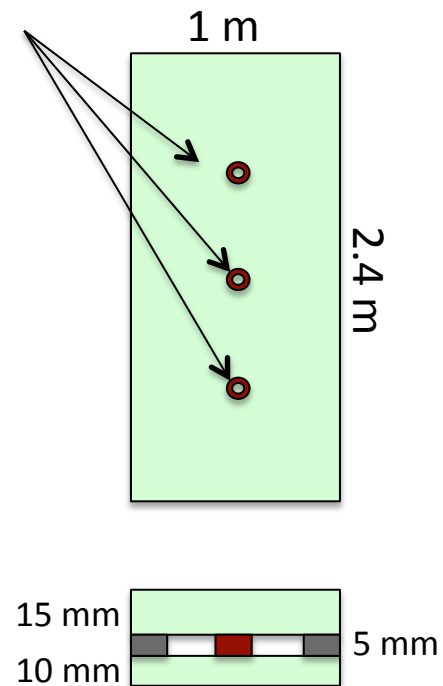


Operational prototype work at CERN

Status report

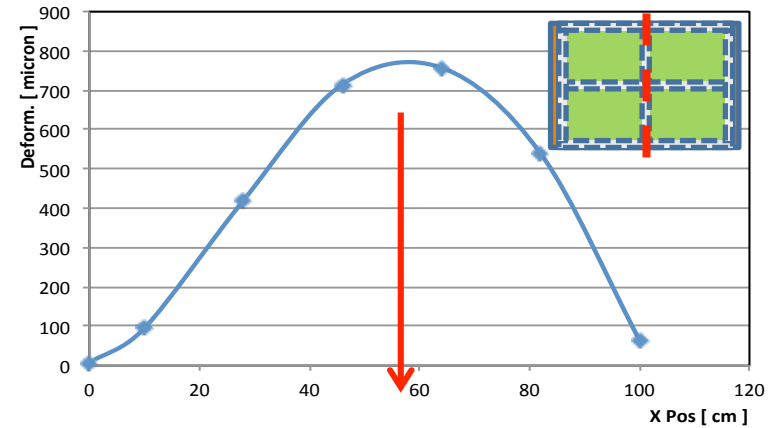
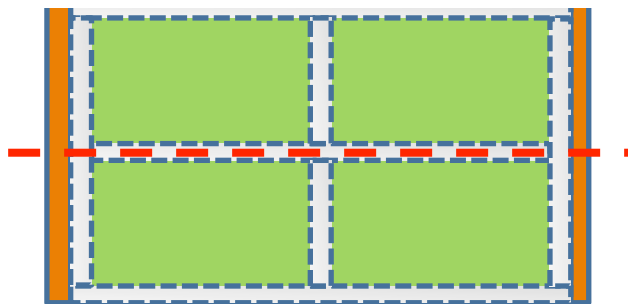
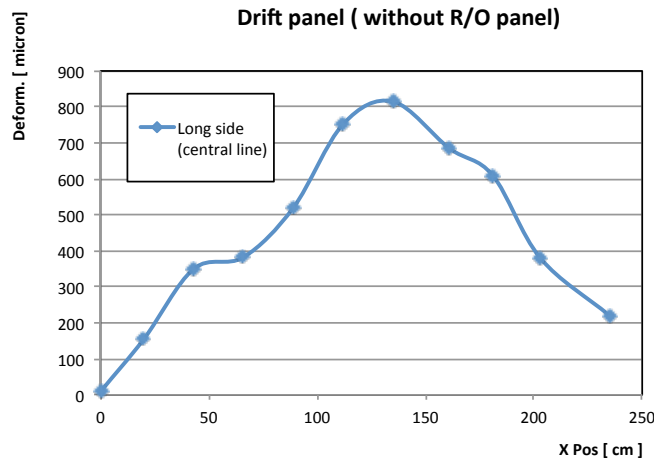
Evaluation of L3 (2.4 x 1 m²)

