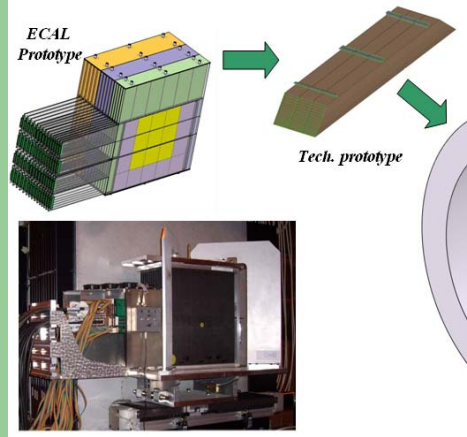
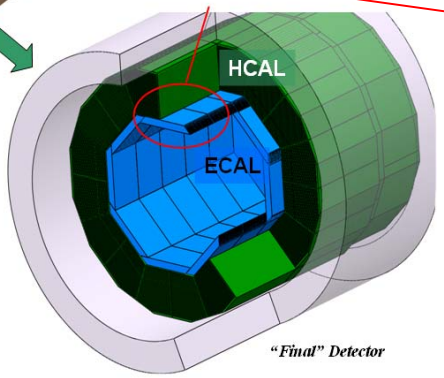
Interconnection of ASUs
SiW ECAL LLR 08/02/2011

