



CMS
BARREL MUON
DT CHAMBERS

News on
Tools, Tests,
Start of Assembly
at Aachen;
Services, Safety,
Cooling, ISR Hall

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010425



Tools at Aachen



Assembly tables (4):

No. 1: In use.

No. 2: In use.

No. 3: *commissioning.*

No. 4: *commissioning.*

Gluing tools for I-beams (3): In use.

Smaller tools:

- to glue C-profiles: **done.**

- to glue corner blocks, front frames: *in preparation.*

- to glue honeycomb: *in preparation*

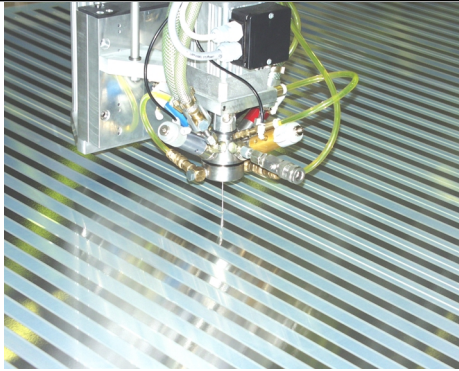
- to glue RPC coupling plates: *in preparation.*

Wire production and control: *SEM images done for every spool. Relation between wire image and wire performance to be watched when testing the DTs.*

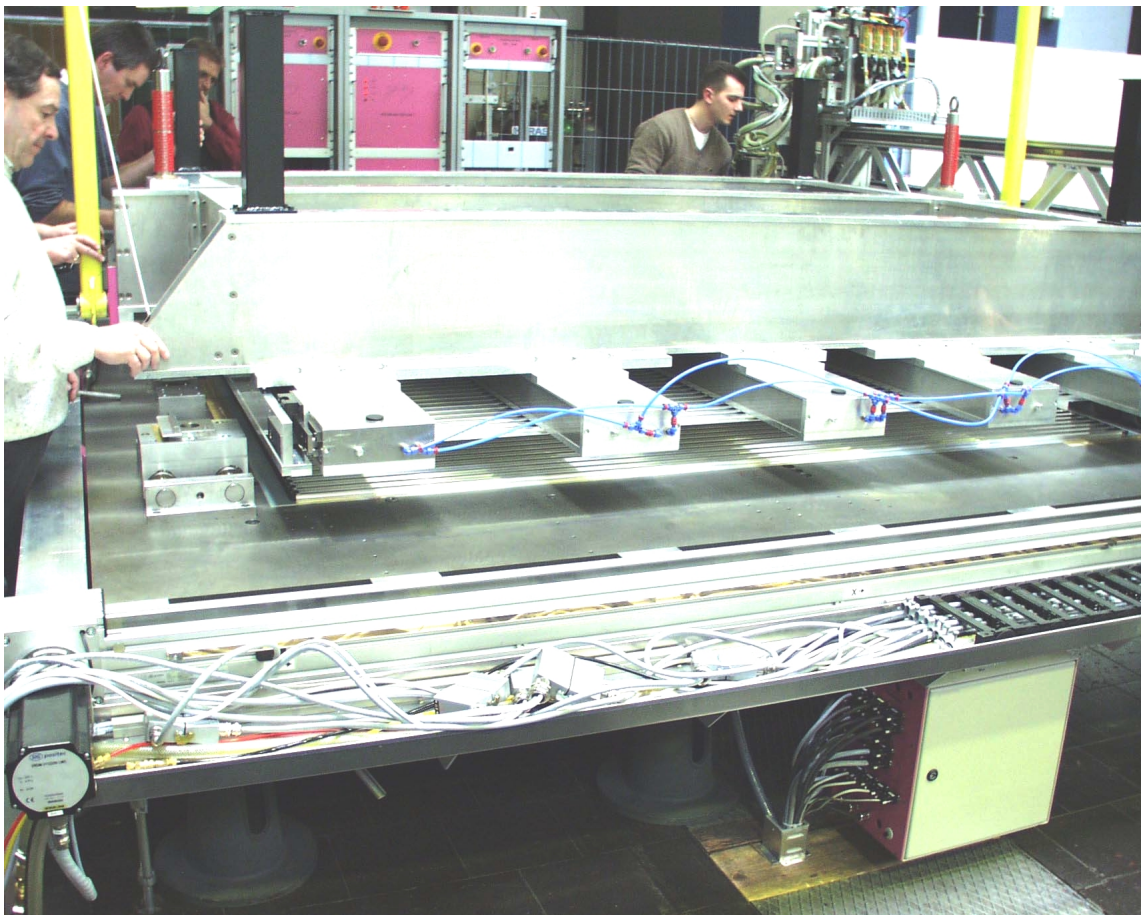
Cleaning of cells: *Deionizer plus vacuum cleaner: **studying***

Wire crimping machine: *modification to cope with heavier spools (5.6 instead of 1.0 km/spool): **in preparation.***

Software: ***In use.** (much work still to be invested)*



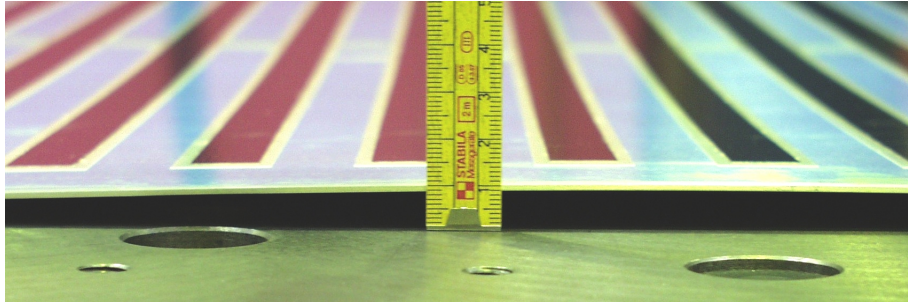
Dispensing normal (left) and conductive (right) glue.



