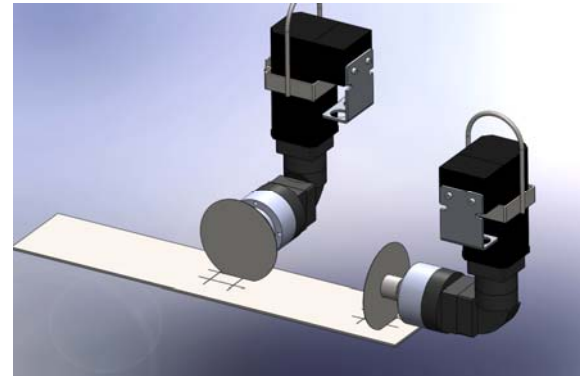
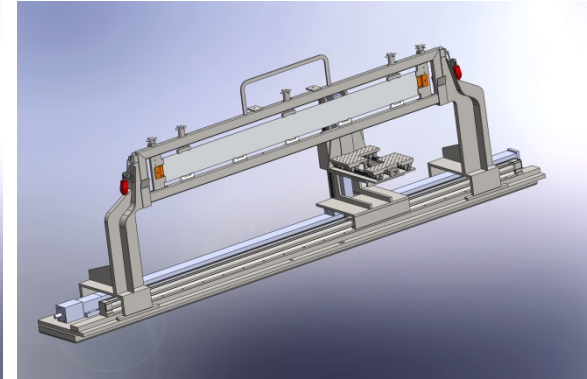
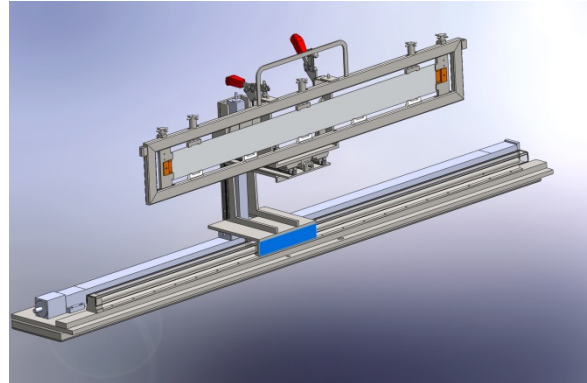


DE LA RECHERCHE À L'INDUSTRIE



# PLACIDE II



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Prepared by Nadine MAUREL and Karl SILBERSTEIN

SEPT 2013

# SUMMARY

- Historical record
- Support fixture
- Spectrometry bench
- Metrology bench
- Cutting Off bench
- Conclusions and Outlook

- PLACIDE II is aimed to replace PLACIDE I presently in LECA Cell 3.
- Presently following a damage the bench is today no more able to operate.
- Since 2011 the replacement of PLACIDE I has been considered taking into account the objective to **dissociate** the non destructive exams functions from the cutting off function.

4 new benches are presently developed by CEA :

- 2 benches devoted to non destructive exams (metrology and gamma spectrography)
- 1 cutting off bench and 1 dismantling bench (not the subject of this presentation).

