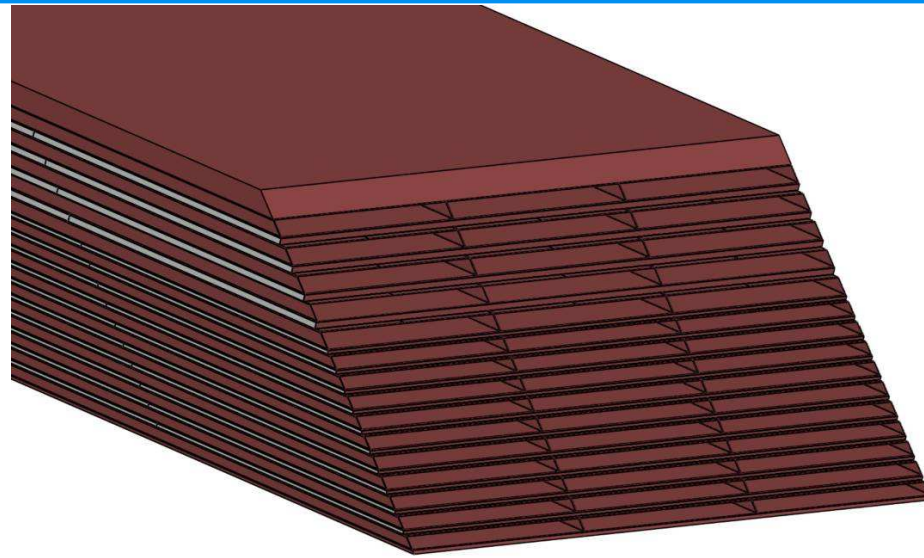


# *ECAL MECHANICAL R&D*



LIR

08/02/2011

# State of mechanical ECAL module.

- 1 Produced parts for ECAL Mould
- 2 Thermal studies
- 3 BG studies
- 4 Mould / ECAL Studies
- 5 Schedule

# ECAL module – parts of Mould

- ⇒ Validation & Thermal tests : **Feb 2011**
- ⇒ Alveolar structure : **March 2011**

## Alveolar layer production :

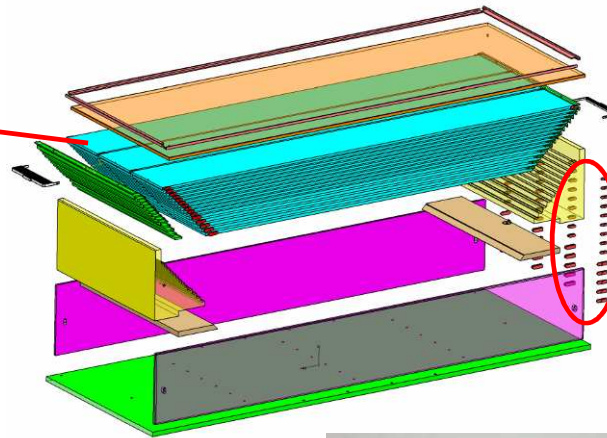
**15/15** structures are been moulded

The production of one layer is now stopped because we waiting the FBG.

The reception of the FBG is expected this week



All the cores and layers are assembled for the thermal test



## Joints production :

**180/180** joints ready

Design and construction of 2 moulds according to lower and upper parts



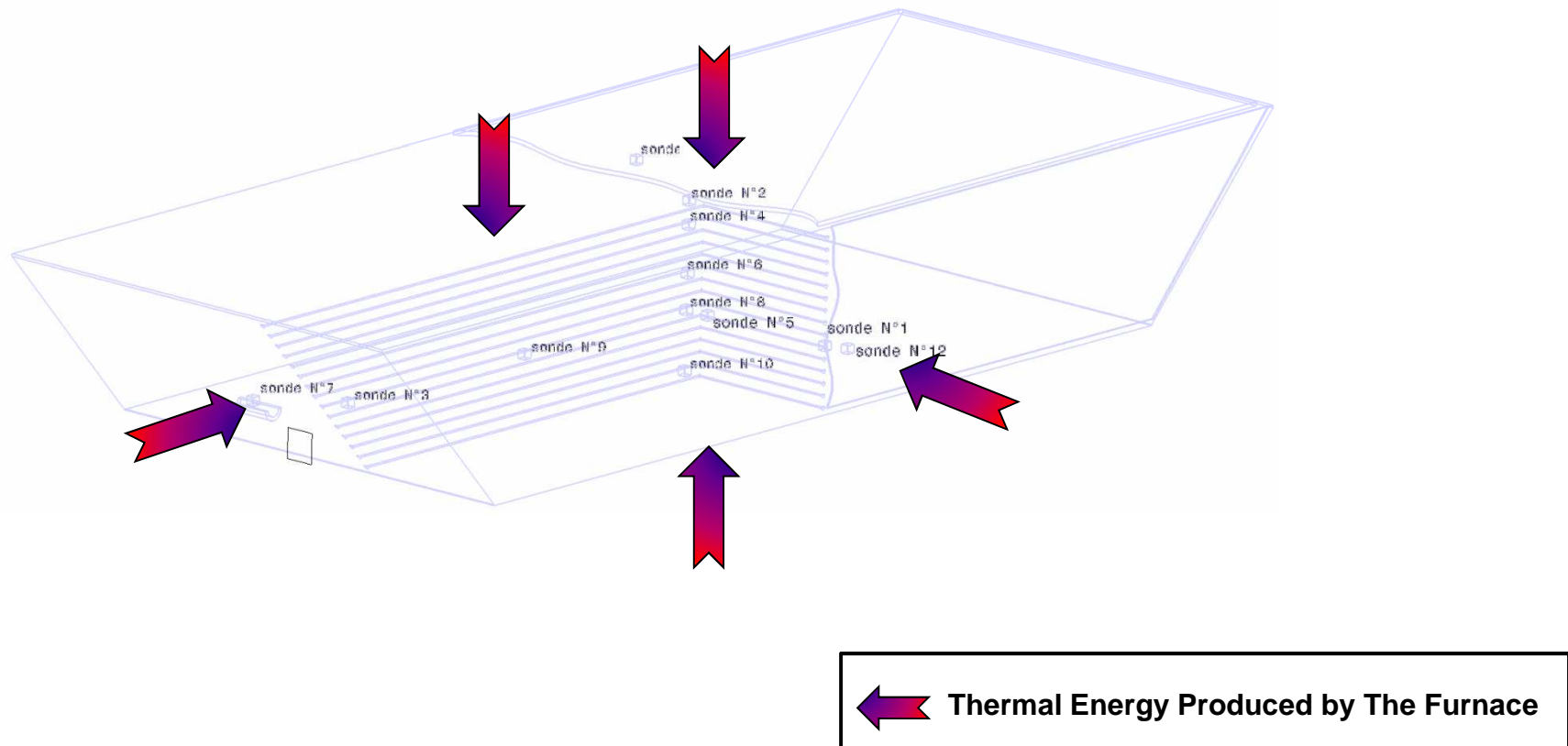
All PVC parts for pre-compacting are completed