P Cornebise CNRS LAL

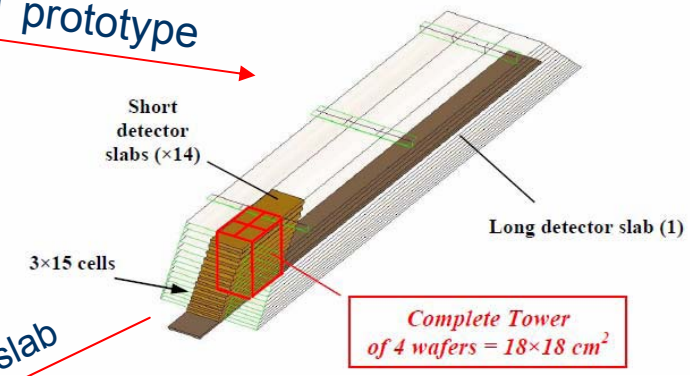
Contents

1 Introduction



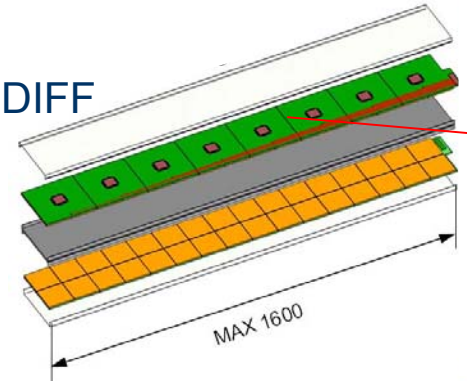


EUDET prototype

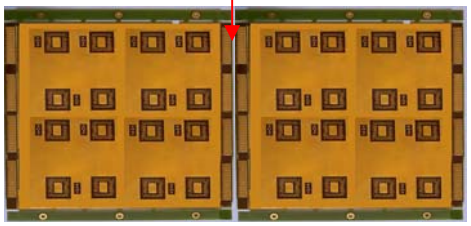


Long detector slab

With:
7 ASUs+1DIFF

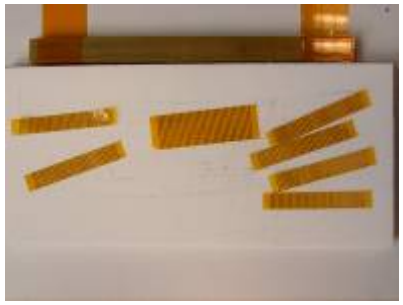


My presentation focuses on the ASUs interconnections study

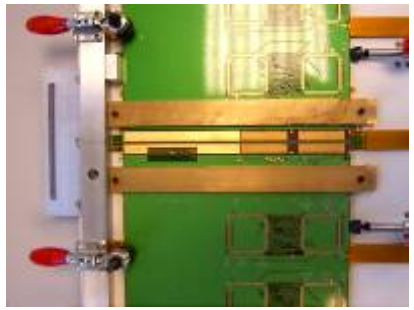


1111µm

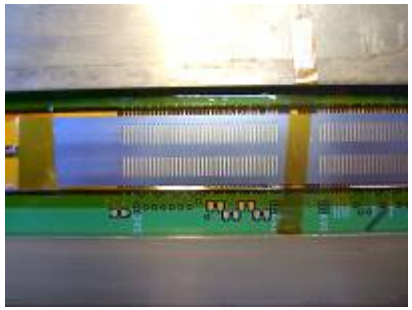
2
Current method of interconnection



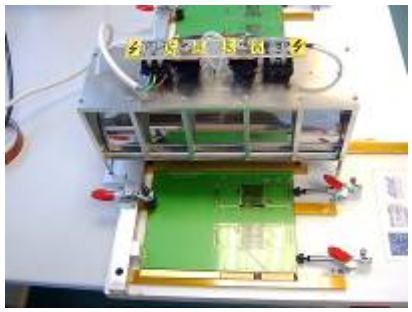
Kapton comb 1 connector



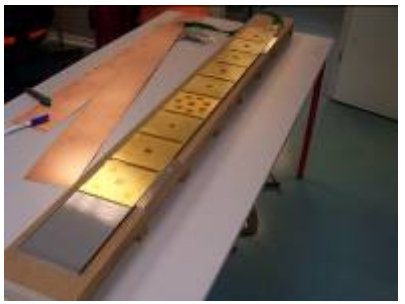
Solder bench



Silk screen for
Manual solder paste laying
(very delicate operation)



Halogen lamp for the solder
200°C for 2.30 minutes

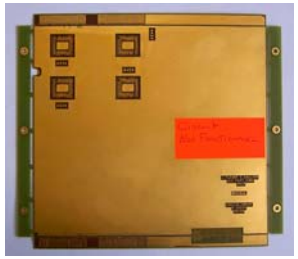


We developed this method with the Cambridge University
and used for interconnect 8 FEV temp

3 PCB FEV interconnection with ACF 3M
3.1 Test results from 3M Beauchamps (95)

Components

1 FEV7 CIP



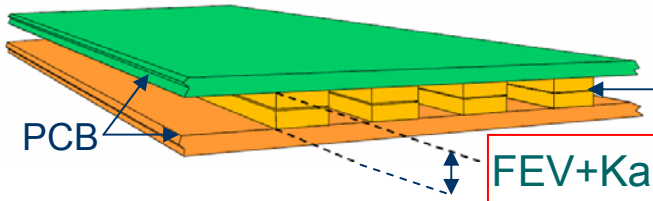
1 Kapton comb
1 connector

ACF 3M 7303 film
width=5mm length= 25meters

Miyachi thermode test bench

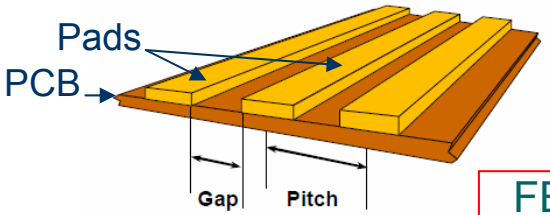
3.1
3M Anisotropic Conductive Film Adhesives ACF 7303 use characteristics

Meet specification for the ACF employment



Maximum height 75µm(3M)