- L3 is the second 2.4 x 1 m² prototype that had been built; it differed from L2 by adding three panel interconnections, spaced by 50 cm
- L3 suffered (like L2) from gas leaks in the drift panel
 - Suspect gas leaks through mesh frame screw holes; frames were not glued, screws not sealed (to be avoided in the future)
 - Gas penetrates into the drift panel
 - Fixed by sealing the drift panel skins with Araldite glue.
- Measurement of mechanical deformations
 - Effect of gas pressure
 - Test of panel interconnections

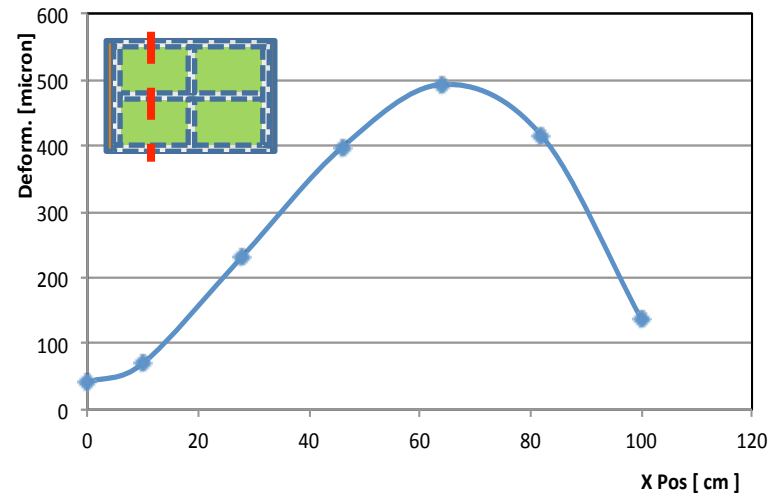


Drift panel (without R/O panel)

- Mesh tension (≈ 10 N/cm) produces banana effect
 - Deformation is ≈ 1 mm in the centre
 - Requires $W \approx 8/11/8$ kg to flatten drift panel (th=15 mm)



