



framatome

Inspections and Measurements on Fuel Assemblies

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**1st International Conference on LWR Fuel
Performance, Modelling and Experimental
Support**

Nessebar, Bulgaria, 14-19 September 2025

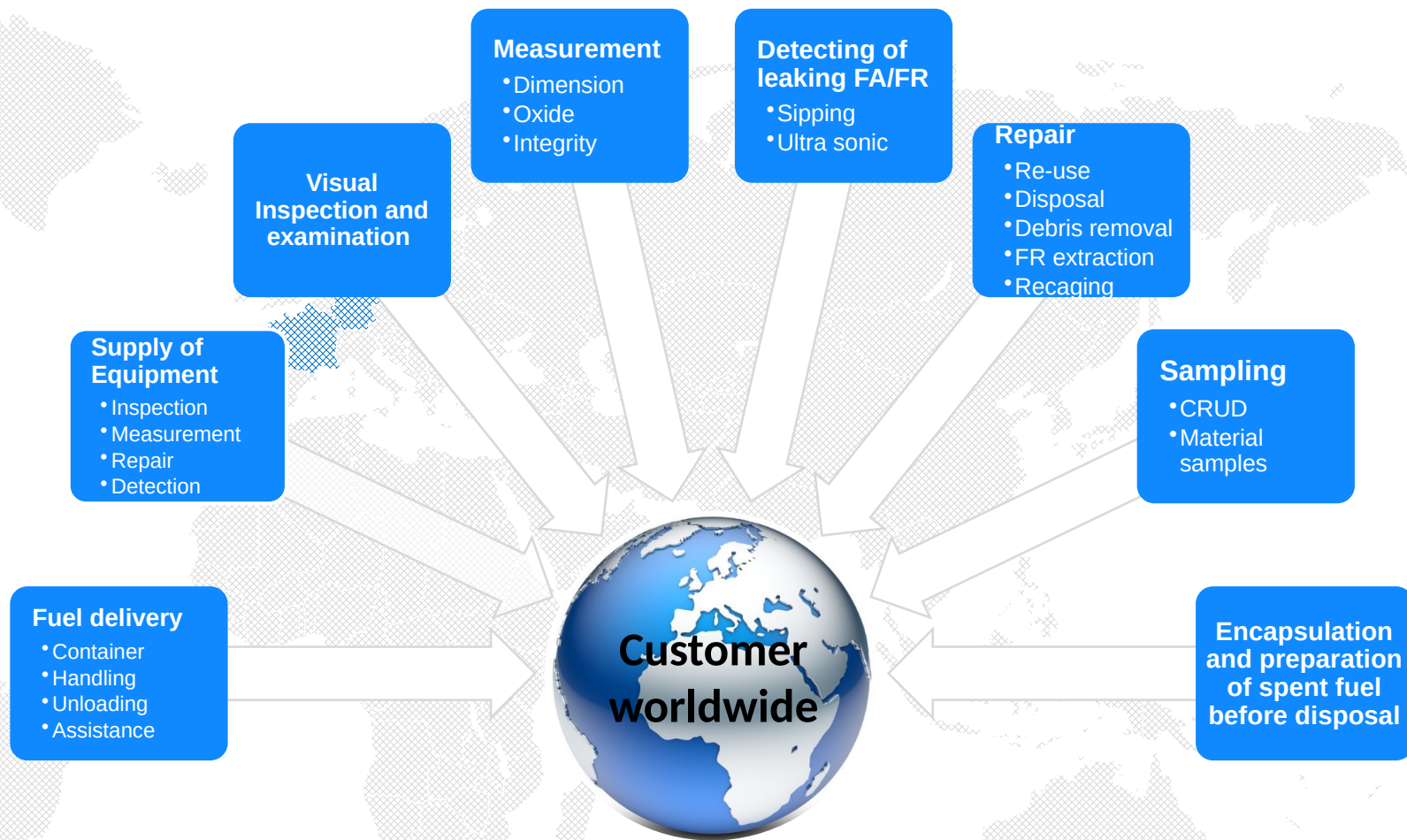
Framatome Fuel Field Services – field of action

Fuel assets

- 3 Controlled areas: Cadarache, Erlangen, Lynchburg
- Development, maintenance & repair, test, preparation and storage of equipment
- Laboratories, training areas and pools

Fuel Services onsite

- 180 highly skilled experts from France, USA and Germany support our customers worldwide on PWR, BWR and VVER fleet
- More than thousand service campaigns performed since 80s
- Unexpected event management, wide data base, rapid assistance