FEV+Kapton
70µm



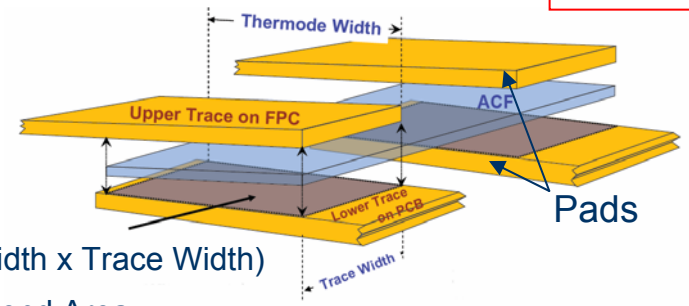
Minimum gap 250µm (3M)
Minimum pitch 500µm (3M)

FEV
500µm
1000µm

The ACF technology is used to:
-Flat screen
-Laptop
-Smartphone…

Minimum Pad Overlap = 0.75mm² (3M)

FEV
2.5mm²



Overlap Area
(=Thermode Width x Trace Width)

Bond Area
(=Thermode Width x Length across All Traces)

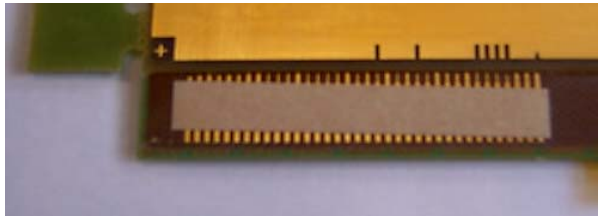
General Properties of ACF 7303

Adhesive Type: Epoxy/Acrylate Blend
Particle Type : Silver-coated glass
Particle Size : 43 µm
Liner Type: Polyester-coated Kraft with Silicone Release
Adhesive Thickness: 74 µm
Liner Thickness: 100 µm

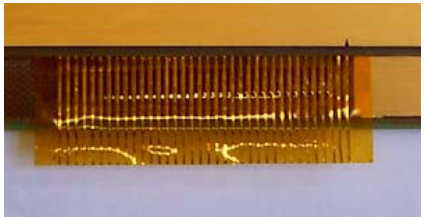
3.1 Process

The ACF 3M looks like double-sided tape

Put the ACF on FEV
Remove the protect film (brown)



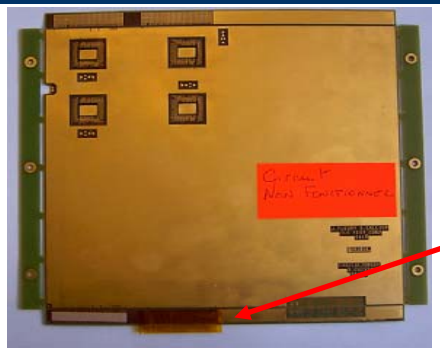
Positioning of the comb
(It's possible to repeat the positioning)



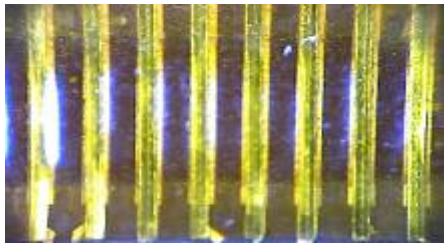
Using
Myachi
Thermode

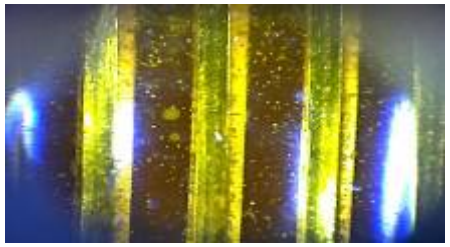
Temperature 150°C
Time 25 seconds
Pressure 18 Bar

3.1 Results



Kapton comb pictures with binocular





Results of electrical test made with a precision multimeter Keithley

Resistance between wires in PCB = 0.2 ohms

Isolation between wires in PCB = ∞

Advantage of the ACF is:

- Ease to use, low stress for PCBs
- **Industrialization of process is very easy**

R&D issues:

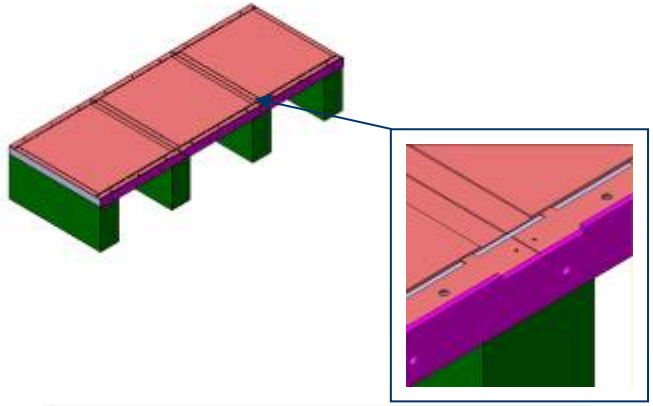
- Currently limited information on the lifetime,
  Requires further electrical and aging tests

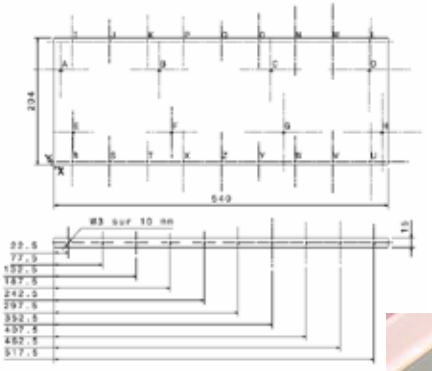
3.2
Next tests with the current thermode

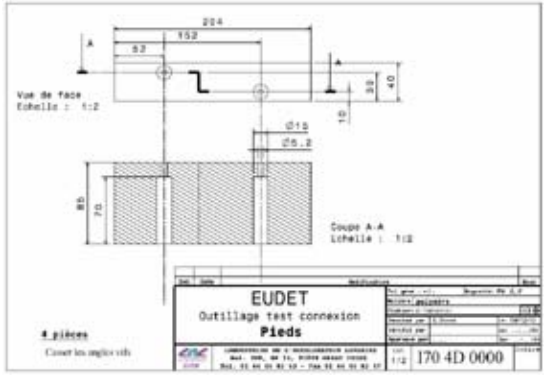
- Interconnect 3 FEVs with a thermode available to us fo free at 3M company or Miyachi company
- Electrical tests in 3 FEVs, resistors,current,high voltage…
- Check the limits of ACF 3M with the use of an oven
  - Required to manufacture a mechanical support for 3 FEVs (part1)
  - Required to produce simple PCBs without chips (part2)
  - Required to produce Kapton combs with 4 connectors (part3)

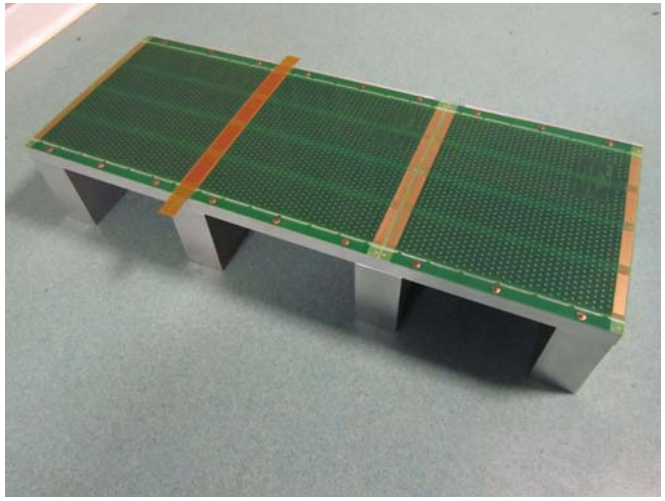
Note:
3M Adhesive has a lifetime of 30 days at room temperature if stored in a freezer