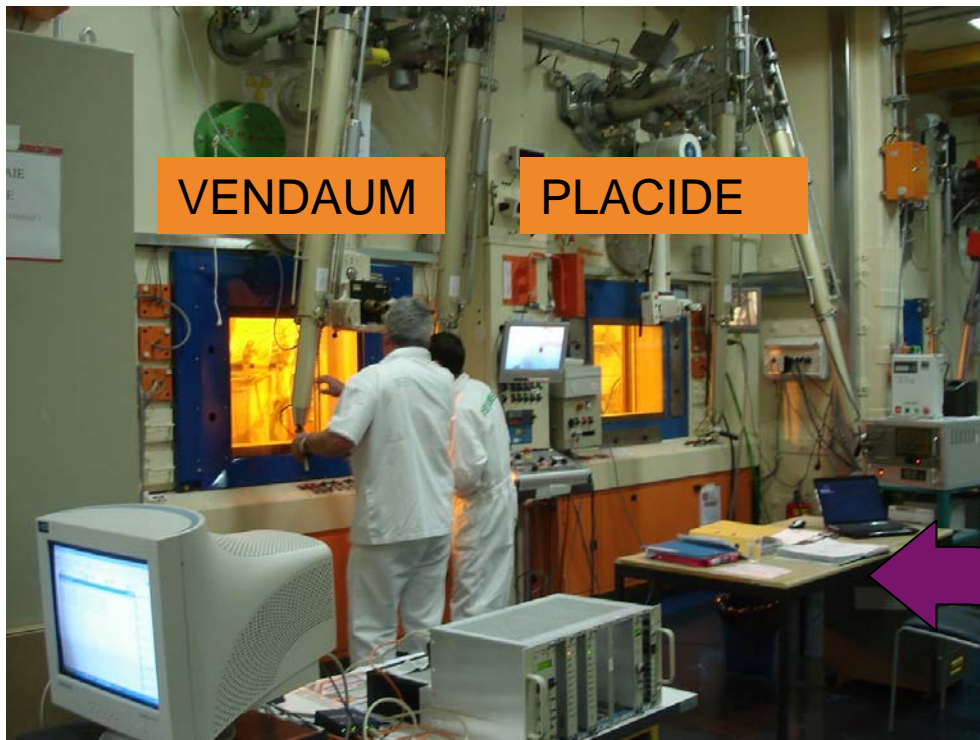
- The development of the 2 metrology and gamma spectrometry benches has been performed so that they can be exchangeable. Non destructive exams can be performed on both benches.

# Cellule 3 at LECA

12 hot cells in LECA

NDE, preparation of samples, DE, waste, storage...

