutting, laser decontamination, robotics and non-destructive characterization were presented.

The conference was opened by David Peattie, CEO of the Nuclear Decommissioning Authority UK, who spoke about current market developments in the UK. How companies are successfully navigating the growing global return market was presented by Dr Jochen Latz of McKinsey & Company, Inc. The presentations by Dr Gabriele Greifeneder of PreussenElektra and Prof. Hartmut Gaßner of the law firm Gassner, Groth, Siederer & Coll. addressed the issue of landfilling cleared radioactive residues from German NPP decommissioning and rounded off the numerous international contributions.

## AUSSTELLER

## iCND 2022

## EXHIBITORS







## SPEAKER REFERENCE WALL

BALCKE  
DÜRRCAEN SyS  
Systems & Spectroscopy Division

Capgemini

cleanLASER  
Clean-Lasersysteme GmbHcyclife  
EDF GROUP

ENGIE

enen

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EWN  
Entsorgungswerk für  
Nuklearanlagen

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Ministerium für Energiewende,  
Klimaschutz, Umwelt und Natur

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RADIATION PROTECTION | ANALYTICS | DISPOSALwii  
GNS-GruppeMONDAY - NOV. 14<sup>TH</sup>, 2022

## PRE-CONFERENCE WORKSHOP

(Presentations are held in English)

11:30 REGISTRATION

12:00 QUICK LUNCH

13:00 Welcome

Dr. Andreas Havenith – AiNT GmbH – DEU

## DECOMMISSIONING SERVICES &amp; PRODUCTS

13:15 Optimization Through Mobile Equipment for D&amp;D

Dr. Hauke Grages – Framatome GmbH – DEU

13:40 Site Characterization with ViridiScope, a Laser Tool for Remote Sampling

Andy Lee – Viridian Consultants – GBR

14:05 Corrosion and Wear-Resistant Coatings for Nuclear Applications  
by using High-Pressure Cold Spray Technology

Markus Brotsack – Impact Innovations GmbH – DEU

14:30 Radiological Characterization of Waste:

from free Release Measurements up to the Measurement of High Active Waste

Dr. Marina Sokcic-Kostic –

NUKEM Technologies Engineering Services GmbH – DEU

14:55 COFFEE BREAK

15:30 Measurement Challenges in Decommissioning

Dr. Matthias Fritzsche –

Mirion Technologies (CANBERRA) GmbH – DEU

15:55 NuVISION - Portable Spectrometric Gamma Imaging System

Lukas Funke – NUVIA Instruments GmbH – DEU

16:20 An innovative Decision-Making Tool for Nuclear Waste Flow  
Optimization during Decommissioning

Oriane Farcy – Capgemini Engineering – FRA

16:45 Automated Internal Transportation of Decommissioning Material through  
Narrow Spaces, as well as the Outward Transfer of Releasable Material  
into the Monitoring Area

Jan Lederer – IEM FörderTechnik GmbH – DEU

## TUESDAY - NOV. 15<sup>TH</sup>, 2022

### 10:00 REGISTRATION

### 11:30 QUICK LUNCH

### 12:30 Welcome

Dr. Andreas Havenith – AiNT GmbH – DEU

## STRATEGIES & MARKET DEVELOPMENT STRATEGIEN & MARKTENTWICKLUNGEN

### 12:50 Innovations for Efficient Decommissioning

Innovationen für einen effizienten Rückbau

Dr. Cord-Henrich Lefhalm – RWE Nuclear GmbH – DEU

### 13:15 Status of ENGIE's Belgian NPP Decommissioning Program

Status des belgischen KKW-Rückbauprogramms von ENGIE

Peter Berben – ENGIE Corporate – BEL

### 13:40 360° Decommissioning Planning - Deconstruction Thought from the End Holistic AI-supported Mapping and Control of the Deconstruction Process

360° Stillsetzungsplanung - Rückbau vom Ende gedacht Ganzheitliche

KI-gestützte Abbildung und Steuerung des Rückbauprozesses

Oliver Wagner – RODIAS GmbH – DEU

### 14:05 Virtual Decommissioning Management (Case Study)

Virtuelles Rückbaumanagement (Fallstudie)

Jyrki Jauhainen – Sweco – SWE

### 14:30 Decommissioning of NPP: Firebrigade Planning and Dynamical Adjustment of Fire Precautions

Stilllegung von Kernkraftwerken: Feuerwehrplanung und dynamische Anpassung der Brandschutzvorkehrungen

Nico Oestreich – Lülfs Sicherheitsberatung GmbH – DEU

### 14:55 EXHIBITOR ROAD SHOW

### 14:55 COFFEE BREAK sponsored by

### 15:40 GNS Multipurpose Casks for Decommissioning - The Right Cask for Every Case

GNS-Mehrzweckbehälter für die Stilllegung - Für jeden Fall den richtigen Behälter

Dr. Luc Schlömer, Dr. Sascha Klappert – GNS mbH – DEU

## PROJECT STATUS & BEST PRACTICE PROJEKTSTATUS & BEST PRACTICE

### 16:05 Decommissioning of the Thorium High-Temperature Reactor (THTR) – Experience of more than 20 Years of Safe Enclosure Operation

Stilllegung und Abbau des Thorium-Hochtemperaturreaktors (THTR) – Erfahrungen aus mehr als 20 Jahren Betrieb des sicheren Einschlusses

Dr. Ralf Verseemann, Stefan Züll – Hochtemperatur-Kernkraftwerk GmbH (HKG) – DEU

### 16:30 Interactive Summary of the Jose Cabrera NPP Decommissioning Project after Achieving Demolition and Waste Management Completion, to the final Site Restoration Phase

Interaktive Zusammenfassung des Stilllegungsprojekts KKW Jose Cabrera nach Abschluss des Abbruchs und der Abfallentsorgung bis zur letzten Phase der Wiederherstellung des Standorts

Diego Espejo Hernando – ENRESA – ESP

### 16:55 Waste Logistics for the Deep Geological Repository in Switzerland

Abfalllogistik für das geologische Tiefenlager in der Schweiz

Dr. Susanne Pudollek – Nationale Genossenschaft für die Lagerung radioaktiver Abfälle (Nagra) – CHE

### 17:45 DEPARTURE OF BUSES TO SCHLOSS RAHE

Abfahrt der Busse zum Schloss Rahe

### 18:15 CONFERENCE DINNER AT SCHLOSS RAHE

Conference Dinner im Schloss Rahe sponsored by  

TUESDAY - THURSDAY  
DIENSTAG - DONNERSTAG





## WEDNESDAY - NOV. 16<sup>TH</sup>, 2022

### DECOMMISSIONING TECHNOLOGIES RÜCKBAUTECHNOLOGIEN

- 09:00 Decommissioning of the Hot Cell Facility at Karlsruhe - Status and Lessons Learned**  
Stand und Erfahrung beim Rückbau der Heißen Zellen in Karlsruhe  
Renée Engert – Kerntechnische Entsorgung Karlsruhe GmbH (KTE) – DEU
- 09:25 Waste Logistics Stream Model to Enhance and Optimize Decommissioning and Dismantling Projects**  
Abfalllogistikmodell zur Verbesserung und Optimierung von Stilllegungs- und Rückbauprojekten  
Jean-Luc Floutard – Cyclife Digital Solutions – FRA
- 09:50 Dismantling of the Main Overhead Crane inside the Containment Building**  
Demontage des Hauptdeckenkrans im Containment-Gebäude  
Tom Rücker – Balcke-Dürr Nuklear Service GmbH – DEU
- 10:15 EXHIBITOR ROAD SHOW**
- 10:15 COFFEE BREAK**
- 11:00 TRES: Introducing a Generic and Versatile Framework for Telerobotics with Force-Feedback**  
TRES: Einführung eines generischen und vielseitigen Frameworks für Telerobotik mit Force-Feedback  
Dr. Jerome Perret – Haption GmbH – DEU
- 11:25 Disassembly Procedure for RPV Internals**  
Zerlegeverfahren für RDB-Einbauten  
Frederic Weigert – ORANO GmbH – DEU, Ronald Strysewske – EWN GmbH – DEU
- 11:50 Cold-Cutting Method for Dismantling of Elements of a Nuclear Power Plant Reactor**  
Kaltschneideverfahren zum Zerlegen von Elementen eines Kernkraftwerksreaktors  
Günter Cramer – TRAWEMA GmbH – DEU
- 12:15 LUNCH**
- 13:30 MEET YOUR COMPANY**

- 13:30 Mobile Attachment for Automated Crack Overmilling - MAARISS**  
Mobiles Anbaugerät zur automatisierten Rissüberfräsung – MAARISS

Birte Froebus – Karlsruher Institut für Technologie (KIT),  
Institut für Technologie und Management im Baubetrieb – DEU

- 13:55 Laser Ablation Rapidly Becoming a Fundamental Decontamination Technology**  
Laserablation entwickelt sich rasch zu einer grundlegenden Dekontaminationstechnologie

Sergej Retich – Clean-Lasersysteme GmbH – DEU

### SITE & WASTE CHARACTERIZATION ANLAGEN- & ABFALLCHARAKTERISIERUNG

- 14:20 Combining X-Ray Inspection and Radiologic Characterization for a Better Evaluation of Total Radioactivity Content in Nuclear Waste Drums**

Kombination von Transmission und radiologischer Charakterisierung für eine bessere Bewertung der Gesamtaktivität in Abfallfässern

Thierry Delvigne – Syscade – BEL

- 14:45 COFFEE BREAK** sponsored by  CAEN Sys  
Systems & Spectroscopy Division

- 15:15 A Low-Cost In-Situ Characterization of Nuclear Waste via a Spectroscopic Radiation Measurement and UHF RFID Tagging Handheld Integrated into the Radwaste Characterization and Classification Management Software**

Eine kostengünstige In-situ-Charakterisierung von Nuklearabfällen mit Hilfe eines Handbediengeräts zur spektroskopischen Strahlungsmessung und UHF-RFID-Bestandsführung, welche an Software für die Charakterisierung und Klassifizierung von radioaktiven Abfällen angebunden ist

Giacomo Mangiagalli – CAEN SpA – ITA

TUESDAY - THURSDAY  
DIENSTAG - DONNERSTAG





**15:40 EMOS - Development of a Mobile, Automated, Optical Inspection System for Radioactive Drums**

EMOS - Entwicklung eines mobilen, automatisierten, optischen Inspektionssystems für radioaktive Fassgebände

Tania Barretto – Karlsruher Institut für Technologie (KIT),  
Institut für Technologie und Management im Baubetrieb – DEU

**16:05 Advanced Spectrometry Techniques for Waste Packages Characterization and Radiological Mapping**

Fortschrittliche Spektrometrietechniken zur Charakterisierung von Abfallgebänden und zur radiologischen Kartierung

José Luis Leganés Nieto – ENRESA – ESP

**16:30 Characterization of Radioactive Waste Based on Neutron-Gamma Emission Tomography (ARCTERIX)**

Charakterisierung radioaktiver Abfälle mit Hilfe der Neutronen-Gamma-Emissions-Tomographie (ARCTERIX)

Dr. Bo Cederwall – KTH Royal Institute of Technology – SWE

**17:00 - 19:30 GET TOGETHER**

sponsored by



**17:00 - 18:15 BUSINESS SPEED NETWORKING**

## THURSDAY - NOV. 17<sup>TH</sup>, 2022

### COMPETENCE & TRAINING KOMPETENZ & WEITERBILDUNG

**09:00 The EURAD School of Radioactive Waste Management**  
EURAD School of Radioactive Waste Management

Niels Belmans – SCK CEN Academy – BEL

**09:25 SAFETEC ACADEMY - Our Path to Nuclear Excellence**

SAFETEC ACADEMY - Unser Weg zur nuklearen Spitzenleistung

Torge Heinz – Safetec Entsorgungs- und Sicherheitstechnik GmbH – DEU

**09:50 COFFEE BREAK**

**10:30 Building European Nuclear Competence through Education and Training Actions**

Kerntechnischer Kompetenzaufbau in Europa durch Aus- und Weiterbildungsmaßnahmen

Prof. Gabriel Pavel – European Nuclear Education Network – EU

### RESIDUE MANAGEMENT & CLEARANCE RESTSTOFFMANAGEMENT & -FREIGABE

**10:55 NES - Soil Measurement Facility**

NES - Erdmessaanlage

Gerald Ernst – Nuclear Engineering Seibersdorf GmbH – AUT

**11:20 Disposal of Cleared Waste from the Demolition of the Switched off Nuclear Power Plants in Schleswig-Holstein**

Entsorgung der freigemessenen Abfälle aus dem Abriss der abgeschalteten Atomkraftwerke in Schleswig-Holstein

Dr. Andreas Wasielewski – Ministerium für Energiewende, Landwirtschaft, Umwelt, Natur und Digitalisierung, Schleswig-Holstein – DEU

**11:45 Standardization of Clearance and Disposal - National and International Developments**

Normung im Bereich der Freigabe und Entsorgung – nationale und internationale Entwicklungen

Matthias Bothe – VKTA – DEU

**12:10 Decommissioning of the BR3 Biological Shield: How a Proper Data Analysis Facilitates the D&D Process**

Stilllegung des biologischen Schildes BR3: Wie eine angemessene Datenanalyse den Rückbauprozess erleichtert

Wouter Broeckx – SCK CEN – BEL

**12:35 Free Release and Recycling of Metals into New Products**

Freigabe und Recycling von Metallen zu neuen Produkten

Arne Larsson – Cyclife Sweden AB (EDF-Group) – SWE

**13:00 FINAL STATEMENT AND OUTLOOK**

**13:15 QUICK LUNCH**

**SPEAKER ABSTRACTS**  
**MONDAY**

**DR. HAUKE GRAGES**

13:15

MONDAY

Framatome GmbH  
Paul-Gossen-Str. 100  
91052 Erlangen  
Germany

www.framatome.com

### OPTIMIZATION THROUGH MOBILE EQUIPMENT FOR D&D

During operation of a nuclear power plant, all required components are optimized for a safe, reliable and sustainable operation of the plant. In some cases, the design capacity of the equipment exceeds the operational required capacity to fulfill requirements in e.g. outages.

This situation changes dramatically when preparing for Decommissioning. Existing equipment might not be able to cope with upcoming wastes, while other systems might be entirely over dimensioned for the remaining purpose. One solution to invest in on site waste treatment centers specialized for decommissioning are expensive and only make sense if a significant number of NPP's are facing shutdown. A smart and flexible solution is mobile equipment. Mobile equipment can be deployed to the area, where the waste occurs and when it is

really needed. It also could substitute larger equipment – like e.g. evaporators – and provide optimized throughput by severely reduced footprint. In other cases, existing equipment like in drum dryers, can either be amended or substituted by significantly faster equipment.

The overall benefit of the mobile equipment is the flexibility in its ability to be brought to operation only on demand and be removed or deployed to another location or operation as soon as the specific mission is concluded.

Framatome uses mobile equipment in many applications for several years. Specifically for Decommissioning various additional technologies have been developed to provide flexible service to its customers.



Copyright Framatome GmbH

**ANDY LEE**

13:40

MONDAY

Viridian Consultants Ltd  
PO Box 594  
RH4 9HU Dorking  
United Kingdom

www.viridian-tc.co.uk

### SITE CHARACTERIZATION WITH VIRIDISCOPE, A LASER TOOL FOR REMOTE SAMPLING

Lasers are used routinely in nuclear decommissioning, particularly for surface cleaning and removal of contaminated concrete. Laser sampling uses a lower power laser to gently remove a small amount of material from a surface without changing its chemical properties. The whole process is fast, clean, resulting in little damage to the sampled surface. A laser sampler attached to a remotely operated vehicle can be deployed in highly radioactive areas, in confined spaces or at height. Material is collected in a form ready for analysis, so in-situ characterisation becomes a reality using portable instrumentation for radiological, chemical and asbestos analysis, with results available in minutes.

ViridiScope is the laser sampler that can be operated manually or remotely. The control system has been designed to be mobile with a

20-metre-long umbilical to allow the sampling head to be taken into areas of high activity or inaccessible places. The head is connected to the control system, via the umbilical carrying the optical fibre carrying the laser power, the signal cable and disposable nylon tubing. Surface material ablated by the laser is transported through the tubing under vacuum, collected on filter paper in a disposable sealed pod, and the mass of each sample is weighed accurately.

The sampling process is controlled by the operator when sampling manually, or from the control system when used remotely. The lightweight head can be attached to a telescopic rod or deployed on remotely operated wall climbers and robotic arms for deployment in very difficult to access areas and in areas of high radiation.





MARKUS BROTSACK

14:05

MONDAY

Impact Innovations GmbH  
Bgm.-Steinberger-Ring 1  
84431 Rattenkirchen  
Germany



www.impact-innovations.com

### CORROSION AND WEAR-RESISTANT COATINGS FOR NUCLEAR APPLICATIONS BY USING HIGH-PRESSURE COLD SPRAY TECHNOLOGY

In recent years, cold spray (CS) technology has been contemplated in many industries, e.g., aerospace, defense, electrical, etc., and increased usage of CS in the nuclear power industry is anticipated. CS process is well known for high powder feedstock deposition efficiency and low-temperature processes leading to oxygen-free deposits. The CS process offers substantial applications, for example, in-situ structural or dimensional restoration and surface coatings to enhance corrosion, fatigue, and wear resistance.

It is of immense importance in the nuclear power industry to use long-lasting storage and transport containers for nuclear waste or materials. Therefore, corrosion resistance is of great importance. Some potential applications of CS

technology include mitigation and repair of stress corrosion cracking, intergranular attack, flow accelerated corrosion, and other types of corrosion by applying a protective coating to isolate the component's structural material from the corrosive environments. On the other hand, the technology can also be used for nuclear energy applications, including coatings for enhancements in wear resistance and heat transfer near-net-shape manufacturing.

The present work demonstrates some relevant applications for the nuclear industry and discusses corrosion and wear-resistant materials. Moreover, the economic aspects of the end product manufactured by CS-process is also evaluated in detail.



DR. MARINA SOKCIC-KOSTIC

14:30

MONDAY

NUKEM Technologies Engineering Services  
Industriestrasse 13  
63755 Alzenau  
Germany



www.nukemtechnologies.de

### RADIOLOGICAL CHARACTERIZATION OF WASTE: FROM FREE RELEASE MEASUREMENTS UP TO THE MEASUREMENT OF HIGH ACTIVE WASTE

Nuclear radioactive waste is produced in research institutes, nuclear power plants but also in nuclear medical institutes: before disposal a characterization of these wastes is needed. This includes the measurement of activity, the determination of contained isotopes and the estimation of necessary storage time until the material can be released. In addition, the release measurement of waste can also be required.

The starting point of the characterization is the historical investigation. In that matter all available information about the waste is collected. This forms the basis to select a suitable measurement method and the related equipment.

The selection of methods and devices must take into account the required detection limits, as well as the necessary dynamic range to be able to measure high active waste, if required. As an example, the HPGe detectors are mentioned: they are highly sensitive to measured activities but may fail in case of activities in the range of

1E+10Bq and higher. In most cases the difficulties may be solved by using a combination of different detectors like HPGe detectors and Geiger Mueller counters.

Furthermore, it is necessary to interpret the measured values. For example, the self-absorption of the radiation inside the waste matrix has to be corrected to receive correct activities from the measurement. This requires the simulation of the measurement process as it can be done with the MCNP code as an example.

The definition of detection limit has also to be carefully determined. Properties of the waste like homogeneity of the material, density etc. has to be taken into account as well as statistical characteristics like averaged masses and other quantities. Finally, the topic "verification and documentation" will be discussed.

Co-Authors: Dr. Ch. Klein & Dr. F. Scheuermann





DR. MATTHIAS FRITZSCHE

15:30

MONDAY

Mirion Technologies (Canberra) GmbH  
Stahlstrasse 42-44  
65428 Rüsselsheim  
Germany



www.mirion.com

## MEASUREMENT CHALLENGES IN DECOMMISSIONING

In the last decades several approaches for determination of nuclear inventory have been established using detector systems which are already proven in design and functionality. During the operational period of nuclear power plants, these detector systems were used to make sure that no radioactive inventory leaves the facility.

For Dismantling and Decommissioning (D&D) of Nuclear Power plants or other sites containing radioactive material, the main task of the detector system is to characterize all components which will later be disposed or can be free released.