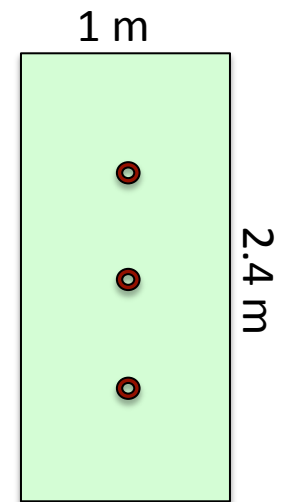
11 Kg to remove the deformation



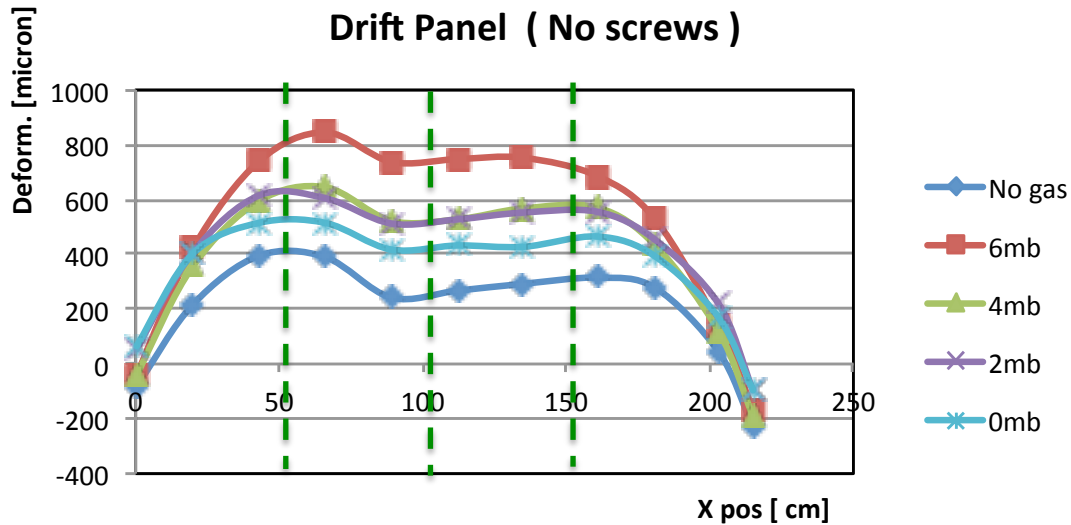
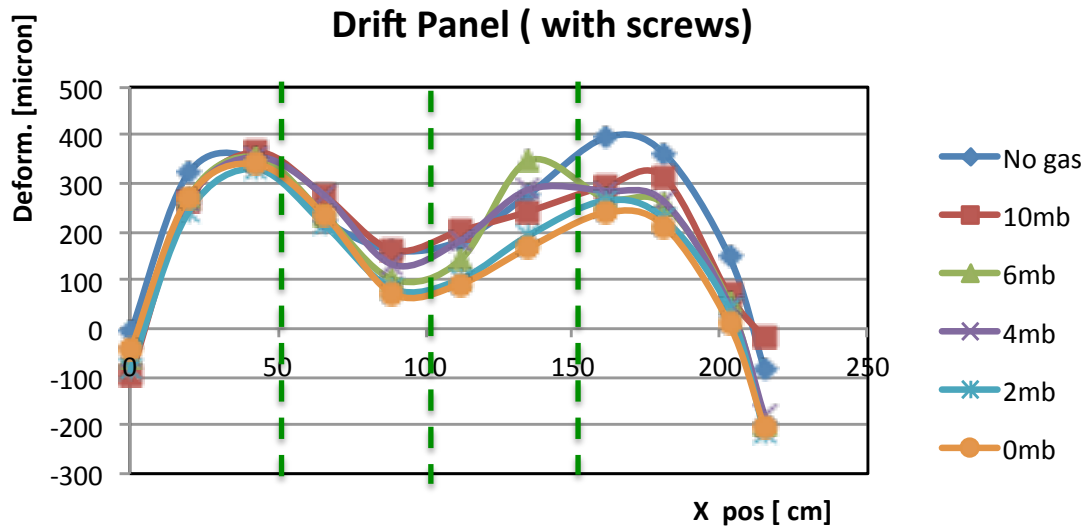
8 Kg to remove the deformation

Evaluation of L3 (cont'd)

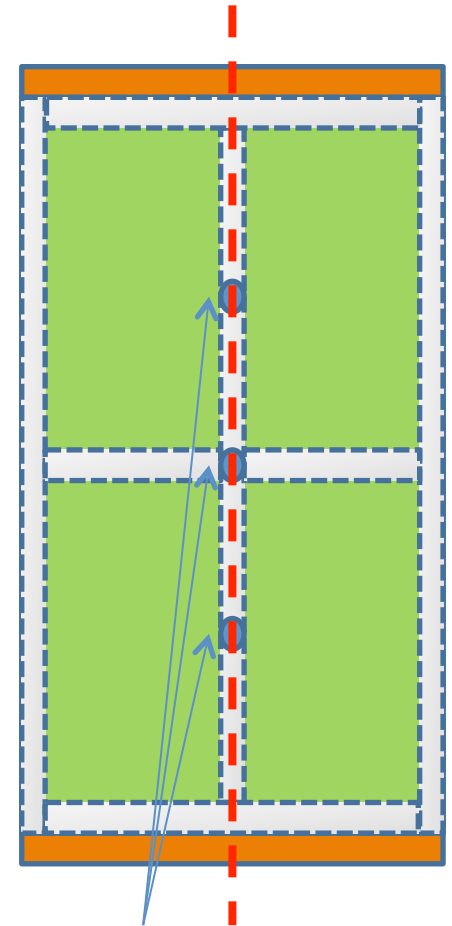
- Measurement of mechanical deformations of assembled detector
- Observe similar 'banana' effect as for drift panel alone
- Gas pressure leads to deformation of 500 and 800 μm for 6 mbar overpressure (operating pressure is ≤ 2 mbar) for drift (15 mm) and r/o panels (10 mm)
- Panel interconnects (every ≈ 50 cm)
 - Reduces banana effect
 - Eliminates the gas pressure effect



