

framatome

Framatome CERCA

**Sustainability of LEU
fuel fabrication**

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RERTR-2022

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18 countries on 4 continents
23 customers (out of TRIGA)
18 reactors (out of TRIGA)
70 designs ; 4 alloys

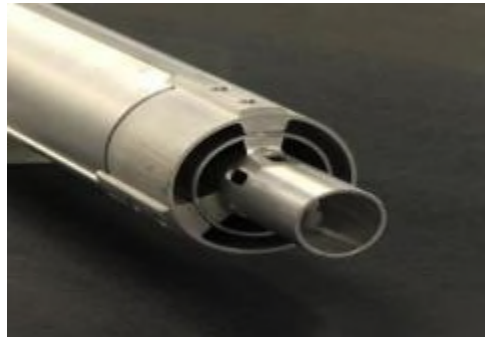
► **Fuel elements**

- ◆ Directly sold to operators of research reactors
- ◆ Design: reactor
- ◆ 4 main types of fuel elements
- ◆ 4 families of alloys
 - U-Al
 - U-Si
 - U-MO
 - U-Zr

► **Mo99 targets**

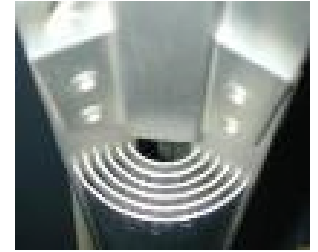
- ◆ Sold to producers of radioisotopes ; irradiated in research reactors
- ◆ U-Al alloy
- ◆ 27 millions of patients/year

Fuel element & irradiation targets



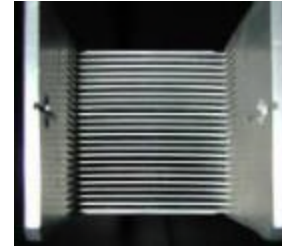
Curve Design

HFR
KUR
MNR



Cylindrical Design

BR2
MARIA
RJH



Flat Design

JRTR
HOR
OPAL

SAFA
RIP
JRR3



Involute Design

FRMII
RHF

2015 – 2022 : Building the future

- ▶ **180 M Euros investment to upgrade our plant to the highest safety and security standards**
 - ◆ Seismic reinforcement
 - ◆ Protection against extreme climatic events,
 - ◆ Reduction of criticality risk in case of any event
 - ◆ Physical protection of the fissile material

- ▶ **15 sub-projects to address CERCA facilities and plant environment**

- ▶ **Present plant upgrade finalized in 2018**

- ▶ **New TRIGA workshop started in 2022**

- ▶ **New Build to host uranium alloy fabrication activities to be fully commissioned in 2023**
 - ◆ Groundworks & digging started at the end of 2017
 - ◆ 1st concrete pouring at 2nd quarter of 2018
 - ◆ Building completed in 2021 ; equipment installed in 2022
 - ◆ Commissioning started in 2022, and will be completed in 2023

- ▶ R&D : key to meet CERCA customers' needs for today and tomorrow
- ▶ R&D : mandatory to gain new customers
- ▶ Decided in 2017, in place in 2019 and fully equipped by 2021
- ▶ Off site to be cost effective, flexible, time & cost effective
- ▶ Investments mainly paid by R&D projects (funded by customers and external partners)
- ▶ 500 m² of Uranium workspace → URANIUM LAB (from DU to HEU)
- ▶ Initially dedicated to the development of metallic Uranium fuels
- ▶ Tomorrow: Dedicated to all Uranium fuel manufacturing R&D (metallic, UO₂, advance reactor...)





State-of-the-art manufacturing equipment

- ▶ 17 glove-box
- ▶ Arc melting furnace ; induction melting furnace ; annealing furnace
- ▶ Powder atomization ; powder grinding/sieving/mixing
- ▶ Compaction presses
- ▶ Hot rolling mill ; cold rolling mill
- ▶ Laser welding ; laser marking
- ▶ Laser Beam Fusion Melting
- ▶ Cold Spray

Strong partnership with universities

- ▶ PUMA platform: academic infrastructures & competencies
- ▶ XDR, microprobe ; FIB / SEM ; TEM / AFM ...



In-house Sampling and Characterization equipment

- ▶ 4 hoods
- ▶ Laser cutting devices ; diamond wire ; electric rotating disk
- ▶ Optical microscopy ; SEM ; EDX microscopy
- ▶ Tensile & compression testing (from 25°C to 1100°C)
- ▶ X-ray inspection ; UT inspection ; acoustic microscopy
- ▶ Profilometer
- ▶ Characterization of chemicals (even traces) ; corrosion detection
- ▶ Thermo measurements (TGA, DSC...)

Our ambition, your benefits

- ▶ To reach out for new opportunities and new markets
- ▶ To expand the competences with new materials and processes (alloys, oxides...)
- ▶ A team open to any challenging project, innovation technology, new collaborations
- ▶ An industrial footprint in a stable country
- ▶ CERCA has the competencies and the facility to run R&D and prototyping projects
- ▶ CERCA has the experience in developing new processes with efficiency and agility
- ▶ CERCA gives you the benefits of a reliable and long-term oriented supplier



**Come to CERCA to learn more
about how we will support
your current activity
and your development projects**

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Thank you !