Front area of C3 in LECA



Front area in LECA



# Detail of the constitution of PLACIDE II

## PLACIDE II

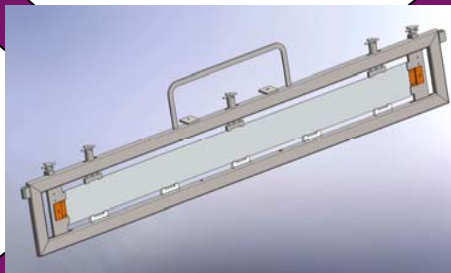
NON DESTRUCTIVE EXAMINATIONS

DESTRUCTIVE OPERATIONS

Spectrometry  
Bench



Support frame



Cutting off  
Bench



Metrology  
Bench



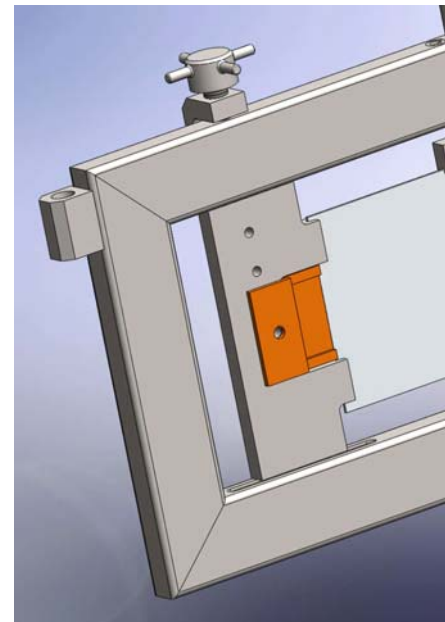
Dismantling  
Bench



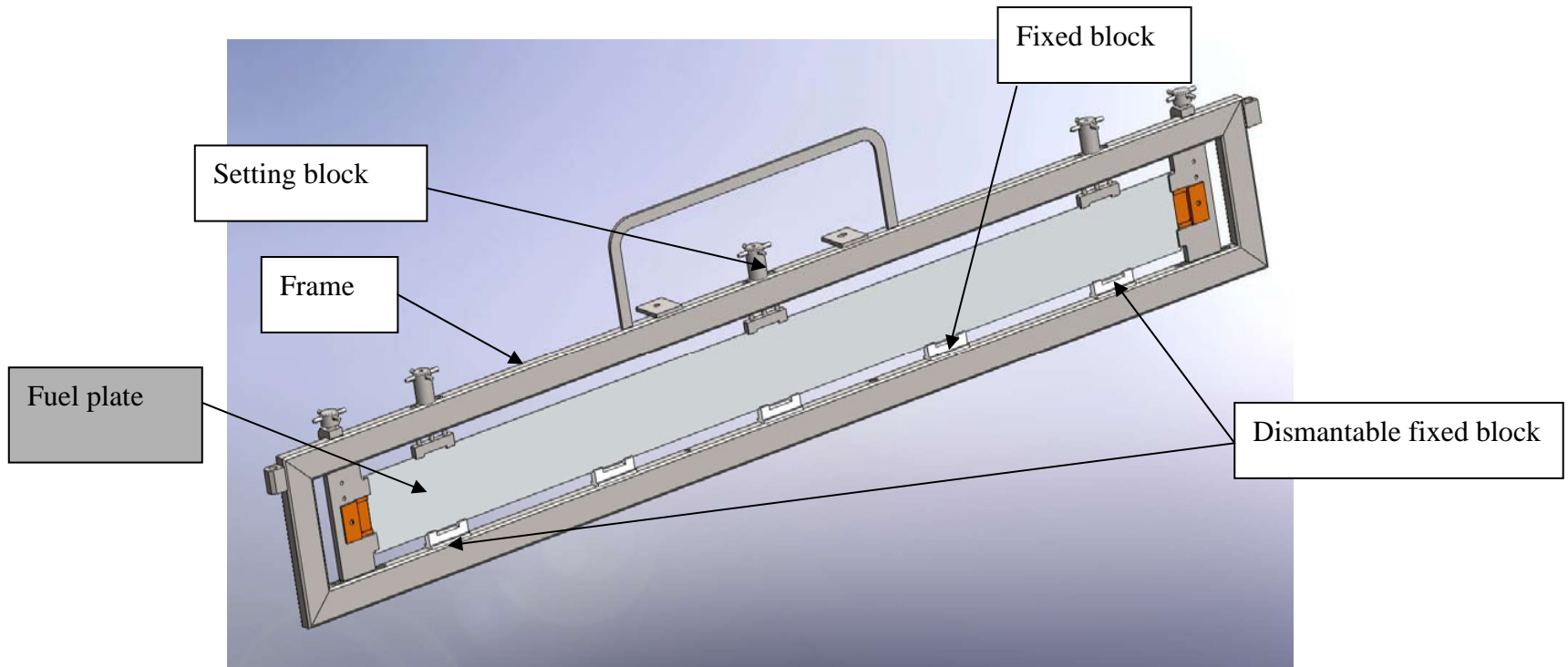
- Historical record
- **Support fixture**
- Spectrometry bench
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- Conclusions and Outlook

## Support Frame (1/3)

- The fuel assembly plate will be set permanently on the support frame when introduced in the cell once and for all its life in the cell.
- The three benches are designed to handle and operate the support frame and its associated fuel plate.
- The support frame allows to keep track of the plate zero mark and all the other indications : top/bottom, front/back.
- Metrology standards will be available on the support frame