L3 assembled - Drift panel surface



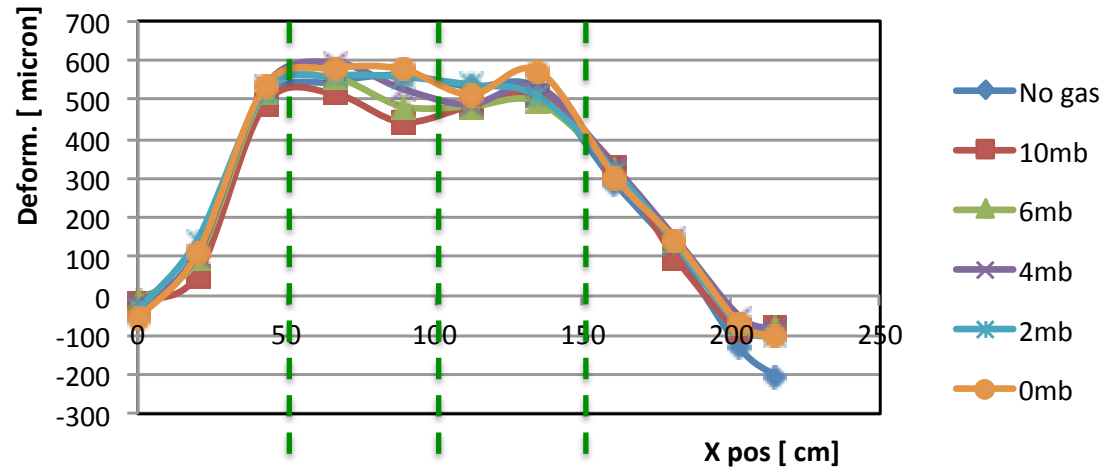
Central line



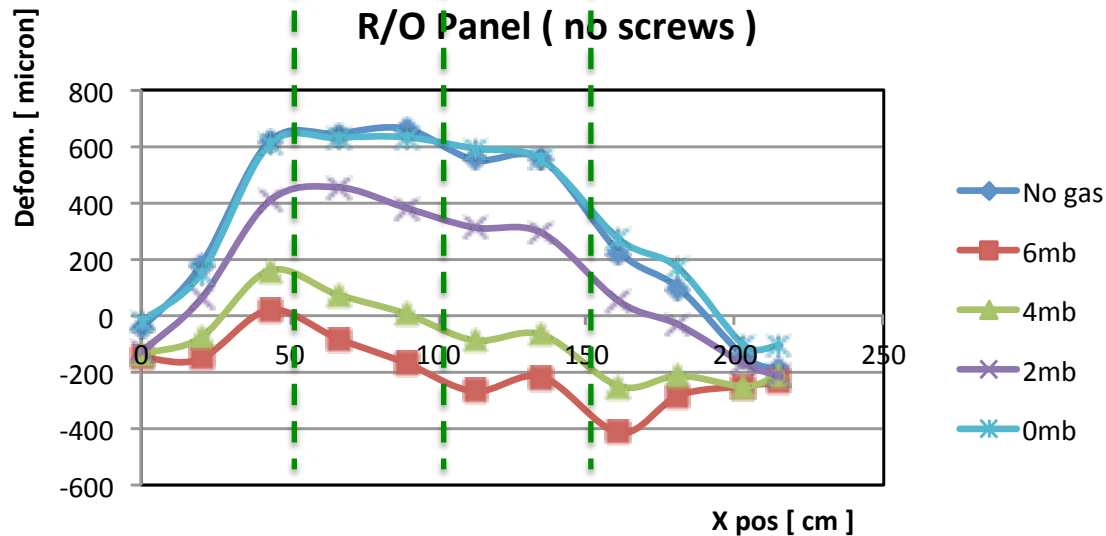
Interconnecting
screws

L3 assembled – readout panel surface

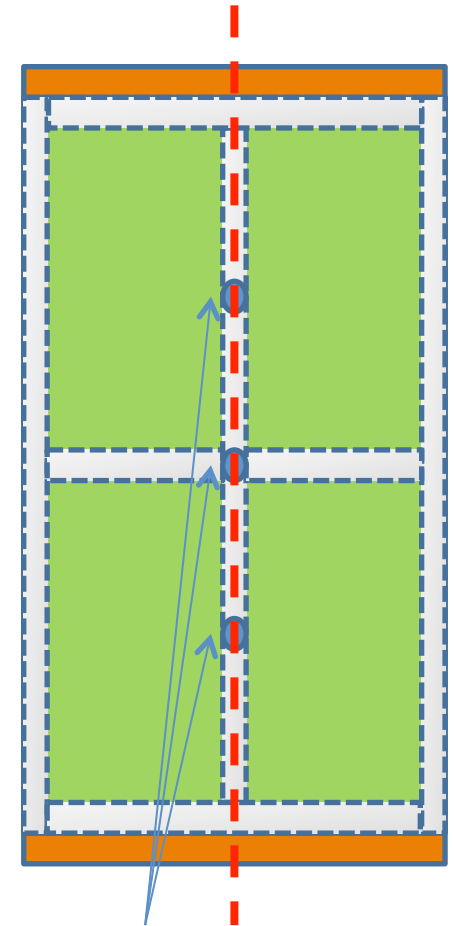
R/O Panel (with screws)



R/O Panel (no screws)



Central line



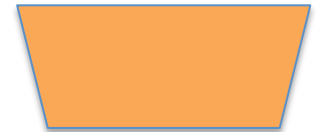
Interconnections

Conclusions from L3 measurements

- Mesh tension creates panel deformation, needs attention
- Concept of internal spacers works
 - Eliminates deformation of panels caused by the gas pressure
 - Distances between spacers to be optimized
- More precise measurements using the laser interferometer will follow shortly
- Will try to compensate 'banana' effect during the assembly
- More results ... in the January meeting

The MMSW project

- Install a MM detector as similar as possible to the NSW detectors on the present Small Wheel next summer, before ATLAS closes
 - Detector dimensions: 1.2 x 0.5 m² (to fit upper half of large CSC)
 - Four layers (quadruplet), 2 eta and 2 stereo
 - Strip pitch 0.425 mm, 1024 strips/layer
- PCB production as close as possible to final production
- Panel construction and assembly serve as prototype for Module 0
- Readout electronics
 - ATCA SRS as DAQ system
 - Front-end boards (SRS compatible) with 8 VMM2 chips/board (back-up: APV25)
- Collaborative effort
 - CERN, Japan, Mainz, Lecce, Napoli, ... for detector construction
 - Bucharest, BNL, Arizona, ... for electronics