In parallel, new technologies like robotics, new fast algorithms, and modern communication systems have been developed and are already in use in the non-nuclear industries.

The idea is to combine the modern technologies with standard detector systems, which then allows to optimize the whole process to save time and money. This presentation shows some examples how already proven detector systems and measurement approaches in combination with new technologies can help to make the D&D process more efficient.



LUKAS FUNKE

15:55

MONDAY

Nuvia Instruments GmbH  
Ostdamm 139-141  
48249 Dülmen  
Germany



www.nuviatech-instruments.com

## NUVISION - PORTABLE SPECTROMETRIC GAMMA IMAGING SYSTEM

The NuVISION and its high-sensitivity version NuVISION MAX are state-of-the-art radioprotection devices. Their unique capabilities lead to applications in numerous fields from the nuclear industry to homeland security and emergency response. The NuVISION can make radioactive sources visible. Two complementary imaging techniques – coded mask imaging and Compton imaging – allow to reconstruct from where the radiation is coming. A superposition of this gamma image with the optical camera image allows to localise the source. On top of this an automatic analysis of the spectrum identifies the radionuclide. Thus, a prompt radiological characterisation of the environment is achieved.

Locating a hotspot from a distance and identifying the radionuclide is vital for radioprotection and risk

assessment. Benefits the NuVISION brings are:

- Work planning is facilitated by having a clear insight of the situation before the intervention starts reducing the dose intake significantly
  - Areas that are difficult to access can be measured e.g. by not needing scaffolding anymore
  - Restricted areas can be examined with workers spending no or a reduced period of time inside of it
  - Automatisation procedures allow a fully automatic scans of large regions of interests without user intervention
- The NuVISION has proved its capabilities in nuclear power plants, research centres and government

agencies all over the world.





ORIANE FARCY

16:20

MONDAY

Capgemini Engineering  
Les carrées du Golf - Batiment B,  
1035 rue JR. Guillibert de La Lauzière  
13290 Aix-En-Provence  
France



www.capgemini.com

As the number of shutdown nuclear power plants increases, nuclear decommissioning activities are expanding worldwide. This is a global challenge: 300 nuclear facilities will be progressively decommissioned worldwide over the next 20 years and more than 10 decommissioning operations are on-going in France. New technologies and solutions in dismantling methodologies are needed to reduce costs and durations of these operations and to improve the safety of operators.

In order to prepare the decommissioning processes, we propose to develop a method to process all the data and knowledge associated with a single nuclear facility, and at the same time to use this information to propose the most efficient decommissioning scenarios.

For this purpose, we have developed an innovative

decision support tool called WELMS (Waste Evacuation Lean Management System) which optimises decommissioning management. Its objective is to anticipate the performance of a suggested scenario for dismantling operations, using a logistic approach, and to determine how to improve the process in terms of cost, time, safety and performance.

Different cases were studied such as a nuclear waste stream during the decommissioning of a nuclear facility specializing in the maintenance and storage of nuclear equipment and a waste drum evacuation in a radioactive effluent treatment plant. The results showed the benefit of this type of analysis in identifying bottlenecks and saturation areas, as well as concrete key performance indicators. The initial decommissioning scenario was successfully tested and results allowed us to propose improvements.



JAN LEDERER

16:45

MONDAY

IEM Fördertechnik GmbH  
Industriestr. 1  
96506 Kastl  
Germany



www.iem.eu

## AUTOMATED INTERNAL TRANSPORTATION OF DECOMMISSIONING MATERIAL THROUGH NARROW SPACES, AS WELL AS THE OUTWARD TRANSFER OF RELEASABLE MATERIAL INTO THE MONITORING AREA

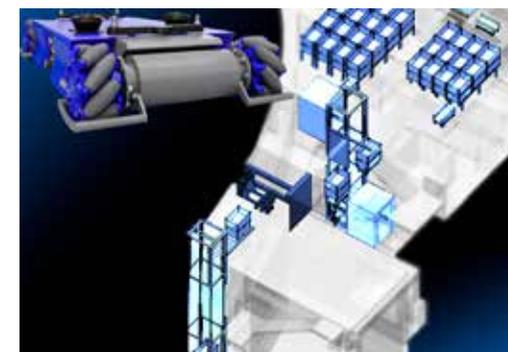
This presentation is directed towards everybody who deals with component and transportation logistics in the decommissioning process of nuclear power plants in the role of an operator or a supplier.

An overview of the transportation requirements and possibilities of carriers and components in narrow spaces as well as the outward transfer into the monitoring area will be given.

The main topics, which are to be considered:

- How can the safe and autonomous transport of containers for decommissioning parts and a retrieval in case of a disruption be ensured?
- How can a contamination transfer be prevented by outward transfer of carries into the monitoring area?

In this context, the possible transportation options are compared to the requirements. It focuses especially on the challenge of automated and / or autonomous transportation in narrow spaces.

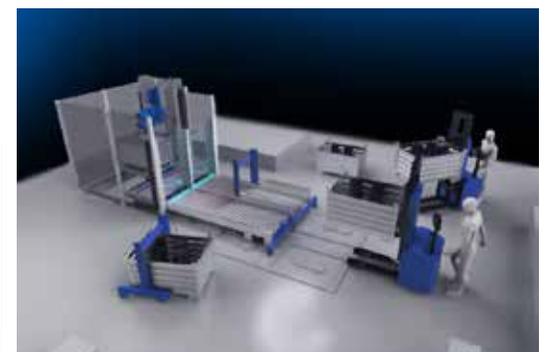


The use of a driverless transportation system (FTS-/AGV) as well as a sluice gate with carry over monitoring as a transition into the monitoring area of a nuclear power plant, which has to be decommissioned, is explained with two practical examples.

Furthermore, this presentation will answer questions like:

- How will the plant perform concerning mass loading and throughput?
- How is the navigational ability of the AGV or the FTS ensured, as well as the collision avoidance?
- Which functions can be integrated into the transportation system and how are containers and components loaded and unloaded?
- How the multi-layered operation is organized in regards to battery life as well as container logistics and which battery systems are even applicable in the controlling area?

Finally it is depicted which advantages an automated transportation process in decommissioning areas generally offers.



**SPEAKER ABSTRACTS**  
**ABSTRACTS TUESDAY**



DR. CORD-HENRICH LEFHALM

12:50

TUESDAY

RWE Nuclear GmbH  
RWE Platz 2  
45141 Essen  
Germany

www.rwe.com/nuclear



## INNOVATIONS FOR EFFICIENT DECOMMISSIONING

Within its NPP fleet RWE Nuclear has experience in all stages of nuclear decommissioning, dismantling and waste management. From completed or far advanced projects of smaller reactors to the transition from operation to decommissioning of state of the art BWR and PWR reactors in the >1GW class.

Since the core processes in decommissioning are completely different to operation of a power plant, the way to be successful has to be consistently reinvented. Methods from production systems are combined with best practice project planning to gain end-to-end control over the relevant cost and schedule drivers. Within RWE Nuclear this approach was developed across the fleet as the so called „Integrated Decommissioning Process (IDP)“ and focuses on the interdependency between the relevant tasks of all involved stakeholders.

It is key to understand the bottlenecks and risks not only in short term but also on the long run. For the nuclear industry it is obvious that the processes to release radioactive materials and buildings from regulatory control are of the essence. To meet the mass flows required for a

dismantling at pace new procedures have to be developed in the legal context for clearance and waste management. This includes technical innovations for efficient and effective material treatment and measurements, i.e. supported by robotics, but also rethinking collaboration between licensee, authority and technical experts. Digitalization can help to speed up transfer times of information between the parties and avoid quality issues, but first its necessary to overcome limitations in the processes itself.

In our experience, the following steps are critical to address these challenges:

1. Understand decommissioning management end-to-end, identify bottlenecks and risks
2. Seek for and implement innovations in processes and technology
3. Build partnerships with all stakeholders to develop together with the same speed

By applying these steps successfully, we can build a common approach and standards agreed among all stakeholders to come to speed and tackle the risks in the long run.



PETER BERBEN

13:15

TUESDAY

ENGIE Corporate  
Blv. Simon Bolivar 34  
1000 Brussels  
Belgium

www.engie.com



## STATUS OF ENGIE'S BELGIAN NPP DECOMMISSIONING PROGRAM

Electrabel is a responsible operator with a strong local presence in Belgium for more than 100 years. Its responsibility is the entire life cycle of its facilities: their construction, operations and decommissioning.

In line with the current law on the nuclear phase out in 2025, Electrabel is focusing since the end of 2020 on the preparation of the decommissioning of the 7 Belgian nuclear plants. The analyses, in order to identify the industrial planning and the internal and external knowledge and skills that we will need to carry out decommissioning activities, have begun and are ongoing.

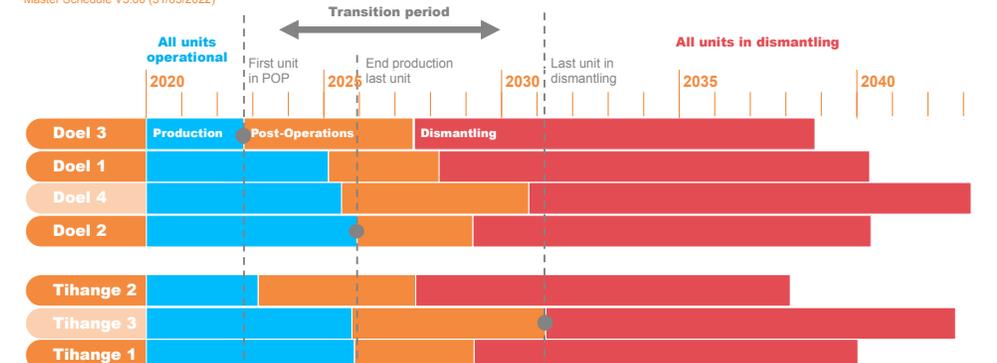
The decommissioning of a commercial nuclear power plant is a first in Belgium. The simultaneous decommissioning of 7 commercial nuclear power plants has never taken place anywhere else. It is an interesting and challenging project for which we will need specific expertise and innovative solutions.

Doel 3 was permanently shut down on September 23<sup>th</sup>, at 21h31, entering the post-operations phase. After the evacuation of the spent fuel, the chemical decontamination of the primary circuit will take place. The dismantling organization is growing as transition plans are being developed, strategic choices related to the dismantling scenarios and options are chosen, new infrastructures are being planned for, waste management treatment and evacuation routes are being developed, license processes are started and the Final Decommissioning Plan is being developed.

The presentation will provide an update on ENGIE's decommissioning program and the main challenges.

## Decommissioning of all seven units with different timelines

Master Schedule V5.00 (31/05/2022)





OLIVER WAGNER

Rodias GmbH  
Eisleber Strasse 4  
69469 Weinheim  
Germany

www.rodias.de

13:40

TUESDAY



### 360° DECOMMISSIONING PLANNING - DECONSTRUCTION THOUGHT FROM THE END HOLISTIC AI-SUPPORTED MAPPING AND CONTROL OF THE DECONSTRUCTION PROCESS

Nuclear decommissioning projects are large-scale projects with a long duration and high complexity. During the dismantling process, various phases such as decommissioning, dismantling and residual material processing have to be interlinked. Many people are involved in the process and the required data is usually distributed across many systems.

During dismantling, large quantities of materials are released that must be further processed before actual disposal. This material flow processing can have repercussions on dismantling and decommissioning. Only consistent overall project planning throughout the entire dismantling project helps to make optimum use of the resources employed, such as employees, equipment, treatment, capacities, storage areas and budget, and enables a wide variety of scenarios to be simulated.



Chart 1: RODIAS – Holistic process optimization

The challenge for IT is to provide a software system that efficiently supports this holistic approach to planning and optimization. RODIAS takes up this approach with its 360 digital driven dismantling process model and provides powerful software modules to support this process:

#### Dismantling Planning

- Allows calculation of deconstruction masses, material quantities and resource requirements and forecasts for the entire project duration
- Supports better planning through computer supported collaborative learning
- Supports the recording of masses and quantities on site

#### Dismantling Optimization

- Optimizes the overall planning in terms of time and total costs
- Can simulate alternative courses of action
- Uses state-of-the-art AI technologies, developed in close partnership with KIT

#### Dismantling Logistics

- Supports the management of residual materials throughout the entire process from dismantling to storage, processing and disposal
- Allows on-site data collection through the integration of user-friendly mobile solutions
- Integrates third-party systems, such as plant management, measuring systems or processing stations. Provides the data basis for dismantling planning and dismantling optimization.



Chart 2: RODIAS – Digital Driven Dismantling in a 360° view



JYRKI JAUHAINEN

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00240 Helsinki

Finland

www.sweco.fi/en

14:05

TUESDAY



### VIRTUAL DECOMMISSIONING MANAGEMENT (CASE STUDY)

Experience of the Decommissioning of the BNCT at FiR1 research reactor and Salaspils research reactor.

Sweco is a forerunner in digitalization in the construction industry. Our digital calculation and data modeling tools are a guarantee of high-quality engineering design. We promote the widest possible use of data from data modeling in all our construction projects. Digitalization breaks old patterns, creating new ways of working and collaborating. Disruption.

Case #1, Salaspils research reactor in Latvia. Our goal was to do laser scanning and 3D model to create digital platform for virtual planning and decommissioning. Attribute data/metadata attached to enrich the modelled 3D/4D objects. We believe in the power of cooperation and partnerships when the goal is to create a better future and growth.

Case #2, BNCT at FiR 1 research reactor in Finland. The client requires a pre-demolition audit for the BNCT facility (focusing on materials inventory and recycling / waste management recommendations. The model will contain a

detailed design of the BNCT facility consisting of steel tube elements filled with heavy concrete, the main door, construction joints, geometric boundary conditions, masses and other meta data attributed to the structural properties, such as radiation measurement data.

- A pre-demolition audit according to Ministry of the Environment (FIN)
- 3D detailed model of BNCT structure in IFC format
- 4D schedule for decommissioning activities
- 5D cost estimate of demolition service
- Preliminary radiation monitoring plan for dismantling activities and classification in model.

Functional, efficient, and energy-efficient buildings and spaces are not a foregone conclusion – but digitalization enables more and more accurate data to be produced and utilized transparently at all stages of the project. Thanks to data modelling and Sweco's new digital services, the project will become more transparent and transparent. Dismantle and decommission virtually first





NICO OESTREICH

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Germany

www.luelf-plus.de

14:30

TUESDAY



## DECOMMISSIONING OF NUCLEAR POWER PLANTS: FIRE BRIGADE PLANNING AND DYNAMICAL ADJUSTMENT OF FIRE PRECAUTIONS

In order to adapt the dimension of plant fire brigades to the progress of decommissioning, a well-founded risk assessment is necessary. This assessment must be transparently and comprehensibly connected with a phased plan of this progress.

In Germany, every nuclear power plant is required to maintain a plant fire brigade. The legal requirements result from regulations regarding nuclear, building and fire protection aspects. A risk assessment forms the basis for site-specific emergency-scenarios, on which the fire brigade must be designed.

During decommissioning, hazards and risks change in multiple ways. Radioactivity, fire loads, staff presence, hazardous activities, etc. constantly evolve during the various phases.

At the same time, the operating framework is changing: buildings getting modified, security

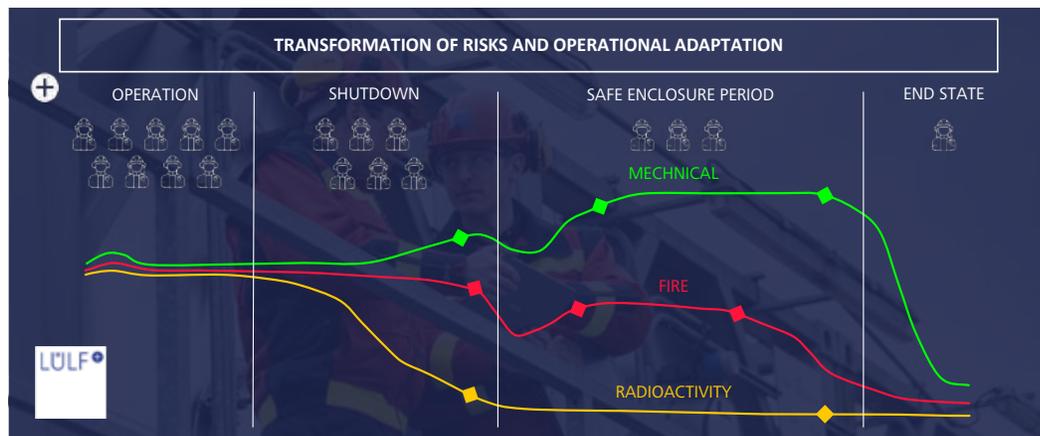
requirements getting retracted, fewer personnel is available etc.

This raises the question: how can operational fire protection be dynamically adapted to the progress of decommissioning?

A sweeping answer to this question is not possible. Due to different federal and regional laws as well as widely varying capabilities of the local public fire brigades, a site-specific assessment of the basic conditions and the local risk is unavoidable.

The main objective is to develop a phased plan connecting the requirements for a plant fire brigade and its dimension with the necessary capability to each phase of the decommission.

Based on this plan, it is possible to organize the fire brigade step-by-step in an effective and economically appropriate, forward-looking manner.



DR. LUC SCHLÖMER

WTI GmbH  
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52428 Jülich - Germany  
www.wti-juelich.de



15:40

TUESDAY

DR. SASCHA KLAPPERT

GNS GmbH  
Frohnhauser Str. 67  
45127 Essen - Germany  
www.gns.de



## GNS MULTIPURPOSE CASKS FOR DECOMMISSIONING - THE RIGHT CASK FOR EVERY CASE

For some decades, the casks and containers of GNS have been serving as a reliable solution for the disposal of waste, of both the operational phase and the decommissioning of nuclear power plants (NPP) in Europe. The long-time experience ensures consistent cask and container designs suited for different types of waste as well as for the needs of transportation, interim storage and final disposal.

For national dismantling and decommissioning (D&D) projects, the GNS group provides a container portfolio covering all relevant radioactive wastes arising during the first D&D steps, as the diagram shows below.

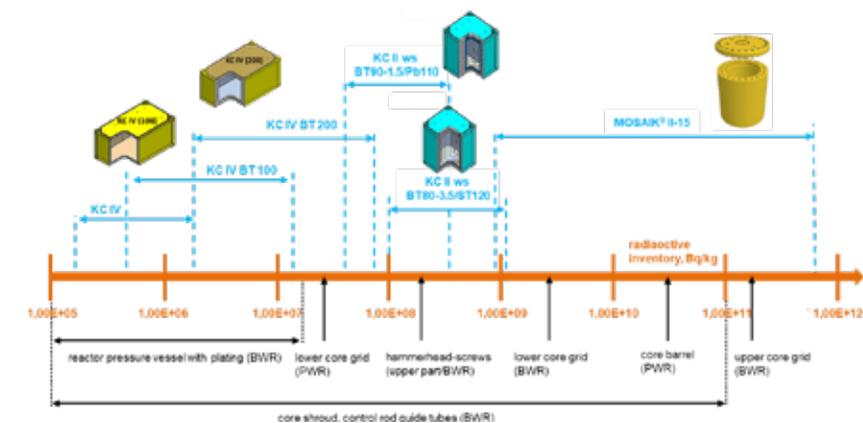
While the MOSAIK® and GNS Yellow Box® product lines made out of Ductile Cast Iron focus on the higher end of the activity levels and are used across Europe, the steel-sheet containers of the GNS subsidiary Eisenwerk Bassum aim at the lower to medium activity levels.

With more than almost 8500 MOSAIK® casks delivered to date it is the best-selling shielded

nuclear transport and storage cask worldwide. MOSAIK® casks provide a cost effective solution for challenging waste management tasks ensuring the disposal of waste from the dismantling of all German NPP. International customers in Switzerland, the UK, the Netherlands and Italy also rely on MOSAIK® casks.

Recently, GNS has developed a new container portfolio for Taiwan that allows higher loading masses and thus requires lower container numbers for the dismantling of a NPP compared to a D&D plan following the German restrictions (20 Mg for final disposal). By that, GNS achieved an optimization from a radiation protection (ALARA principle) and a commercial point of view.