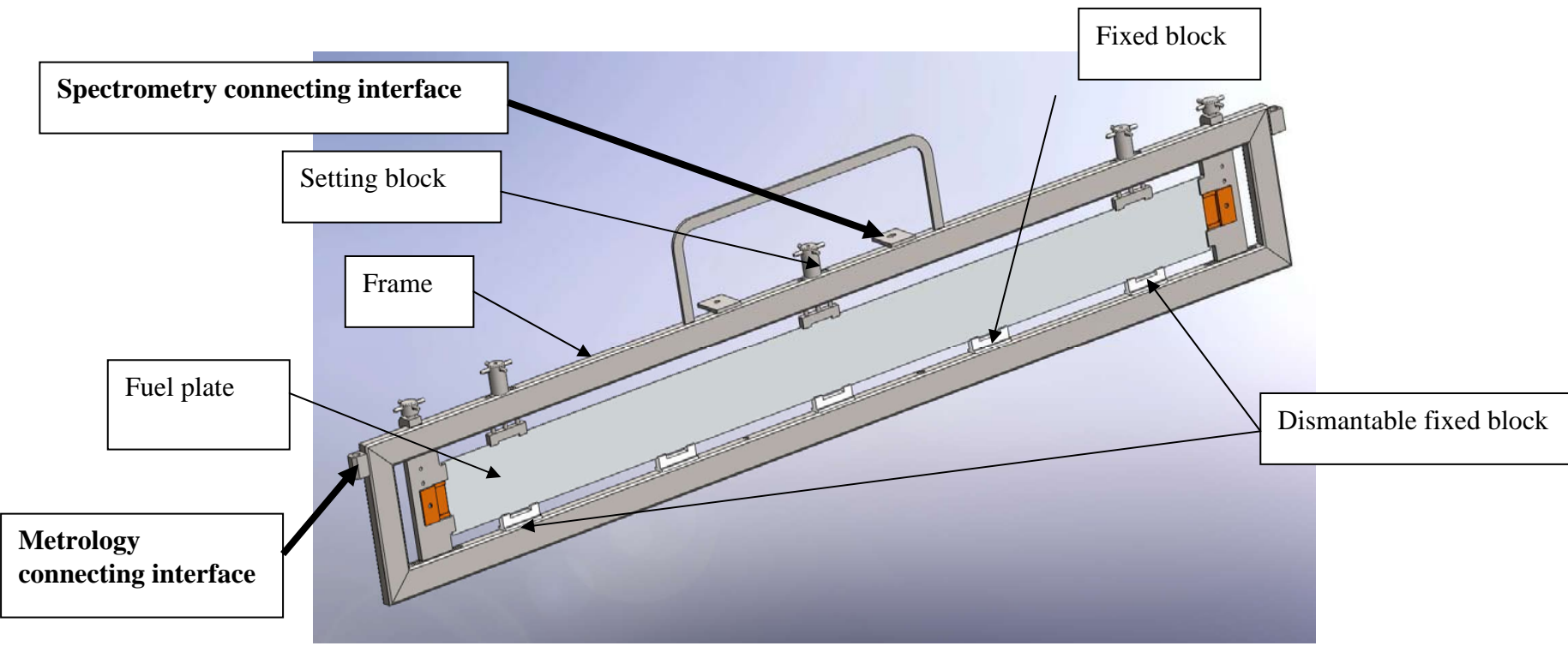


# Support Frame (2/3)

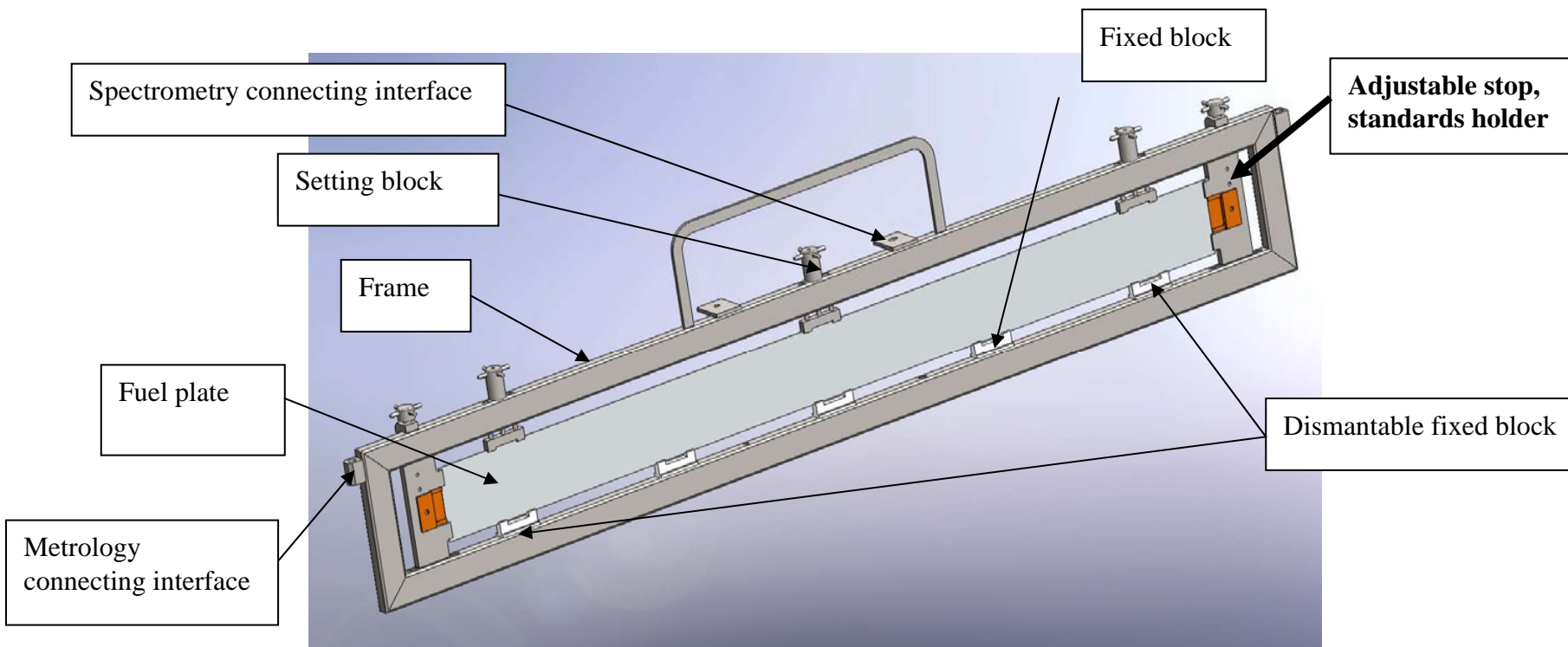




