FCAL mechanics – by (at) CERN

Konrad Elsener

FCAL HW WG meeting, 9 February 2015

Short History (1)

FP7 - AIDA project: FCAL received an EU contribution, one part of it for a "mechanical infrastructure"

FCAL workshop Cracow (April 2010):
CERN offers to help with the task to design and build this precision structure

November 2010: first draft of "Functional Specification" agreed by FCAL
-> KE to discuss with PH/DT, project given to F.-X. Nuiry

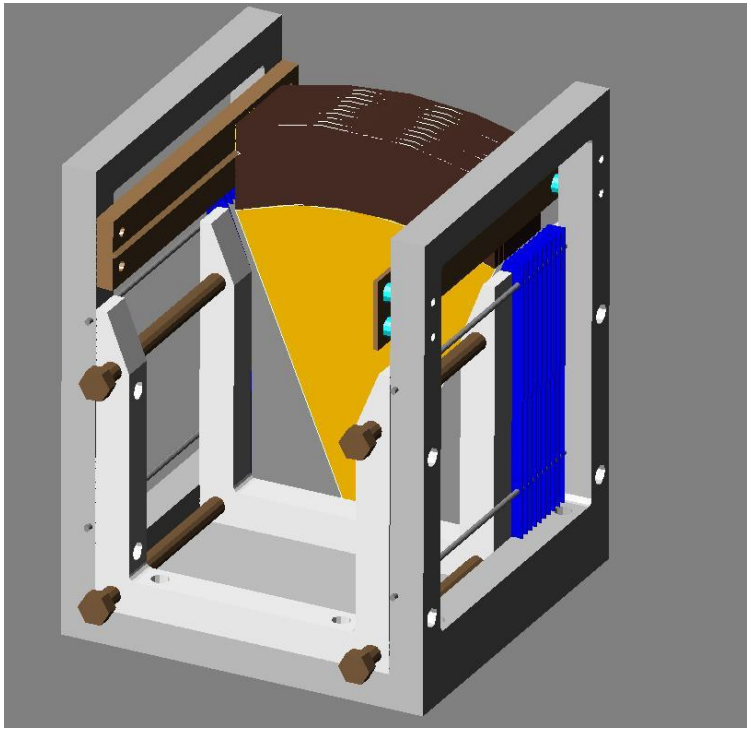
FCAL workshop Predeal (May 2011):
presentation of first, detailed proposal (KE for F-X. Nuiry)

FCAL workshop Belgrade (Sept. 2011):
updated proposal (KE for F-X. Nuiry)

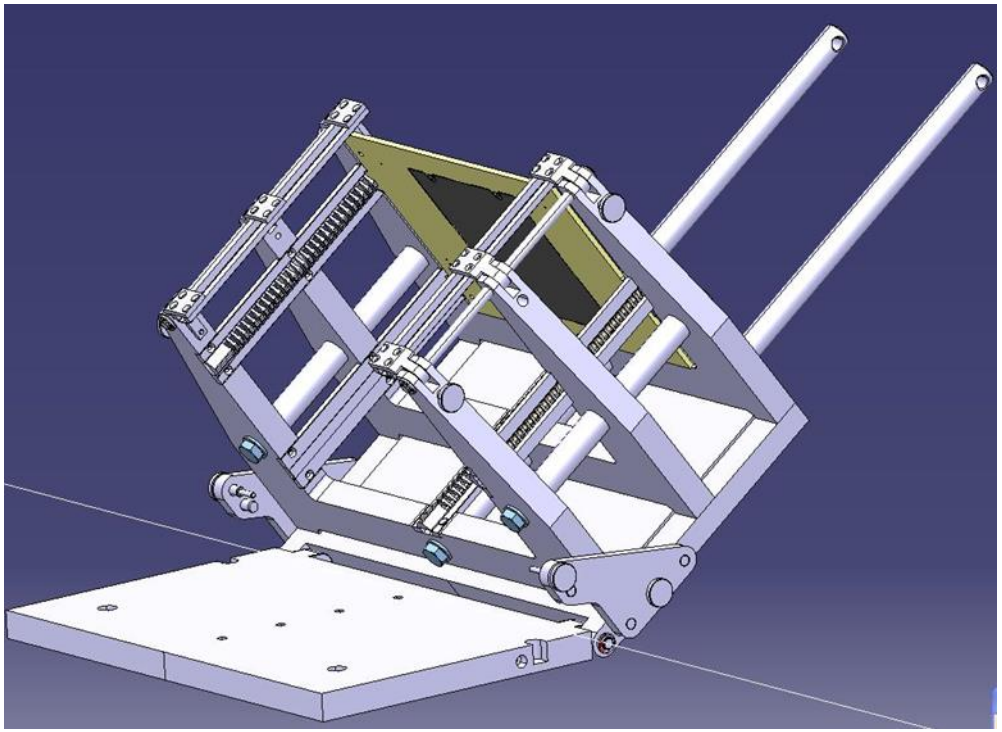
… construction work started …

Short History (2)