In summary, the GNS group not only provides an existing cask portfolio, but also continuously develops, optimizes and adapts its portfolio to the different customer needs, incorporating the experience gained from its own D&D activities. In doing so, the GNS group draws on its many years of experience in container and cask development.





16:05

TUESDAY

**STEFAN  
ZÜLL****DR. RALF  
VERSEMANN**

Hochtemperatur-Kernkraftwerk GmbH  
Siegenbeckstrasse 10  
59071 Hamm - Germany

www.thtr.de



## DECOMMISSIONING OF THE THORIUM HIGH-TEMPERATURE REACTOR (THTR) – EXPERIENCE OF MORE THAN 20 YEARS OF SAFE ENCLOSURE OPERATION

The Thorium High-Temperature Reactor (THTR) is a prototype reactor constructed at the location of Hamm in the 80s. Based on the experience with the operation of the AVR-Reactor (AVR = Arbeitsgemeinschaft Versuchsreaktor Jülich), the THTR should deliver additional operational experience for high-temperature pebble bed reactors in Germany.

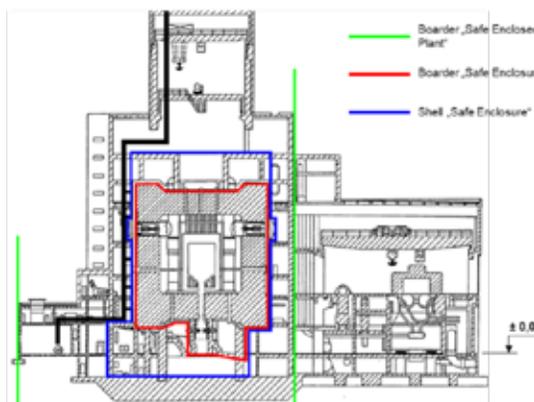
For this government-financed project, the decommissioning decision was already made in 1989. Initially in 1995 all the pebbles have been removed from the core and the spent fuel elements have been transported to the interim storage Ahaus (today's BZA). By 1997, the safe enclosure of the plant was achieved. Until today, the THTR 300 is operated more than 25 years as "Safe Enclosed Plant" (SEP).

The presentation will show the construction of the THTR 300 and its technical specificities, it will

further give impressions about the necessary steps to reach safe enclosure. Another focus will be on the experience with the organisational structure as well as the operational procedures, taking into account that THTR und a coal plant share a joint site.

However, 25 years of safe enclosure operation do not mean a standstill by default. Due to changing boundary conditions, several adaptations have been implemented, resulting in improved operations. This includes regulatory and technical changes on the one hand, as well as on the other hand organizational changes and even structural changes at the coal plant site operation, that had an impact on the THTR.

The only constant – more than 25 years of experience with safe (enclosure) operation since October, 1st 1997 and no reportable events.



DIEGO ESPEJO HERNANDO

16:30

TUESDAY

ENRESA  
Emilio Vargas, 7  
28043 Madrid  
Spain

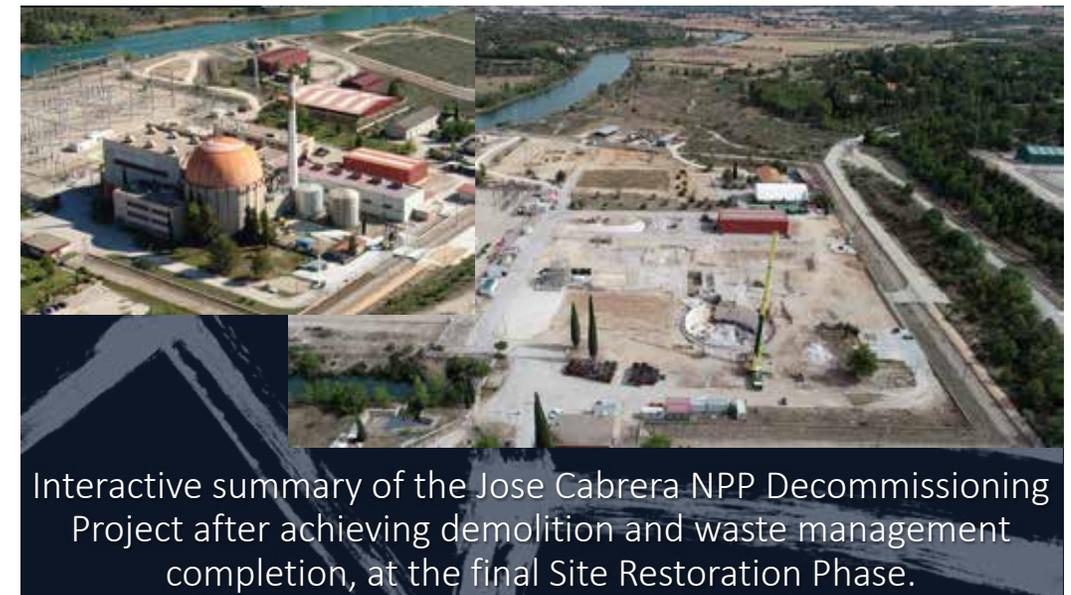
www.enresa.es



## INTERACTIVE SUMMARY OF THE JOSE CABRERA NPP DECOMMISSIONING PROJECT AFTER ACHIEVING DEMOLITION AND WASTE MANAGEMENT COMPLETION, TO THE FINAL SITE RESTORATION PHASE.

After 12 years, since its beginning in 2010, the Jose Cabrera NPP Decommissioning Project has achieved its final demolition completion until the final site restoration, marking a milestone in Spain and as an international reference for the sector, due to the complexity of the operations, activities, technical works carried out, techniques developed and challenges faced, as the first Spanish commercial NPP dismantled. As a remarkable reference for the decommissioning nuclear industry, the current presentation shows, time-lapsed summarized in video, the overall project until the present date and the waste production data highlights.

Based on the experience achieved, ENRESA faces the next challenging NPP Dismantling Project, the first BWR in Spain, with the aim of the continuous improvement, lessons learnt and the need to develop and apply new, more efficient and modern techniques and make our best efforts on optimization of the radioactive waste to be generated and disposed, always with the commitment to safety and quality, for keeping the technical excellence and being a reference for the NPP Decommissioning sector worldwide.



Interactive summary of the Jose Cabrera NPP Decommissioning Project after achieving demolition and waste management completion, at the final Site Restoration Phase.



DR. SUSANNE PUDOLLEK

16:55

TUESDAY

Nagra  
Hardstrasse 73  
5430 Wettingen  
Switzerland

www.nagra.ch

## WASTE LOGISTICS FOR THE DEEP GEOLOGICAL REPOSITORY IN SWITZERLAND

Nagra, the National Cooperative for the Disposal of Radioactive Waste, has been tasked with planning a deep geological repository for Switzerland. The Federal Government has had the lead in the site selection process since 2008. Starting with the whole of Switzerland, less suitable regions and rock formations were excluded in a multistage process. In 2018, the Federal Council decided that Nagra should investigate three siting regions in greater detail. In September 2022, and following in-depth investigations of these regions, Nagra proposed Nördlich Lägern as the site for a deep geological repository for all of Switzerland's radioactive waste.

Nördlich Lägern has the largest safety reserves and is, in Nagra's opinion, the most suitable site for a deep geological repository. The encapsulation plants for the waste are to be constructed at the existing Zwiilag interim storage facility site in the community of Würenlingen. Placing them at Zwiilag has several advantages

– here, for example it is possible to benefit from synergies with the existing infrastructure and the experience of the Zwiilag personnel. In addition, open or non-conditioned waste will not have to be handled at the repository. This simplifies the infrastructure and processes for receiving and provisioning the waste for final disposal.

The talk presents the current underlying logistics concept for the transport of radioactive waste: most of the required transports of disposal packages will take place as regular road transports by lorry or heavy goods vehicle, and a small part will be carried out as special transports secured by a police escort. Important boundary conditions, current technical planning principles and the remaining optimisation potential are also explained.

Representation of the future encapsulation plants at the Zwiilag interim storage facility site in 2060



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for Nuclear Power

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**SPEAKER ABSTRACTS**  
**WEDNESDAY**



RENÉE ENGERT

09:00

WEDNESDAY

Kerntechnische Entsorgung Karlsruhe GmbH  
Hermann-von-Helmholtz-Platz 1  
76344 Eggenstein-Leopoldshafen  
Germany



www.kte-karlsruhe.de

## DECOMMISSIONING OF THE HOT CELL FACILITY AT KARLSRUHE - STATUS AND LESSONS LEARNED

Until the mid-1990s, the hot cell facility at the KIT Campus North site was used for the analysis of irradiated fuel elements, fuel element test specimens and structural materials.

At the core of the facility are five concrete cells equipped with lead glass windows, manipulators and airlocks. 95% of the total activity inventory is located within the cells, with additional outside contamination located in the exhaust air ducts and the chemical wastewater systems. Challenges in the dismantling of the hot cells include varying radiological conditions in each cell, the very cramped quarters and the resulting logistical difficulties. The situation is further aggravated by the extremely outdated installations and building services technology. Disassembly and modernization of those systems is limited due to the constructional environment.

The dismantling permit was issued in December 2010. From 2011, the building structure was

adapted to the requirements of the dismantling process. Since 2017, dismantling of the concrete cells has been carried out in line with a uniform procedure, working from the lower up to the higher radiologically contaminated cell.

With an initial remote decontamination of the cell interior, dose rates are reduced to such an extent that work such as coring of the cell interiors, removal of coatings with subsequent dismantling of the steel liner, wall penetrations and radiation protection windows can be carried out manually. Work in cell 3 was completed in early 2022. Currently, the steel liner in cell 4 is being dismantled. Once work in cell 4 will be completed (2023), concrete cell 5 will follow.

As a continuous process off optimization know-how gained from the dismantling of concrete cells 3 to 5 will be used for further evaluation and adjustment of the dismantling concept planned for the more highly radiologically contaminated cells 1 and 2 (max. dose rate 2,3 Sv/h).



JEAN-LUC FLOUTTARD

09:25

WEDNESDAY

Cyclife Digital Solutions  
615 avenue de la Roquette  
30200 Bagnols sur Ceze  
France



www.cyclife-edf.com

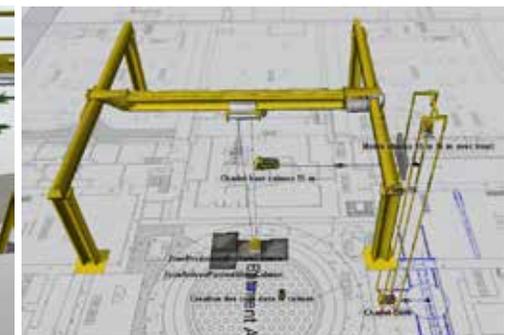
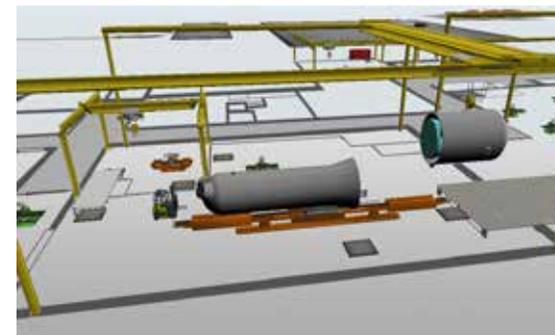
## WASTE LOGISTICS STREAM MODEL TO ENHANCE AND OPTIMIZE DECOMMISSIONING AND DISMANTLING PROJECTS

The notion of waste is intrinsically linked to decommissioning activities and therefore presents a major challenge for society as well as for technology and finance. The need to secure waste management is therefore obvious, that is the reason why the waste-led decommissioning approach is at the core of Cyclife's activities.

Flow simulation software offers an efficient solution for securing processes. They allow, in particular, to recreate an environment and to model it in order to simulate the different streams generated by dismantling activities, in particular the waste streams. We will present two real use-cases that illustrate the capacity of these innovative tools to improve and optimise waste streams by taking into account the limitations of a given nuclear facility environment.

Simulation models are based on the organisation, the resources including human aspects, the performance and the speed of the equipment. When creating the simulation model, we estimate the evacuation time of the waste packages according to the planned streams that will improve technical and organisational paths, optimising the evacuation rate and the resources. Therefore simulation models created will enable to identify critical stations and bottlenecks that could lead to delays or even work stoppages. Simulation models will deliver results depending on entry data of a given hypothesis (creating disturbances and assessing their impact) to support the decision-making.

Simulations will lead to complementary investigations to mitigate the risk, better perform and make the best of valuable resources.





TOM RÜCKER

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76149 Karlsruhe  
Germany

[www.balcke-duerr.com](http://www.balcke-duerr.com)

09:50

WEDNESDAY

**BALCKE  
DÜRR**

## DISMANTLING OF THE MAIN OVERHEAD CRANE INSIDE THE CONTAINMENT BUILDING

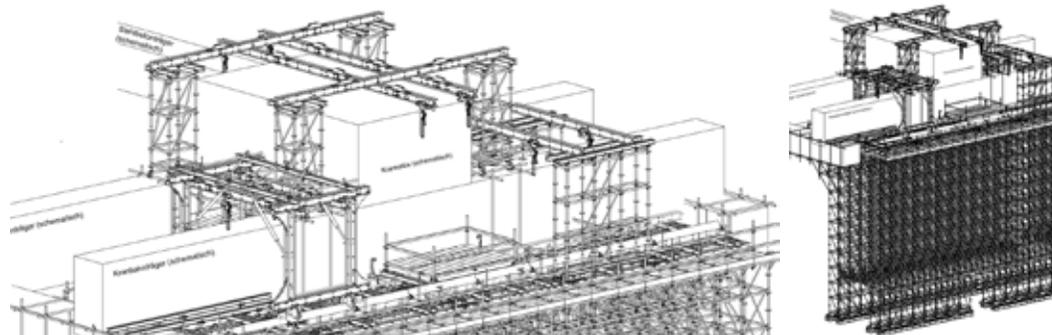
As one of the final steps in the decommissioning process of the containment the reactor building crane has to be dismantled. Parts of the crane are contaminated with airborne particles, which might be embedded into the structural material due to mechanical loads and therefore can not be decontaminated. Additionally, the complex geometry and hollow sections complicate the radiological measurements for clearance.

The challenging aspect of this project is that usually there is no remaining hoist above the crane. Therefore, either an additional crane must be installed or a mobile crane has to be brought into the containment. Due to the requirements regarding the structural qualification for a fixed crane and the additional risk of contamination of a mobile crane, we searched for a better, easier and more economic solution.

We solved these problems by using scaffolding to support the crane girders and custom lifting

equipment. On top of the 5 x 12 x 24 m scaffold a steel substructure has been constructed to support the weight of the girders and equipment. This further allowed to spread the load of 30 Mg evenly to the lower level of the building. Most parts of the scaffolding were small enough for batch-wise clearance measurements.

A frame of modular steel beams above the crane trolley provided access to the motors, gearboxes, rope drums and trolley frame. The dismantled parts were transported to the platform on top of the scaffold and down a lift shaft. After complete dismantling of the trolley, the girders were slightly lifted from their rails and cut in 2 m wide pieces using a wire saw. Each part was brought to the lift shaft with a manually movable lifting device. The end trucks were lifted from the rails using hydraulic pistons and chain hoists. The work was completed over a 9-month period, including the dismantling of the rails, platforms and electrical equipment. Most of the scaffolding used (> 95 %) was released from the containment.



DR. JEROME PERRET

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[www.robotics.haption.com](http://www.robotics.haption.com)

11:00

WEDNESDAY



## TREX: INTRODUCING A GENERIC AND VERSATILE FRAMEWORK FOR TELEROBOTICS WITH FORCE-FEEDBACK

Robotics are becoming increasingly important in decommissioning and waste management operations. Interactive programming and artificial intelligence techniques are contributing to greater adoption. Nevertheless, many activities cannot do without human supervision and dexterity, and depend on remote control of robotic manipulators. Among the technical solutions, the one that offers the best productivity and safety level is telerobotics with force feedback.

Telerobotics with force feedback has been used operationally in the nuclear industry for two decades already. However, it was limited to very specific devices, such as Mascot/Dexter, Telbot or Maestro, and therefore very expensive and difficult to deploy on a large scale. With the new availability of high-speed interfaces for standard industrial robots, there is an opportunity for a generic framework supporting different vendors and applications, relying as much as possible on off-the-shelf components (COTS).

To enable operational use, a telerobotics solution cannot rely on technical excellence alone. It is essential to take into account critical requirements, such as integration into an existing communication infrastructure, secure data flows, and the interweaving of manual and automatic operations. But it is also important to look ahead to future uses, and to ensure that the building blocks are compatible with the concepts of extended reality, digital twin, data analysis and artificial intelligence, and to propose open interfaces.

In this talk, we will present our generic and versatile framework for force-feedback telerobotics, called „TeleRobotics EXtender“, and how we have addressed those challenges. We will also give examples of its use in early adopter nuclear facilities. Finally, visitors will be able to physically experience the solution at our exhibit booth #47.




**FREDERIC  
WEIGERT**

Orano GmbH  
Suedwestpark 65  
90449 Nürnberg  
www.orano-gmbh.de

11:25

WEDNESDAY

**RONALD  
STRYSEWSKE**

EWN GmbH  
Latzower Straße 1  
17509 Rubenow - Germany  
www.ewn-gmbh.de



## DISASSEMBLY PROCEDURE FOR RPV INTERNALS

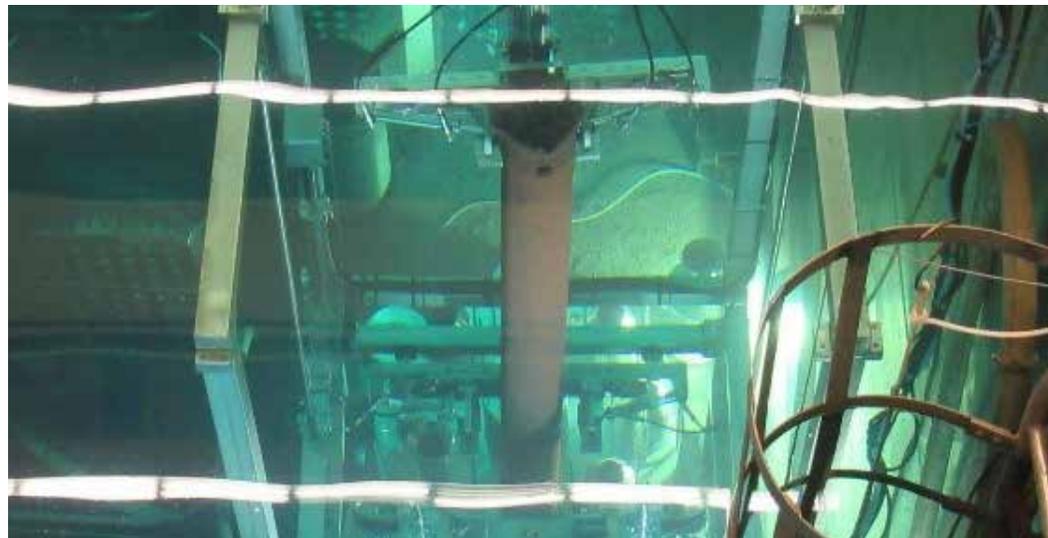
Based on our Project of decommissioning the reactor pressure vessel (RPV) internals of the Nuclear Power Plant located in Brunsbüttel the used technological approach we used is presented.

The main components of the boiling water reactor internals of Brunsbüttel, and hence our project scope, consisting of the steam dryer, steam-water-separator, feed water sparger, upper and lower core grid, control rod guide tubes, core shroud and some smaller Parts. Additional to this we dismantled the control rods in advance to the main project.

The overall mass of dismantled and packed into final storage containers adds up to around 180 tons of activated material. Due to the radiological characteristics of the internals these 180 tons the dismantling needs to be done with adequate shielding. In our case this meant to perform nearly every cut under water with remote handled

or controlled tools. Prior to the on-site activities the concept was developed and detailed, elaborated and approved by authorities as well checked by independent experts within the supervisory process. The required tools for the segmentation as well as the packing was planned, manufactured and commissioned within the engineering phase of the project. Additional tooling was developed during execution, to react to possible deviations and unknowns found on site.

