

# **Situation with industry**

*Rui de Oliveira*

# **Micromegas**

***Let me remind you the last process  
for mass production***

# Read/out PCB:



*50um Kapton + resistive strips*



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PCB + readout strips

50um Kapton + resistive strips



← 25um Glue

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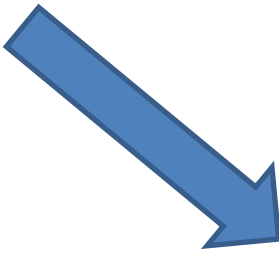


Isostatic Gluing

# Read/out PCB:

**PCB + readout strips**

**50um Kapton + resistive strips**



**25um solid Glue**



**High temp Gluing**

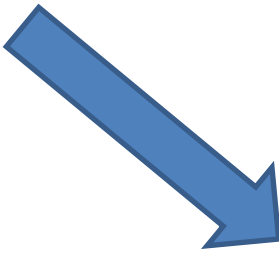


**Pillars creation**

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PCB + readout strips

50um Kapton + resistive strips



25um solid Glue



High temp Gluing

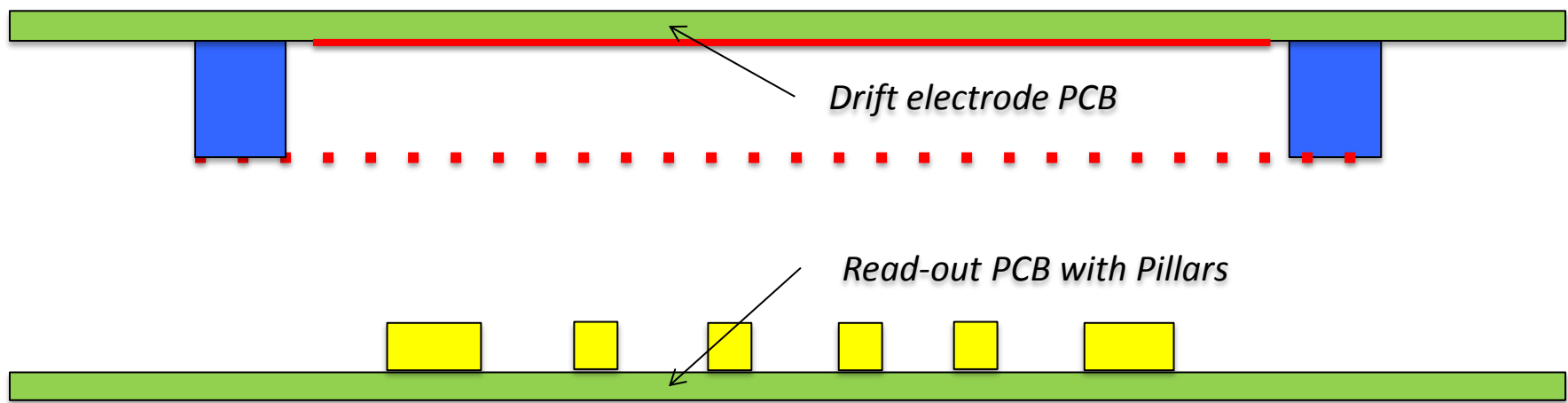


Pillars creation



Fiducial creation

# Micromegas final assembly:





## PCB + readout strips

- ELTOS

- *Boards of 2m x 0.5m have been already produced*
- *Quote request for 1200m<sup>2</sup> (2.25m x 0.5m) on going*
- *1.2m x 0.5m in production for MSW test*

- ELVIA

- *Boards of 2m x 0.5m have been already produced*
- *2 Boards LSBB project 1.2m x 0.5m in production (2D read-out)*
- *Quote request for large volume soon*

- Triangle labs:

- *Boards of 2m x 0.5m have been already produced*
- *Quote request for large volume soon*

# Resistive deposition



## • Charbonney

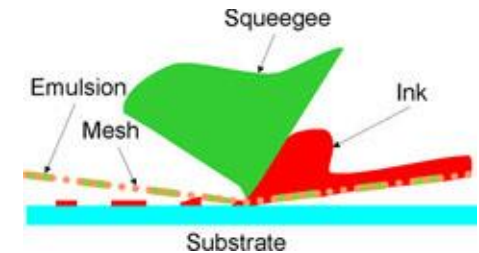
- *Swiss company near CERN doing screen printing*
- *Printing 1m x 0.5m resistive strips → OK*
- *Max possible size: 1.5m x 0.9m*
- *Mass Production → OK*
- *MSW in production*
- *ATLAS MAMMA , LSBB and many small detectors have been produced*
- *Waiting for large volume quote*