"before"



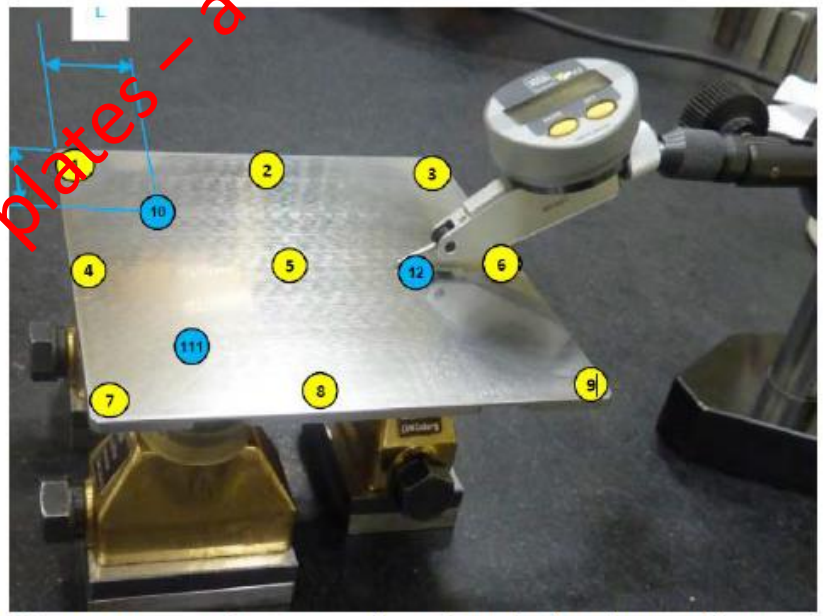
"summer 2011"



(for accuracy and ease of handling,
we need to glue the tungsten plates into
a permaglass frame)

Short History (3)

Procurement of Tungsten plates – a long story

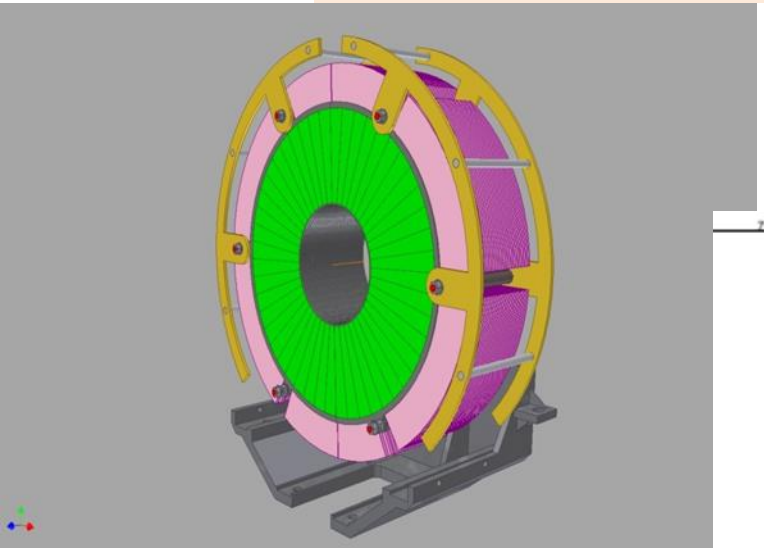


Points 10, 12 and 111 are at the same level and all other yellow points are probed.