Lowering the tool to glue the second layer of cells on the first one.

- *First plates, for 1 MB1, arrived 010406.*
- *Plates bent at 1 cm/m level! - outside tolerances (Known; are test. Which is role of this first assembly? Tool test under extreme conditions? Debugging of assembly?)*
- *Started 010417; today 010424 expect 4th gluing.*
- *Conducting glue contact: ~10% have ~4 Ohm (or more)!?.*

Some examples of non-conformities of finished plates
(observed on first plates for 1 MB1, arrived 010406) :



Difficult
gluing

- Plates bent at 1 cm/m level! - outside tolerances (Known; are test. Which is role of this first assembly? Tool test under extreme conditions? Debugging of assembly?)

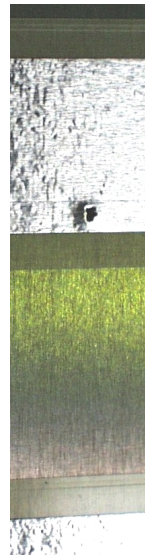


EH010412

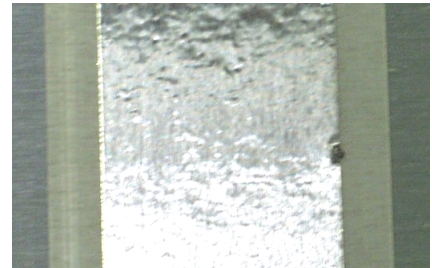
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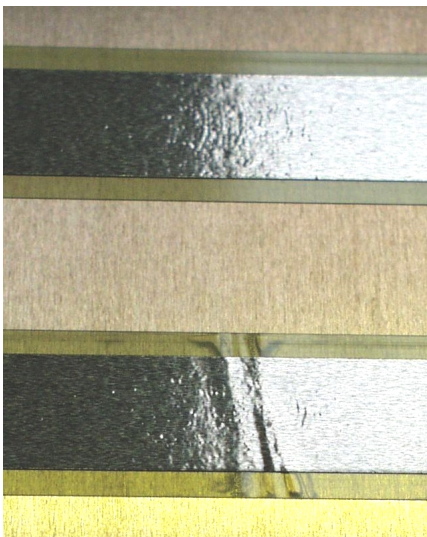
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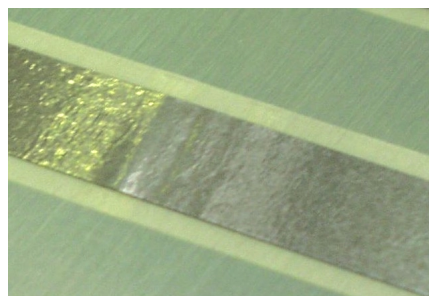
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4



5



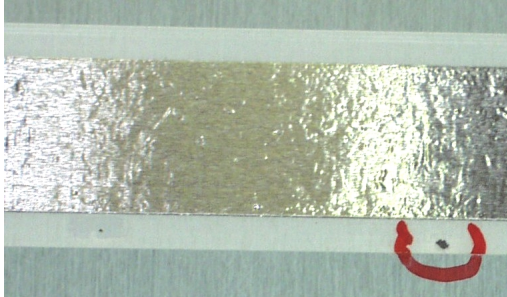
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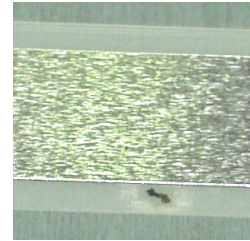
7

- Dangerous defects: points sticking out (1-4) and Mylar+Al tape sticking out by ~ 1 mm ! (5, 6) are likely to give HV problems; two or more Al layers (7) would compromise endplug space and position.

*Some examples of non-conformities of finished plates
(observed on first plates for 1 MB1, arrived 010406) :*



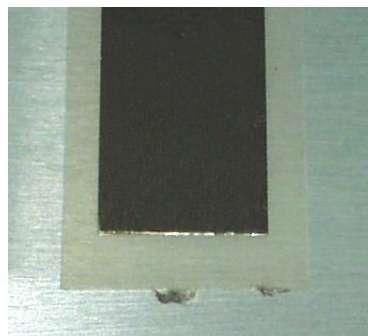
EH010412



- *Dirt under Mylar strip. Noticed and marked at plate production site (left); noticed at chamber assembly site (right). Dangerous or not?*



- *Dirt on strip. This is what can be removed by blowing deionizing air.*



- *Glue at border. This case is probably not causing any trouble.*



Components etc.