# ECAL module – Thermal test

The goal:

- 1 - Measuring and understanding the propagation of heat from the outside to the inside of the module
- 2 - Create a heating cycle adapted to the structure.
- 3 - Test and improve the assembly procedures.

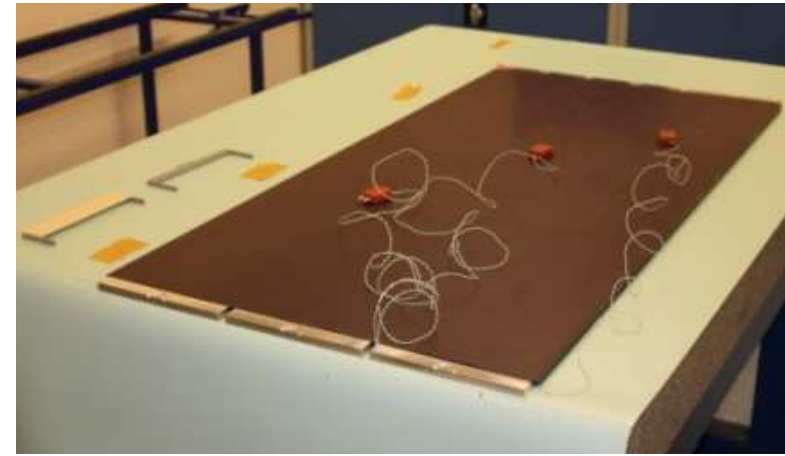


# ECAL module – Thermal test

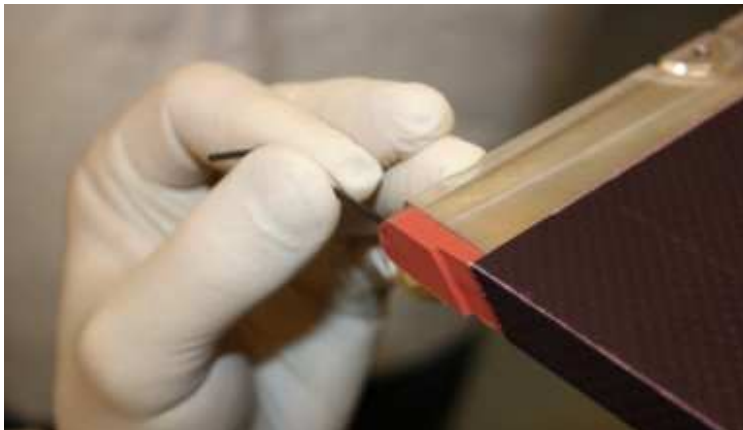
⇒ what we have already built



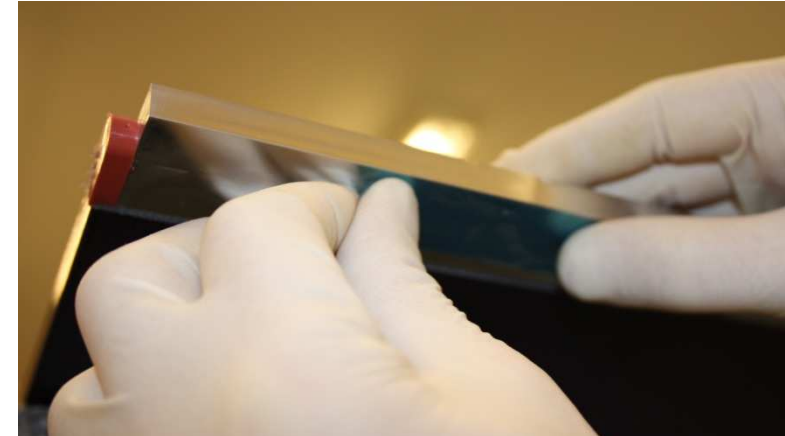
**1** *First assembly*



**2** *The temperature sensor are stuck to the core*



**3** *The joints are inserted between the alveolars and cores*

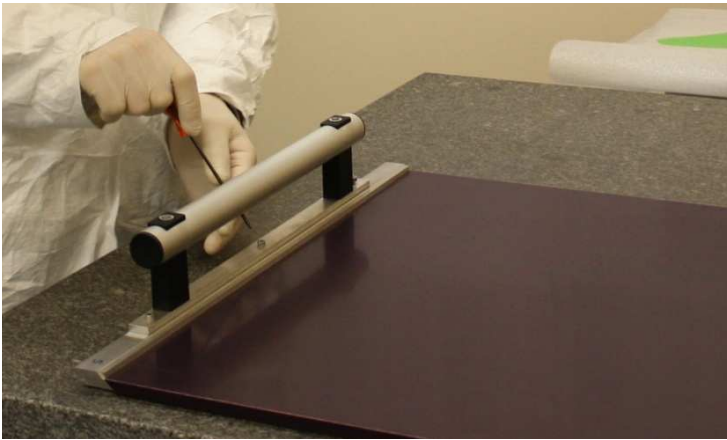