Starting with a general introduction of the applied concept, the presentation focuses on the used tooling and on-site activities. Mainly the remote handling of our tools for cutting and packing. For example, part of the presentation is the use of the under-water robot system for dismantling the core shroud and the CAMC-Cutting. The conclusion gives information on the current status of the dismantling as well as the next steps.


**GÜNTER CRAMER**

Trawema GmbH  
Otto-Brenner-Str. 16  
52353 Düren  
Germany

www.trawema.de

11:50

WEDNESDAY

**TRAWEMA®**

## COLD-CUTTING METHOD FOR DISMANTLING OF ELEMENTS OF A NUCLEAR POWER PLANT REACTOR

Team TRAWEMA represents together more than 10 decades of expertise and experience in developing mobile and flexible and innovative engineering solutions. In recent years TRAWEMA has successfully applied its expertise to the nuclear industry - for decommissioning of nuclear power plants (NPPs).

A specialised machine for in situ overhead cutting of Control Rod Drive Housings was developed and commissioned to support dismantling of boiling water reactors (BWR) at BKAB and OKG in Sweden. Many cutting methods for metals and alloys are available, and thermal-cutting methods offer many advantages, but their application in a nuclear context can be problematic. Therefore, the focus of the project was to develop an engineering solution that successfully completes the job while also reduces radiological risk and limits creation of additional radioactive waste and waste difficult to manage.

TRAWEMA applied its unique engineering of the cold-cutting process, being “inside to outside”, to design a cutting machine with a capability to operate in a constrained space and in radiation-controlled areas. Added-value was limited creation of air-borne radionuclides and integration with waste management plans. In this case the machine made the cutting close to the reactor calotte, ensuring easy handling of the cut components for the next phase of the dismantling operations. The remote operations were handled remotely from the containment underneath the reactor in a “standing position”, the machine could also be operated in a “hanging position” from the reactor floor, completing several cuts in a shift.

TRAWEMA’s engineered solution was applied successfully for a removal of control rod piping, with lower occupational dose rate to operators allowing for longer operations, and hence faster completion of the project; creation of secondary waste was avoided too. Owing to the smart design, the machine was easily decontaminated, transported and installed at another site.



**BIRTE FROEBUS**

Karlsruhe Institute of Technology  
 Gotthard-Franz-Str. 3, Geb 50.31  
 76131 Karlsruhe  
 Germany

[www.tmb.kit.edu/RKKB.php](http://www.tmb.kit.edu/RKKB.php)

13:30

WEDNESDAY



### MOBILE ATTACHMENT FOR AUTOMATED CRACK OVERMILLING - MAARISS

In the dismantling of nuclear facilities, the decontamination and remote-controlled crushing of reinforced concrete is a central point. For the surface decontamination of the upper millimeters, several methods are available that are constantly being optimized and further developed. However, there is a great need for research in the demolition and selective deep removal of reinforced concrete, e.g. in the case of cracks or eruptions into which contamination could penetrate, or the removal of metallic fixtures.

In recent years, a new combination tool consisting of indexable inserts and impact plates has been developed as part of the DefAhS research project, in detail „Defined removal of highly reinforced concrete structures“. With this method it is possible to remove highly reinforced concrete in one operation. The following property right could be granted: „Device for removing building material“ (DE102015114122B3). Within the research project, concrete, reinforcement and fixtures

(dowels, rails, anchor plates, pipe penetrations) could be cut successfully.

The MAARISS research project, in detail „Mobile attachment for automated crack milling“, has been running since November 2020. The hybrid milling technology developed in DefAhS is intended to form the basis for the milling drum used in MAARISS. The objectives of MAARISS includes, among other things, the development of a new vacuum system for direct collection of the material removed from the milling drum and automation of the system for the use in nuclear facilities. Cracks are to be automatically milled over in order to enable subsequent clearance measurement by the staff on site. The physically very strenuous work of crack uncovering should be reduced to just one operator in a safe environment. The construction of a scaffold should be completely dispensed with and existing transport technology (forklift or lifting platform) should be used.

**SERGEJ RETICH**

Clean-Lasersysteme GmbH  
 Dornkaulstr. 6  
 52134 Herzogenrath  
 Germany

[www.cleanlaser.de](http://www.cleanlaser.de)

13:55

WEDNESDAY



### LASER ABLATION RAPIDLY BECOMING A FUNDAMENTAL DECONTAMINATION TECHNOLOGY

Laser decontamination by high power CleanLASER is a proven process. In comparison to common methods of blasting and chemical decontamination the laser achieves high decontamination factors with significant waste reduction in shorter time and at unbeatable costs of decontamination.

Laser ablation is a non-abrasive cleaning method that uses no consumable media, chemicals or gases. The capabilities and benefits for laser ablation in DECON applications include:

- Removal of contaminated coatings, oxides/rust, and hydrocarbons
- Significantly minimizing the volume of radwaste

- Radwaste reduced to a less costly waste disposal classification
- Dose risk reduction from potential contamination sources
- Recovery of costly tooling
- Recycling of valuable metals that would otherwise be costly radwaste
- De-painting of critical weld seams for NDT

Physical background information of process, technical key solutions by cleanLASER as well as few examples from use in field will be presented.





THIERRY DELVIGNE

14:20

WEDNESDAY

SYSCADE  
3 rue Mont d'Orcq,  
7503 Froyennes  
Belgium

www.syscade.com



### COMBINING X-RAY INSPECTION AND RADIOLOGIC CHARACTERIZATION FOR A BETTER EVALUATION OF TOTAL RADIOACTIVITY CONTENT IN NUCLEAR WASTE DRUMS

Syscade is a compact mobile laboratory recently developed for assay of nuclear waste drums. It combines an X-Ray inspection and high-resolution radiologic characterization of waste drums. The analysis process is fully automatized and it offers high end technical solutions. Both assay systems are installed in a fully shielded cabin, with the following upsides: self-shielding of the X-Ray unit; and lower background radiation when spectrometry measurement are performed, for an improved MDA even down to clearance levels with shorter measuring times. One technical challenge in this project was to minimize both dimensions and weight of SYSCADE unit. Minimizing the dimensions of the XRay cabin obliged us to develop a dedicated image reconstruction software to correct image distortion due to the short distance between X-Ray tube and detector. Another issue was to perform spectroscopy measurements in a cabin where intense X-Ray beams are generated. A retractable detector positioning system was developed. It allows integral open geometry or scanning each waste drum vertically and angularly to determine

distribution of the radioactivity, for each isotope. The latest development are about the superimposition of X-Ray imaging information with gamma-ray characterization results. As such, the typical use of a transmission source, which is to be avoided for safety & security reasons certainly in a mobile deployment, is replaced by NDT RTR. Dedicated software routines are under development to calculate – from X-Ray images - the average density of materials per drum areas, and so, to determine the gamma-ray attenuation factors associated to each segment and each part of segment (angular resolution), allowing to minimize “type B” errors due to non-homogeneous distribution of the materials (matrix) contained in each waste drums. This paper presents the main technical challenges of this R&D project, and innovative solutions that we have developed. Other key subsystems will be presented: the retractable conveyor system, safety and radiation monitoring system, and the centralized automation system with database where all collected information is associated to a unique QR code generated and printed for each waste drum.



GIACOMO MANGIAGALLI

15:15

WEDNESDAY

CAEN SpA  
Via Vetraia 11  
55049 Viareggio  
Italy

www.caen.it



### CHARACTERIZATION VIA THE RADHAND INTEGRATED INTO THE REACH™ SYSTEM FOR A LOW-COST IN-SITU WASTE CHARACTERIZATION OF NUCLEAR WASTE

A key aspect of operational activities and radioprotection in NPP is the management of nuclear waste. Providing efficient and reliable real-time radionuclide concentrations contributes invaluable information while processing nuclear waste as it can in turn reduce costs with packaging, transportation, and disposition for NPPs. Currently, waste characterization uses HPGe to determine the radionuclide concentrations and isotopes abundances. This requires NPPs to be equipped with a laboratory on site as well as radiological experts and immense amounts of time and effort to obtain the results for well-defined gamma-emitting radionuclides which are easily detectable. Current characterization practices involve obtaining waste stream specific distributions which are then applied to all waste packages of the same waste stream type. This type of analysis is typically performed by HPGe detectors whom the main drawbacks are the typical long measurement times, the time for post process analysis, and the high entry cost. We

developed a faster and user-friendly waste characterization toolkit which represents a step change in the characterization of LLRW. It is intended for all waste packages for open geometry measurements by providing a low-cost detection technology with an easily transportable device. It directly measures gamma dose rates and gamma emitting activity by radionuclide for packaged radioactive material. The RadHAND device is used for the gamma measurement and the data digitalization via RFID technology. The system can track the uniquely identified WP using the attached RFID tag and restore the WP characterization history using the database. This paper will show results for tests made with the RadHAND which measured real package radioactive waste from NA commercial power plants to evaluate its performances in fixed geometry configuration. The feasibility to substitute the old typical procedure based on HPGe characterization with this new system will be analyzed.





TANIA BARRETTO

15:40

WEDNESDAY

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 Germany

www.tmb.kit.edu/941



## EMOS - DEVELOPMENT OF A MOBILE, AUTOMATED, OPTICAL INSPECTION SYSTEM FOR RADIOACTIVE DRUMS

The usual practice in the interim storage facilities is recurrent inspections, which are carried out almost exclusively manually and without electronic comparative recordings as well as without mechanical documentation and archiving. Manual performance is labor intensive and requires the use of personnel exposed to radiation.

Based on these facts, the Institute for Technology and Management in Construction, is developing an automated drum inspection system as part of the funding measure FORKA - Research for the Deconstruction of Nuclear Facilities. EMOS is a mobile inspection unit that remotely and automatically records the entire surface of the drum, including lid and bottom, optically, evaluates it analytically and both stores it electronically and outputs the results in the form of an inspection report. In this way, recurring inspections of the drum stock can be completed under the same inspection conditions each time.

A decisive advantage is the possibility of carrying out the inspection remotely in order to reduce the radiation dose to the employees on site. The optical evaluation, display and output of the results will ensure a more precise inspection and analysis of the drum surfaces through software to be specially developed than is possible through manual and visual inspections as currently performed in the interim storage facilities. The continuous monitoring of the stored drums will be facilitated and also the tracing of a possible damage development through the comparison of archived measurement results is a novel and powerful tool that helps to increase and ensure the safety aspects of interim storage in the long term. Changes in the drum geometry as well as the surface condition (e.g. corrosion formation, etc.) can be identified at an early stage with the help of the inspection unit and measures can be taken at an early stage to counteract the loss of integrity of the storage containers.



JOSÉ LUIS LEGANÉS NIETO

16:05

WEDNESDAY

ENRESA  
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 Spain

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## ADVANCED SPECTROMETRY TECHNIQUES FOR WASTE PACKAGES CHARACTERIZATION AND RADIOLOGICAL MAPPING

The use of gamma cameras is becoming a promising technique to locate the sources of activity in a radioactive environment. Rudimentary gamma images can be superimposed with visible images to provide an idea of the radioactivity distribution in the involved environment. Further improvements are required for using that approach to measure the radioactivity in a more precise manner.

There are large differences in the resolution of both devices, namely between a gamma camera and a normal visible camera. The gamma cameras could provide 8x8, 16x16 or 32x32 pixels resolution in a normal way versus typical resolutions of megapixels in visible cameras. It is not easy to properly match both images in one composed image.

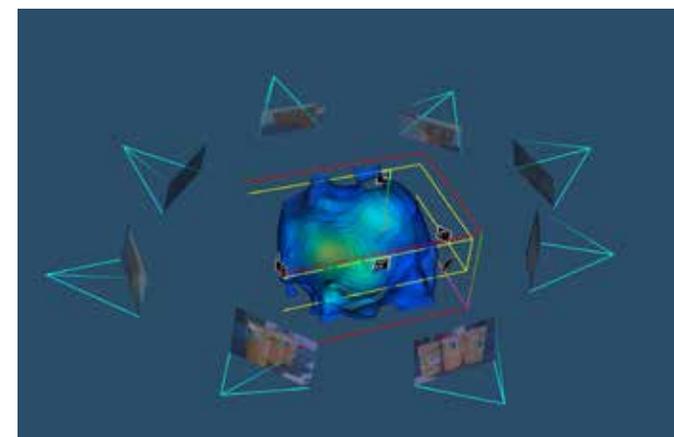
Each pose from a gamma camera provides a 2D image as also does one visible frame. Computer vision allows to define absolute coordinates of

several collected frames and then a 3D image can be produced.

The use of markers in the image makes it easier to locate them by computer vision and therefore it will allow to fix coordinates for the different collected poses of the same environment.

The combination of computer vision and gamma cameras has been developed to produce a 3D gamma reconstruction of the involved environment in addition to the 3D visible image. The final result is a 3D combined image in gamma and visible light. This saves a lot of hypotheses that normally are used in the definition of the activity distribution and also reduces the number of collimated measurements to do around the radioactive waste to better locate the activity distribution.

The development of this approach will improve the activity determination in containers, packages and large items regardless of the complexity of the analyzed geometry and matter heterogeneity.





**DR. BO CEDERWALL**

**16:30**

**WEDNESDAY**

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Roslagstullsbacken 21  
114 21 Stockholm  
Sweden

[www.physics.kth.se/nuclear](http://www.physics.kth.se/nuclear)



## CHARACTERIZATION OF RADIOACTIVE WASTE BASED ON NEUTRON-GAMMA EMISSION TOMOGRAPHY (ARCTERIX)

A project for non-destructive assay (NDA) of radioactive waste at the Studsvik nuclear decommissioning site is presented. The concept is based on a novel 3D radiation imaging modality for special nuclear materials (SNM) - neutron-gamma emission tomography (NGET). By adding localisation and imaging of SNM inside shielded waste containers to the array of existing techniques used for radioactive waste characterization, the project aims to complement the state of the art in passive and active NDA interrogation methods for radioactive waste. It is aimed primarily at the class of mixed, long-lived radioactive waste that is commonly called “legacy” or “historic waste” and is associated with special safety, security and safeguards concerns due to its mixed composition, commonly poor documentation, and the frequent presence of SNM. A detection system featuring the NGET imaging modality might also be applied to radioactive waste characterization in general, potentially including verification of spent nuclear

fuel and other types of high-level waste suspected of containing SNM. The invention behind this radioactive waste characterization technique was awarded the Euratom Innovation Prize 2022.

A major aim of the project is to achieve a high degree of automation and high throughput capabilities to quickly scan large radioactive waste inventories for the presence of special nuclear materials with minimal manual intervention.

Bo Cederwall<sup>1</sup>, Vivian Peters<sup>1,2</sup>, Anders Puranen<sup>2</sup>, Jana Vasiljevic<sup>1</sup>

<sup>1</sup>KTH Royal Institute of Technology, Stockholm, Sweden

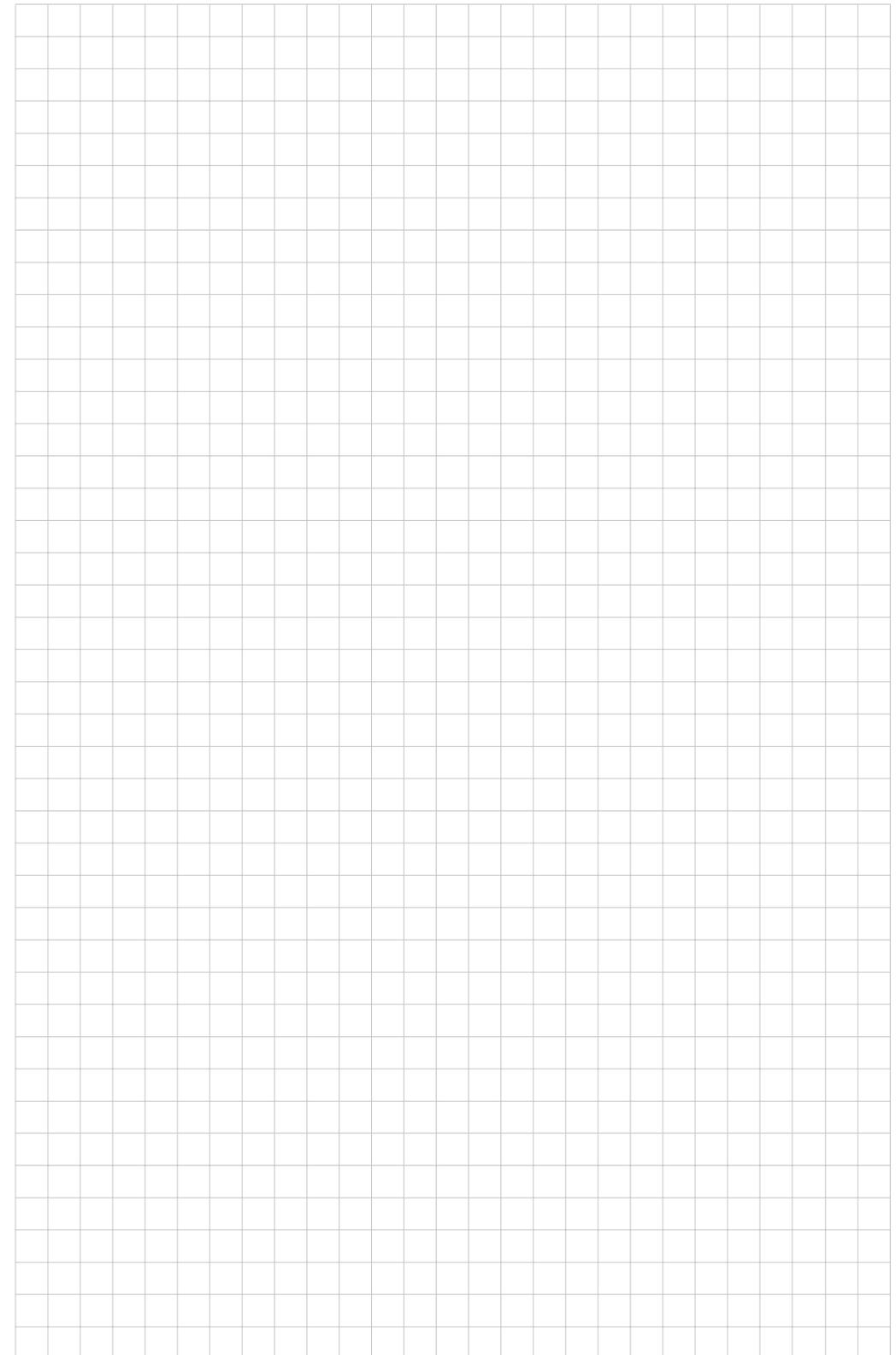
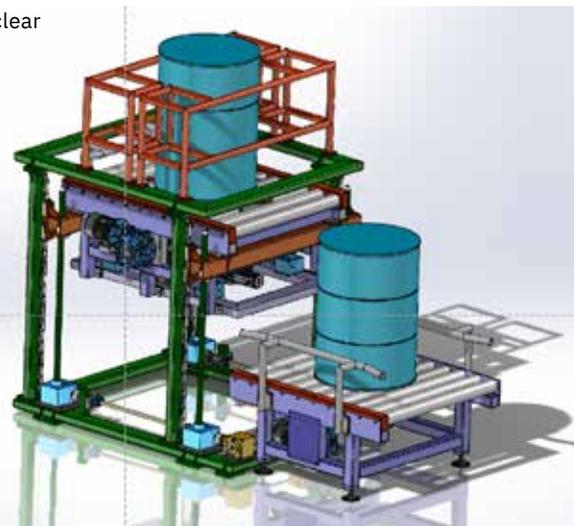
<sup>2</sup>SVAFO AB, Studsvik, Sweden

Jana Petrović, Alf Göök, and Bo Cederwall, “Rapid imaging of special nuclear materials for nuclear nonproliferation and terrorism prevention”, *Science Advances*, Vol. 7, No. 21, eabg3032 (2021). <https://doi.org/10.1126/sciadv.abg3032>

R. Stone, “New type of imager could help spot smuggled nuclear materials”, *Science*, 19 May 2021

<https://doi.org/10.1126/science.abj5464>

[https://ec.europa.eu/info/news/nuclear-innovation-prize-seven-applications-awarded-2022-may-31\\_en](https://ec.europa.eu/info/news/nuclear-innovation-prize-seven-applications-awarded-2022-may-31_en)



**SPEAKER ABSTRACTS**  
**THURSDAY**


**NIELS BELMANS**
**09:00**
**THURSDAY**

SCK CEN  
Boeretang 200  
2400 Mol  
Belgium

[www.sckcen.be](http://www.sckcen.be)

**sck cen**  
Academy

### THE EURAD SCHOOL OF RADIOACTIVE WASTE MANAGEMENT – BUILDING COMPETENCES IN RADIOACTIVE WASTE MANAGEMENT IN EUROPE

The European Joint Programme on Radioactive Waste Management (EURAD) aims to achieve a step change in European collaboration towards safe radioactive waste management (RWM) through a robust and sustained science, technology and knowledge management (KM) programme. In this context, the ‘School of Radioactive Waste Management’ supports competence building in RWM matters through education and training actions. Four distinguished initiatives are highlighted: organization of courses/webinars, coordination of a mobility programme, providing a panoramic view on all matters related to RWM, and actions to support the EURAD PhD community. A portfolio of basic and specialized training courses was set up containing an up-to-date list of existing and newly developed training courses. The School of RWM pays attention to the best-fitted training format and that scientific state-of-the-art is guaranteed. The School also coordinates a Mobility Programme, allowing its beneficiaries to perform technical visits, to

undertake internships and to set up exchanges programmes between institutions within EURAD. In addition, it also financially supports beneficiaries to attend training courses and conferences. These mobility actions can be complementary to a training programme or part of a Continuous Professional Development programme. RWM is an intrinsically multi- and transdisciplinary field. Therefore the School offers its end-users a panoramic view of all relevant knowledge and skills required in RWM through its training portfolio, supported mobility actions and other activities. Finally, the initiative was taken to provide support for the EURAD PhD Community. As future key figures in the field of RWM they benefit from the possibilities to network with their peers and with established experts early in their careers. This presentation describes the driving forces behind the concept of the School, the link with the EURAD KM programme, the daily organisation and the results obtained so far.