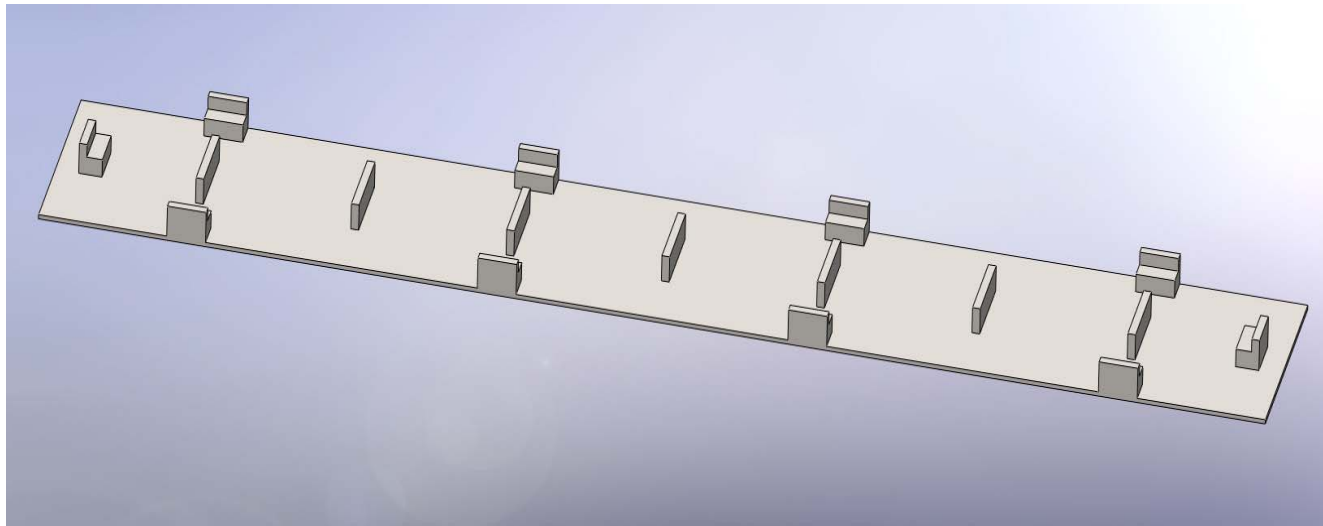
# Support Frame (2/3)