**4** *A scotch is stuck under cores*



# ECAL module – Thermal test

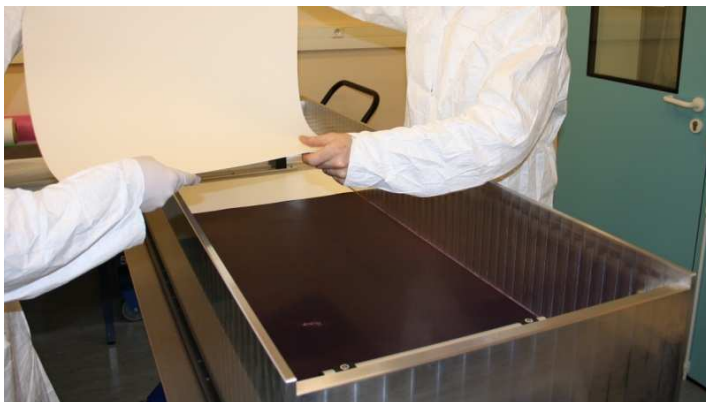
⇒ what we have already built



**5** *the aluminum rods and hand grips are screwed*



**6** *The alveolar layer is inserted in the mould with steel calibration foils*



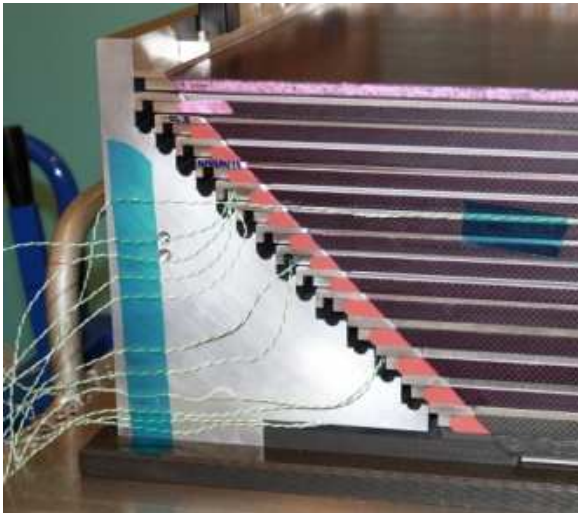
**7** *The foils of 0.35mm are positioned on the layer*



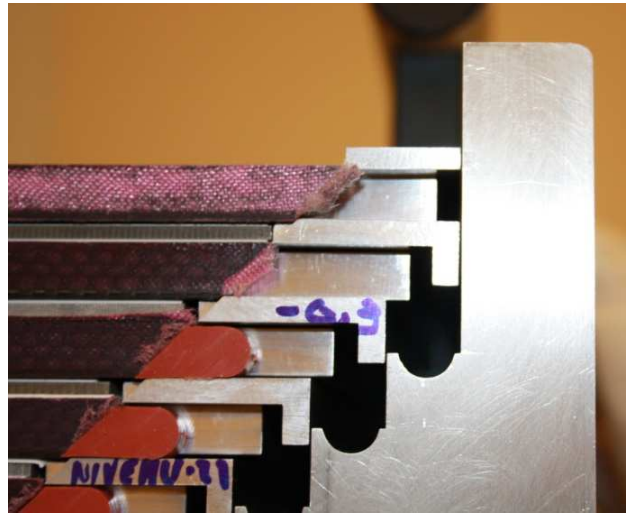
**8** *The tungsten plates are positioned precisely in the mould*