**TORGE HEINZ**
**09:25**
**THURSDAY**

Safetec GmbH  
Dischingerstrasse 8  
69123 Heidelberg  
Germany

[www.safetec-strahlenschutz.de](http://www.safetec-strahlenschutz.de)

**Safetec**

### SAFETEC ACADEMY - OUR PATH TO NUCLEAR EXCELLENCE

For more than 20 years Safetec has dedicated itself to its customers’ success – with foresight, social responsibility and industry-specific know-how. It is our genuine aspiration to protect the environment and people’s health on the highest possible level though still seeking to improve that on a daily basis.

Therefore, our workforce consists of highly skilled specialists from various professions, e.g. technicians & engineers for radiation protection, nuclear decommissioning, measuring technology, waste treatment and storage and related project management. We are also very proud that we qualify the majority of our own workforce through our Safetec academy approach which is also open for external partners who want to benefit from our educational expertise.

Based on the rapidly growing demand especially from the German decommissioning market we now want to take the academy to the next stage.

We are aiming for nuclear excellence not only for ourselves. Based on the ambitious targets of our major clients who are focused to execute the decommissioning of the German nuclear power plant fleet timely and most efficiently we will have to continuously develop our nuclear expertise as well as our capabilities for continuous improvement. Very simply – we call it “fit for nuclear excellence in decommissioning!”

Our path to nuclear excellence in decommissioning incorporates a variety of industrial best practices from continuous improvement and adult learning (e.g. Operational Excellence, KATA Coaching & Improving, target competence driven learning journeys) This is indeed very ambitious last but not least for ourselves but isn’t striving for excellence and perfection something that is just too natural for us in the nuclear industry. Please fasten seat belts, relax and join us on our very specific journey to nuclear excellence.




**PROF. GABRIEL PAVEL**
**10:30**
**THURSDAY**

European Nuclear Education Network  
Rue d'Egmont 11  
1000 Brussels  
Belgium



www.enen.eu

### BUILDING EUROPEAN NUCLEAR COMPETENCE THROUGH CONTINUOUS ADVANCED AND STRUCTURED EDUCATION AND TRAINING ACTIONS

Nuclear power and non-power technologies are technically very complex facilities that operate in the increasingly challenging regulatory framework and market conditions. Development, construction, operation, decommissioning, waste management and oversight of these facilities require personnel with excellent education, skills and motivation: nuclear specialists, that are equipped to work in multidisciplinary, multicultural and competitive environments.

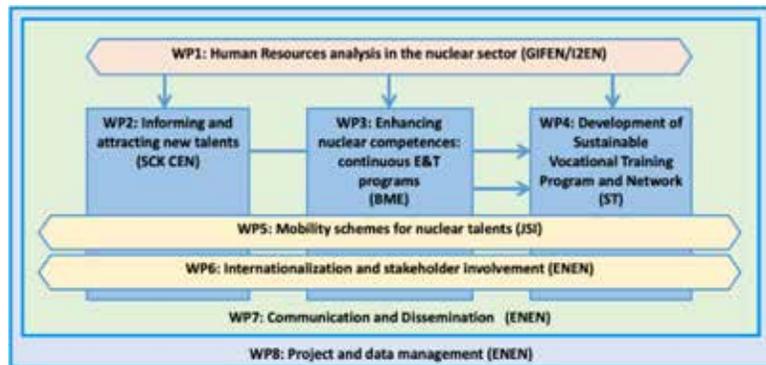
Recent communication of the European Commission stated clearly that nuclear energy will be in “the backbone of a carbon-free European power system”.

Education and training (E&T) in nuclear matters in Europe need persistent efforts to be adequately promoted, aiming to maintain and further develop the high level of expertise reached in the nuclear power and non-power fields and also in considering the limited attractiveness of nuclear careers for young generations, experienced both at Universities and in recruiting for jobs.

ENEN is the largest and most integrative nuclear Education and Training (E&T) efforts up to date. Attraction of excellent new talents followed by outstanding development through E&T, cross-cultural and cross-disciplinary activities are the overarching objectives. Excellent workforce should remain the basic enabler of safe long-term operation of existing and development of advanced facilities. A detailed insight into the EU supply and demand of nuclear human resources for power and non-power applications will be developed. This will include industries, academia, technical safety organizations and regulators.

The main objectives of the project are:

- analyzing the needs of human resources in the nuclear sector
- informing and attracting new talents
- enhancing nuclear competences by continuous E&T programmes
- developing sustainable vocational training programs and networks
- establishing a successful mobility scheme for nuclear talents
- International cooper


**GERALD ERNST**
**10:55**
**THURSDAY**

Nuclear Engineering Seibersdorf GmbH  
Forschungszentrum  
2444 Seibersdorf  
Austria



www.nuclear-engineering.at

### SORTING AND MEASURING BULK SOLIDS WITH THE NES SOIL SORTING FACILITY

As part of the dismantling work resulting from 45 years of nuclear research at the Seibersdorf Research Centre, four above-ground landfills (in the form of embankments) with approx. 8,400 m<sup>3</sup> – of partially contaminated material – must be dismantled.

Long-lived activation products (especially Co-60, Am-241), fission products from the experimental set-ups (especially Sr-90, Cs-137) and Ra-226, e.g. from blast furnace slag, are expected.

NES developed and built a Soil Sorting Facility to process the material from the surface landfills. It is used to sort and evaluate fine-grained, free-flowing bulk material (grading curve 0-32 mm) such as soil, gravel, broken concrete and building rubble. For this purpose, the material with a defined bulk thickness is placed on a conveyor belt, measured by means of beta and gamma detectors and automatically sorted on the basis of these measured values. The material is fed into the soil sorting facility in 200-l drums and discharged again in 200-l drums; the throughput is about 1.2 m<sup>3</sup> per hour.

The purpose of the facility is to sort the material into uncontaminated or slightly contaminated material and more radioactively contaminated material. At the same time, data is continuously recorded for the drums generated in this way. A data set of radiological measurement data is generated for each drum to enable a subsequent radiological assessment of the individual drums. Ultimately, the aim of the facility is to group as large a proportion of the material as possible into drums containing harmless material and to provide the necessary data for these drums for restricted release. The radioactively contaminated material is separated, collected in separate drums and disposed of as radioactive waste.

The agreement with the comparative methods (ISOCS and drum measuring system) is satisfactory. In sub-areas at low activities, the EMA showed slightly higher values than the comparison methods (conservative). At higher activities, the agreement





DR. ANDREAS WASIELEWSKI

11:20

THURSDAY

Ministerium für Energiewende, Klimaschutz, Umwelt und Natur des Landes Schleswig-Holstein  
Vorzimmer - V 7a -  
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24143 Kiel



www.mekun.schleswig-holstein.de

## DISPOSAL OF CLEARED WASTE FROM THE DEMOLITION OF THE SWITCHED OFF NUCLEAR POWER PLANT IN SCHLESWIG-HOLSTEIN

The phase out of producing atomic energy in Germany is well accepted. But the demolition of the switched off atomic power plants is a challenge. The by far biggest amount of the material can be handled as „non radioactive“ after passing a very complex and enhanced so called „clearance procedure“ and though is good for ordinary waste treatment. The main parts have to be recycled, while a smaller section should be deposited at a disposal site. This is the case, for example, if used building material is contaminated with special ordinary waste. The following essay describes the situation in Schleswig-Holstein with one atomic research reactor and three existing atomic power plants, one of them still running. Furthermore it will be explained in detail how the stream of waste coming from the atomic power stations will find their way to a suitable disposal

site, legally. Therefore the materials have to pass a special procedure, laid down in the Radiation Protection Ordinance and the Federal Waste Act. In addition to the legal conditions how this kind of waste should be cleared in order to be managed under the waste regime, the essay shows the political dimension as well. The treatment of waste, originated from atomic power sites, is not popular. Keeping this in mind the Ministry of Environmental Affairs in Schleswig-Holstein has started a campaign to strengthen the transparency and acceptance of the proposed demolition. Stakeholders are invited to take part at hearings with involved experts. In the end political decisions are necessary to guarantee that a complete and successful demolition of existing atomic power plants will be realized.



MATTHIAS BOTHE

11:45

THURSDAY

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Bautzner Landstr. 400  
01328 Dresden  
Germany



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## STANDARDIZATION OF CLEARANCE AND DISPOSAL - NATIONAL AND INTERNATIONAL DEVELOPMENTS

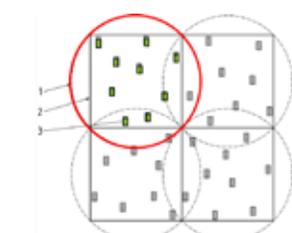
In the next tenths of years decommissioning of nuclear installations, particular nuclear power reactors, will be a task in many countries. Clearance and disposal are two main aspects of decommissioning. In Germany we already acquired experience in clearance and disposal in decommissioning of some nuclear installations (e. g. research reactors, production facilities and power reactors) in the last about 30 years. A series of standards was established for clearance procedures and measurements in result of these experiences and to guide further decommissioning projects: DIN 25457 „Activity measurement methods for the clearance of radioactive substances and nuclear facility components“. The four parts of this series are:

- Part 1: Fundamentals
- Part 4: Contaminated and activated metal scrap
- Part 6: Rubble and buildings
- Part 7: Ground surfaces and excavated soil

All parts of this series of standards are now in the second revision.

In the international framework, ISO developed some standards beginning in the 90th of the last century. Now we see a new approach to revise these standards and moreover to establish new standards in the fields of clearance and disposal.

Beside these specific standards for clearance and disposal in the last years standards for measurement methods had been revised or established. Some new standards are now in preparation and will be published in the next two years. The methods are surface contamination measurement, gamma spectrometry, liquid scintillation counting, alpha spectrometry.



Example: Combination of clearance measurement methods  
1 - area covering method e.g. in situ gamma spectrometry  
2 - investigated area  
3 - non area covering method e.g. contamination measurement  
Source: DIN 25457-7: 2017-08



WOUTER BROECKX

12:10

THURSDAY

Belgian Nuclear Research Centre  
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2400 Mol  
Belgium

www.sckcen.be



## DECOMMISSIONING OF THE BR3 BIOLOGICAL SHIELD: HOW A PROPER DATA ANALYSIS FACILITATES THE D&D PROCESS

Belgian Reactor 3 (BR3), a former pilot reactor for Belgian commercial power plants, is currently being decommissioned. The major installation and technical equipment have been dismantled and the current focus of decommissioning is on the building structure itself. This talk concentrates on the dismantling strategy of the activated concrete (biological shield) and outlines the current status of implementation.

We applied a thorough upfront characterization and categorization strategy following the Belgian regulatory framework, prior to start dismantling and segregation. The initial characterization of the BR3 biological shield was selected as use case within the EU horizon 2020 project INSIDER. Within this project we applied a data analysis and sampling design strategy, resulting in a 3D model (or digital twin) for the activity distribution throughout the entire

concrete structure. Consequently, the model was assessed against conditional and unconditional release limits resulting in a categorization of the entire volume. The categorization model allowed to select and optimize the dismantling and segregation techniques: jack-hammering for the external wall and dry diamond wire cutting for the remaining walls.

Today, jack-hammering is completed and the dry diamond cutting process is ongoing. Throughout the project, the availability of the model and visual representations turned out to be crucial. Not only as a reference and communication aid for dismantling experts and regulatory bodies, but in addition to optimize the decision making process of the dismantling strategy itself and to track the inventory of activated materials during removal.



3D biological shield model



Model cross sections at different heights



First blocks removed from topside curved wall

Manipulation of blocks



ARNE LARSSON

12:35

THURSDAY

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## FREE RELEASE AND RECYCLING OF METALS INTO NEW PRODUCTS

Large complex components, including Magnox boilers and PWR steam generators, as well as scrap metals of different kinds can be treated aiming for free release and recycling into new products. Overall, more than 95% of the contaminated metals processed, can be and have been made subject to recycling to the conventional market.

Free release and recycling of metals from nuclear installations, in line with the principles of a circular approach and the waste hierarchy, has been applied by Cyclife, a subsidiary of EDF Group, in its Swedish facility for decades.

The free release process uses the results from radiological laboratory analysis of the samples taken from the metal bath in connection to the casting of the metal to ingots. The samples are fully representative thanks to the induction stirring effect during the melting process and provided with low uncertainties. In addition, as several key nuclides are separated from the metal during the melting process, the free release

process is significantly less complicated than clearance of surface contaminated metals. Prior to release for external recycling, the in-gots are checked to verify that the surface contamination, if any, is significantly below the threshold values.

The free release criteria applied by the regulatory bodies are based on certain scenarios developed by the international organizations (IAEA, European Commission etc.). As recycling of ingots is more favorable than recycling of surface contaminated scrap metals in a radiological perspective, Cyclife contracted a specialist company to calculate the radiological impact from recycling of ingots which have been cleared as per current regulations and specific permits.

The trading of the released ingots is performed based on commercial conditions. For conditionally cleared ingots, which will have to be co-melted with material of a non-nuclear origin, certain criteria apply to secure that the ingots are recycled in a proper way.



# 16. KONTEC SYMPOSIUM

16. Internationales Symposium  
"Konditionierung radioaktiver Betriebs- und  
Stilllegungsabfälle"  
einschließlich  
16. Statusbericht des BMBF "Stilllegung  
und Rückbau kerntechnischer Anlagen"

**30.08. - 01.09.2023 | [kontec-symposium.de](https://kontec-symposium.de) | @KontecSymposium**

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**COMPANY PROFILES**

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### COMPETENCES IN NUCLEAR SERVICES

Our nuclear services focus on the radiological and material characterization of nuclear residual and waste materials. We offer wide-ranging knowledge in nuclear technologies such as radiation measurement techniques, waste management concepts and nuclear simulations.

As a contractor to waste producers, we have carried out numerous measurement campaigns since 2012 in order to characterize radioactive waste. The documentation for final

disposal was generated for qualification of the waste packages in line with the regulatory requirements. AiNT has the license to dispatch staff to undertake on-site measurements in controlled areas and has technical qualified personnel for radiation protection. Several expert statements from the TSOs confirm the suitability of the applied measuring methods and performed campaigns by AiNT for the radiological characterization according to the regulatory requirements.



#### DRUM SCANNERS AND GAMMA-SPECTROMETRIC MEASUREMENT DEVICES

- Design and layout of gamma waste scanners
- Measurement devices for detection of fissile material by active or passive neutron interrogation
- Radiographic measuring devices for filling heights and density determination
- Approval documents for the drum scanners
- Execution of experimental validation campaigns in our technical center
- Uncertainty and sensitivity analyses according to DIN EN ISO 11929
- Support for the qualification of the drum scanners
- Commissioning and training of employees

#### MEASUREMENTS FOR CLEARANCE

- In situ gamma spectroscopy
- Development of measurement protocols
- Statistical sampling methods
- Radiological mapping
- Application documents for clearance procedures

AiNT develops decommissioning strategies and concepts for the conditioning and packaging of radioactive waste in which we particularly highlight opportunities for cost savings. We support our customers in preparation of application documents and campaign related process plans for process qualification and provide expert advice in the licensing and authorization process.

Furthermore, we perform nuclear simulations based on precise modeling for applications such as

#### CHARACTERIZATION OF RADIOACTIVE WASTE

- Radiological characterization
- Inventory of hazardous materials
- Waste package documentation
- Re-qualification of legacy waste
- Non-destructive measurements
- Uncertainty evaluation and quantification

#### DECOMMISSIONING MANAGEMENT

- Identification of relevant framework conditions
- Planning of technical realization and resources
- Preparation of schedules and test sequences
- Project controlling
- Radiation protection

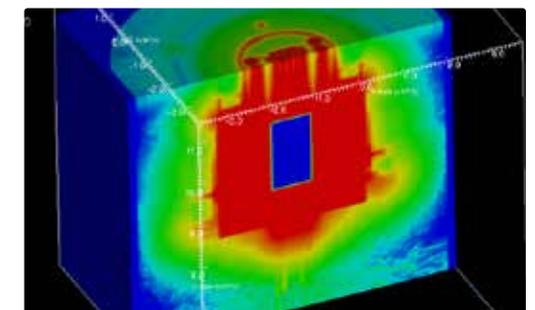
#### NUCLEAR SIMULATIONS

- Calculation of dose maps
- Activation calculations, e.g. for reactor components
- Simulation of measurement systems
- Design of shielding against neutron and / or gamma radiation



radiation transport calculations, determination of activation of materials and modeling of non-destructive measurement systems. In addition, we develop innovative metrological systems for different purposes.

With high expectations to our work, we are open to support our customers in their challenging tasks and offer engineering and nuclear services for the safe, effective and efficient management of radioactive waste.



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### EXPERTS IN NUCLEAR TRAINING

AiNT offers a modular based training program covering fundamental knowledge like „Basics of Nuclear Technology“ as well as advanced modules

to specific topics such as „Decommissioning and Dismantling of Nuclear Facilities“ or „Conditioning, Release and Final Disposal of Radioactive Waste“.



Since 2011, more than 1000 people have participated in the modular training program. Our customers include representatives from utilities, nuclear industry research institutions and regulatory authorities. We cooperate with more than 70 lecturers with outstanding professional

expertise in our seminars. Our customized inhouse trainings are well appreciated by authorities and renowned companies such as Siemens, Westinghouse, CNNC, ROSATOM, German regulations and research institutions like the University of Basel.

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### AIXITEM GMBH - CUSTOMIZED SOLUTIONS FOR NUCLEAR FACILITIES

For 25 years aixITem GmbH has been supporting its customers by providing individual IT solutions.

For nuclear facilities, we offer various customized solutions for the following applications:

#### **aix.Dosi to support dosimetry**

Functions include personal, job and area dosimetry with automatic dose limit monitoring and date checking for configurable events. Access control and other systems are integrated via interfaces. Numerous export and evaluation functions simplify documentation obligations and administrative work. Using a role-based user system and a modular structure, complex application scenarios are configurable. Most importantly, the system aix.Dosi is particularly suitable to support the decommissioning process.

#### **aix.GammaPool for planning and performing gamma spectroscopic measurements**

Our aix.GammaPool program manages in-situ and laboratory measurements. In addition to a clas-

sic software application, planning and evaluation options also include a web-based module. Based on the data of measuring devices aix.Gamma-Pool automatically generates reports, which are required for notifications to authorities (e.g. to organize clearance and disposal). The software is used, among other things, for clearance measurement, for various measurement tasks in radiation protection and for statistical evaluation processes.