PCB production

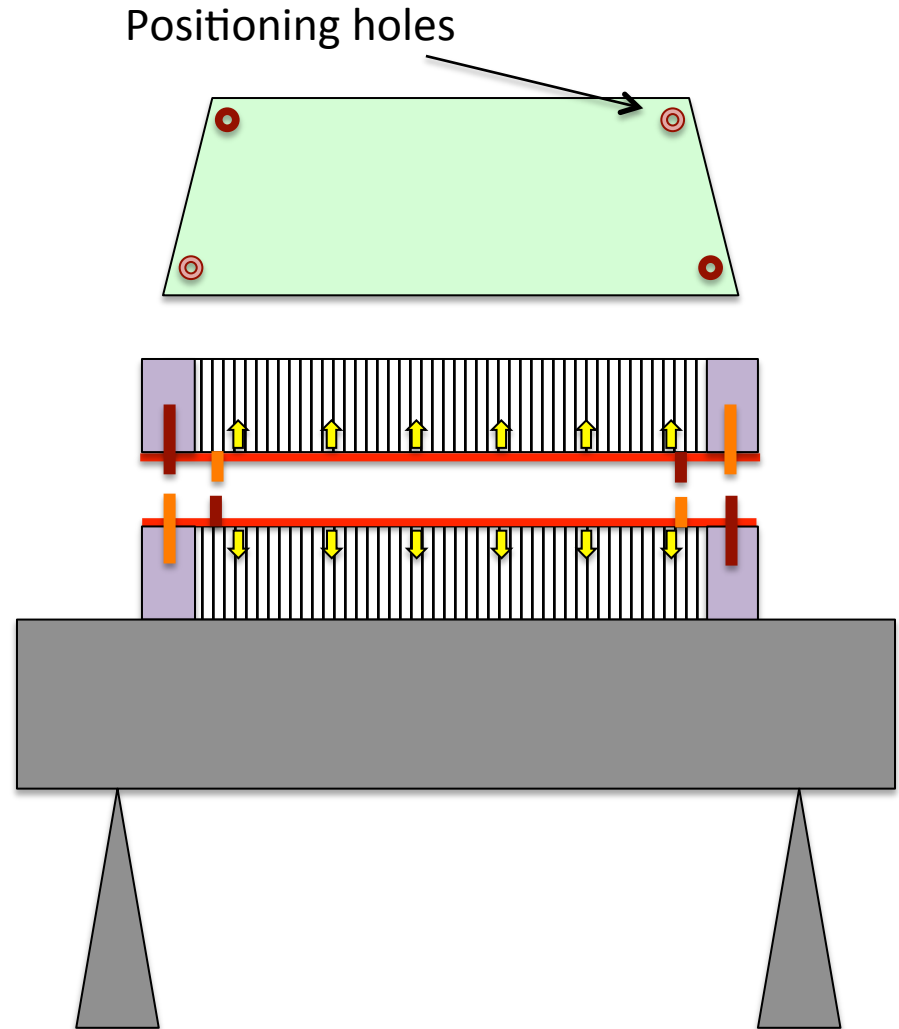
- PCB production method as in final production, however, PCBs are smaller in size
 1. Etching of readout pattern on PCB (Eltos, Italy); expect boards to arrive next week
 2. Production of Kapton foils with resistive strips (Japan); done
 3. Glueing of resistive strip foils at CERN
 4. Making of pillars at CERN
 5. Cutting and drilling at CERN

Panel construction (PH-DT)