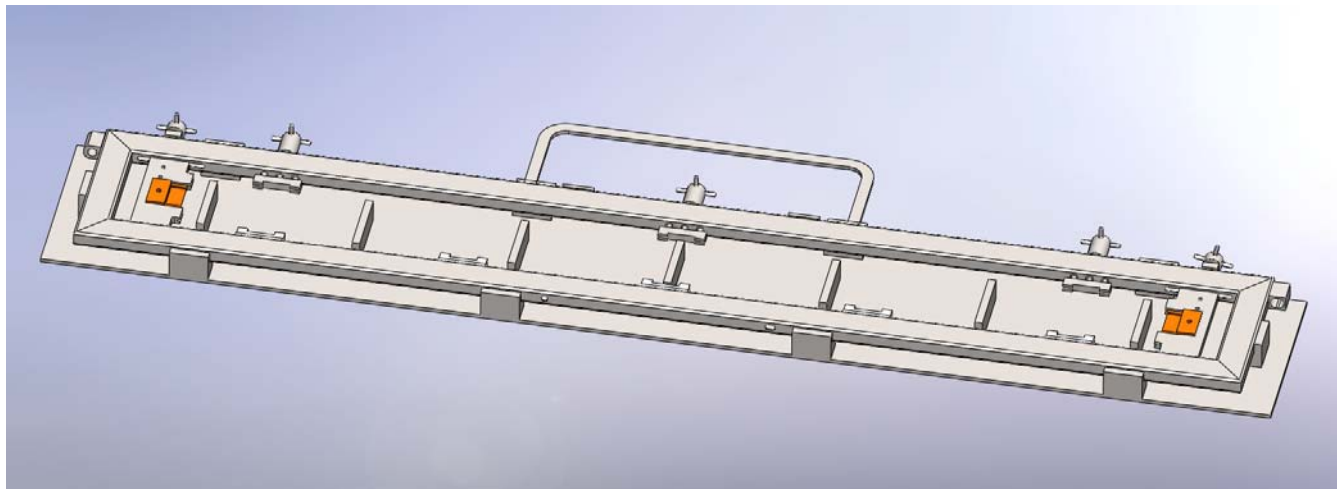
# Support Frame (2/3)



## Support Frame (3/3) – Setting Tool



Fuel Plate holder to set the plate into the frame (Fuel Plate Setting Tool)

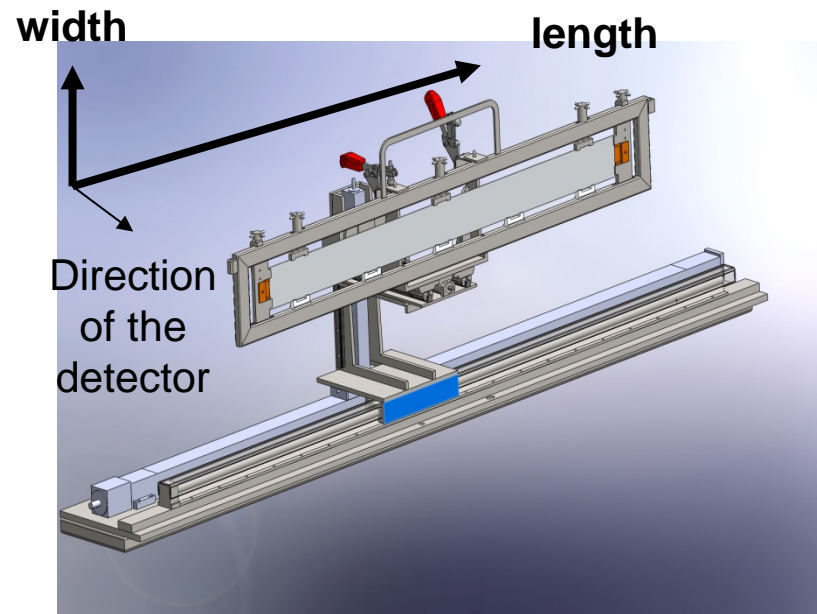


Setting Tool for Support Frame.

Can be used with the Cutting Off bench.

