

HOTLAB 2019

Extraction and transfer of samples from the core of Fukushima reactor using the PADIRAC

Christophe Selliez-Vandernotte
Senior Executive VP, Nuclear Activities
christophe.selliez@getinge.com
Direct line : +33 2 54 73 46 94
Handy : +33 6 07 50 41 01



Extraction and transfer of samples from the core of Fukushima reactor using the PADIRAC

IRID International Research Institute for Nuclear Decommissioning



Christophe Selliez¹, Adrien Guyot², Bruno Milhaud³

1. Senior Executive V.P., Nuclear Activities, Getinge-La Calhène - 41100 Vendôme, France
2. Nuclear Key Account Manager, APAC, Getinge-La Calhène - 41100 Vendôme, France
3. President, CLEO - 30200 Orsan, France



HOTLAB19

Samples of the corium from the reactor core must be transported from the Robot Green House sampling cell to the Intermediate Cell. The radio-active environment is not compatible with human presence around the Robot Green House. The combination of a leaktight container and automatised transportation system will do the job. The transportation system has been developed by the subsidiary of the project of METI (Ministry of Economy, Trade and Industry), «Development of Sampling Technologies for Retrieving Fuel Debris and Internal Structures» under the leadership of IRID.

IRID (International Research Institute for Nuclear Decommissioning) understands that the first debris samples from the Primary Containment Vessel of Fukushima reactor are important to tackle future dismantling operations.

Mitsubishi Heavy Industries (MHI) has been developing whole sampling system and technologies as a member of IRID.

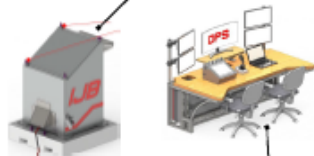
LaCalhene's PADIRAC – a transfer/transport cask containing CTIX, a stainless steel DPTE[®] container – was selected to contain the samples. Designed for the nuclear environment, the PADIRAC needs little modification for the job and will have no technical impact on the installation.

CLEO can design and provide a tele-operated trolley system with total freedom of movement, to convey the PADIRAC from the “clean” zone to the reactor, dock it and bring it to the intermediate cell.

THE CONCEPT: PADIRAC LEAKTIGHT CASK (CTIX) - TROLLEY - COMMUNICATION CABLE - UMBILICAL STORAGE DEVICE - OPERATOR STATION
The cable provides robust connections and maintains a mechanical link with the “clean” side, while the trolley is in the radio-active environment.

Robot Green House (sampling cell)

Intermediate Junction Box



Operator Station

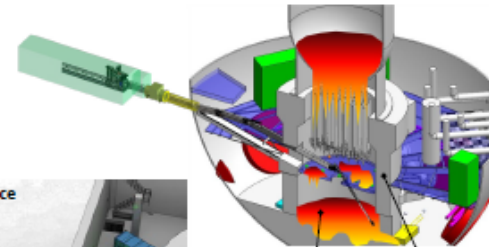
DPTE[®] 270 Alpha door

T-PAD Trolley

FUKUSHIMA REACTOR BUILDING

Remote Control Interface approx. 1 km

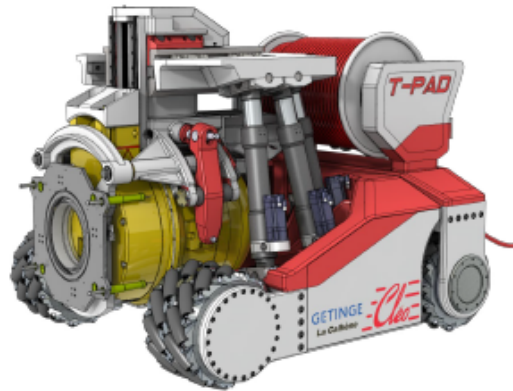
Travelling Distance approx. 50 m



PCV (Primary Containment Vessel)
Debris

Dose rate inside R/B: 10 mSv/h max.

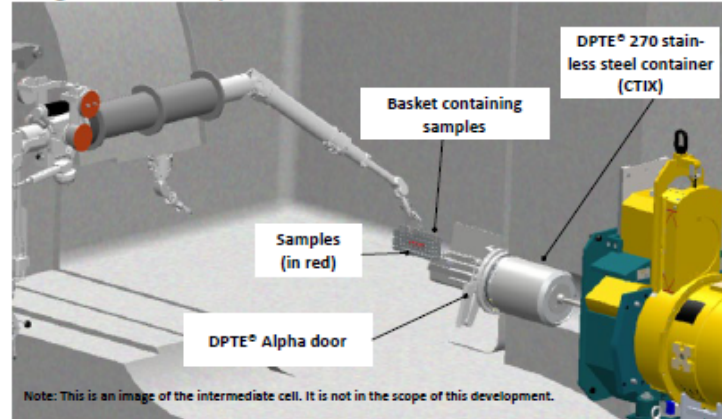
T-PAD TROLLEY WITH MECANUM WHEELS FOR TOTAL FREEDOM OF MOVEMENT



This highly complex specific design includes integrated cameras and remote control via cable.

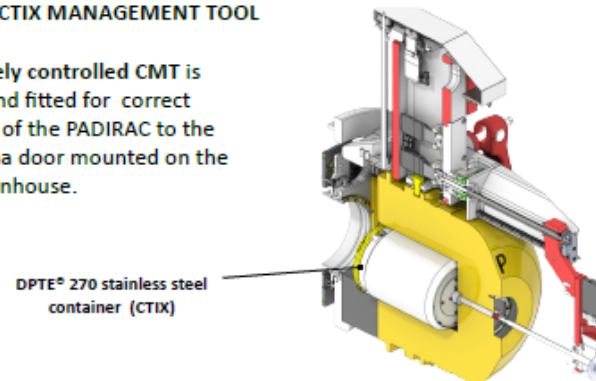
- Mecanum wheels are used for ground movement.
- A hexapod system enables positioning between the PADIRAC and the DPTE® door.
- The control electronics are embedded as close as possible to the sensors / actuators.
- Specific shielding protection is provided for the electronics.
- Cradle function to position and support the PADIRAC by the chassis during transport.
- The centre of gravity is positioned as low as possible during the docking phase.
- The trolley can carry a PADIRAC RD15 (Ø 790 mm, weight 2580 kg) or RD20 (Ø 890 mm, weight 4350 kg).

INSIDE THE INTERMEDIATE CELL: extracting the basket containing samples from the DPTE® container inside the PADIRAC transport cask, using a remote manipulator



THE CMT - CTIX MANAGEMENT TOOL

The remotely controlled CMT is designed and fitted for correct positioning of the PADIRAC to the DPTE® Alpha door mounted on the Robot Greenhouse.



THE PADIRAC CASK is a lead shielded sealed container for transfer and transport of solid radio-active waste, based on CEA standard protection techniques.



The patented DPTE® system is incorporated in the PADIRAC for secure leaktight transfer.

