

## Hot Cells Complexes (HCC)

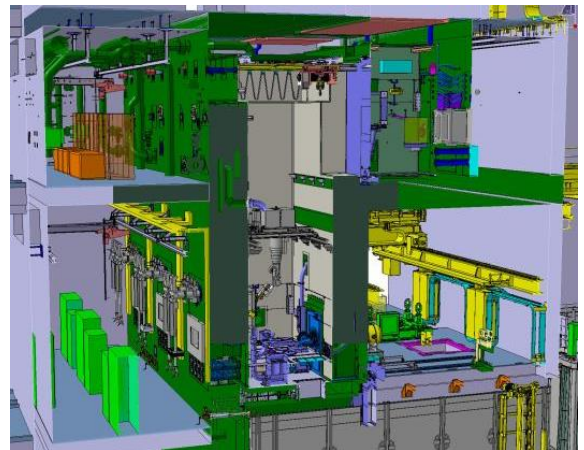
### Radiochemical Laboratories & Remote Manipulator Systems

From conception through construction to full commissioning, Framatome enables nuclear operators to test, collect and treat radioactive elements without loss of containment thanks to remote handling shielded cells.

#### Challenge

Nuclear facilities generate radioactive elements that must be properly collected and treated within a remoted handled shielded cells, known as Hot Cells Complexes (HCC). Handled elements can span from solid irradiated fuel assemblies, effluents and volatile powders generated by various methods of treatment of irradiated fuel components or irradiated solid and/or liquid waste.

Framatome has built up a strong expertise and know-how for new builds, special operations, dismantling operations and radioactive waste treatment in the field of Hot Cells Complexes (HCC), based on applications and final needs.



© Framatome's Full Architect Engineering for Jules Horowitz Reactor

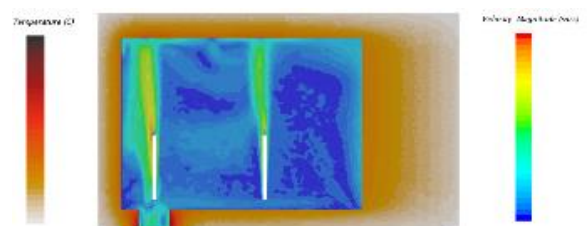
#### Solution

Framatome offers a full panel of services from design, implementation to operation of hot cells complexes for nuclear utilities. Services included:

- Basic and detailed designs of hot cells with its operating equipment's such as:
  - Fuel handling system for PWR and FBR
  - Packaging handling and opening system
  - Robotic devices and special cutting tools
  - Remote manipulator and tube transfer systems
- HVAC & cooling system
- Building layout
- Earthquake, thermal and thermo-mechanical analyses, including latest regulations Post Fukushima
- Nuclear safety analyses and demonstration
- Licensing support including interactions with Nuclear safety Authorities
- Thermal and radiation shield calculations to support safety analysis
- Refurbishment of existing hot cell complexes
- Dismantling and decommissioning of hot cell complexes
- Supplier's follow-up & on-site construction management
- HCC Cost analysis



© Engineering & Operating Sodium Cold traps treatment solutions



© Passive cooling system solution simulation for EDF's Centralized storage pool for used fuel "PEC" project

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## References

CEA - France:

- **Jules Horowitz Reactor** (2003-2021, 1 hot cell with 8 shielded windows on 2 levels)
- **ASTRID** : Fuel unloading design (20013-2019)
- Marcoule: **ISAI** project (1980-2015, 3 cells), **Atalante** 1 project (1985-1993, 9 hot cells), **Phenix** reactor (2009-2020, 3 cells), **APM** project (1994-2016, 2 hot cells)
- Cadarache: **LECA & STAR** (1986-1993, 3 hot cells with > 10 shielded windows, then 1996-2012 upgrade project with > 10 shielded windows)

EDF - France:

- Centralized storage pool for used fuel: **PEC** project (starting 2019, Fuels unloading and handling Cell)
- Centraco-Marcoule: **ADELI** project (2019-2023, hot cell for treatment of Pressurized Water Reactor control rod guides)
- Creys-Malville: **Superphenix** project (2005-2017, 4 hot cells, then 2016-2024, hot cells for dismantling )

TEPCO – Japan: Design enabling corium extraction from damaged reactors on **Fukushima** (Fuel Debris Retrieval 2015-2020)

HIFRENSA – Spain: **Vandellos** project (1993-1997, 1 hot cell)



© LECA complete refurbishment of main hot cell complex (left: before, right, after)

## Customer benefits

- Operate in a one stop shop for hot cells complexes
- Benefit from proven track record and on-going activities thanks to latest lesson learned
- Reduce dosimetry thanks to a dedicated HCC that avoid operations in harsh environment

## Technical information

- Strong know-how built on several successful EPCM deliveries for Hot Cell Complexes on all types of nuclear facilities
- Integration of latest Post Fukushima requirements for seismic analysis
- Primarily on Design & Engineering Activities, Framatome can also deliver EPCM services

## Key figures

- More than **20 years** continuous works from design to delivery of **27 hot cells**
- In the period **2019-2020**, more than **7 design projects** on-going
- **+ 20 engineering fields** supported by Framatome's Subject Matter's Experts and highly skilled engineers for Hot Cell Cells
- **10 SME** (Subject Matter Experts), with more than a decade of experience

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