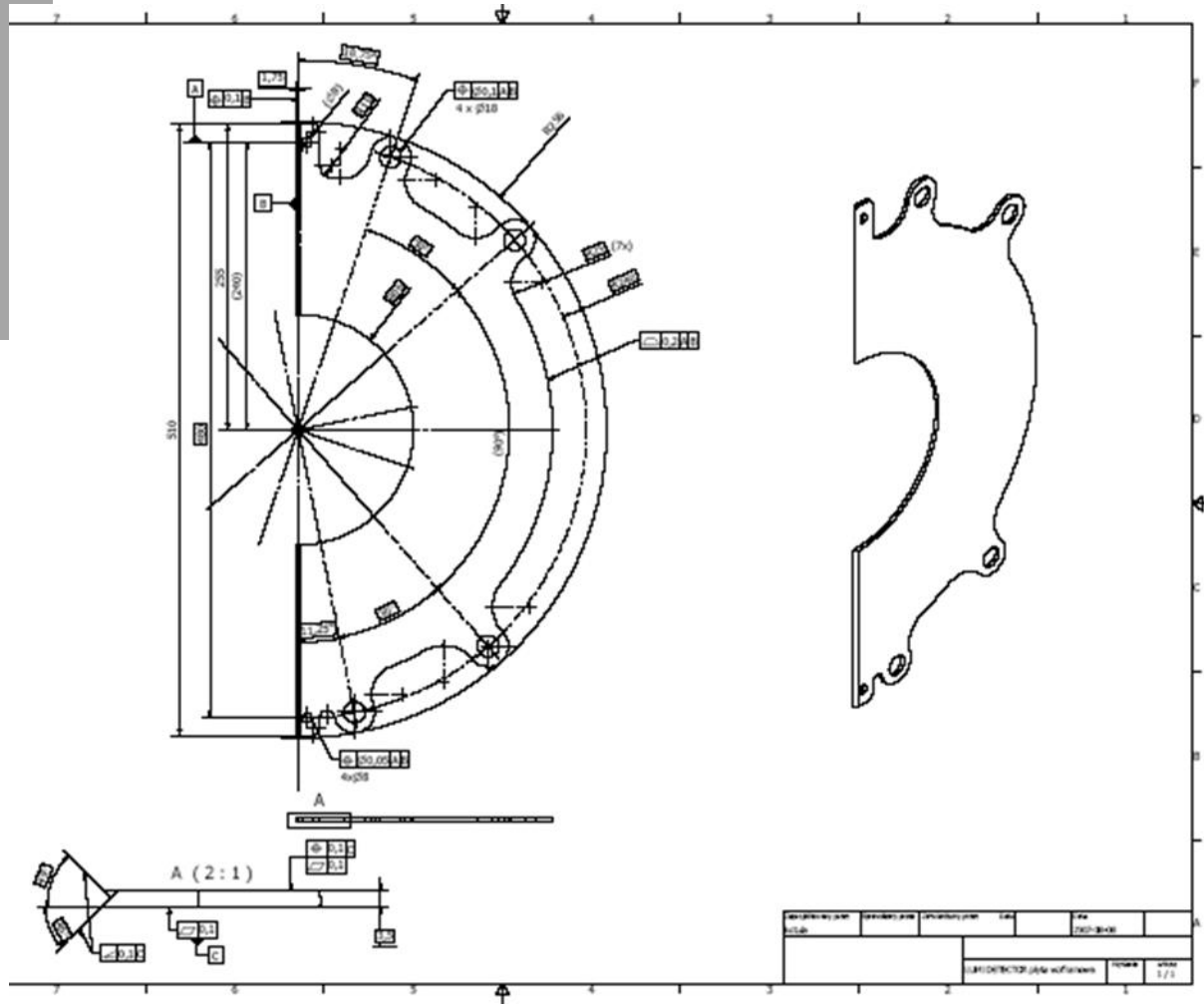
A summary of the flatness measurment results is shown below:

	PLATES	TOLERANCE ASKED	PLATE 1	PLATE 2	PLATE 3	PLATE 4	PLATE 5
PLANSEE	Flatness plane A	10µm	90 (Local problem)	10	9	3	7
	Position opposite plane	40µm	40	68	48	56	24

(Parenthesis – LumiCal)