Missing material, *for first chamber:*

- FE boards
- Feedthrough connectors for signals, DCS, testpulses
- Al plates ? (Suitability of bent plates questionable)
- Link plates (DT-RPC link; approved drawings)
- HV cables
- Lateral fixtures (“balanced beams”), for handling.
Needed? To be done centrally and by whom?
- Some further small components we might not yet be aware of, at first chamber.

First DT by end May 2001?

Difficult to predict. It depends on where to put threshold of what “first DT” is, on availability of material and on number/type of problems encountered during first assembly. Milestone is then:

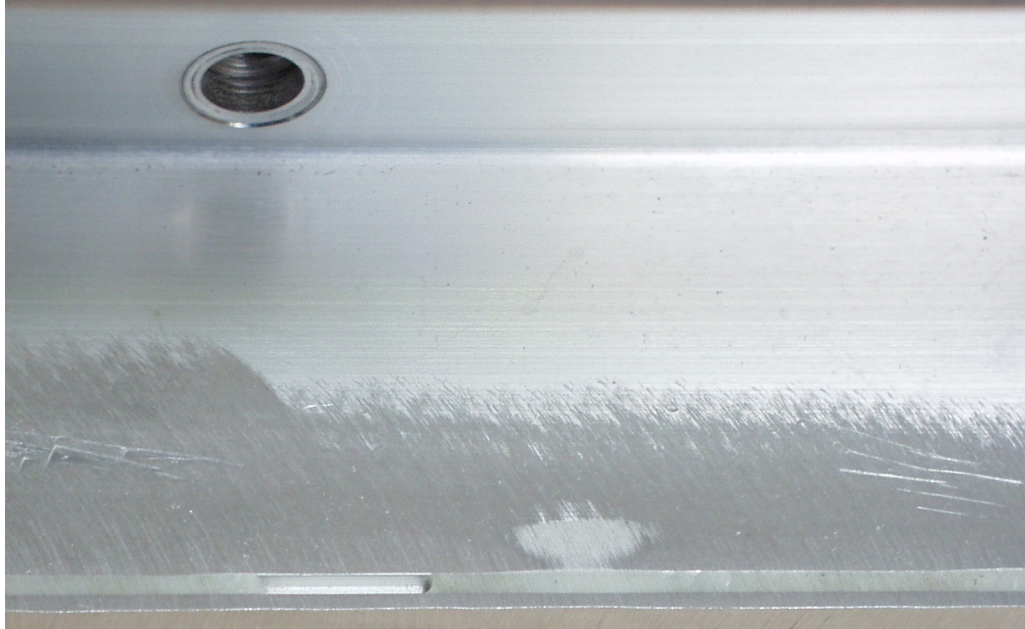
The assembled body (assuming plates can all be used)?

The equipped DT (providing all material is available/useful)?

The tested/certified DT?

The RPC link plates will NOT be there.

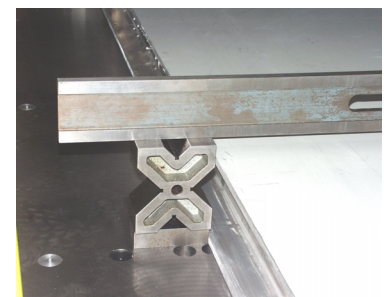
Quality control of 2 honeycomb panels received recently:



Visual control: Groove is full of glue. Coarse grinding used to remove glue from border left visible traces, **too sharp edges** and **much dirt in lateral channels**. **Metallic pieces** (from inserts) falling out of channels.

Measurements:

	PANEL 1:	PANEL 1:	conclude:
Thickness(*) (128.0±0.5 mm)	128.2 - 129.0	128.3 - 129.5	not o.k.
Width 1	1923.3	1922.9	o.k.
Width 2	1923.2	1923.1	o.k.
Diagonal difference (≤ 3 mm)	1	1	o.k.



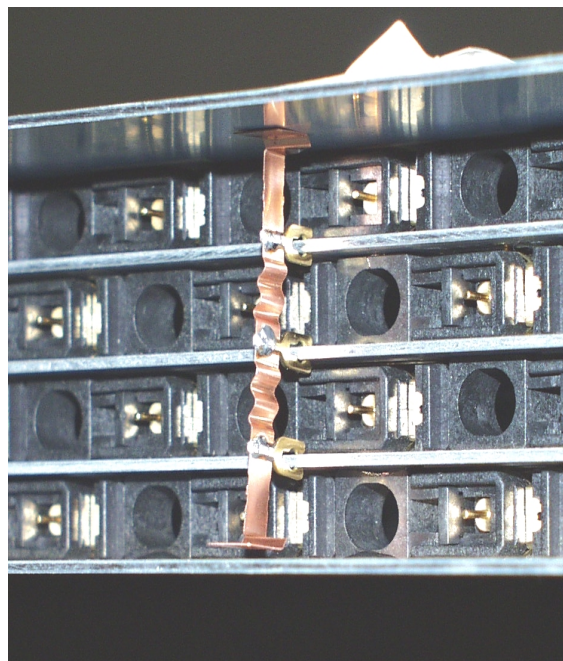
Ruler, to measure at center.

(*) Is height above flat plane of table. Measured at grid of 3 x 3 points, for both faces of the honeycomb. One face nearly flat, the second face is bad.