#### **aix.GerVer and aix.QuellVer for device and source management**

Our system helps to manage measuring devices and radioactive sources used in nuclear power plants. This includes monitoring the requirements of authorities regarding regular functional testing, calibration and verification.

Individual solutions from aixITem

We customize our applications to our clients' needs. Feel free to contact us. For more information, visit: <https://nuclear.aixitem.de>



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SNC • LAVALIN

**ATKINS**

Member of the SNC-Lavalin Group

### SNC-LAVALIN / ATKINS - ONE OF THE MOST COMPLETE NUCLEAR SERVICES COMPANY

Founded in 1911, SNC-Lavalin is a global fully integrated professional services and project management company and a major player in the ownership of infrastructure. From offices around the world, SNC-Lavalin's employees are proud to build what matters.

Our teams provide comprehensive end-to-end project solutions to clients in nuclear, oil & gas, mining & metallurgy, infrastructure and clean power.

In 2017 we acquired Atkins and became one of the most complete nuclear services companies in the world. With more lines of business, we now provide complete end-to-end offerings for the entire nuclear life cycle.

Our combined Nuclear team of close to 3,000 talented people are part of one of the most complete nuclear services companies in the world.

We're well positioned to design and engineer the next generation of nuclear power plants, inclu-

ding CANDU® reactors and SMRs. Alongside this, we continue to maintain existing generating fleets, project manage and perform life extensions, design, advise and install technology upgrades, and safely decommission and manage the waste from legacy facilities.

Through our subsidiary Atkins Energy Germany GmbH we are providing products and services that help our clients to safely decommissioning their nuclear assets and develop a blueprint for a net zero carbon future. The energy portfolio comprises PMO and Owners Engineer Services, turnkey radioactive waste management and decommissioning of nuclear facilities e.g. large component and reactor removal as well as underground energy storage expertise. Additionally, all products and services of the wider SNC Lavalin / Atkins group e.g. infrastructure, architecture and mobility are available through Atkins Energy Germany GmbH.

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### FREE RELEASE MONITOR FOR NUCLEAR FACILITIES AND NUCLEAR MEDICINE CENTERS

In radiological centers and nuclear medicine clinics, it is often necessary to perform measurements associated with the release from regulatory control of materials and instruments for short-lived radionuclides, such as I-131, Tc-99m, Lu-177, I-123, F-18, etc. Typically, the mass of the measured objects in such applications does not exceed 50 kg.

This work presents the results of the development of a small-sized free release monitor designed for the release of materials and various hand tools of nuclear facilities and labs that weigh up to 50 kg, from radiation control. To increase the registration sensitivity of controlled radionuclides, 12 scintillation units based on a 3" x 3" sized NaI(Tl) crystal were used as gamma-radiation detector. The volume of the measuring chamber of the monitor amounted to 200 liters, and the thickness of the low-background shielding was chosen

50 mm. MDA of the designed monitor for the point sources I-123, I-131, Tc-99m, and F-18 was better than 100 Bq with measurement time not exceeding 60 s.

The results presented in this paper were obtained in the frames of PostDoc Latvia research project proposal No.1.1.1.2/VIAA/4/20/725 of the Dr.Phys SERHII POHULJAI "Development of the Prototypes Family of Free Release Monitors ("Liberator") for the Decommissioning of Facilities of Nuclear Industry" supported by the European Regional Development Fund (contract No.9.-14.5/46 signed between the "Baltic Scientific Instruments" (<http://bsi.lv/en/>) and the "State Education Development Agency" (<https://viaa.gov.lv/eng/>) of the Republic of Latvia).

We express our thanks to this institution for the support of our investigations.



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# BALCKE DÜRR

## BALCKE-DÜRR RÜCKBAU - YOUR RELIABLE PARTNER FOR THE DISMANTLING OF NUCLEAR FACILITIES

Balcke-Dürr is capable of executing lump-sum projects for boiler maintenance, heat exchanger overhauls, cooling tower services and new built or decommissioning of nuclear power stations.

We develop, engineer, manufacture, install and maintain heat transfer and process solutions for highest demands. With our own team of highly skilled and experienced engineers and field service staff we are able to provide you with customized solutions.

### Our services and solutions in nuclear decommissioning

We are specialized for work in nuclear facilities having comprehensive understanding of their working environment and infrastructure which enables us to provide best possible support for decommissioning and dismantling of nuclear power plants.

- Concepts, studies, project management and implementation
- Dismantling projects with own staff and tools
- Various special tools available
- Dismantling planning
- Waste management
- Permits, radiation protection and clearance

We are the innovative partner needed to implement individual solutions in the dismantling of nuclear power plants.

We make the promise to implement the dismantling of nuclear facilities with a focus on safety for people and the environment, compliance with reliable processes using our many years of experience, and cost-efficient implementation through planning and execution that is optimized in terms of time and personnel.



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### EXPERTS FOR MEASUREMENTS IN RADIATION PROTECTION

Radiation protection is one of the most important parts in industrial safety and is subject to strict legal regulations. Exactly for this sensitive area BERTHOLD TECHNOLOGIES provides highly sensitive and reliable instruments.

The Berthold radiation protection division supplies advanced and reliable detection technology for measurement of radioactive contamination, dose and dose rate, activity and airborne radioactivity concentrations. The portfolio ranges from hand-held instruments up to large customer-tailored systems for research, nuclear medicine, nuclear energy and decommissioning.

For many decades, customers have trusted Berthold to support their efforts in creating a healthier world, a safer environment and more efficient manufacturing processes. Our deep understanding of science combined with leading-edge technology empowers our clients with tools and solutions to pursue the most challenging applications - we improve life in meaningful ways.



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### THE DECOMMISSIONING SPECIALIST - PROVEN RELIABILITY IN TOUGH ENVIRONMENTS

It's hard to think of an environment where remote control is more critical than in a nuclear plant. Here, Brokk robots are the preferred choice for nuclear decommissioning and can perform difficult tasks in four main categories:

- Dismantling and size reduction
- Sorting waste material
- Decontamination
- Demolition

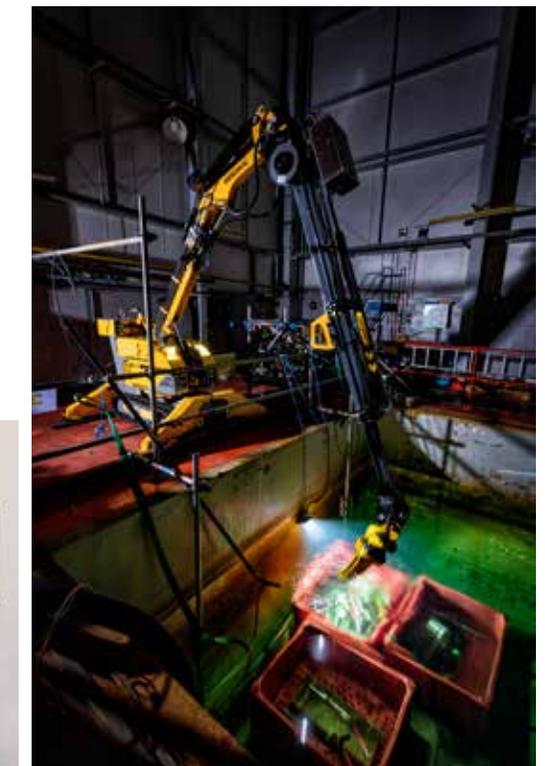
All Brokk robots come with unique features you won't find in typical demolition equipment, plus it can gain access to places where people and other machines can't go.

Remote-controlled handling, heat resistant design, flexible three-arm system, and an electric motor for powerful, quiet, fumeless operation, we leave nothing to chance when it comes to perfecting the performance of our machines. And since the robot is built for adaptability, our engineers can customize the robots to meet your specialized needs.



At Brokk we offer a proven combination of design, engineering and service that can tackle almost any undertaking. With over 8,000 machines working on exciting projects around the world, Brokk has become synonymous with safety, quality and efficiency.

For more than three decades Brokk has been involved in and delivered robots to decommissioning projects all over the world, resulting in an unmatched experience in tailor-made solutions.



## BRENK SYSTEMPLANUNG GMBH

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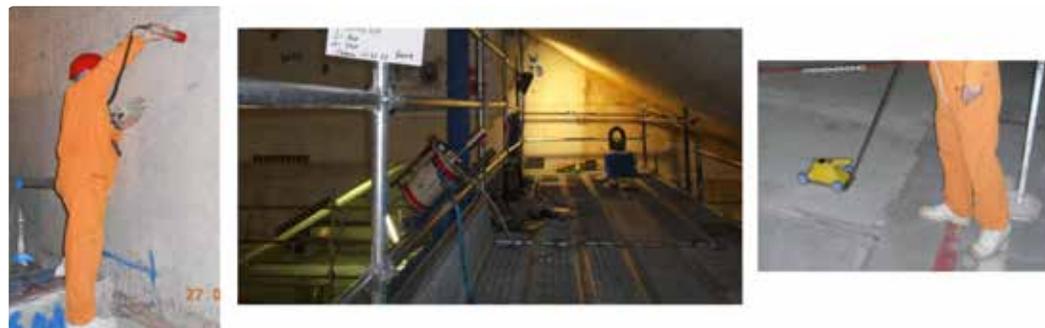
### BRENK SYSTEMPLANUNG GMBH (BS)

BS offers consultancy services for over 40 years. With more than 75 staff (engineers and scientists) we provide expert knowledge in the areas of radiation protection, nuclear technology, radwaste management including disposal, NORM, mining engineering, environmental management, plant/process engineering as well as software development, artificial intelligence, and business analytics. We are a Germany based company with several branch offices. Our customers comprise the private as well as the public sector on national and international level e.g. German and foreign governments and their different regulatory bodies, or IAEA and EC.

Our services in the nuclear sector include all aspects of radiation protection (activation/shielding calculations, dispersion modelling of radionuclides, safety assessments) and decommissioning (concepts, comprehensive support for clearance, radiological characterisation, clearance

measurements, licensing support, waste package optimization). Our remarkable set of specific measurement devices allows us to conduct radiation measurements in a timely manner even under exceptional conditions. Our software tool PUG3 supports an efficient and traceable planning and conduct of all steps of a clearance process from the very beginning. In the field of radwaste management we provide services related to waste processing, interim storages and disposals itself. For the latter our services cover the entire life cycle of a disposal for deep geological and near-surface disposal.

Several of our experts are appointed members of national advisory commissions (Commission on Radiation Protection (SSK), Nuclear Waste Management Commission (ESK)) and working groups of international organizations (IAEA, OECD/NEA).



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### CAEN SyS, THE CAEN SPA SPECTROSCOPY DIVISION - INNOVATIVE NUCLEAR MEASUREMENT SYSTEMS

CAEN SyS, the Systems & Spectroscopy Division of CAEN Spa, is a worldwide leader in development of Radiation Measurements Systems and Spectroscopy Solutions, engaged with high performance operations involving Nuclear Facilities, Measurements Laboratories, Security and Safeguards Applications.

CAEN SyS is committed to delivering exceptional nuclear measurement instrumentation, expertise and technical support, offering radiation detection instrumentation and integrated turn-key solutions with added value and operational benefit for customers, enhancing safety and security through nuclear measurements in the following Areas:

SECURITY, SAFETY & SAFEGUARDS, LABORATORIES.

CAEN SyS Systems & Spectroscopy Division is built upon CAEN traditions of teamwork and partnership. The CAEN Network Companies (or Group) is a cluster of Companies with excellence know-how.



Decades of collaboration and co-development with very large international research projects have maximized CAEN SyS capability to translate customer's needs and expectations into cost-effective and reliable solutions.



CAEN SyS enormously benefits from its foundational relationship with CAEN, a world leader in designing multi-input electronics for a wide range of radiation detectors, and nowadays is involved in several leading-edge R&D collaborative projects, to continue expanding and developing expertise in high-level electronic design, and to extend competence and skills into complementary and relevant applications for the benefit of the community.

The longstanding expertise along with the full range of products and service provided by the CAEN Network Companies (or Group) allow CAEN SyS to be at the forefront of innovation and excellence within the culture of safety and security.

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### CYCLIFE IS YOUR STRATEGIC PARTNER FOR YOUR NUCLEAR DECOMMISSIONING AND WASTE MANAGEMENT PROJECTS

As an European pioneer, Cyclife group offers integrated servicing in nuclear decommissioning and dismantling as well as radioactive waste management through its subsidiaries. Applying EDF's unique waste-led decommissioning approach, Cyclife works with its customers in reducing costs and waste generation, by optimising programmes and recycling valuable material through its subsidiaries.

The three nuclear licensed facilities of Cyclife, based in France, the UK and Sweden, treat VL to LL waste, provide best available techniques for radwaste treatment and material recycling. Their services go from waste management and decommissioning consultancy to large component management, decontamination, waste-size reduction, melting, incineration and to pyrolysis. The group has a commercial structure in Germany.

Cyclife owns engineering and expertise centres that define scenarios for the full decommissioning of nuclear installations with highly skilled teams, using cutting-edge technologies and developing innovative tools and processes:

- Cyclife Digital Solutions performs simulations and studies with a robust real-time 3D digital tool, DEMplus® for nuclear, as a decision-making support
- Quadrica delivers digital twin solutions based on its own MySurvey® and VirtualSurvey® apps
- Cyclife Engineering and Graphitech, a joint venture of Cyclife and Veolia Nuclear Solutions, are dedicated to the decommissioning of types of reactors, the design of innovative remote tooling, and of waste storage/treatment facilities
- Waste2Glass, a joint venture of Cyclife and Veolia Nuclear Solutions, aims to treat some radwaste utilising Geomelt® vitrification process
- Aquila Nuclear Engineering creates containment, shielded equipment, remote handling and transport/packaging for the nuclear industry

Cyclife applies EDF's unique waste-led decommissioning approach to reduce costs and waste generation, to optimise plannings and recycle valuable material when possible.

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### DORNIER NUCLEAR SERVICES GMBH – THE EXPERTS FOR NUCLEAR DECOMMISSIONING

Dornier Nuclear Services GmbH is a member of the Dornier Group, which brings together several companies to jointly assist our clients in the implementation of projects and provide guidance in decision-making processes. The Dornier Group is a global one-stop shop for engineering services with a focus on the infrastructure sector. A functioning and interlocking infrastructure plays a pivotal role in the 21st century and is a basic prerequisite for progress.

The number of nuclear power plants reaching the end of their lives, either for technical or political reasons, is increasing every year. Dismantling nuclear facilities, as well as dealing with radioactive waste and residual materials and treating them prior to final disposal poses great challenges for operators of nuclear facilities. We offer comprehensive know-how to support the entire process.



We have set ourselves the target of enabling our customers to dismantle their nuclear facilities safely and efficiently. To this end, our holistic disposal planning covers the topics of dismantling planning, disposal planning, packaging planning, radiation protection and repository documentation. Our highly motivated team of experts will provide you with solution-oriented and expert support for your individual tasks.

Our disposal planning maps out a decommissioning project through to disposal or clearance. The documents required for release or repository documentation are planned and maintained. We plan verification strategies and coordinate sequence schedules and documents within the scope of the supervisory and repository procedures in order to ensure efficient and easily verifiable repository documentation. This includes a certified team of radiation protection specialists who provide you with optimum operational support on site and train your staff.



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**DSD HEAVY LIFT AG: CONCENTRATED COMPETENCE FOR HEAVY LIFTING AND DISMANTLING IN THE NUCLEAR SECTOR**

DSD Heavy Lift AG offers its customers innovative solutions for handling heavy loads that are tailored to their needs. Our field of application ranges from infrastructure projects to nuclear dismantling. Although the company has only existed as a subsidiary of DSD Steel Construction AG since January 2022, the team consists of experts, some of whom have over 30 years of experience in the industry. Mechanical engineers, construction engineers, hydraulics experts, assembly teams, and mechanics work closely together in the company. Due to the high level of expertise, DSD Heavy Lift AG offers solutions for the effective and, above all, the safe dismantling of power plants as well as nuclear power plants and special solutions in the heavy lift sector.

Our services at a glance:

- Engineering, special solutions
- Consulting, planning, coordination, assembly, and dismantling
- Moving, lowering, and lifting components
- Crane work, road transport

We place particular emphasis on effective and safe work in order to deliver on time and reduce safety risks to an absolute minimum. We were able to demonstrate our cumulative expertise in our very first project: We worked on the construction of the Braila Bridge over the Danube in Romania, the largest suspension bridge in Europe. Our task was to lift and move 86 parts with a total weight of 50,000 t over a length of 1.9km without any incidents. We worked on the construction site with a team of up to 32 men, including numerous specialists. This enabled us to complete the project successfully, safely, and within the specified time frame. In the future, DSD Heavy Lift AG will successfully implement many more challenging projects in order to make a name for ourselves in the market and to continuously grow at a healthy rate.

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**FORTUM & UNIPER NUCLEAR SERVICES – COMPREHENSIVE NUCLEAR DECOMMISSIONING AND DISMANTLING SERVICES**

Fortum & Uniper have combined their experiences and competences related to nuclear decommissioning and started to offer services under joint Fortum & Uniper Nuclear Services (FUNS) cooperation. Our capabilities and experience ranges from decommissioning of research reactors to full scale nuclear power plants covering comprehensively the whole value chain of nuclear decommissioning projects.

**Decommissioning planning**

Our approach to decommissioning planning considers waste treatment and disposal solutions as early during operation as possible enabling optimization of waste management operations and minimization of the costs of decommissioning. We can support in all questions related to decommissioning planning, including e.g. strategy planning, dismantling and waste management planning and radiation analyses.

**Pre-decommissioning and facility shutdown**

Well-prepared decommissioning ensures the safe and efficient decommissioning of a facility, and minimizes delays and undue costs. We have

capability, experience and know-how also from utility point of view to support our clients in all pre-decommissioning activities to achieve timely and cost effective projects, or support in a specific area such as licensing, waste management or cost analyses.

**Dismantling**

We have capabilities to perform even the most demanding dismantling activities, including large components (RPV, RPVIs, biological shield, steam generators etc.), volume driven dismantling and heavy liftings. FUNS has decades of experience in large component dismantling from projects in the Nordics and Central Europe with excellent track record.

**Waste Management**

FUNS has unique knowledge of treatment and handling of activated and contaminated nuclear waste. Based on our long experience in treatment and disposal of nuclear operational and decommissioning wastes, we are able to optimize the waste management of a decommissioning project.

**Project management**

Successful project management is required in complex decommissioning projects. We have first-hand experience in delivering and managing projects ranging from large decommissioning programs in Sweden to individual dismantling projects and small cost optimization studies.



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### FRAMATOME IN GERMANY - OUR CUSTOMERS' PERFORMANCE IS OUR EVERYDAY COMMITMENT!

Framatome is a major international player in the nuclear energy market recognized for its innovative solutions and value-added technologies for designing, building, maintaining and advancing the global nuclear fleet. The company designs, manufactures and installs components, as well as fuel and instrumentation & control systems for nuclear power plants and offers a full range of reactor services.

With 15.000 employees worldwide, every day Framatome's expertise helps its customers improve the safety and performance of their nuclear plants and achieve their economic and societal goals.

Framatome is owned by the EDF Group (75.5%), Mitsubishi Heavy Industries (MHI – 19.5%) and Assystem (5%).

Framatome in Germany also offers a competitive solutions portfolio for the post-operational-phase and dismantling of nuclear power plants which contains: dismantling of large components (RPV, RPV internals, steam generator etc.), engineering, dismantling scenario studies, system decontamination, sampling, characterization, radiation protection, waste management, waste treatment and back fitting of (mobile) operating systems.

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### INNOVATIVE MEASUREMENT SYSTEMS FOR THE DETECTION OF IONIZING RADIATION IN AIR, WATER AND MATERIALS

GIHMM is an Austria-based manufacturer (formerly BITT Technology) of radiation measurement systems, specializing in radiation early warning systems, measurement of ambient radioactive radiation, in-situ isotope identification, alpha, beta, gamma aerosol activity, as well as monitoring control and data acquisition. GIHMM products are used in national systems for radioactivity measurement, aerosol measurement systems for breathing air, food analysis and waste and drinking water analysis systems.