# ECAL module – Thermal test

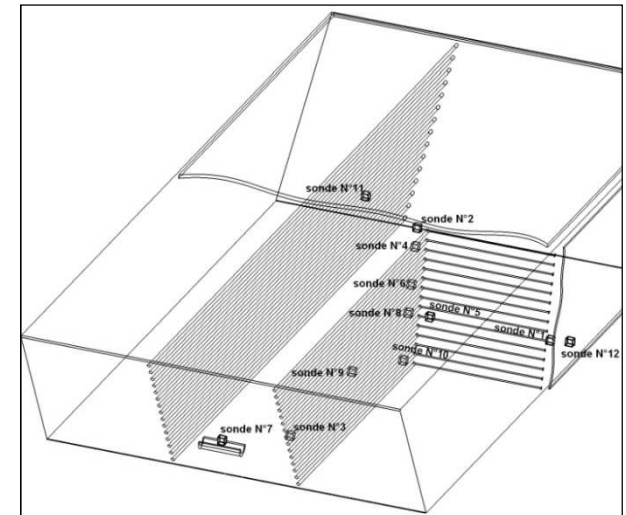
⇒ what remains to be done: End of assembly **Feb 2011**



*The temperature sensor wires are maintained*



*The layers are positioned at 0.3 mm of the staircase.*



*Positions of the temperature sensors*

# ECAL module – BG studies

The goal :

- 1 – Compare the results of stress concentration obtained by simulation.
- 2 – Study the deformed inside the structure.
- 3 – Improve the simulation about the global mechanical behaviour

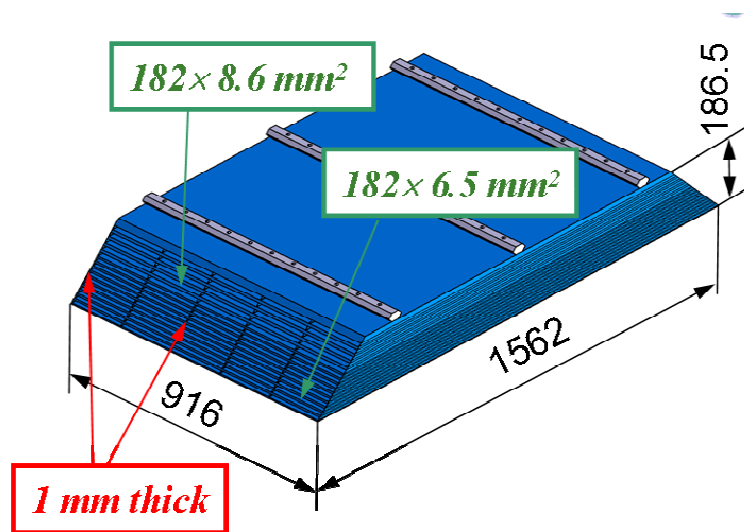


Fig.1a – Module du ECAL

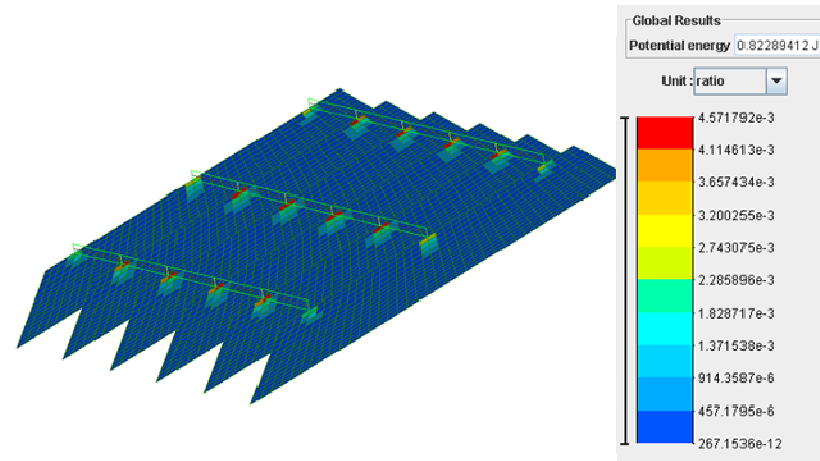


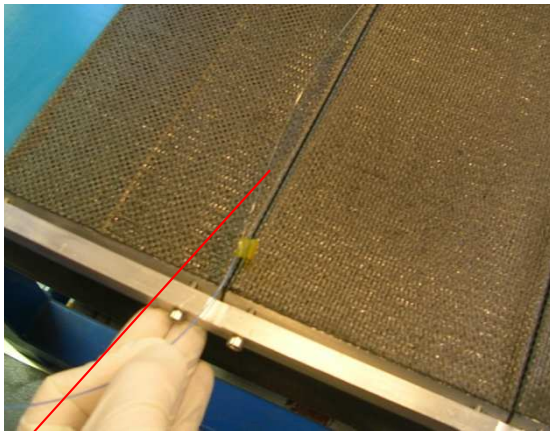
Fig.1b – Localisation des contraintes maxi sous son poids propre (TSAI-HILL)