Test done with colleagues at CIEMAT:



*Lateral strips: welding on Al plate **surface** works fine (left points), while welding on **non-flat edge** does not work (right point, dark). **Use point welding on plate face, not edge.***



*Contact spring: Alloy used is not adequate for point welding. **Use conductive glue** at top and bottom plates.*

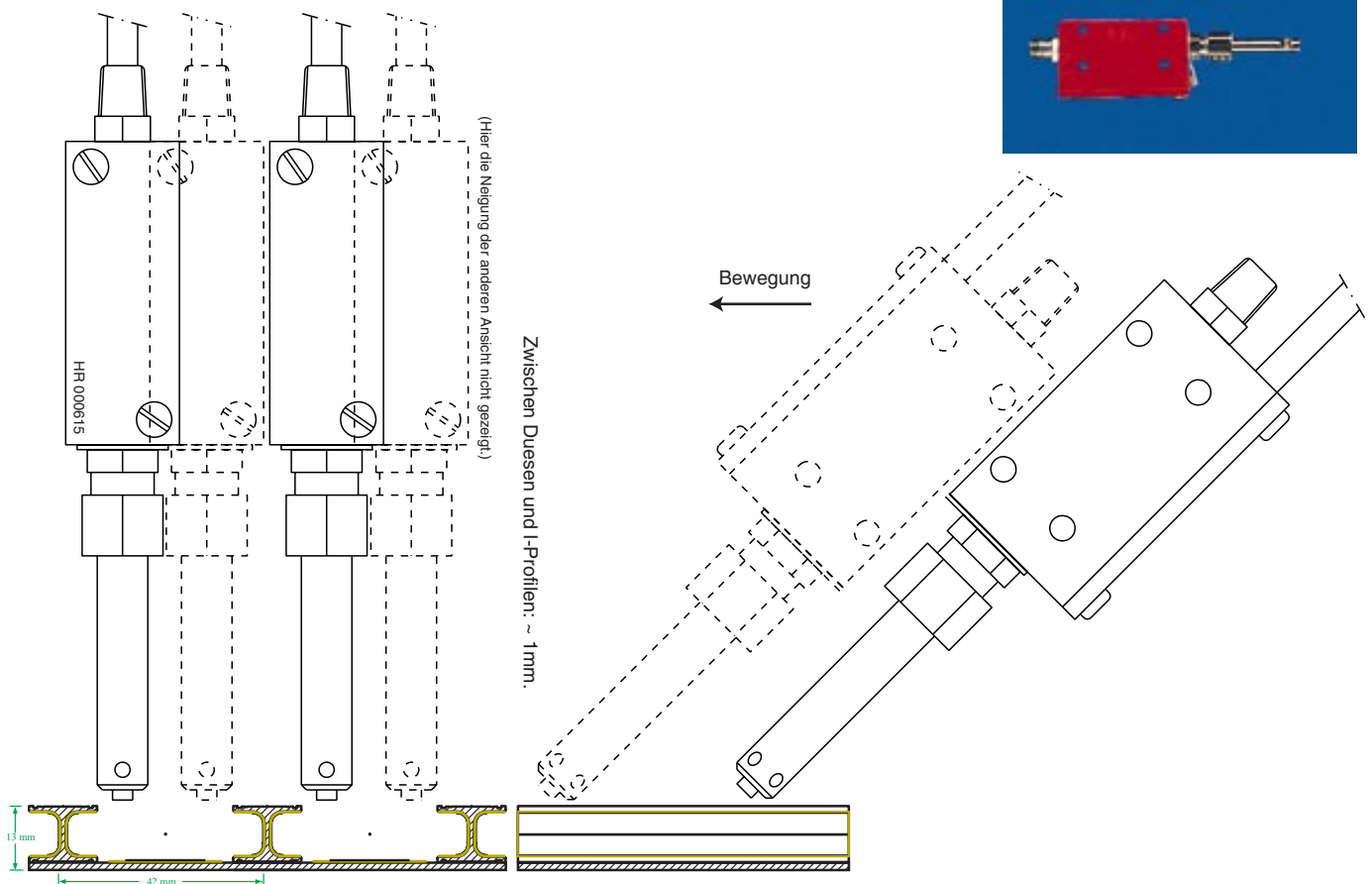
P.S.: Short after this meeting, M. Degiorgi has demonstrated that and how also this contact spring can be correctly point welded.

Study of cell cleaning, for use short before closing a layer:

DEIONIZING + CLEANING

000615 hr

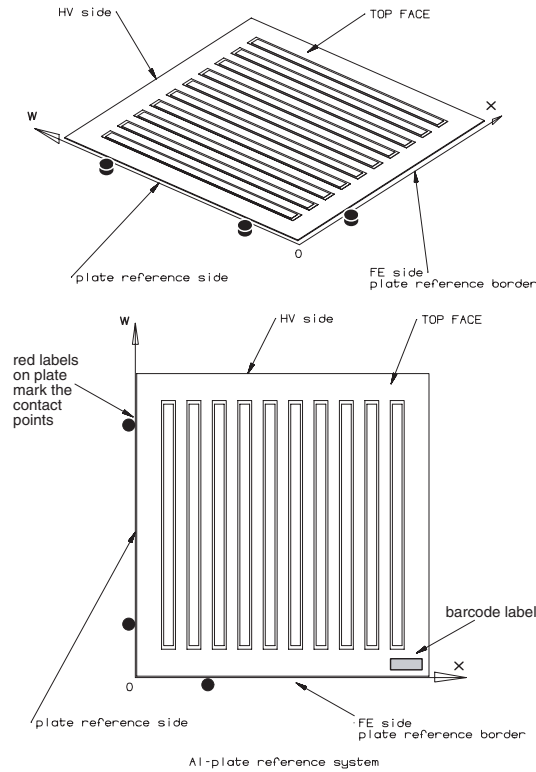
Deionizer blows air under 45 deg on cell, while a vacuum cleaner (not shown) under -45 deg removes the air + dust. The nozzles (from Simco) are mounted on a common supply tube and are moved by the coordinatograph. Foresee unit about 12 cells wide. Cleaning time about 15 min.



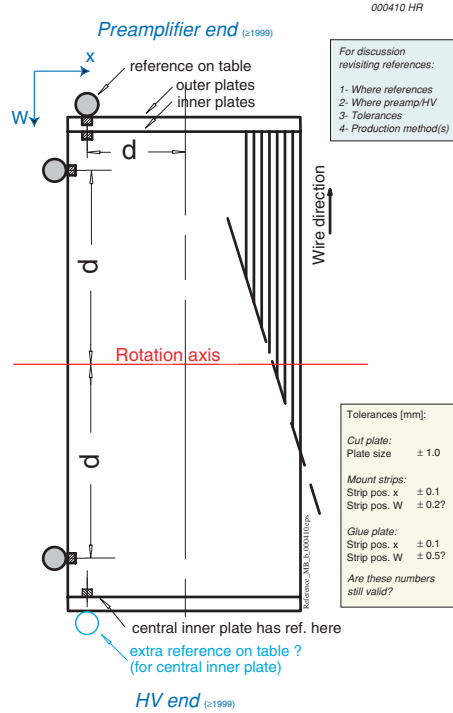
Idea: Provide air and LV trough cable chain, mount 50 cm wide head (for 12 cells) on coordinatograph head, their supply box on the bridge.

1- Alignment conventions:

Files plate_reference_000420_mb and plate_strip_conv000620:



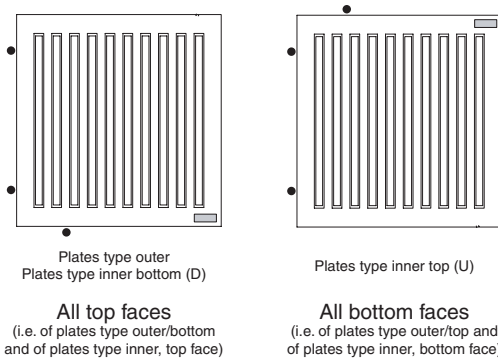
Files reference_plate_990127 and BMU_Torino_000410:



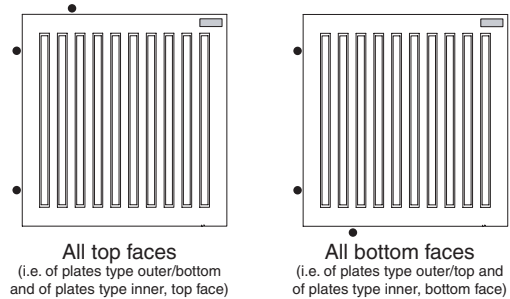
Both are only fully compatible as long as the fluctuations in the plate length along the wire direction are negligible.

2- Alignment conventions (from MB1 plate production 010406):

On traveller of MB1 plates:



On actual MB1 plates:



Thus: actual MB1 plates correspond to situation at top right figure, fine for MB1 / Aachen

Red labels mark on plates the actual contact point to references.

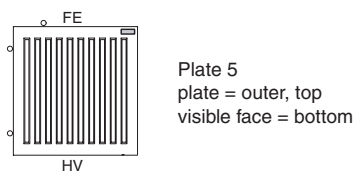
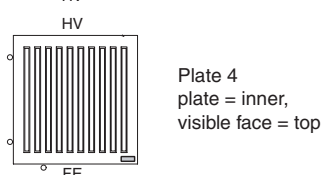
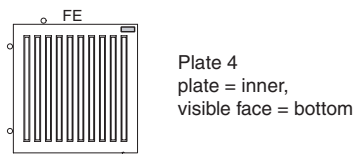
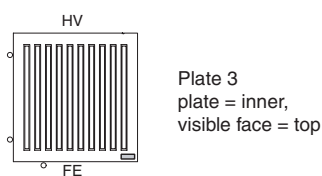
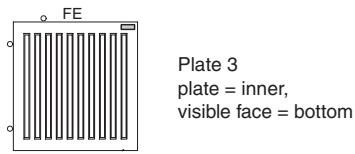
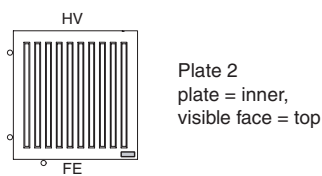
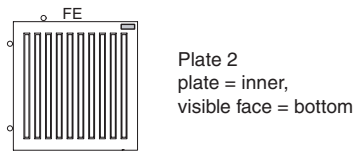
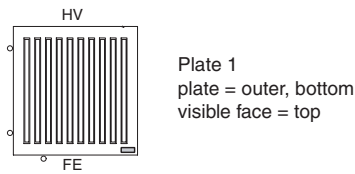
File: plate_strip_conv000620_hr.pdf Is original files from MB (top left), HR (top right), AS (bottom left), with added comments and observation from plates (HR).