3.2
(1) Mechanical support for 3FEVs
by Julien Bonis









-Completed 11/01/2011

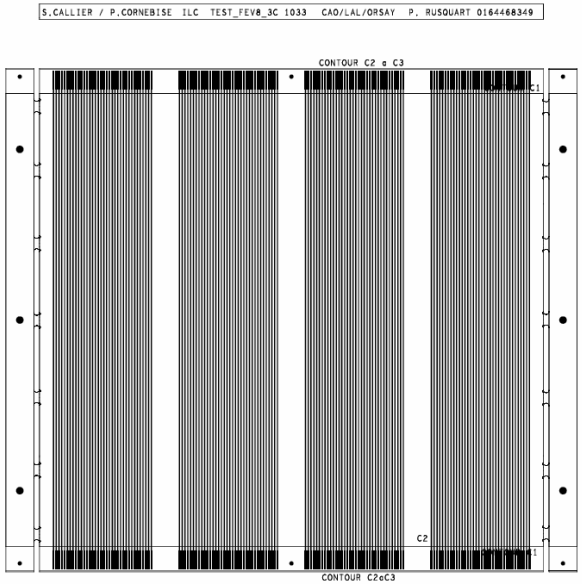
3.2
(2) PCB FEV8 3C CAO LAL

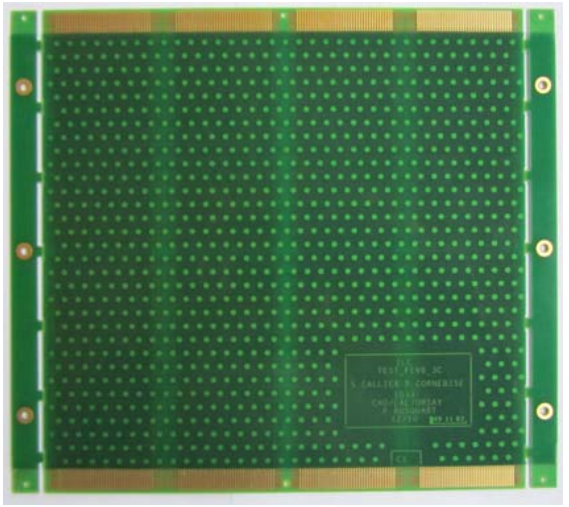
by Dominique Cuisy and Pascal Rusquart

4 connectors

Wire by wire

4 connectors

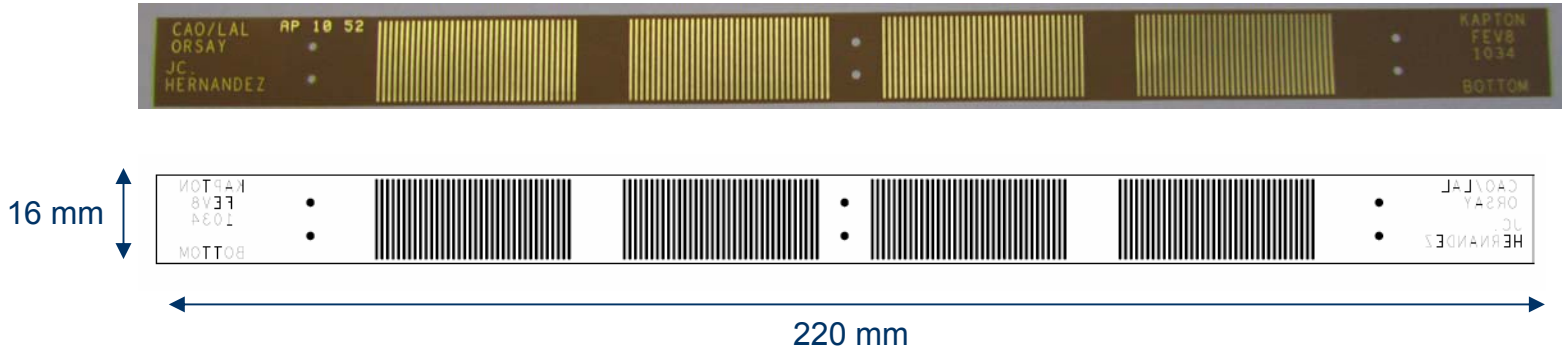




-Completed 10 boards 26/01/2011

3.2
(3) Kapton combs CAO LAL
by Dominique Cuisy and JC Hernandez

Kapton combs FEV8

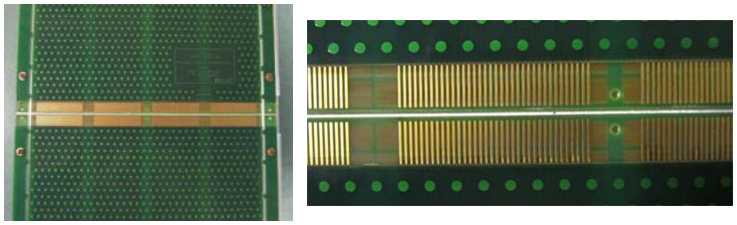


4 connectors with 36 copper pads length=14mm width=0.5mm thickness 35µm
Thickness of kapton = 50µm
Total thickness = 85µm

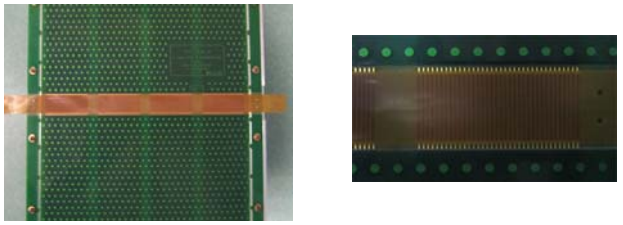
-Completed 06/01/2011

3.2
Preparation of test bench for testing

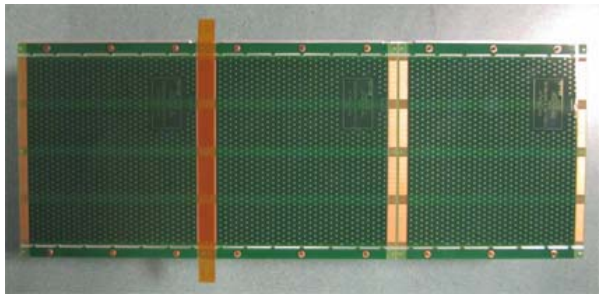
Positioning FEV8 3C
to mechanical support



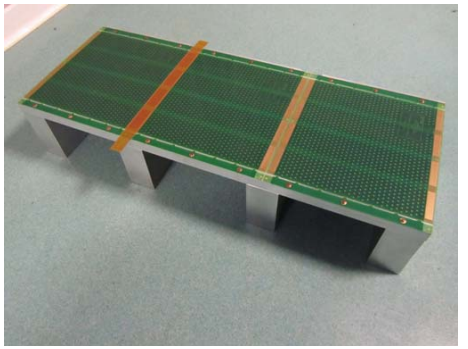
Positioning kapton combs
on ACF 3M



The test bench is now ready
to start interconnection process



The test is scheduled for March 9
and we'll go together me and Rémi Cornat



3.3
Next steps with our thermode if we buy it

- The price of thermode is estimated at 10 000 euros (ANR)
- The new machine has a nozzle adapted to interconnect 4 or 2 half connectors simultaneously
- We need a new mechanical support for 7 FEV8 and if possible automated

4
Eudet LAL assembling hall

- Status
  - Demounting crane n°1 completed
  - Computer and phone network completed
  - Water heating system completed
  - Electrical installation current
  - Control crane n°2 to be done
  - Replacement front door to be done
  - Painting to be done
  - Work completed planned middle of March

Inauguration planned for March 14 2011

Thank’s for your attention