

Rod dismantling and samples retrieval at Cadarache



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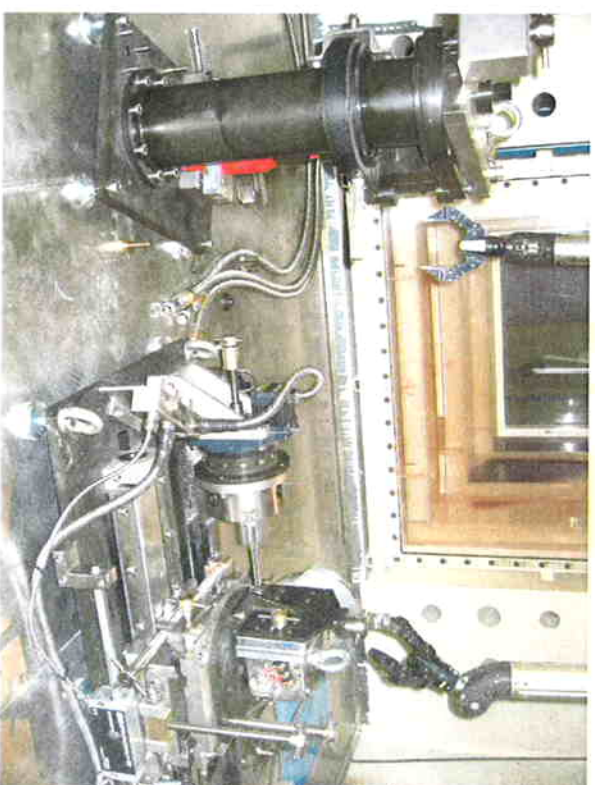
French Atomic Research Commission - CEA Cadarache