A strong footprint for a strong customer service

MIF for Inspection and Measurement



Inspection of FA, RCCA and TPA by a hand-held camera

Inspection performed by using a camera manipulator with refueling machine or auxiliary bridge

1987

MIF

Development of the MIF for outage optimization and self-sufficient inspections and measurements

1999

MIF

Further modernization of the MIF and develop the compatible technique for all customer needs

- Inspection
- Measurement
- Debris
- Detection

2024

eMIF

Enhanced MULTIINSPECTION Facility

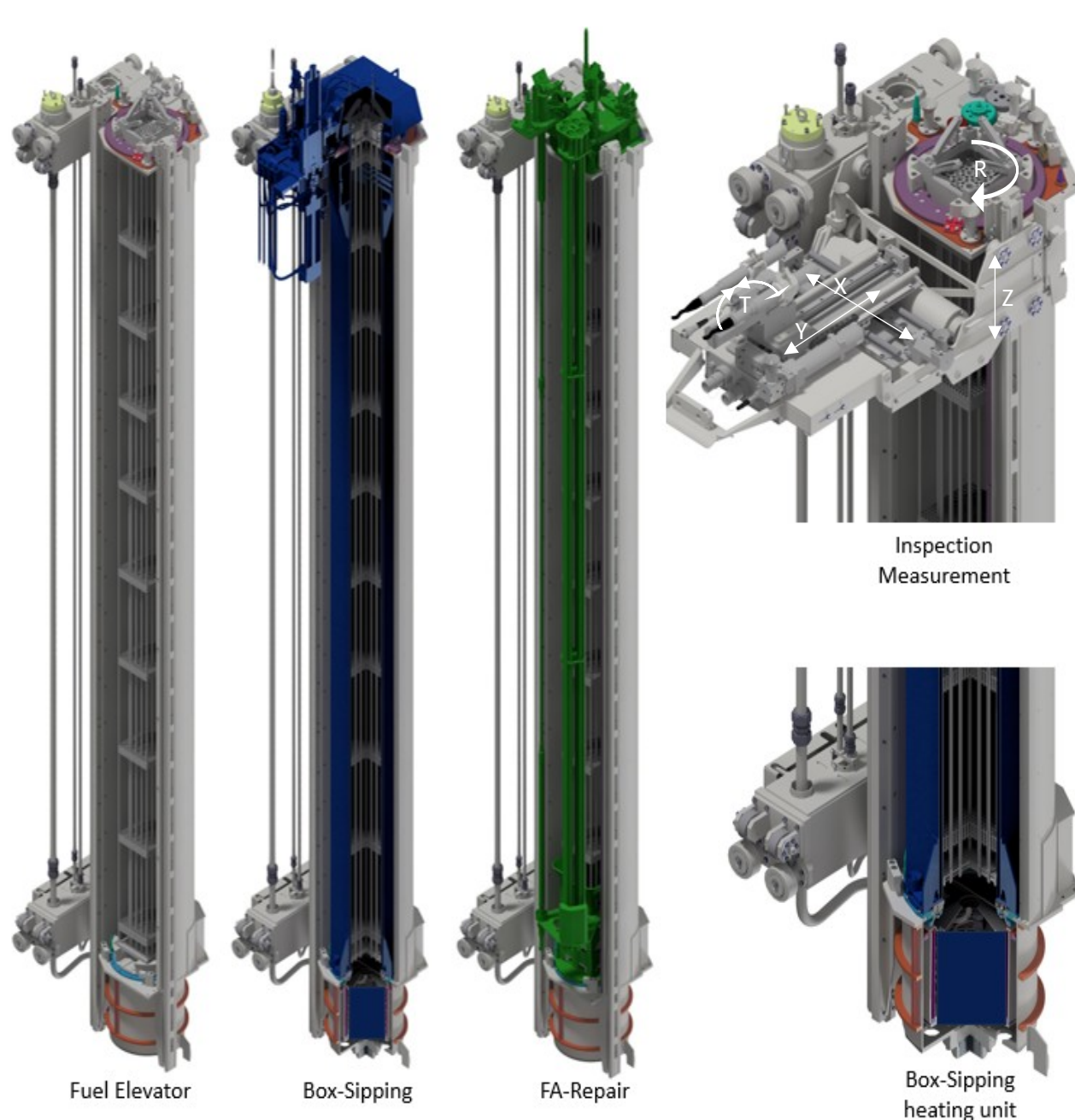
- Inspection
- Measurement
- Debris
- Detection
- Sipping
- Repair