## • ELVIA

- *1.2m x 0.5m LSBB in production (Screen printing)*

## • ELTOS

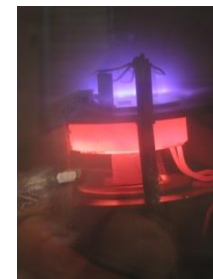
- *1.2 x 0.5m MSW in production (Screen printing)*
- *2.3m x 0.5m possible*
- *We are waiting for large volume quote*



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## • Raytech

- *Japanese company (Ochi Atsuhiko contact)*
- *Vacuum deposited resistive layers (lift off technique)*
- *MSW in production*



Wikipedia PECVD

# Large size gluing



## • MDT

- *Italian company having an extra large Isostatic press (similar process used at CERN)*
- *Press gluing capability 4.2m x 1.6m → to be tested*
- *Mass production → seems OK*
- *Quotes for large volume not yet asked*
- *We should organize a visit and probably make the MSW prototypes*



## • ELVIA

- *They have an Autoclave with the correct dimension.*



# Pillar creation



- ELTOS

- *1.2m x 0.5m MSW Micromegas in production*
- *Quote for 1200m2 requested*

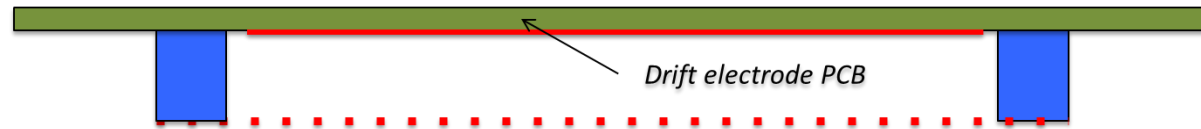
- ELVIA

- *LSBB 1.2m x 0.5m real BULK in production*
- *Quote for large volume still to be sent.*

- Triangle Labs

- *No request submitted up to now*

# Mesh stretching



- Seritec

- *Swiss company near CERN stretching meshes*
- *Stretching 2m x 1m mesh → OK*
- *Max possible size: 3.2m x 2.2m*
- *Mass production → OK*
- *We are studying the received quotes for 1200m<sup>2</sup>*

# Registration

- Optical fiducial (ultimate precision)

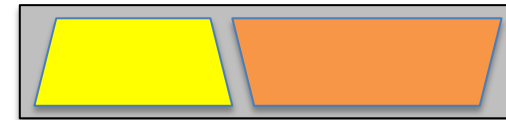
- RASMASKs directly on the boards
- A few  $\mu\text{m}$  error due to the photolithographic mask.

- Mechanical fiducial (less precise due to assembly steps)

- Precise CCD or X-ray drilling machine
- Drill perfectly in the middle of a pattern.
- Triangle Labs have such machine (+/-15 $\mu\text{m}$  error claimed by the machine producer : PLURITEC)
- This machine can drill and mill on 2.5m x 0.6m

# PCB production considerations

- PCB size: 0.5 x 2.4 m<sup>2</sup>, the same for all boards
  - Combine two small boards into one PCB; reduces # of PCB layouts
  - 24 different PCB layouts
  - Number of PCBs (w/o) spares: 1536
- Production could be split between two or three producers
- PCB production in four steps
  1. Etching of readout pattern
  2. Gluing of KAPTON foil with resistive strips (produced in Japan)
  3. Making of pillars
  4. Cutting and drilling
- All steps could be done by different industries or some by the same
- Three or four different call for offers



# PCB production time line

- MM construction start: 2015
- PCB production contracts should be signed in fall 2014
- First boards to be delivered in Feb 2015
- Typical output: 8 boards/day
  - 3 – 4 months if split b/w three producers
  - 6 months if two producers



# PCB production - open questions

- What about spares?
- What about the drift electrodes?
  - Cu-clad PCBs – if so, who does them?
  - Conducting paint (spray ?)
  - Cu foil ?
  - Other ...

# PCB production – Module 0

- Use PCBs for Module 0 to qualify potential production sites & procedures
  - Split orders into small orders in different companies (if possible)
  - Contracts for full production will not yet be signed
- Module 0 orders have to be placed in April 2014 to have PCBs for Module 0 construction in June/July
- PCB layout/design has to be frozen in March
- Qualification of Kapton glueing and pillar deposition on full-size PCBs to be done b/w now and February 2014

**Thank you**