Equipments for dismantling and fuel pellets retrieval

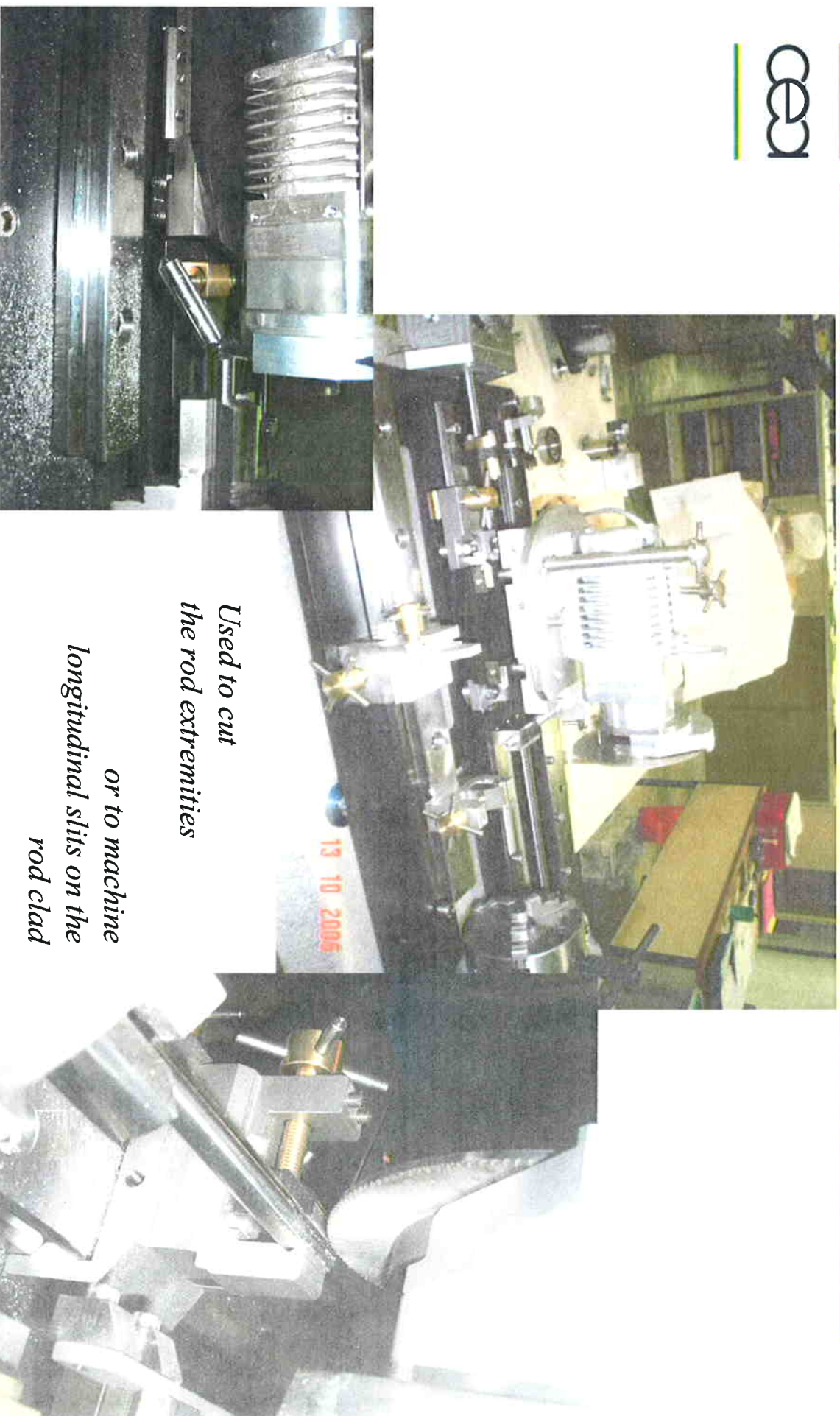


● General objectives :

- ◆ *Fuel pellets retrieval from rods,*
- ◆ *Individual conditioning of fuel pellets under inert atmosphere*
- ◆ *Three equipments have been designed and fabricated :*
 - Specific cutting Machine,
 - Fuel pellets retrieval equipment,
 - Device to close containers under inert atmosphere



Cutting Machine



*Used to cut
the rod extremities
or to machine
longitudinal slits on the
rod clad*

Dismantling procedures : nominal (A) and alternative (B) 1/3

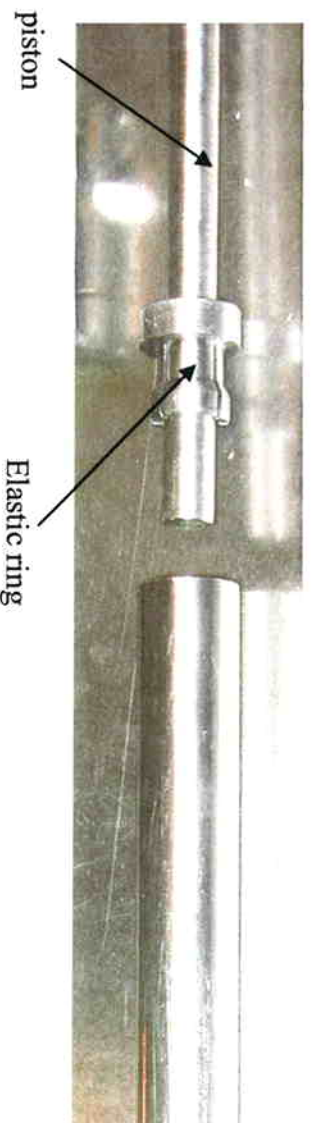
CEA

- Nominal procedure (“A”):