For final clarification...

Alignment conventions:

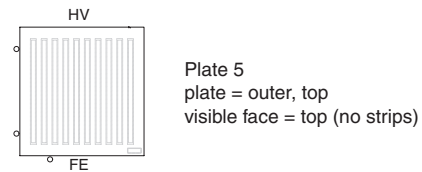
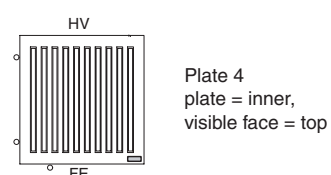
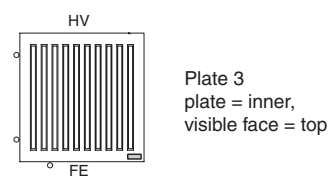
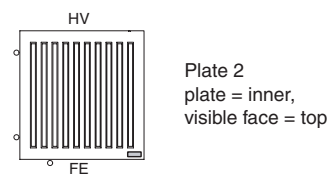
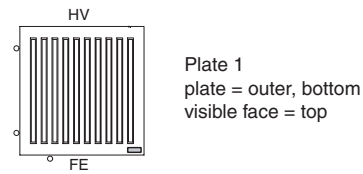
The following shows a natural way to ensure a uniform referencing of the plates at the deposition and assembly sites, thus minimizing systematic positioning errors. It is assumed that the barcode label is always placed at the FE-end of the strips. Corresponds to the situation shown in the files `plate_reference_000420_mb` and `plate_strip_conv000620`:

At strip deposition site:



File: `plate_strip_conv000620_hr2.pdf`

At chamber assembly site:



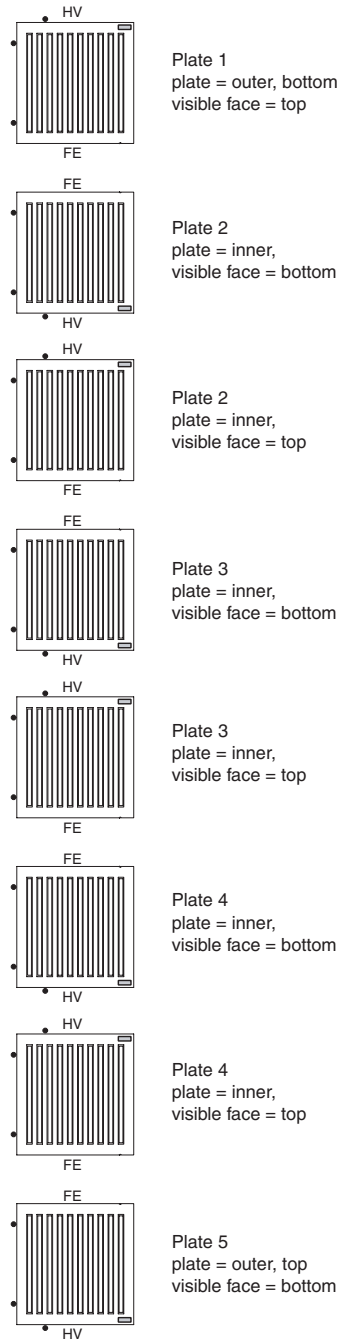
Red labels mark the contact point on plates with respect to references corners.

HR 010505

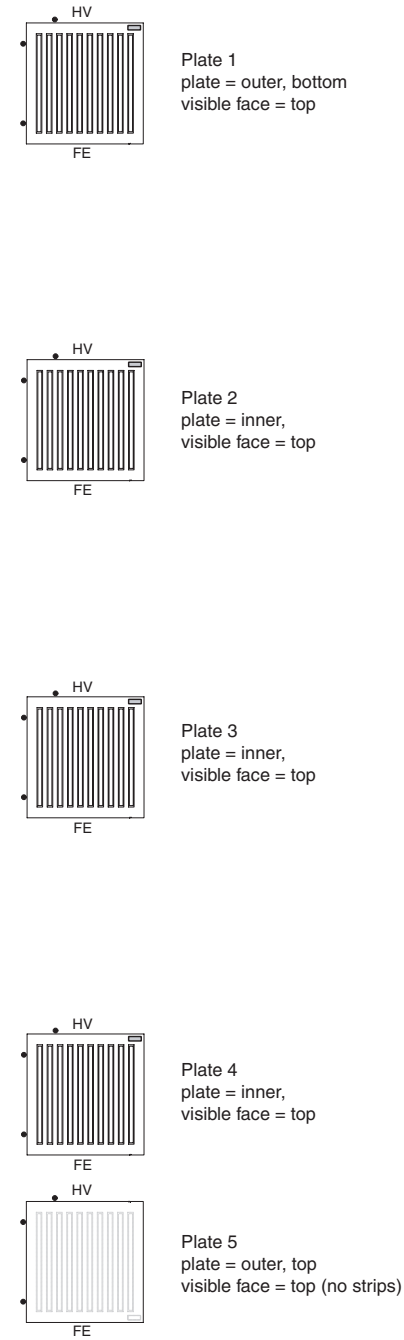
Alignment conventions:

Referencing of the MB1 plates at the deposition and assembly sites, minimizing systematic positioning errors. It is assumed that the barcode label is always placed at the "FE-end" of the strips. Corresponds to the situation shown in the files reference_plate_990127 and BMU_Torino_000410 (o.k. for MB1; is different from convention in files plate_reference_000420_mb and plate_strip_conv000620):

At strip deposition site:



At chamber assembly site:



Red labels mark on plates the actual contact point to references.