- Historical record
- Support fixture
- **Spectrometry bench**
- Metrology bench
- Cutting Off bench
- Conclusions and Outlook

- The gamma detector is outside the hot cell as close as possible from the fuel plate. The gamma flux is measured through a collimator.
- The plate can be motioned along two perpendicular axis corresponding to the width and the length of the plate.
- The third axis allows to set the collimator distance from the fuel plate
- A single PC allows fuel plate displacement operations and data acquisition

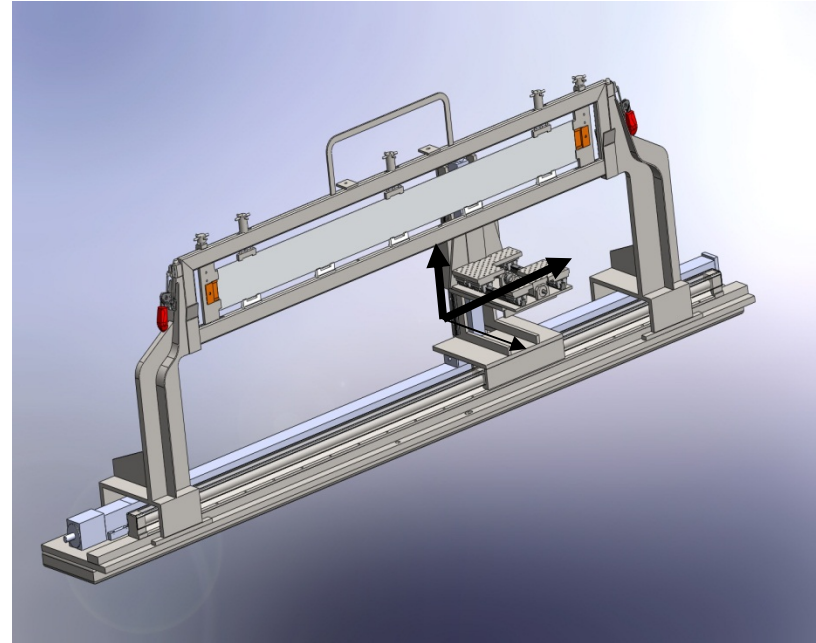


- Historical record
- Support fixture
- Spectrometry bench

## **- Metrology bench**

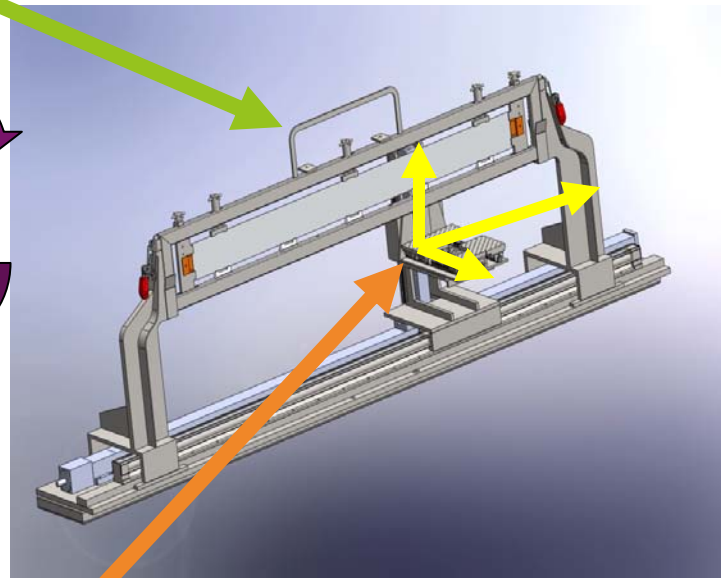
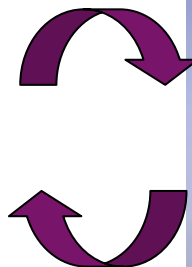
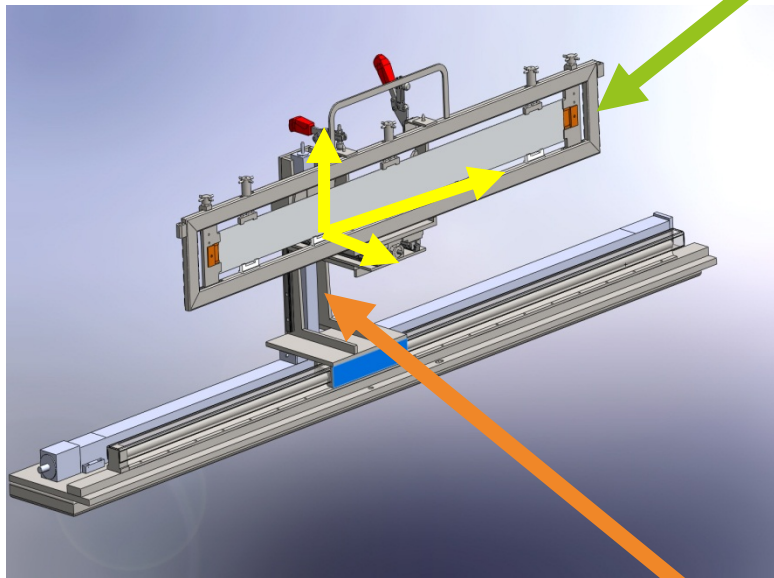
- Cutting Off bench
- Conclusions and Outlook