GIHMM is an official and internationally accredited calibration laboratory with almost 50 years of experience in the development, design and manufacture of radiation measurement systems and total solutions. Especially known for our national environmental early warning and monitoring systems, we have installed complete systems in many countries worldwide. GIHMM works locally

with dedicated, well-trained service partners who share the same understanding of the high-quality GIHMM products, solutions, and services that we deliver to our customers.

Regarding the continuous development of future products and solutions for our industry, in 2023 GIHMM will present an innovation in scintillation technology based on the latest developments in electronics and data acquisition (EDAQ) from large-scale nuclear physics experiments. Just as GIHMM revolutionized environmental monitoring for the detection of ionizing radiation in 1980 with the introduction of a proportional counter with a dose rate measurement range over 9 orders of magnitude to 10 Sv/h, GIHMM will introduce the first scintillation detector with spectral measurement for a dose rate range of over 9 orders of magnitude. This enables very fast and accurate isotope identifications from low to high energy.



## GNS GESELLSCHAFT FÜR NUKLEAR-SERVICE MBH

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### EXCELLENCE FOR NUCLEAR

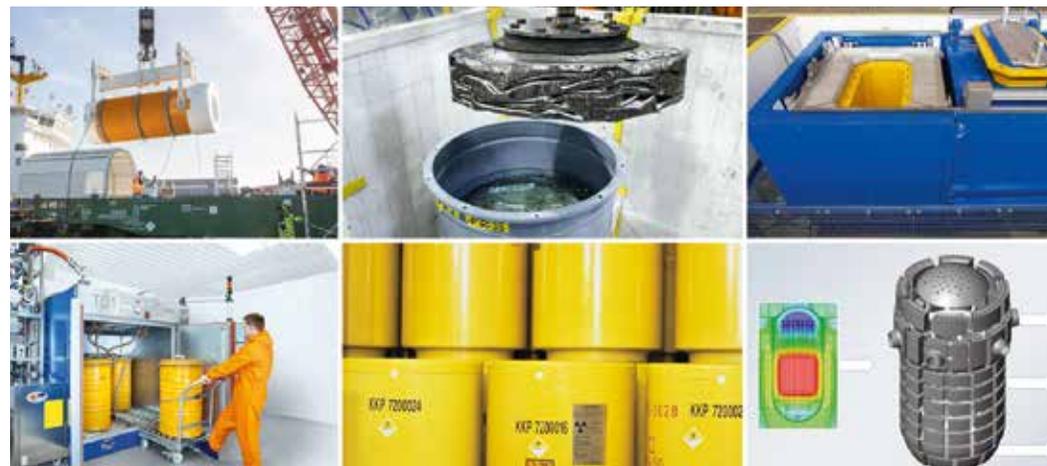
GNS Gesellschaft für Nuklear-Service mbH offers comprehensive solutions for the management and disposal of spent nuclear fuel and all types of radioactive waste from the operation of NPPs based on its nuclear expertise of more than 40 years. For all phases of decommissioning GNS offers solutions from defueling to dismantling and packaging of RPVs and their internals and also other primary circuit components. Experienced activation calculations facilitate efficient cutting and packaging as well as minimal dose rates.

Almost 2.000 spent fuel/HLW casks of the CASTOR® and CONSTOR® type and around 9.000 MOSAIK® casks and GNS Yellow Boxes® for ILW are in use today in a number of countries on four continents. This makes GNS the world's top supplier of shielded transport and storage casks. For more than three decades, GNS has been responsible for the management of all the radioactive waste and the spent nuclear fuel resulting from the operation of the German NPPs. Its

products and services comprise the design and manufacturing of casks and containers for ILW and HLW, the construction of equipment for conditioning and packaging of wastes as well as the operation of conditioning facilities and preparations for final disposal. For nearly three decades GNS also operated the central interim storage facilities for HLW, ILW and LLW at Gorleben and Ahaus.

GNS treats both solid and liquid radioactive waste and applies suitable treatment processes to ensure acceptability of the waste for interim storage and final disposal. In this context a large number of data and information needs to be acquired, documented and updated. For that GNS offers comprehensive software and database solutions, e.g. for tracking operational waste or residues from decommissioning.

With its more than 800 employees, the companies of the GNS Group achieve an annual turnover of around 250 million euros.



## HATCH LTD.

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### WE BUILD PRACTICAL SOLUTIONS THAT ARE SAFE, INNOVATIVE AND SUSTAINABLE

Hatch is passionately committed to the pursuit of a better world through positive change. We embrace our clients' visions as our own and partner to develop smarter, more efficient, and innovative ideas. Our global network of 10,000+ professionals work on the world's toughest challenges. Our experience spans over 150 countries worldwide in the energy, metals, infrastructure, digital, and investments market sectors.

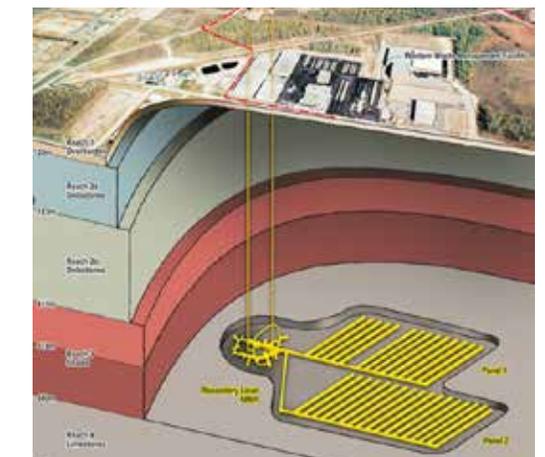
We are employee-owned and independent—free to bring our best thinking to your business. Our exceptional, diverse teams combine vast engineering and business knowledge, working in partnership with our clients to develop market strategies, manage and optimize production, develop game-changing technologies, and design and deliver complex capital projects.



# HATCH

We work closely with the communities in which we serve to ensure that our solutions optimize environmental protection, economic prosperity, social justice, and cultural vibrancy. We want their businesses, ecosystems, and communities to thrive, both now and into the future. As we transition to a low-carbon economy, the world is looking to nuclear as a key component of the energy mix.

The next generation of reactor designs are on the brink of commercialization, and new markets are emerging. Innovative thinking in waste management and execution of new builds is more important than ever to achieve our global environmental goals. Concerns related to safety, decommissioning, and storage are actively being addressed, and ground-breaking advances are leading to safer, more practical nuclear operations. With nuclear, the possibilities are endless for our greener future. Big. Small. New. Decommissioned. Refurbished. Whatever your plans, whatever your scope. We can help.



## HUSQVARNA DEUTSCHLAND GMBH

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### SHAPING GREAT EXPERIENCES

At Husqvarna Group we've worked with constant innovation since 1689, it's in our DNA. Rifles, motorcycles, the world's first solar powered lawnmower and vibration free chainsaw, diamond tools and demolition robots – the list of our historical achievements can be made long. 2009 - The first remote-controlled demolition robot is launched.

The Construction Division

With a focus on innovation and customer support, our Construction Division is a global leader in machinery and diamond tools for the construction and stone industries. Our construction products are used exclusively by professionals – so they're built for high-level performance, reliability and superior support. We're investing in innovation to continue developing the widest, most effective and most powerful product range on the market. Its foundation is built on product and technology leadership ensured by high investment levels in user-centered product development to offer

professional users the most efficient and powerful solutions in market. Products and solutions are distributed globally in all relevant sales channels. Our vision is to make a difference for those who shape urban environments. We want all people to have a great place to live, work and spend time with family and friends. In a future of growing populations, mega cities, emerging markets quickly developing etc it is critical that everyone not only have a place to live and that there is infrastructure to support all of this but it should also be great.

Products from Husqvarna Construction are: Light Compaction machinery, Dust and Slurry Management, Sawing and Drilling machines, Demolition products, diamond tools, wire saws, floor saw and Power cutters.

The latest products are surface and flooring machines like shotblasters, floorgrinders, scarifiers, scrapers.

### Important milestones



### Short facts Husqvarna Construction



Total net sales in 2021 amounted to **SEK 7.2 billion**



**Leadership positions** in machinery and diamond tools for the construction and stone industries

Sales in more than **100 countries** and Production plants in **14**



Approximately **2,800 employees** globally

Sales channels are **distributors & dealers, rental and direct sales**



Growth through acquisitions, most recent in 2022 was **Heger**

**IEM FÖRDERTECHNIK GMBH**

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**IN-HOUSE TRANSPORT OF LLW**

IEM FörderTechnik GmbH is a leading provider of material flow systems for bulk and piece goods handling for more than 50 years.

Our business unit Nuclear Decommissioning is specialized in the development of proper and secure transport systems as well as disposal methods for nuclear facilities.

It's our task to design conveyor systems for the most diverse stages of dismantling / decommissioning and to adapt these systems to the special requirements of each individual nuclear facility. We develop and manufacture conveying solutions for the whole process as well as for individual tasks within the process.



IEM FörderTechnik is your partner for:

- Feasibility studies of in house transport logistics and handling processes
- Conveying systems for handling of bulk materials, e.g. concrete demolition waste, by dust proof trough chain or corrugated belt conveyors
- Conveying systems for piece goods (barrels, transportboxes and containers)
- Airlock systems with radiological monitoring
- Handling systems for low level waste
- Mobile barrel testing systems
- Barrel tipping systems for residual material processing



## KONECRANES NUCLEAR EQUIPMENT & SERVICES

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### KONECRANES IS A WORLD-LEADING GROUP OF LIFTING BUSINESSES™

Konecranes is a world-leading group of Lifting Businesses™, serving a broad range of customers, regardless of your lifting needs, Konecranes is committed to providing you with lifting equipment and services that increase the value and effectiveness of your business.

The Konecranes organisation brings the expertise of Konecranes Nuclear Equipment and Services (KNES) providing cranes designed specifically for nuclear applications combined with our experience in providing cost effective designs with shorter delivery periods using our state of the art COTS crane components (especially suited to Decommissioning Applications).

Our quality control program ensures that each nuclear crane and component is designed to meet or exceed all mandated standards.

Service & Modernization – our extensive network services all makes and models of material hand-

ling equipment worldwide to support the nuclear industry.

Services include outage support, inspections, repairs and maintenance. We provide any OEM parts for any brand of overhead crane or hoist including re-engineered & re-manufactured parts (motor rewinds, brakes, etc.).

RailQ generates 3D and 2D graphs of the runway rails and identifies misalignment and other problems of your cranes.

RopeQ wire rope inspection - visual and Non-Destructive (NDT) rope inspection service that examines what you cannot see with a visual only inspection.

Please do not hesitate to contact us through our website. We would be happy to help solving your lifting challenges.



## KRANTZ GMBH

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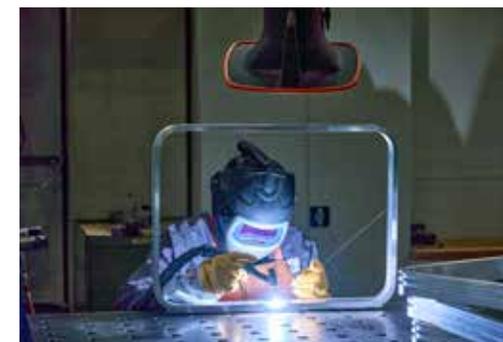


### KRANTZ - 140 YEAR 'S OF EXPERIENCE - TRADITIONALLY COMMITTED TO THE FUTURE

Clean air is one of the elementary preconditions for quality of life and human health. That is why it is important that the air we breathe day after day is treated well. We take this task very seriously. We are the expert partner at your side at all times, especially concerning plant construction and ventilation services for nuclear power stations. Our products enjoy an excellent reputation and are used where quality and reliability matters, in both public and in commercial buildings. Examples are clean rooms, nuclear installations, high security laboratories and isolation wards.

Krantz offers a broad assortment of very different products and services for one common theme - clean air!

**Air Technologies:**  
Customized solutions for sensitive environments. HVAC systems for nuclear applications incl. I&C, installation, service and maintenance. Assessment, conception, planning, consulting, licensing documentation, pre approval documents (PAD), execution, modification and system customization, documentation, commissioning.



#### Filter & Damper Systems

Components for Decommissioning and Dismantling as also new builds:

- Safe Change Filter Housings
- Recleanable HEPA Filter Housings
- Gastight Shut-Off Dampers
- Non Return Dampers
- Pressure Surge Dampers

#### Clean Air Solutions

Deals with environment-related processes, in particular with the treatment of industrial exhaust air laden with hydrocarbons.

Our system technology is based on thermal afterburning, i.e. oxidation of hydrocarbons to carbon dioxide and water. Among all exhaust air treatment systems applied for the treatment of exhaust air contaminated with hydrocarbons, thermal afterburning systems achieve the highest destruction yields and meet the strictest emission Limits.

#### Air & Climate Solutions

The range of products and systems includes air outlets for commercial and industrial applications, cooling and heating systems as well as facade mounted ventilation systems:

- Ceiling Air Outlets
- Sidewall Air Outlets
- Floor Air Outlets
- Displacement Outlets for commercial and Industrial Sector
- Chilled Sails

## MIRION TECHNOLOGIES (CANBERRA) GMBH

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## MIRION TECHNOLOGIES (CANBERRA) GMBH

Mirion Technologies is a leading provider of products and services related to measurement, detection and monitoring of radiation. Mirion is built on 60 years of experience in research, problem-solving and product development. We approach our work through a lens of curiosity and rigor, with a spirit that compels us to question and constantly drive innovation in our field

As one of the global leaders in radiation measurement with over 1800 talented professionals, the mission is driven to protect people, property and the environment from the harmful effects of ionizing radiation.

To serve our customers all over the world Mirion maintains locations on different countries. Therefore, we can provide local support according to the country specific requirements for radiation safety.

The portfolio of Mirion Technologies embraces a large variety of solutions for spectroscopy, radiation detection health-physics and camera applications.

For D&D and especially for NDA applications Mirion has broadened their portfolio to provide solutions also for challenging projects. By applying state of the art of technology and science and following the customer's needs, these products are constantly developed further.

Mirion works with great partners to always be able to provide the best solutions and expand possibilities. Especially automatization and robotics applications are a new, exciting field for D&D applications.

Visit our booth to learn more about our capabilities for D&D and radiation safety. We are looking forward exchanging with you!



**MIRION**  
TECHNOLOGIES



## NUCLEAR CONTROL & CONSULTING GMBH

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### FINDING THE BEST SOLUTIONS FOR OUR CUSTOMERS IS OUR PRIMARY GOAL

Nuclear Control & Consulting GmbH (NCC) was founded in 2008. NCC offers specialized advisory and consultancy services for practices and for the handling of radioactive sources and materials.

Our staff with 12 experts is highly qualified in radiation protection, in environmental protection as well as in health and safety. NCC's offices are in Leipzig (main office), Berlin, Brunswick, and in the Cologne region.

NCC works on projects in Germany and internationally, e.g. in Austria, Belgium, France, Japan, Norway or Switzerland.

High technical standards must be met for the planning and for the preparation of radiation protection licensing documents. NCC accompanies customers in their licensing procedures with:

- Plant engineering, process optimization, design of radiation protection areas and basis of technical standards
- Creation of approval documents and management plans, best available technology studies
- Support in authorization procedures (licensing of practices, notification, exemption)
- Planning of radiation protection actions and periodic safety reviews (mitigation, reduction and optimization of radiation exposures)
- Environmental, health and safety consulting services, radiation protection training, radiological surveys
- Planning of decommissioning measures for nonnuclear installations
- Waste treatment, recycling, disposal and clearance
- Support of transportation and international shipment



## NUKEM TECHNOLOGIES ENGINEERING SERVICES GMBH

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### NUKEM TECHNOLOGIES ENGINEERING SERVICES – YOUR PARTNER FOR NUCLEAR ENGINEERING SOLUTIONS

The NUKEM Technologies Group is world-wide active in the areas of radioactive waste management, the decommissioning of nuclear facilities and engineering.

Our engineers offer the entire range from concepts and feasibility studies up to development, procurement and supply of waste processing facilities as well as construction of complete waste treatment plants.



The decommissioning, decontamination and dismantling of nuclear facilities require not only a comprehensive technical know-how, but primarily a solid understanding of legal approval procedures. Our long-standing experience is instrumental in determining the needs of the operators of nuclear power plants or other nuclear facilities. We offer our customers a broad spectrum of services in engineering and consulting as well as radiation protection.

Consistent customer focus and quality management are fundamental to our corporate policy. We place a high premium on personalised customer service, timely project completion, providing our customers with clear and comprehensible documentation and superior quality products. A visible sign of our emphasis on quality is our quality assurance system based on DIN EN ISO 9001:2015. Furthermore, we are certified pursuant to DIN EN ISO 14001:2015 and ISO 45001. In addition, we hold other international certificates issued in Russia, Lithuania and France.



**PEDI AG**

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### ALPHA-TIGHT HOUSINGS AND PROTECTIVE SYSTEMS FROM PEDI ENSURE THE PERSONAL AND ENVIRONMENTAL SAFETY DURING DISMANTLING PROCEDURES

Since more than 60 years, PEDI AG is a competent partner for the nuclear industry all over Europe. The company is specialized in developing, manufacturing and selling of protecting and shielding products for persons and environment. During the dismantling process of radioactive contaminated equipment, components or building structures, the use of tight housings or encasements is necessary, stopping the distribution of airborne particles and dust. For this purpose, PEDI uses flexible housing materials with high mechanical properties and certified for the use for alpha-tight encasements. A so called dismantling tent serves as a work place for cleaning or maintenance or dismantling activities. Particularly, it can be used for storage or handling of radioactive substances in solid, liquid or gaseous condition. The decontamination tent includes a solid frame structure and a flexible housing. The frame structure remains completely outside of the tent, so it remains free of contamination. The inner space of the housing is completely empty and easy to clean. The housing is permanently evacuated

down by 200 Pa. After use, the tent housing will generate a minimum of waste in weight and volume.

In the field of Personal Protective Equipment, a vast range of established protective suits and auxiliaries is available: Depending on the method of operation, the suits are designed for integral ventilation or to wear with mask, for single or multiple use, for light or heavy works. For the ventilated suits, a breathing air supply is needed. The PEDI air supply and air distribution components are engineered for high reliability, durability and long life cycle. Due to these characteristics, PEDI products assure an immediate readiness for operation at every time.

Airborne particles can be collected with a variety of air samplers, test swabs (smear tests) and screening tests, allowing an efficient air monitoring right around the clock.

More information on [www.pedi.ch](http://www.pedi.ch)

**SAFETEC GMBH**

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WEB www.safetec-strahlenschutz.de

### SAFE INTO THE FUTURE

For more than 20 years Safetec has dedicated itself to its customers' success – with foresight, social responsibility and industry-specific know-how. It is our genuine aspiration to protect the environment and people's health on the highest possible level still seeking to improve that on a daily basis.

Therefore, we understand ourselves as reliable and sustainable problem solvers – for the benefit of our national and international customers.

Our workforce consists of specialists from various professions, e.g. technicians & engineers for radiation protection, nuclear decommissioning, measuring technology, waste

treatment and storage and related project management. We are also very proud that we qualify the majority of our own workforce through our Safetec academy approach which is also open for external partners who want to benefit from our educational expertise.

We are convinced that our success is truly based on our willingness and ability for mutual exchange and experience sharing. Thus, we are actively networking with our market partners and various professional societies and institutions within Germany.



# MIT SICHERHEIT IN DIE ZUKUNFT

Ein Blick ins Zukunftsgeschehen  
SE  
TC

**ROBUR ENERGY GMBH**

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WEB www.robur-energy.com

**MORE THAN 30 YEARS OF EXPERIENCE AS A SUCCESSFUL SERVICE PROVIDER**

ROBUR ENERGY is part of ROBUR, an industrial service provider with more than 3,000 colleagues. With more than 30 years of experience as a successful service provider and about 250 employees we support nuclear power plants, nuclear facilities and manufacturing firms. Experienced, specialized teams for maintenance, inspection, decommissioning and waste management, as well as our well-established proprietary EAM software (incl. operations management/waste tracking systems for NPPs) ensure successful projects.