This is how the MB1 plates are being prepared.

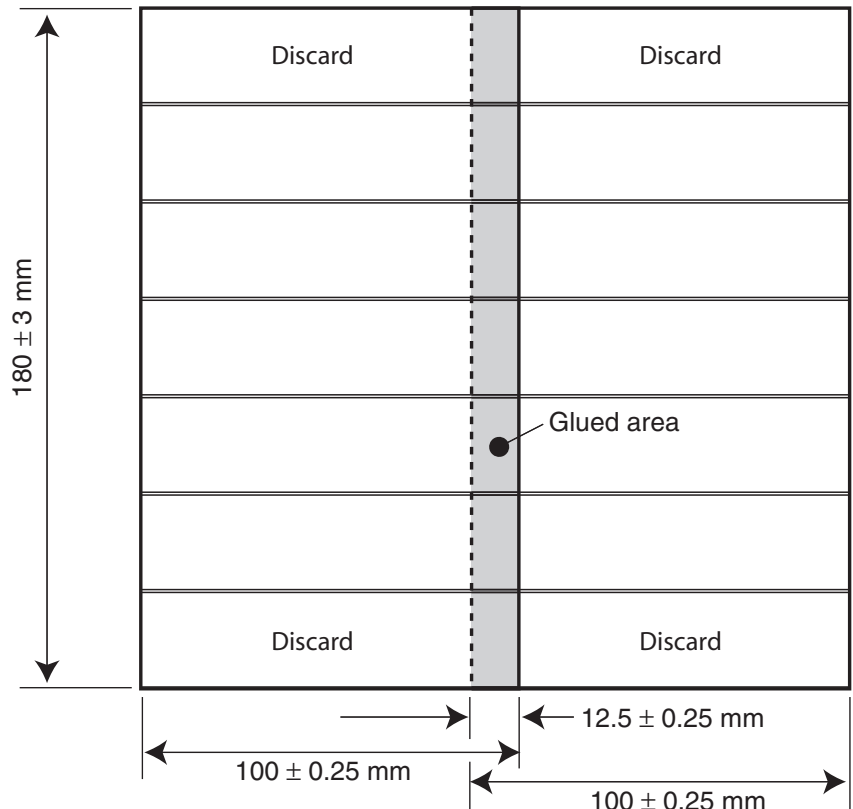
Method:

Glue the two rectangles 100 mm x 180 mm, with 12.5 mm overlap and 0.1 mm glue layer, set by wire or glass beads spacers, and holding the rectangles with a jig for precise alignment. For testing, first cut into 25 mm wide strips, discarding the two border strips, thus obtaining 5 samples. Prepare 3 plates, measure one plate (= 5 samples) within one month and store the others for later.

Further comments:

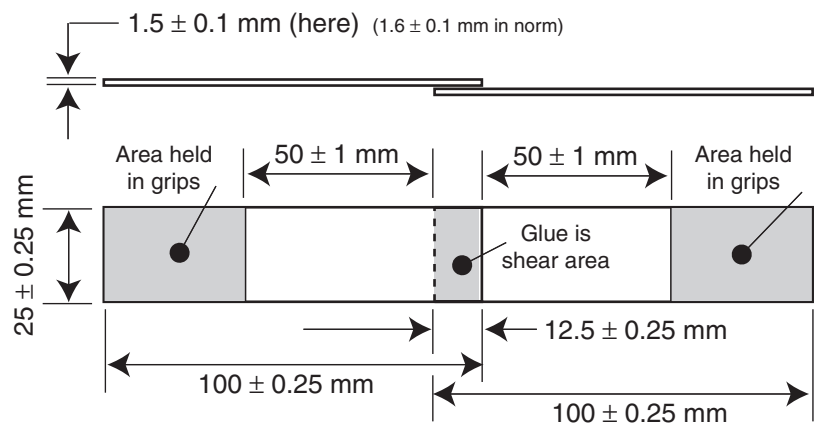
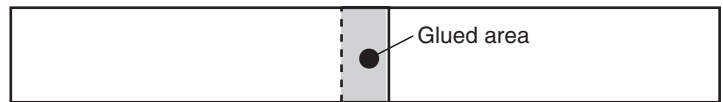
- 1- Typical glue thickness is 0.2 mm, but 0.1 here; measure and record it.
- 2- The excess of adhesive squeezed out during the formation of the joint shall be removed immediately after assembling.
- 3- Major axis of the specimens shall be the rolling direction of the Al plate.
- 4- Measure dimensions to within ± 0.1 mm.
- 5- Grips are self aligning.
- 6- May use shim, to apply force in plane of the adhesive bond.
- 7- Operate test machine at a constant test speed so that the average joint will be broken in a period of $65 \text{ s} \pm 20 \text{ s}$.
- 8- If working at constant rate of loading, apply the load at the rate of 8.3 MPa to 9.7 MPa.
- 9- Measure the applied force to within 1%.