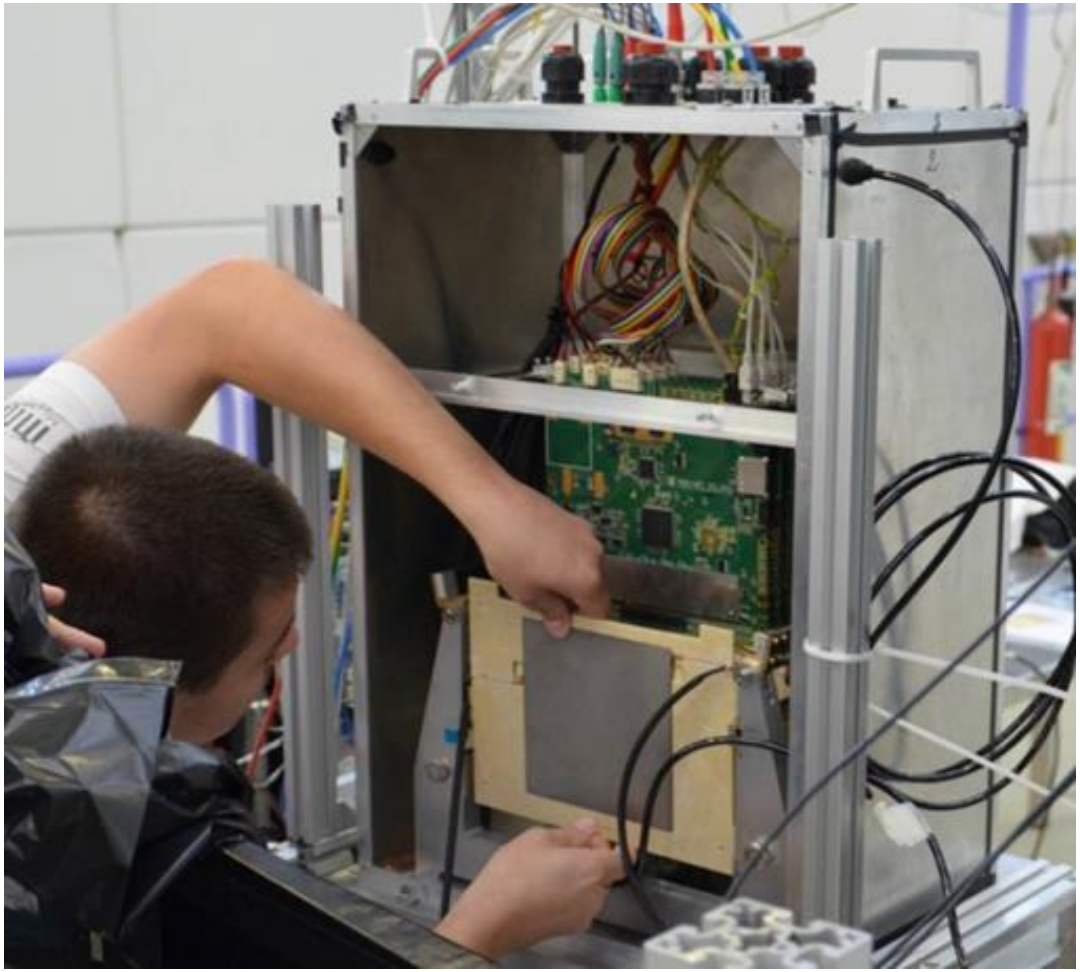


from: W. Wierba, various FCAL workshops



Are we sure we know how to construct the LumiCal within the mech. tolerances ?

Testbeam October 2014



Today

- We have a mechanical infrastructure, which seems to work;

----> We have 4 excellent, 1 good and 6 not so good W plates <----

- W plates can be placed at 1 mm distance from each other (step of the “comb”)
- sensor plate positions / distances depend on the electronics + connectivity

- FCAL-AIDA mechanical infrastructures is dismantled and packed in boxes
- W plates in their permaglass frames are packed in boxes
- all is ready for transport (to DESY ? next test-beam?)

DOCUMENTATION

collection of docs made, see EDMS https://edms.cern.ch/document/1475879/

- 6 presentations by F.-X. Nuiry
- 3 technical notes (see next pages)

Documentation – Notes (1)