# ECAL module – BG studies

⇒ what we have already built

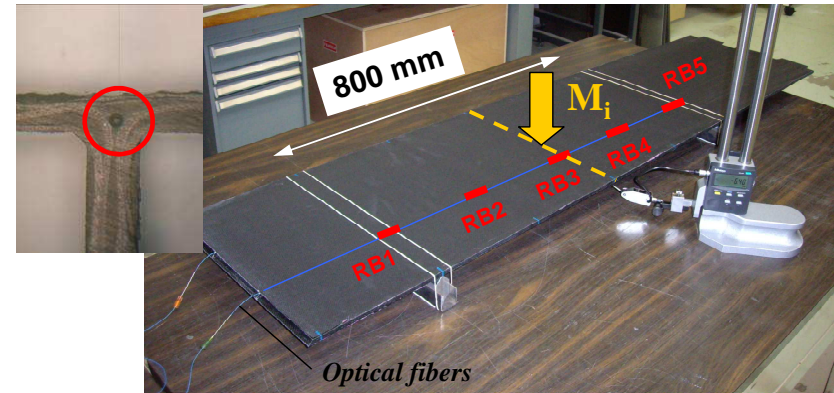
1



*Integration of Optical fibers between two layers of carbon*

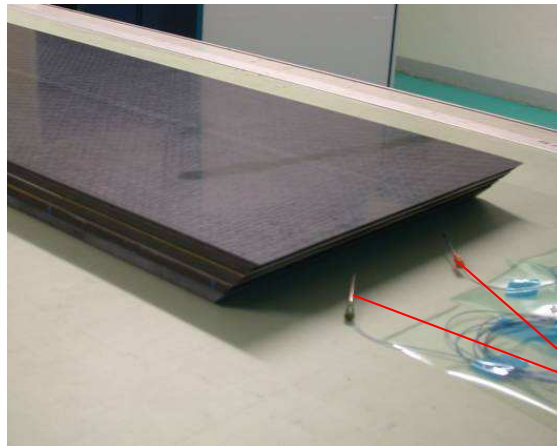


2



*Bending 3pts tests to validate the FBG inside one alveolar layer*

3

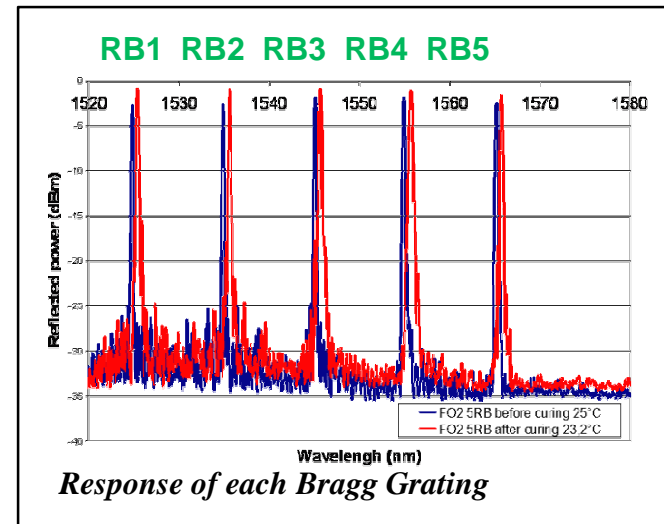


*Optical fibers*



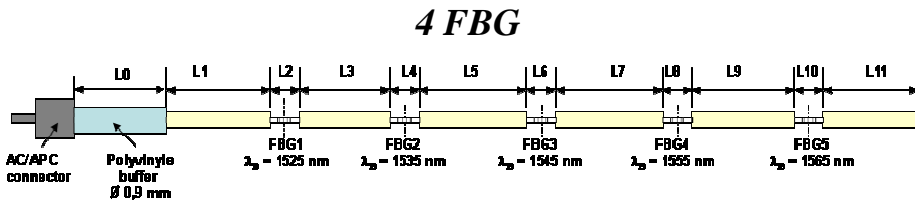
*Preparation of similarly tests on demonstrator + destructive tests !!!*

4

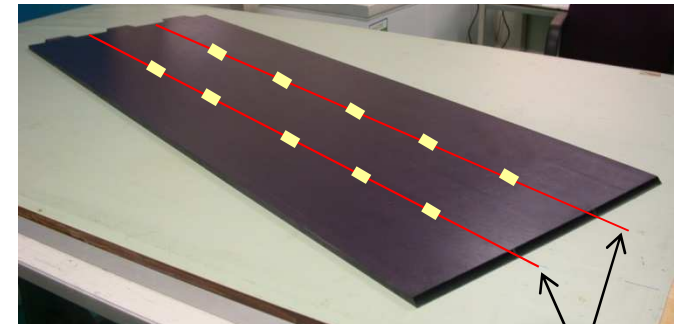


# EUDET module – BG studies

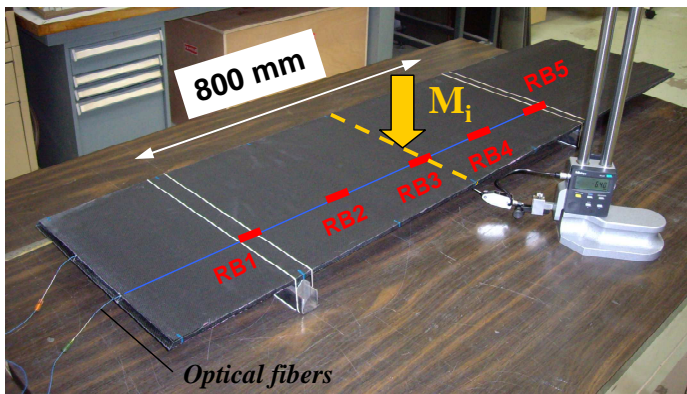
⇒ what remains to be done: **March 2011**