Standard glue test panel following ISO 4587:1995(E)



KBo 000225 / HR 010501

Single probe sample, after cut:



The final glue probes, according to the norm ISO 4587:1995(E)

Here: summary of relevant aspects from ISO norm, as reminder of presentation by K. Bosseler ~ 1 year ago.



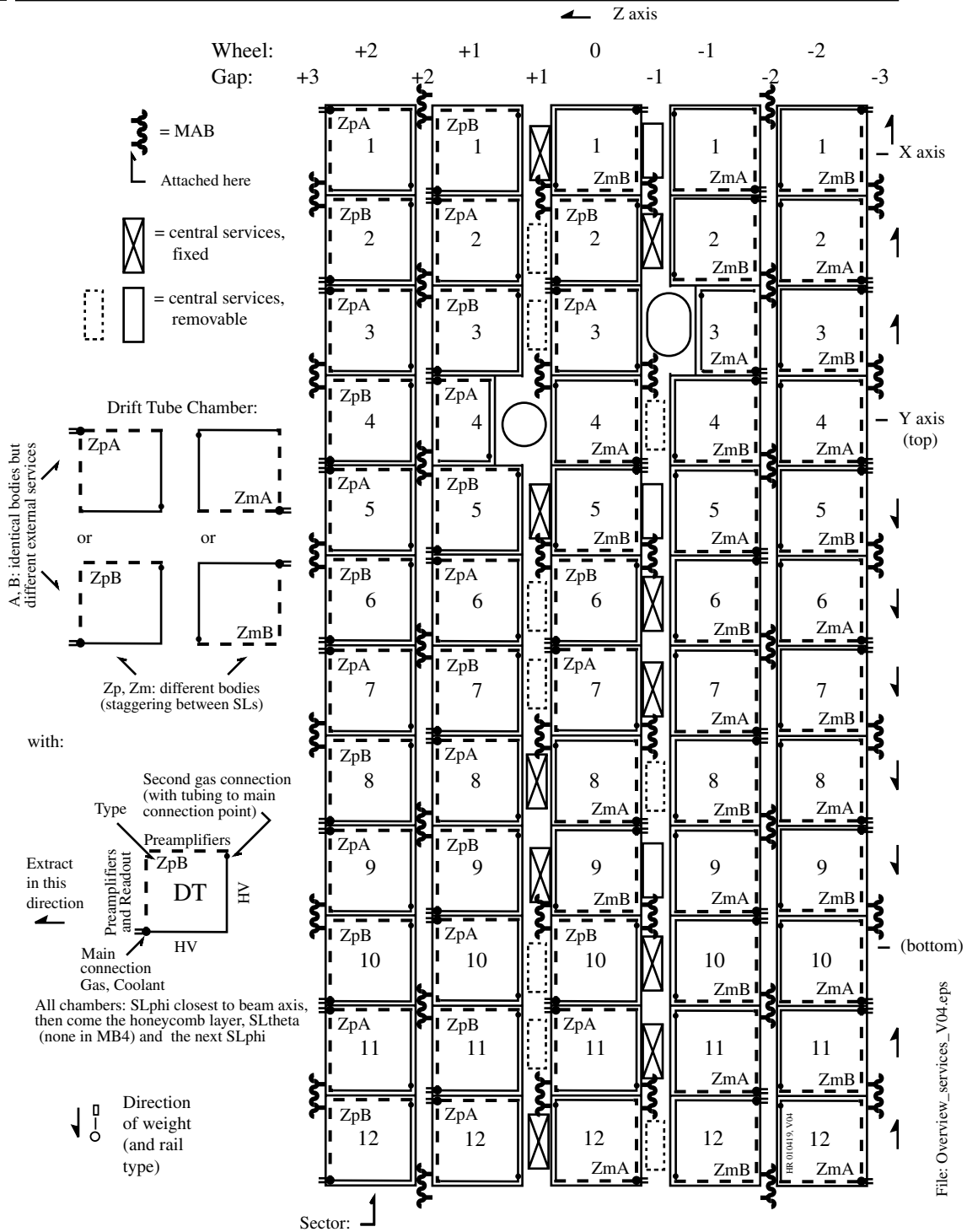
General



Services, Safety, Cooling, ISR Hall

Services

Meetings on 010326-27 0103xx and this week. See separated transparencies (scanned). Some main news are:



Installation of CMS Barrel Muon Chambers. Sectors as seen from inside. Sectors 4 and 10 have the chambers subdivided in two, at station MB4 (not shown here). The difference between A and B types is the location of gas, coolant, HV and LV external connection; the bodies are identical. The staggering between the SuperLayers is, however, different between the Zp and Zm types (have to extract the chambers in opposite directions in Z+ and Z- wheels, but the wheels have all the same orientation and are made left-right asymmetric to ensure an hermetic coverage in azimuth).

This is an update, showing more details and the fact that now all sectors around the central wheel are being considered for central services. A solution for the removable ones is still in preparation.