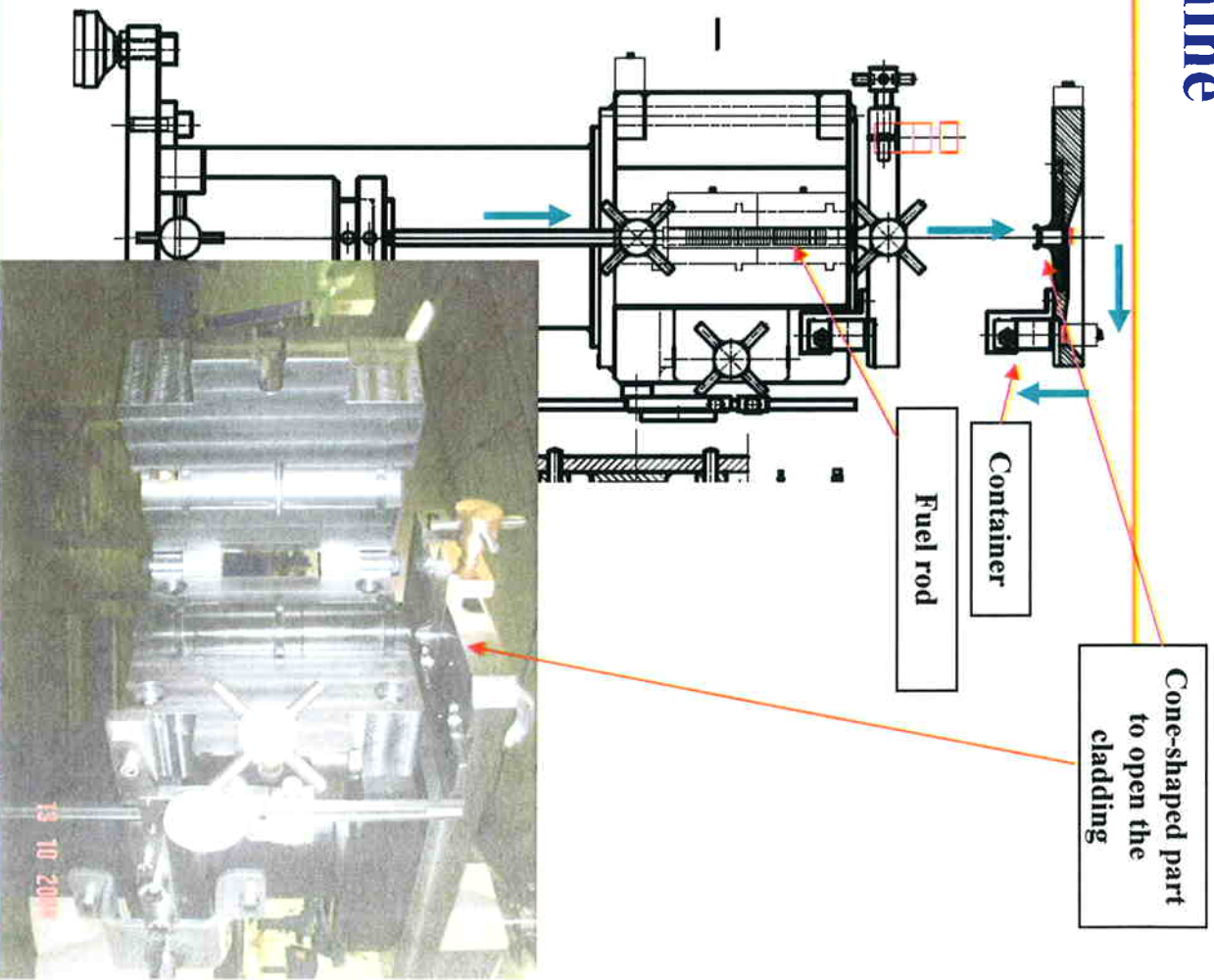
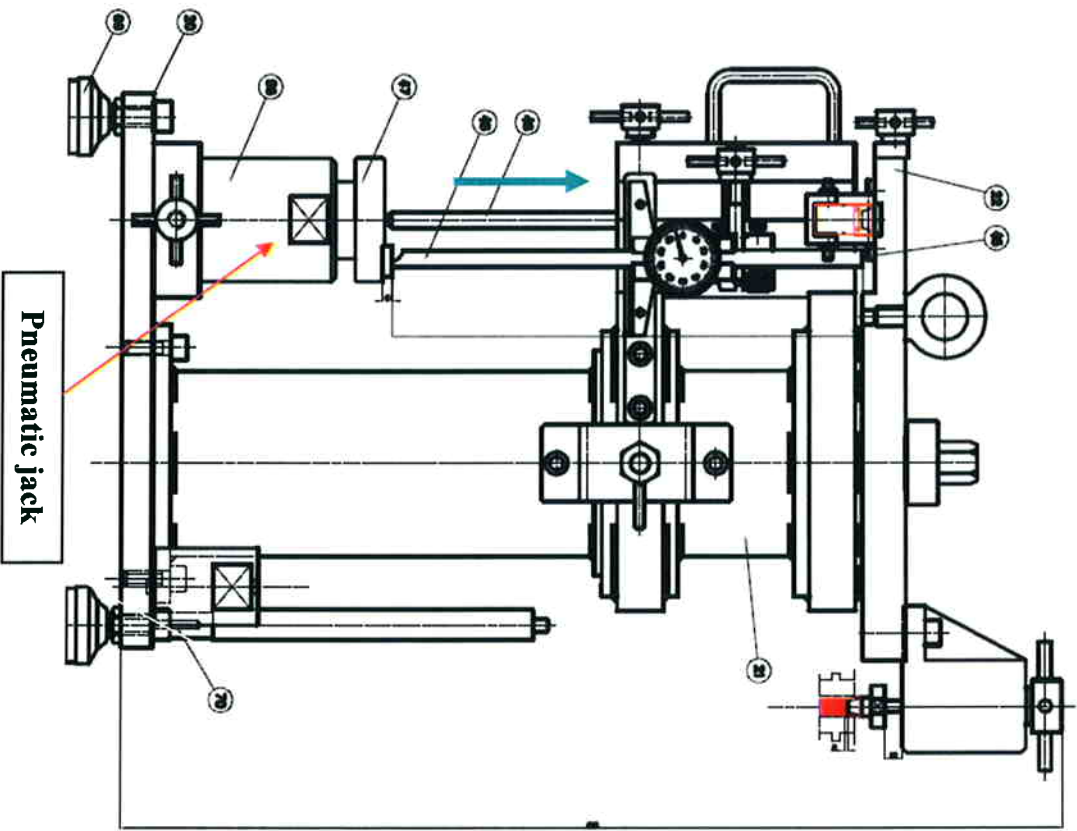
- ◆ rod is cut at both extremities
 - Firstly, cut in the plenum (to prevent the spring pushing the pellets outside),