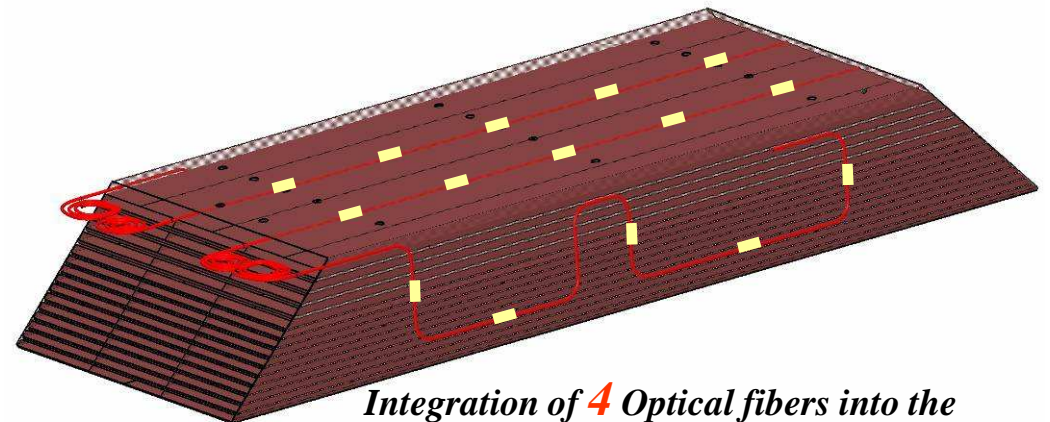
Schema of position of BG inside the fiber.



Build a new layer with 2 FBG inside



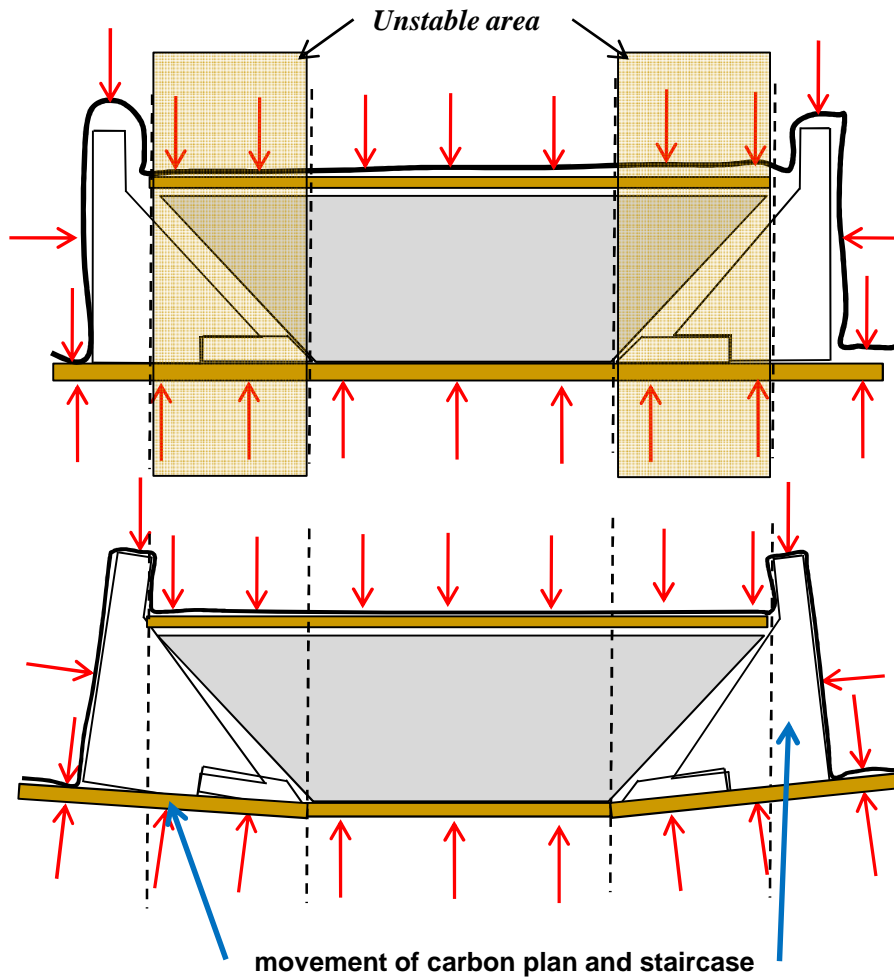
Bending 3pts tests to validate the proper functioning of fbgs



Integration of 4 Optical fibers into the EUDET module :

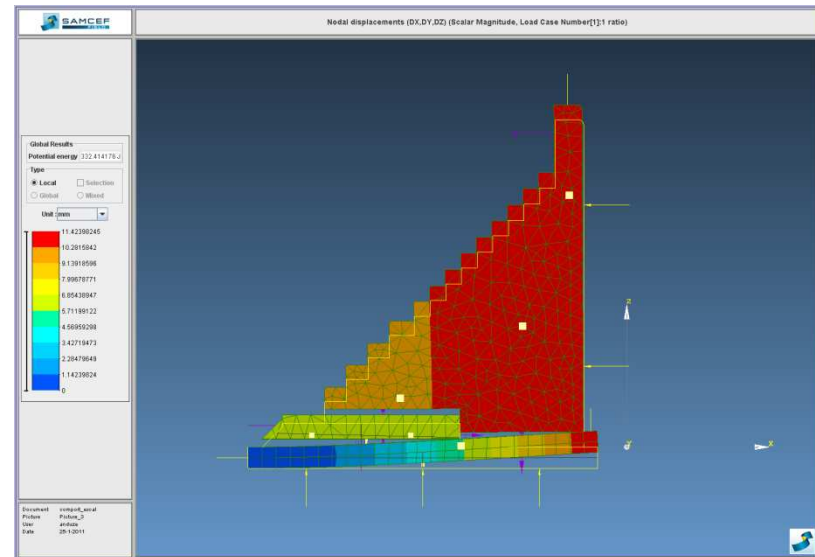
Correlation : Tests + Simulations

During assembly of the mold, we saw a problem.  
There was an area at the end of the structure that were not balanced.