CERN Div./Group:
PH-DT-EO

CERN
CH-1211 Geneva 23

DATE: 2014-10-23

AIDA Infrastructure for very forward calorimeters

Assembly procedure

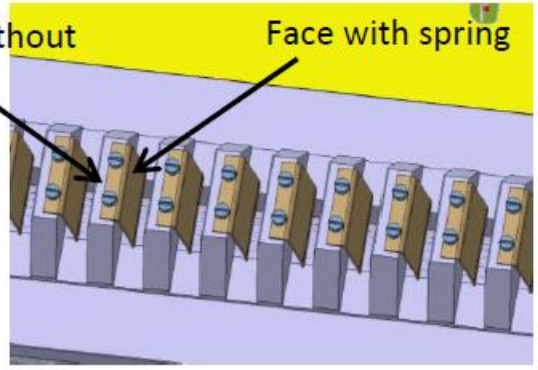
Contents

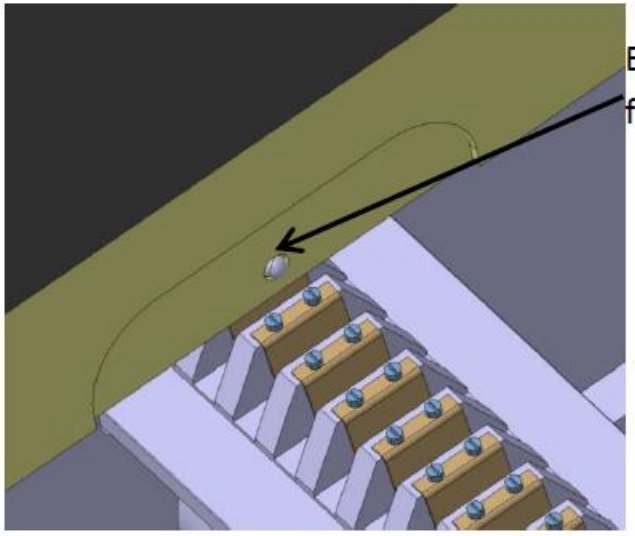
Documentation – Notes (1 +)

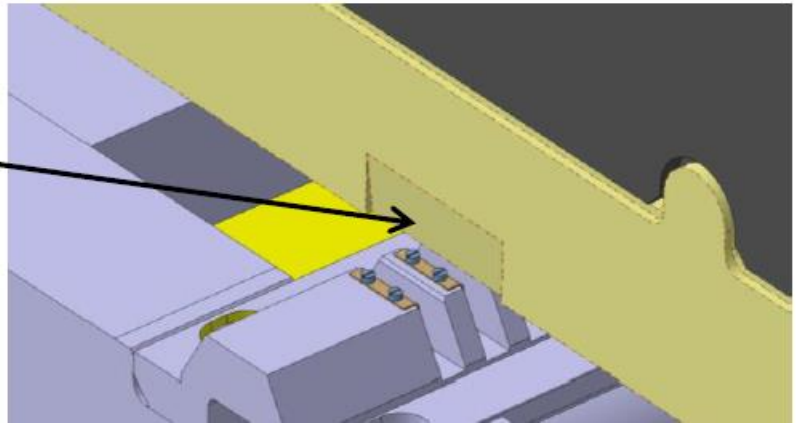
Example: step 5 (out of 8)

5. Insert the W assembly while keeping the bottom bearing opposed to the bottom comb spring.

Bottom comb







Documentation – Notes (2)

CERN Div./Group:
PH-DT-EO

CERN
CH-1211 Geneva 23

DATE: 2014-11-05

AIDA Infrastructure for very forward calorimeters
Tungsten plates

Abstract

This document summarises the different steps towards getting precisely machined tungsten plates for the AIDA mechanical infrastructure used by FCAL.

Contents

Documentation – Notes (3)

CERN Div./Group: *PH-DT-EO*

CERN
CH-1211 Geneva 23

DATE: 2013-02-01

AIDA Infrastructure for very forward calorimeters

Tungsten assembly to the Permaglas frame

Assembly procedure

Abstract

This Functional Specification describes how tungsten plates have to be glued in permaglas frames.

The assembly is realised on a clean marble previously recovered with a tedlar foil.

Material needed:

-Cleaning rag
-Flat Tedlar foil
-Araldite 2011: gun + cartridge + mixer
-Teflon tape
-Isopropyl alcohol
-Levelling pads (3*1mm and 4*0.2mm)
-Masse (3*200g)
-Spatula

CERN staff (update)

- Francois has left the project (and his group) – but is still at CERN
- training (Didier Piedigrossi, technician, PH-DT) in the assembly of the mechanical parts of the structure successfully completed last year

N.B. for the sensors/electronics Przemek from Cracow is a crucial person !

- one of the key persons (Christophe Bault, senior designer, PH-DT) is still available (for limited periods)

- New fellow 1st March 2015: Szymon SROKA
  main project: CLIC detector vertex and tracker mechanics
  side project: FCAL-AIDA mechanical infrastructure; needs to learn all about it

“Upgrade” Proposals (1)

Reminder:

W plates can be placed at 1 mm distance from each other (step of the comb) – sensor plate positions / distances depend on the electronics + connectivity

Tel Aviv team is actively persuing a thinner assembly of sensor/electronics
(with some help of CERN designer + technicians + 3D printing experts)

See presentations and reports by Tel Aviv team

“Upgrade” Proposals (2)

2014 CERN internship (Thomas Lajeune; supervisors F.X. Nuiry and Ch. Bault)

- concept for thinner assemblies (machining of permaglass frames; glue sensor on W plate)
- Propose to build a “machine” to insert assemblies

See: https://edms.cern.ch/file/1440262/1/Presentation_finale_Thomas.pdf