Our NPP services include:

**Post-operation & dismantling**

- Decontamination, gutting and demolition of components and buildings/NPP as well as entire sites ("greenfield")
- Removal and decommissioning of highly contaminated systems, machines and plants using powerful equipment and remote-controlled appliances
- Cross-departmental decommissioning projects
- Operating residual material processing centers
- Provision of specialist personnel to support post-operation and decommissioning as well as decontamination and waste management

**Handling & conditioning**

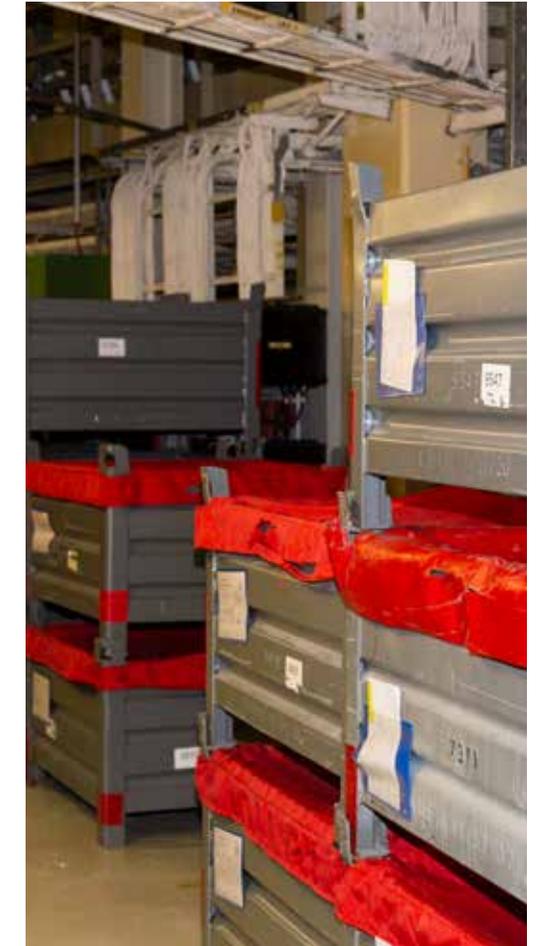
- Disassembly and sorting of contaminated waste with consideration to nuclide vectors and acceptance criteria
- Assessment and radiological characterization of historical waste according to waste disposal legislation
- Conditioning and waste package production for the final repository, incl. disposal documentation
- Planning/implementation of waste treatment systems, special machines, remote controlled systems

**Site cleanup & greenfield solutions**

- Disposal planning for waste material eligible for clearance
- Complete solutions for the operation of waste management facilities
- Disposal/handling solutions for (TE)-NORM waste
- Clean up of hazardous waste from industrial sites



**ROBUR ENERGY**  
IHR KRAFTWERKSSPEZIALIST

**Our licenses & certifications**

- Permission in accordance with § 25 StrlSchG
- DIN ISO 45001 & SCCP/SCC\*\*/SCP
- DIN EN ISO 9001 & KTA 1401
- Handling agent for hazardous waste (KrwG)
- Asbestos and man-made fiber removal, work in contaminated areas

**RODIAS GMBH**

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**WE RAISE ASSET LIFECYCLE MANAGEMENT PROCESSES TO INDUSTRY 4.0 LEVEL**

RODIAS is a medium-sized IT services company specializing in asset and maintenance management solutions for buildings, facilities and complex industrial plants. With an agile and innovative approach, based on the latest software technologies, we are enabling digital transformation for our customers. In addition to customer-specific implementations of the market-leading products IBM Maximo and Infor EAM, we have developed our own solutions around our focus area EAM (Enterprise Asset Management).

One example is our Insight Control Panel (ICP) product suite, which includes components for resource planning, mobile data access and for mobile capturing of maintenance data. ICP works as a middleware solution, following the idea of RAD (Rapid Application Development) environment. In the backend it communicates with IBM

Maximo, Infor EAM, SAP PM or other ERP and legacy systems to facilitate system-overarching processes.

Our portfolio also includes proven solutions for Internet of Things (IoT) and for smart analytics in the context of condition-based maintenance and predictive maintenance. In terms of enterprise asset management solutions, our openBMS is the de-facto standard for the nuclear industry in the German-speaking market.

For the decommissioning and dismantling of large industrial facilities, such as nuclear power plants, we have developed a special range of services and software solutions in recent years. Our solution for the planning and execution of large decommissioning and dismantling projects consists of three components.

With the planning component, it is possible to create an overall plan according to standard patterns and to successively refine this plan.

With the optimization component, large, complex plans can be optimized with regard to time or total costs using mathematical methods. For this purpose, RODIAS is developing OPTRIA together with KIT, which can be used as an add-on to existing planning management tools.

In close cooperation with our customers, we have developed software for tracking dismantling materials. It supports the entire process from dismantling to disposal. There is also a mobile client that can be used both online and offline.

**RODIAS**

YOUR DIGITAL TRANSFORMATION SPECIALIST



RODIAS was founded in Mannheim in 1984 and today stands for continuity and reliability in the industry as a recognized and independent specialist for consulting, design, optimization and implementation of EAM processes and solutions. Since 2018, RODIAS has been part of ROBUR Industry Service Group. We are the service provider for the digital transformation and digitalization of the professional industrial services market. In 2020 the former GIS - Gesellschaft für integrierte Systemplanung mbH and EAM Software GmbH have merged to RODIAS GmbH. The company is based in Weinheim near Heidelberg, Germany. Currently, RODIAS employs more than 80 people across several locations in Germany.

Components of an Enterprise Asset Management System



Areas of application for an Enterprise Asset Management System

**360° DIGITAL DRIVEN DISMANTLING**

## SCHMINKE KRANTECHNIK GMBH

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### WIR SIND IHR PARTNER BEI DER ANSCHAFFUNG, PRÜFUNG UND INSTANDHALTUNG IM BEREICH DER KRAN- UND HEBETECHNIK.

Seit der Übernahme der Heinzel Kran- und Stahlbau GmbH in 2016 realisieren wir Neuanlagen und Einbauten insbesondere für den Einsatz in der Kerntechnik gem. KTA. Auch gehört der Sondermaschinenbau und Sonderanfertigungen in Edelstahl für den Kraftwerkseinsatz zu unseren Leistungen. Unser Portfolio umfasst u.a. Projekte im Aus- und Rückbau, Erweiterungsmaßnahmen, Umbauarbeiten, Modernisierungen bestehender und die Inbetriebnahme neuer Anlagen.

Als zuverlässiger Servicepartner garantieren wir mit unseren fest angestellten und bestens ausgebildeten Servicetechnikern professionelle Arbeiten in allen Bereichen von Kernkraftwerken.

Unser Kransachverständiger berät Sie in Fragen der Konstruktion, Sicherheit und Perfomance, bei der Aus- und Weiterbildung Ihrer Mitarbeiter und bei der Erstellung von Gefährdungsbeurteilungen.

Die Zertifizierungen nach EN 1090-3 (EXC3), EN 1090-2 (EXC4), ISO 9001, EN ISO 3834-2 und KTA 1401 liegen vor.

Wir freuen uns, Sie auf der ICOND2022 persönlich kennenzulernen und auf gemeinsame Projekte und Herausforderungen!



# SCHMINKE

## KRANTECHNIK

### WE ARE YOUR PARTNER IN THE FIELD OF CRANE AND LIFTING TECHNOLOGY.

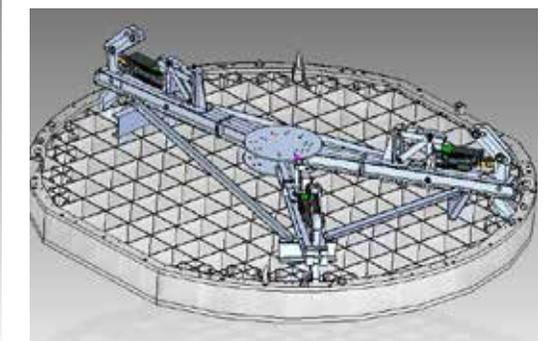
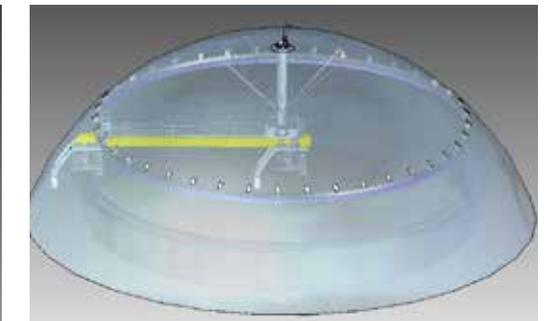
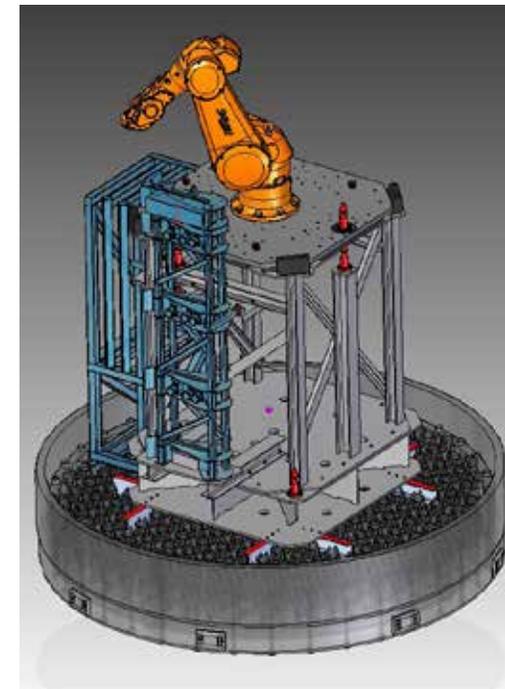
Since the takeover of Heinzel Kran- und Stahlbau GmbH in 2016 we realize new facilities and installations especially according to KTA. Special machine construction in stainless steel for use in power plants are also part of our services. Our portfolio includes, among other things, projects in construction and dismantling, enhancement measure, reconstruction, modernization of existing facilities and the commissioning of new installations.

As a reliable service partner, we always guarantee professional work with our permanently employed and highly trained service technicians.

Our crane expert advises you in questions of design, safety and performance, in the training and further education of your employees and in the preparation of risk assessments.

We are certified according to EN 1090-3 (EXC3), EN 1090-2 (EXC4), ISO 9001, EN ISO 3834-2 and KTA 1401.

We look forward to meeting you in person at ICOND2022 and to joint projects and challenges!



## STÄUBLI FLUID CONNECTORS

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# STÄUBLI

### DELIVERING FAILSAFE CONNECTIONS IN A SAFETY-CRITICAL SECTOR

As one of the leading manufacturers of quick connector systems, Stäubli covers connection needs for all types of fluids, gases and electrical power.

Robust, long-lasting connectors for hostile environments, Stäubli offers a broad range of connection solutions for all fields within the nuclear industry. Our highly safe, reliable couplings, multi-couplings, electrical connectors and equipped hoses are designed for sensitive applications such as quick connection of fluid and electricity circuits, as well as energy supply, breathing air supply, filling and draining, contaminated fluid sampling and transfer of effluents. Thanks to many years of experience in the design and manufacturing of solutions for harsh environments, our components feature robustness and long service life. Our quick-release coupling solutions are a key element in ensuring the reliability of the entire

nuclear power generation process. This is why we are proud to work with the major players in the nuclear industry worldwide. As a long-standing partner of the sector for over 60 years, our experts fully understand your issues and expectations in terms of connections. They provide the best, most appropriate response, throughout the entire lifetime of your installation, from the definition of your requirements through to the dismantling of the structure.



Stäubli:  
Advanced  
connection  
solutions  
for every  
industry.



## SWECO

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# SWECO



### SWECO – TRANSFORMING SOCIETY TOGETHER

Sweco should be approached with high expectations. We promise to be an approachable and committed partner. Working with Sweco should be easy and we will do our best to understand your needs better than anyone else. We also promise to make sure that we always offer you the right expertise for your needs. Whatever your challenge, you can count on Sweco to find a solution.

Sweco plans and designs the sustainable communities and cities of the future. Together with our clients and the collective knowledge of our 18,500 architects, engineers and other specialists, we co-create solutions to address urbanisation, capture the power of digitalisation, and make our societies more sustainable.

We harness our expertise as solutions for the energy revolution and sustainable industry and society.

Sweco is Europe's leading engineering and architecture consultancy, with sales of approximately SEK 21 billion (EUR 2 billion). The company is listed on Nasdaq Stockholm.

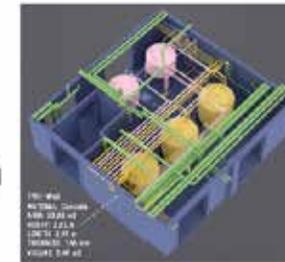


### SMART SOLUTION FOR PRE-DEMOLITION AUDIT

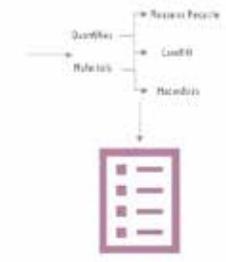
AREA  
LASER SCANNED



DIGITAL TWIN  
CREATED



INVENTORY OF  
MATERIALS AND QUANTITIES



SWECO

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**TRAWEMA PROVIDES PORTABLE COLD CUTTING AND MACHINING SOLUTIONS WITH A GROWING APPLICATION FOR NUCLEAR DECOMMISSIONING/DISMANTLING.**

Trawema GmbH, located in a close proximity to Cologne/Aachen, provides machinery and equipment to customers around the globe for performing dedicated on-site (in-situ) machining tasks for repair and dismantling applications. Team Trawema represents together more than 10 decades of expertise and experience in developing mobile and flexible tools for operations in complex environments, offering economical and practical solutions. We regularly work in the energy industry, such as maintenance of power plants, as well in heavy industries like mining and steel production. In recent years Trawema has successfully applied its expertise to the nuclear industry - for decommissioning of nuclear power plants (NPPs).

We strive for technical excellence, engineering innovation, and ease of operations. Paramount is for us safety and reliability - „The machine needs to be as safe as possible without any influence on reliability“ - robust testing, qualification and training are for us mandatory steps before operations start. At Trawema we believe that dismantling techniques should be reliable, straight-forward to operate, the tools should be easy to decontaminate and maintain, and contamination should be controlled. Our added value is creating tools that are easily deployable on site and transportable (e.g., IP2 container). It is also essential to limit creation of additional waste and/or waste difficult to manage, and so we work together with clients to ensure our tools are integrated with waste management plans and decommissioning concepts.



**CASE STUDY: CONTROL ROD DRIVE HOUSING**

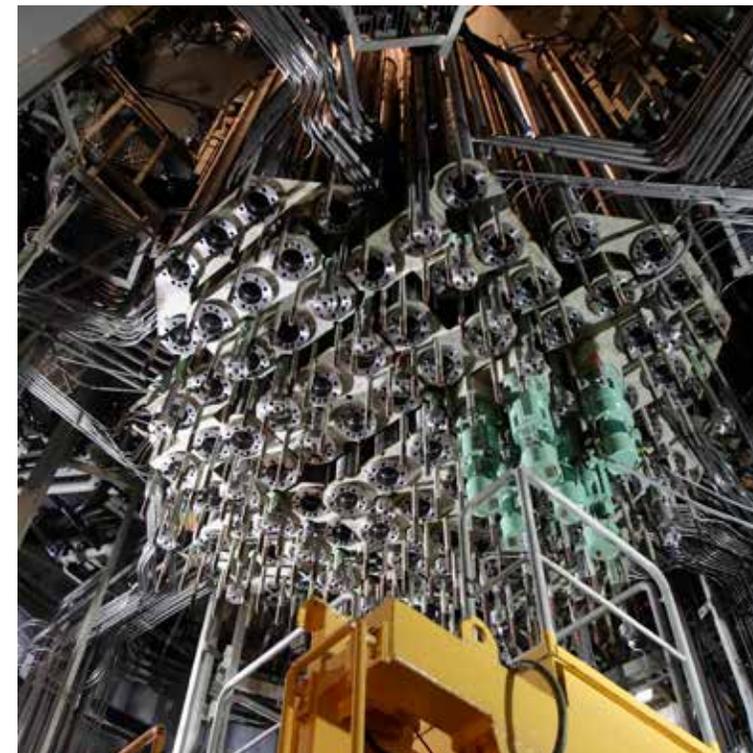
Thermal-cutting methods offer advantages owing to ease of performing the cutting, but from a radiological risk and waste point of view, it can be problematic – hot temperatures melt and partly evaporate the metal and some of the radiological content, airborne radioactive material is easily created. Owing to the melting of the metal at high temperature, some contamination may remain fixed in the metal, and possibility to decontaminate dismantled structures is reduced. Use of the thermal-cutting methods also often requires extensive arrangements for dismantling that are inflexible and cost time.

# TRAWEMA®

Especially for the field of nuclear dismantling, Trawema developed and constructed specialized machines for cutting off Control Rod Drive Housings (pipes) which are connected to the calotte underneath of a core of a nuclear reactor - in this case Boiling Water Reactor (BWR). The speciality is the cold cutting process from inside to outside the pipe. Our method has many advantages, it can:

- reduce formation of air-borne and/or gas-phase radionuclides,
- limit possibility of change in chemical form of radionuclides, and
- decrease level of contamination generated.

The cut is made close to the reactor calotte (approx. 5 meter cutting elevation inside the pipe) to ensure easy handling of the reactor calotte for the post-segmentation phase. The cutting process can be handled either upside-down (overhead) from the containment underneath the Control Rod Drive Housing Flanges or in hanging position from the reactor floor level. Remote operations contribute to a reduced occupational dose rate of the operator, allowing for longer operations and therefore faster completion of the project. Our engineered solution was applied successfully and owing to its smart design it was easily decontaminated for transport and implementation at another site.



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### TS QUADRAT GMBH - YOUR STRONG PARTNER FOR NUCLEAR TECHNOLOGY / WASTE MANAGEMENT

TS Quadrat GmbH is a nuclear engineering specialist for materials handling technology and special purpose system construction.

We provide in-depth, comprehensively planned and documented systems and components for safely handling radioactive waste during operations or decommissioning of nuclear facilities.

These include:

- Conveying and handling systems for drums, pellets and containers
- Measurement stations
- Flame cutting systems
- Container & Drum Loading
- Casting / Concreting / Supercompaction
- Gantry crane systems
- Special and bespoke processing plants
- Residual substance logistics

Many of the mentioned systems can be designed as mobile solutions to suit the customer project.

We offer our customers full-service support from planning, design and documentation to production/execution.

As our customer, you benefit from the experience and expertise our team has gained from the large number of projects we have successfully completed over the past decade - plus our quality management system certified in accordance with DIN EN ISO 9001:2015.

For more information, please visit [www.tsquadrat.com](http://www.tsquadrat.com) or reach out to us directly for a more detailed conversation on how TS Quadrat GmbH can solve your problem.

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### DIE RICHTIGE PSA ZUR RICHTIGEN ZEIT AM RICHTIGEN ORT

Die UniTech Services Group ist mit zwei Verarbeitungsanlagen sowie Forschungs- und Entwicklungsstandorten der führende Anbieter von Schutzkleidungsmanagement-Dienstleistungen für die Nuklearindustrie in Europa. Der Hauptzweck dieser Dienstleistung besteht darin, sicherzustellen, dass der Kunde die richtige PSA (persönliche Schutzausrüstung) zur richtigen Zeit am richtigen Ort hat.

Seit 2012 bietet die Niederlassung UniTech Service Group Ltd auch einen Gerüstmonitoring- und Dekontaminationservice an. Für weitere Informationen zu unseren internationalen Kapazitäten besuchen Sie bitte unsere Website [www.unitech-services.eu/de/](http://www.unitech-services.eu/de/)

UniTech bietet auch eine Mobile Supply Store-Lösung an, bei der Produkte in einem rollenden Lagerhaus direkt an den Standort des Kunden geliefert werden.

UniTech bereitet derzeit den Bau einer neuen Verarbeitungsanlage im französischen Lyon vor, die im Oktober 2025 eröffnet werden soll. Diese Anlage wird zusätzlichen Service-Support durch einen eigens errichteten Zwischenlager- und Leasingbereich für kontaminierte Materialien und eine eigene Arbeitszone für TMD-Arbeit bieten.







[www.icond.de](http://www.icond.de)



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