- Spring (and thermocouple if any) are removed,
- Clad extremity are machined in order to eliminate defects,
- A ring is placed at the bottom extremity and an elastic plug at the top extremity to avoid pellets displacements during handling operation between cutting and pellet retrieval.



Retrieval machine



Dismantling procedures : nominal (A) and alternative (B) 2/3



- Nominal procedure (“A”):
 - ◆ *The rod is placed vertically in the retrieval equipment and fuel pellets are pushed through the clad*
 - The fuel stack is pushed using an hydraulic device : displacement and pressure are controlled in order to detect any locking
 - If no locking : each pellet is placed in 1 aluminium container
 - 1 picture to view the pellet state
 - each container is engraved (rod number + pellet number)
- *If locking : alternative procedure “B”*

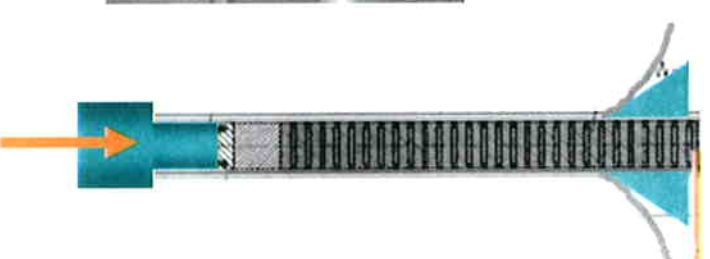
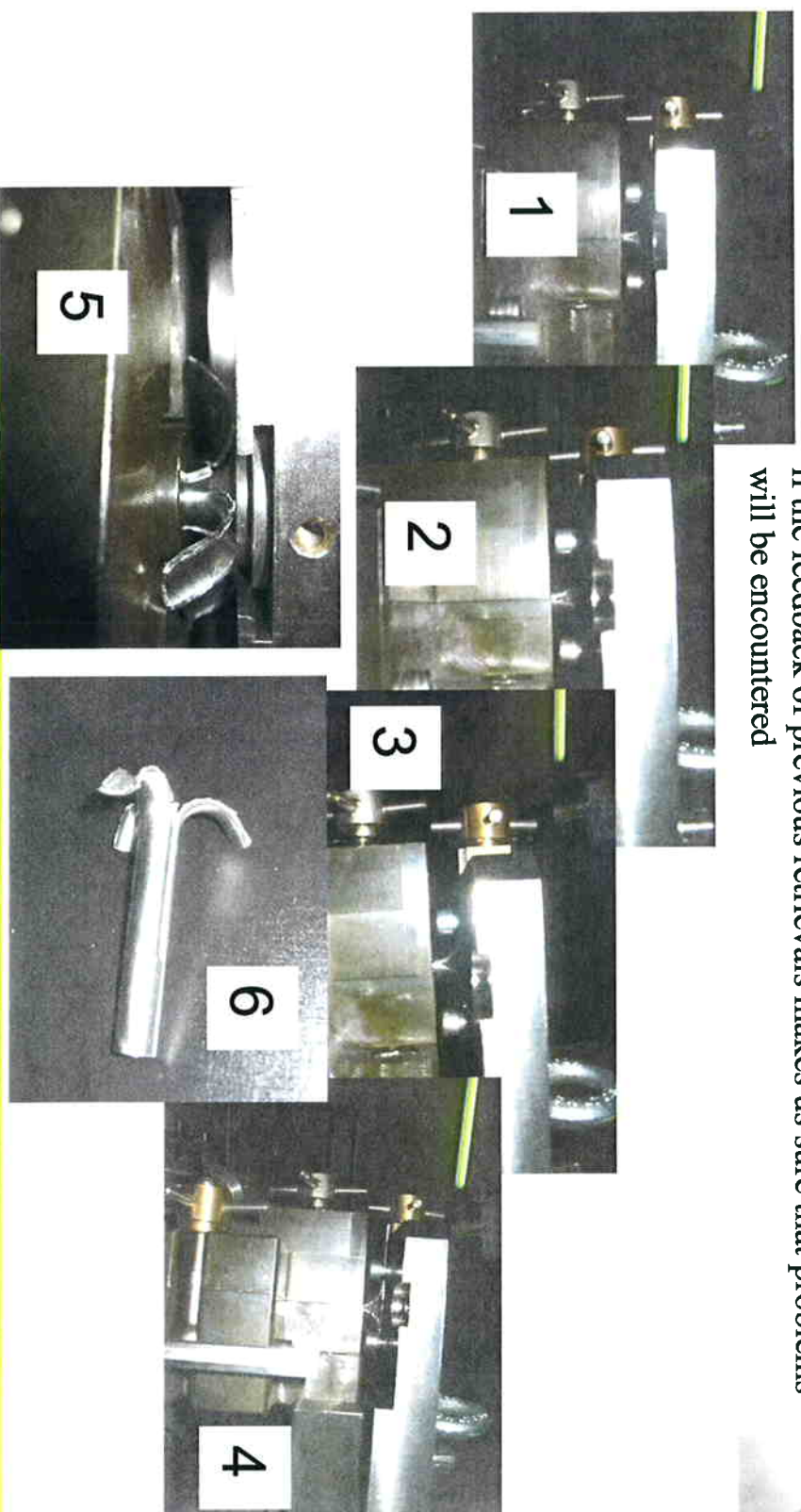