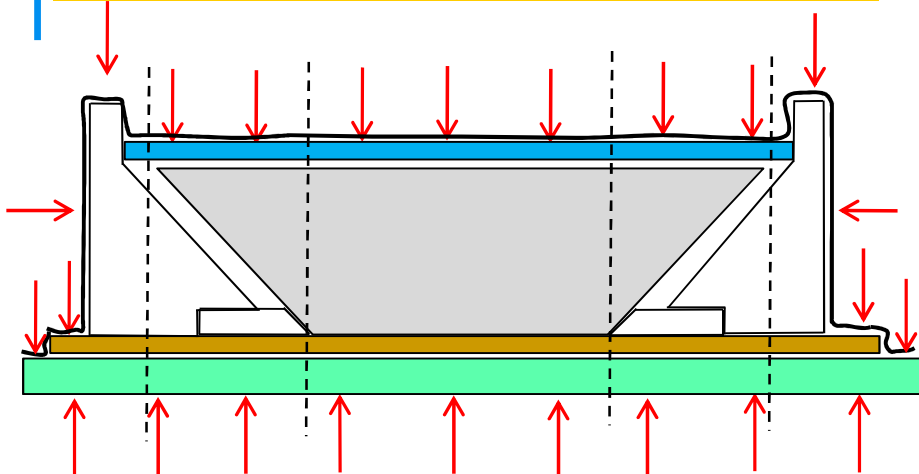
The first design incorporated a contact between the structure and the staircase.

But due to many modifications, we have forgotten the role of the balance of forces that the structure has played.





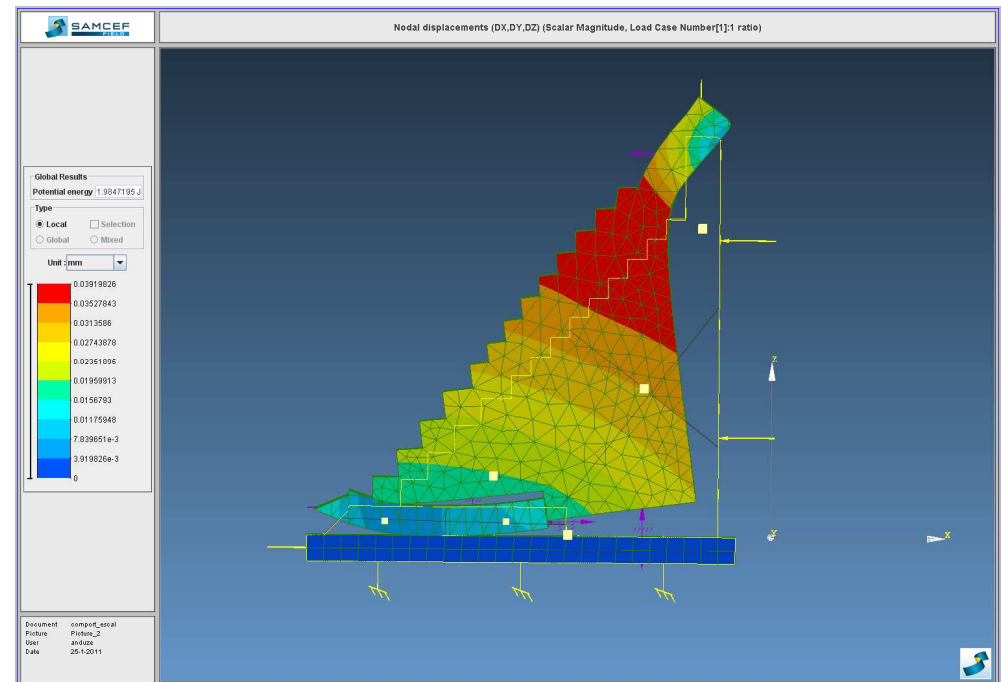
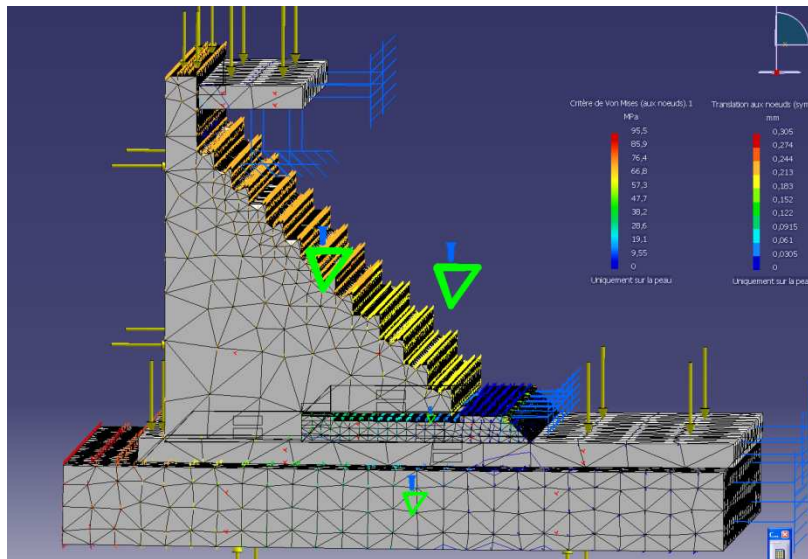
⇒ what remains to be done: **Feb 2011**



To solve the rotation of the staircase, we add a **carbon plate** on top to block it's move.