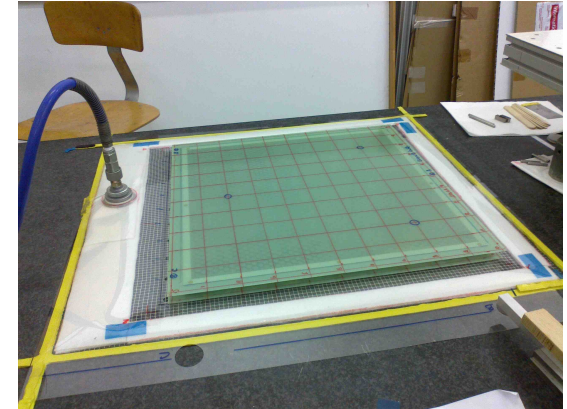
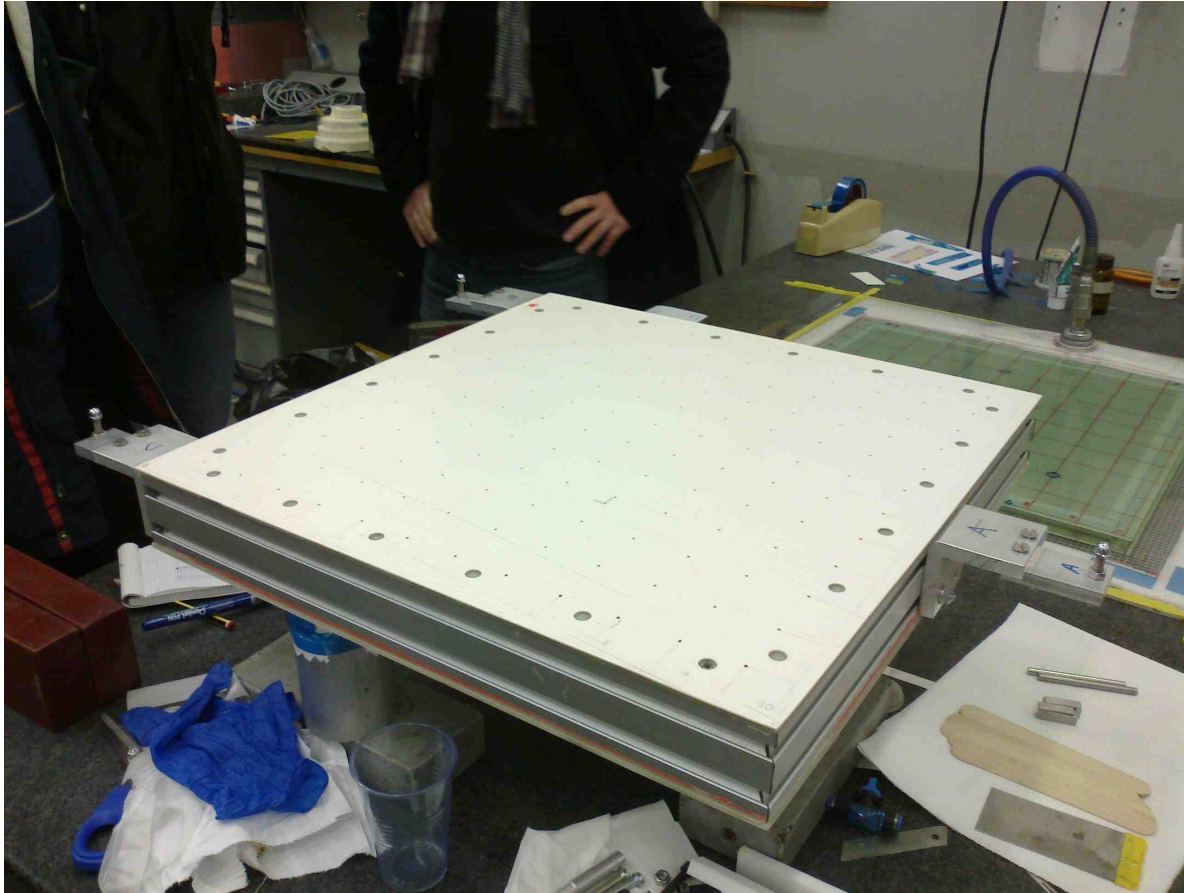
- Method follows the very successful 50 x 50 cm² prototype panel construction (flatness $\leq 20 \mu\text{m}$)
- Vacuum table & stiffback
 - Flat surfaces are produced on a marble table
 - Stiffness is achieved by 60 mm high Al honey-comb core
 - Vacuum pumping through flat surface
- Stiffback of 50 x 50 cm² has been produced and tested
- Vacuum table follows same principle
- Stiffback and vacuum table incorporate positioning pins for PCB alignment

Panel construction tool

- Vacuum table + vacuum stiff-back
- Positioning pins for PCB alignment incorporated in frames
- Flat surfaces produced on marble table; does not require machining of flat surface
- Stiffness by thick honeycomb core
- Light, but stiff, structure, cheap
- Replaces marble



The 50 x 50 cm² prototype



Work by Francisco Perez
& Jordan Degrange (PH-
DT)

Status of MMSW

- Readout PCBs in production, expected to be delivered by mid November
- Vacuum table & stiff-back
 - Parts ordered, construction to start next week
 - Expected to be completed by 22 November
- Panel glueing
 - Design of mechanical parts and drawings done
 - Material ordered
 - Expect glueing to start in last week of November