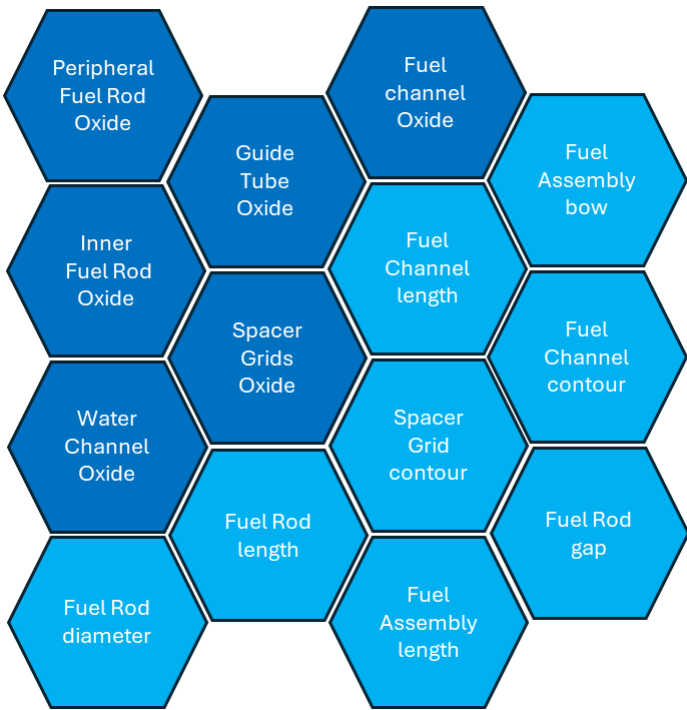
The worldwide-used technologies – **Inspection, Measurement, Sipping, and FA-Repair** – have been integrated into one modular system: the enhanced MULTIINSPECTION Facility

ENHANCED MULTIINSPECTION FACILITY

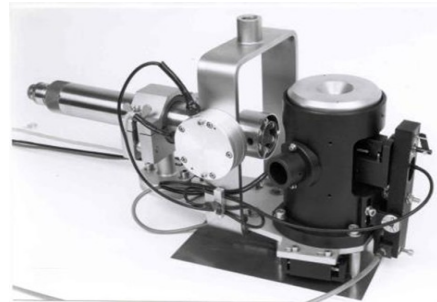
Continuous advancements in inspection technologies and measurement methodologies further enhance the accuracy, efficiency, and reliability of fuel assembly evaluations, thereby reinforcing the safety and economic performance of nuclear power plants

- Only one technology carrier, increasing available fuel pool space
- Five axes for precise positioning of the inspection and measurement equipment
- Maintenance work on the modules can be carried out easily as they are stored separately
- Subsequent Framatome developments will be compatible with the technology carrier

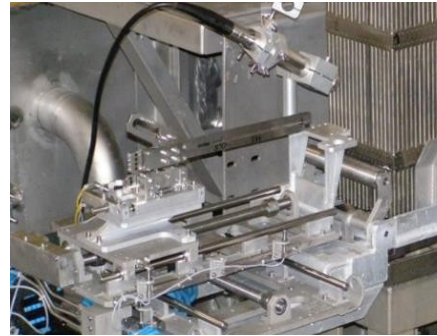




Oxide Layer Measurement technologies in dark blue
Dimension Measurement technologies in bright blue



Oxid layer, integrity, diameter and inspection on single fuel rods



Leaker detection on fuel rods

Measurements on Fuel Assemblies

Validation and verification of fuel performance codes, experience from in-reactor behavior of fuel assemblies are vital. The codes are used for in-core fuel management and justification of safe fuel assembly operation.

- The Measurement equipment can easily be installed and applied during timely limited outages.
- Framatome's own development, including software solutions to secure lifetime support

Framatome has developed measuring devices which can be used to record the design-relevant data by measurements on irradiated fuel assemblies.

Further, the Framatome portfolio offers mobile PIE Measurement equipment that can determine the dimensional changes and oxide layer thicknesses on fuel rods and spacer grids of fuel assemblies.



Contour and oxide layer on spacer grids



Oxide layer on peripheral fuel rods



Oxide layer on inner fuel rods

Conclusions

- Framatome developed equipment for inspection and measurement on fuel assemblies for customers worldwide
- The systematic application of these inspection and measurement techniques supports design licensing, informed maintenance and replacement decisions, contributes to the optimization of fuel management strategies and ensures early detection of potential issues
- Framatome developed PIE Measurement techniques meet the requirements of power plants in a sustainable manner

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Thank
you

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