Dismantling procedures : nominal (A) and alternative (B) 2/3

CEI ● Alternative procedure (“B”):

- ◆ *cladding is machined (longitudinal slits) and rod is opened in the manner of a banana in the dismantling equipment*

This procedure is used in case of pellet locking in Procedure “A” or if the feedback of previous retrievals makes us sure that problems will be encountered



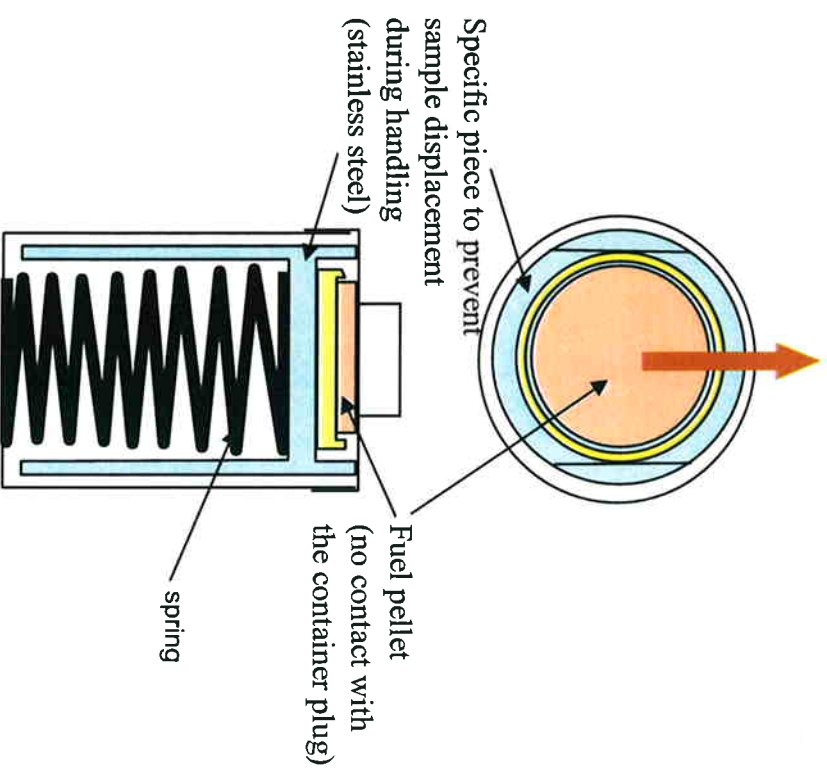
Pellets storage



- All aluminium containers with samples coming from a given rod will be placed in a bigger storage container filled with Ar.



This specific equipment is available to fill individual stainless steel containers if necessary
But will not be used in the routine procedure
(too many samples !)



Summary



- This apparatus was designed in consideration of radiation, resistance and remote-controlled operation to equip in hot cells.
- it has been in operation for dismantling more than 700 fuel discs without any noteworthy breakdowns,
- Well proven technique by :
 - ◆ *the operator's skill and experience with handling very thin fuel discs,*
 - ◆ *Design of an additional tool (mechanical tweezers) to optimize the handling very thin pellets.*
 - ◆ *Filled inert gas canisters package.*