

Situation with industry

Rui de Oliveira

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Outline

- **CERN team presentation**
- ***Situation***

CERN TEAM

- **Serge Ferry**
 - *Vacuum deposition expert + Micromegas Micro-bulk*
 - *Ex: CAST detector*
- **Julie Veron**
 - *Large size Read-out boards expert*
 - *soon simulation*
 - *Ex: recent 1m x 0.5m 2D read-out for SOLID experiment (COMPASS like)*
- **Olivier Pizzirusso**
 - *Micromegas expert*
 - *Ex: MAMMA detector*
- **David Ranchin**
 - *Low mass inner tracker circuits expert*
 - *Examples soon. (training phase)*
- **Alexandra Gris**
 - *Low mass inner tracker circuits expert*
 - *Ex: IBL low mass bus ATLAS*
- **Alexis Rodrigues**
 - *GEM expert*
 - *GEM team leader (3 FSU persons)*
 - *Ex: Major help in setting up single mask technology*
- **Silvia Franchino**
 - *R&D, simulation*
 - *Examples soon (training phase)*
- **Antonio Teixeira**
 - *Competent in all technologies (section leader deputy)*
 - *Follows technically the Staff team*

Outline

- *CERN team presentation*
- *Situation*
 - *GEM*
 - *Micromegas*
 - *THGEMs*

GEM

Large PCB procurement (valid for the 3 technologies):

- **Viasystem**

- *US company*
- *Multilayer boards size : 1.2m x 0.5m*

- **ShenZhen SinoFast Electron Limited**

- *Chinese company*
- *Multilayer boards size: 1.3m x 0.5m*

- **ELTOS**

- *Italian company*
- *Single sided boards size: 2.3m x 0.5m*
- *Double sided boards size: 1.2m x 0.5m*
- *Multilayer boards size: 700mm x 0.5m*

- **ELVIA**

- *French company*
- *Single sided boards size: 2.3m x 0.5m*
- *Multilayer boards size: 700mm x 0.5m*

We are trying to find more companies making large boards (any information from collaboration is welcome)

GEM in industry

• Techtra

- Polish company
- Making GEM since 10 years
- Licensed by CERN
- Setting up equipment for large GEM production since 1 year
- 30cm x 10cm GEMs already produced

• UPLUS/Mecharonics

- Korean company
- Making GEM since a few months
- Licensed By CERN
- 30cm x 30cm GEMs already produced (low quality)
- Willing to ramp up to large size
- Willing to do mass production

• Tech-etch

- US company
- Making GEM since 15 years
- Many small and medium sizes GEM have been produced
- Recently involved in STAR experiment (80 GEMs 40cmx40cm)
- Active TT transfer with CERN to build large size foils
- Licensed by CERN
- Ready for mass production with small and medium sizes

- Single mask test performed
- 10cm x 10cm GEM available
- Looking for volume

- 10cm x 10cm GEM produced
- Need to be qualified
- Exploring large size with 2 masks
- Large size GEMs in a few months?

- Actively setting up the single mask process
- Already some positive trials have been performed
- Few months to get first single mask GEM
- Weekly meeting with CERN

Micromegas

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

Read/out PCB:



50um Kapton + resistive strips



Read/out PCB:

PCB + readout strips

50um Kapton + resistive strips



← 25um Glue

Read/out PCB:

PCB + readout strips

50um Kapton + resistive strips



25um Glue



Isostatic Gluing

Read/out PCB:

PCB + readout strips

50um Kapton + resistive strips



25um Glue

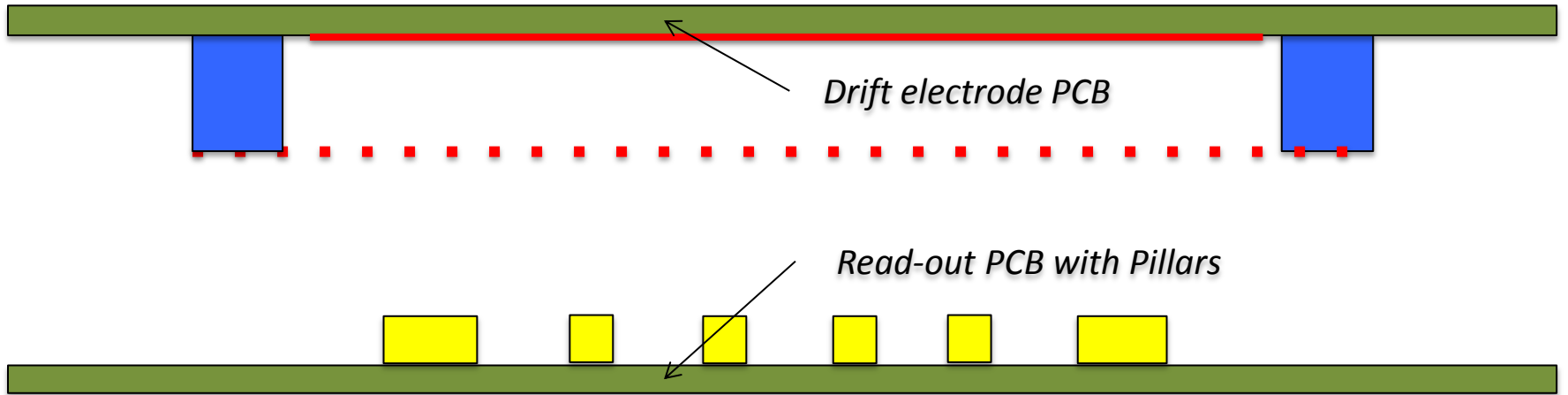


Isostatic Gluing



Pillars creation

Micromegas



PCB

- ELTOS

- *Quote request for 1200m² (2.25m x 0.5m)*
 - *Single axis*
- *1.2m x 0.5m in production*
 - *Single axis (MSW) test*

- ELVIA

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



PCB + readout strips

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

- Raytech

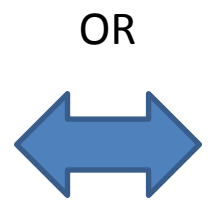
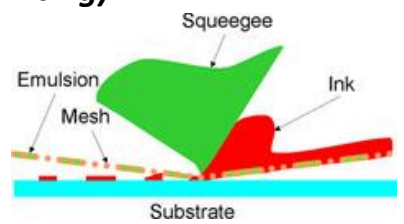
- Japanese company (Ochi Atsuhiko contact)
- Vacuum deposited resistive layers (lift off technique)
- MSW in production

- ELVIA

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

- ELTOS

- 1.2m x 0.5m MSW in production (Screen printing)
- Waiting for large volume quote



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*



Pillar creation

- ELTOS

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

- ELVIA

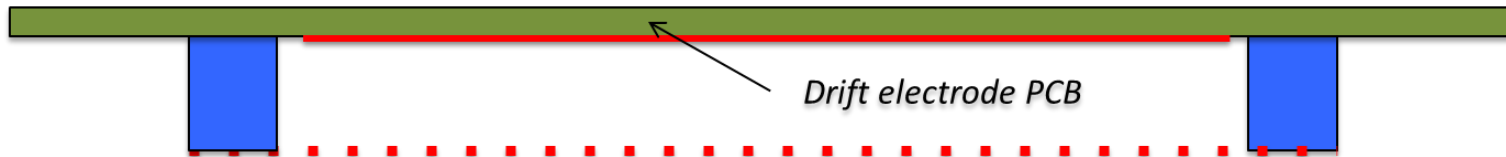
- *LSBB 1.2m x 0.5m real BULK in production*
- *Quote for large volume still to be sent.*



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 1200m²



THGEM

- **ELTOS**

- **Drilling**

- **30 Hours /m2 for 1mm pitch**
 - **Best case 2 to 3m2 per week without interfering with their core PCB production**
 - **Price reduction with volume is not really expected (still need to be clarified)**

- **Photolithography**

- **OK**

- **Rims**

- **OK**

- **Cleaning**

- **We need to define a process and make trials**
 - **Polishing → long manual process**
 - **Spray polishing machine ? (to be tested)**
 - **PU coating → shorter process but still manual**
 - **Automatic spray machine ? (to be tested)**
 - **Chemical process will be preferred → using existing equipment**

Thank you

questions

- Any comment on the industrialisation?
- Will it be interesting to set up STD kit detectors?
 - 50cm x 50cm ?
 - 1m x 0.5m ?
- Integrate the HV distribution Resistive hybrid to the STD 10cm x 10cm detectors?