- Profilometric measurements from which the thickness is calculated
- Widths and Lengths measurements
- Measurements Techniques :
  - LVDT (robustness)
  - Confocal microscopy used for tuning up the pitch
- Two motors allow displacement of the transducers along the width and the length of the plate
- The third motor allows the motion of the transducers towards the plate (identical to the motion of the collimator)



# NDE BENCHES

Same support fixture



Same 3 axis displacements

The plate is moving in front of the detector

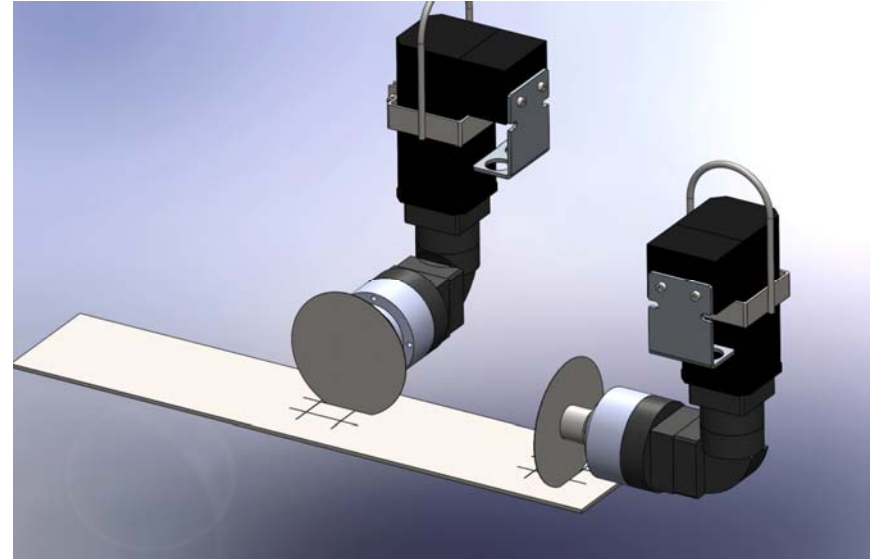
The sensor is moving in front of plate



- Historical record
- Support fixture
- Spectrometry bench
- Metrology bench
- **Cutting Off bench**
- Conclusions and Outlook

# Cutting Off Bench

- Sampling off, keeping the leaktightness of the fuel cell (the interface between two cells is less than 2 mm),
- Feasibility of sampling one or several fuel cells and preserving the integrity of the fuel plate set in the support frame,
- Use of the cartography of the plate from spectrometric exam and use of all referenced marks (the fuel plate is permanently set in the support frame).



## Conclusions and Outlook

The technical choice to dissociate the Non Destructive Exams from the cutting off operation allows lighter fixtures to handle in the hot cell and mostly to have independant functions so that one break does not affect other functions and does not prevent to perform other operations.

The principle of the support frame allows the proper indexing of the plate and to keep the reference once for all, as well for the NDE as for cutting off operations.

We have developped two separated NDE benches but with a high compatibility between each over so that they can be exchangeable.

In the futur, the NDE bench concept allows to consider the use of complementary non destructive exams such as video and eddy current techniques.

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