To solve the deformation of the carbon plan, we added an thicker **aluminum plate** to withstand the stresses.

After some simulations, we have a mold perfectly balanced as shown in the result below.





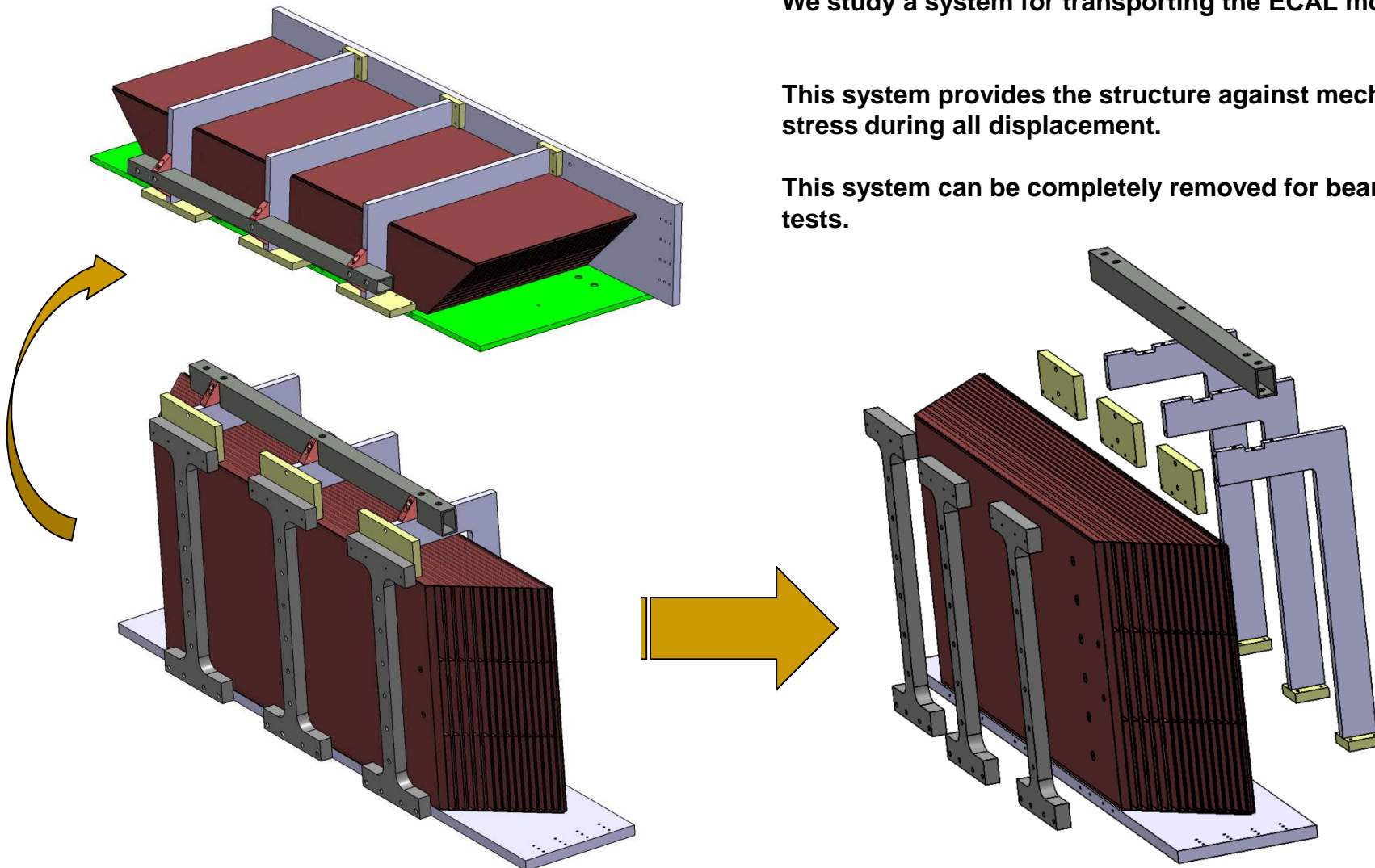
# ECAL module – Studies

⇒ what remains to be done: Design of transport system *Jun 2011*

We study a system for transporting the ECAL module.

This system provides the structure against mechanical stress during all displacement.

This system can be completely removed for beams tests.



# The schedule:

- ECAL module :
  - Reception of complete Assembly mould **Done**
  - Thermal tests **Feb 2010**
  - Build one alveolar layer with FBG **March 2011**
  - **ECAL module construction** **March 2011**
  - Modifications of H mould **May 2011**
  - **14 short H-shaped + 1 long** **May 2011**
  - **TestBeam preparation** (interfaces, tools...) **Jun 2011**