

Final operations to be performed in the production sites prior to shipment of modules

- 1) Label the Module
 - a. **Description:** modules have to be labelled in such a way that they can be readily identified from all sides
 - b. **Solution:** place stickers on all four sides of the modules and at both ends
 - c. **Test:** visual inspection

- 2) Module Shielding and Grounding
 - a. **Description:** the closure of the module Faraday cage requires:
 - i. the connection of the Side Wall to the Straw Panel
 - ii. grounding of the spacers
 - b. **Solution:**
 - i. solder the “flaps” to the Side Walls
 - ii. experiences shows that the spacers are already in contact with the Side Walls (*should this not be the case or considered not reliable, then the special “grounding” screw threads would have to be cleaned from glue*)
 - c. **Test:** check with the multimeter:
 - i. Connection between the GND pins of the FT Board and the Side Walls
 - ii. Connection between the GND pins of the FT Board and the spacers

- 3) Adjust round hole
 - a. **Description:** various various effects spoil the accuracy of the holes in the Aluminum (8mm) inserts:
 - i. wrong machining of the insert and excess glue and poor cleaning/filing during panel lamination at Cracow
 - ii. Excess glue in the panel assembly procedure (from the spacer)
 - b. **Solution:** rim the hole by hand using an 8H7 rimmer
 - c. **Test:** check hole dimension with go/no-go calibers

- 4) Adjust slotted hole
 - a. **Description:** various effects spoil the accuracy of the slotted holes in the Aluminum (8mm) or plastic (4mm) inserts:
 - i. Wrong machining and excess glue and poor cleaning/filing during panel lamination at Cracow
 - ii. Wrong superposition of panel and FT boards slotted hole, due to panel expansions with respect to nominal (straw template) length
 - iii. Excess glue in the panel assembly procedure (from the spacer)
 - b. **Solution:** remachining of the slotted hole, as shown in Fig.1
 - c. **Test:**
 - i. check hole dimension with go/no-go calibers
 - ii. check panel length (pin-2-pin) and write it down

- 5) Check gas pipes
 - a. **Description:** gluing of the gas pipes sometimes gives rise to:
 - i. Pipes which are not firmly fixed in the insert holes (this has been more often the case for the plastic inserts of the S modules)
 - ii. Pipes where gas flow is prevented by glue
 - b. **Solution:**
 - i. If pipes are not are firmly fixed, if not re-glue them
 - ii. If gas flow not ok, there is not much you can do beside noting this down
 - c. **Test:**
 - i. Check that pipe is firmly fixed
 - ii. Check by visual inspection that there are no obvious obstacles to gas flow (pipe bent, obstructions by glue etc.). If some pipe is somehow damaged write it down and make sure at least his twin is ok by actually checking the gas flow.

- 6) ***Join twin pipes to adapt to C-frame connection: notice that is not yet clear whether this can be done prior to transport, since the total length might exceed the length of the transport boxes: Henk Schuijlenburg will clarify this issue***

- 7) Clean FE-box threads in the Aluminum spacers
 - a. **Description:** clean the two threads meant for the FE-box screws
 - b. **Solution:** re-drill the hole to clean it and then re-thread it
 - c. **Test:** check that a “dummy” FE box can be fully inserted

- 8) Clean extra glue at the four corners
 - a. **Description:** large amounts of glue coming out of the side walls at the four corners of a module during module assembly may prevent:
 - i. the FE-box to be completely inserted
 - ii. the covers of the FE box to be put in place
 - b. **Solution:**
 - i. This has already been solved, since NIKHEF has modified the design of the FE box cover inserting dents in the position corresponding to the excess glue. However, notice that the dent cannot be too deep, since the FT Board connectors (HV!) have to be covered
 - ii. Remove excess glue by means of a file
 - c. **Test:** check that a “dummy” FE box, complete of covers, can be fully inserted

- 9) Clean FT edges from glue
 - a. **Description:** it was noticed that occasionally thin layers of glue running from the Aluminum spacer onto the FT boards (thus mostly at the side edges of the FT boards) cause high currents under HV
 - b. **Solution:** scratch away the thin glue layer with a scalpel
 - c. **Test:** re-measure dark current under HV

10) Remove HV shorts

- a. **Description**: some channel appear to have large currents at very low HV (50V) and we refer to them as “shorts”. Notice that e.g. at Heidelberg shorts are removed just after tests.
- b. **Solution**: see prescription from Sebastian Bachmann at <http://www.physi.uni-heidelberg.de/~bachmann/lhcb/Production/DisconnectChannels.pdf>
- c. **Test**: repeat HV-in-air test

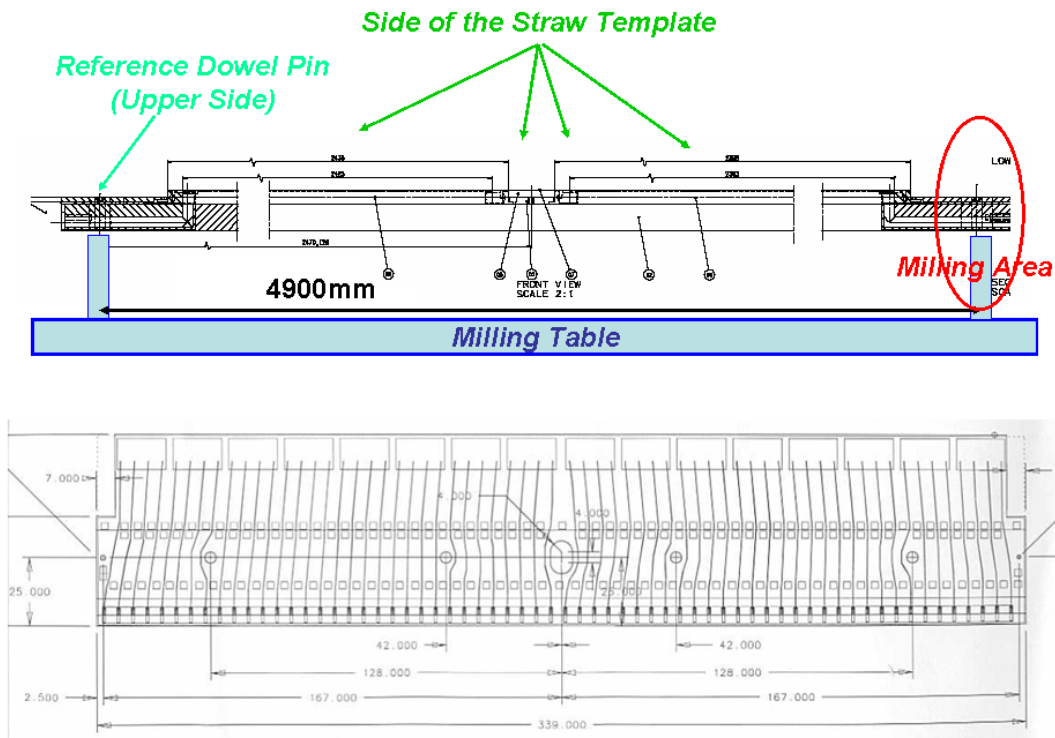


Figure 1 Side view of the Milling Setup (top) and Lower Feed-Through Board Layout (bottom).

Please notice that in the proposed solution:

- 1) one assumes that the module fits in the milling template
- 2) one expects the Lower FT to be in the nominal position, since it has been carefully adjusted in the Straw Template, and thus **no damage to the vias in the PCB to result**. In case of doubt, the figure above shows where vias are in the PCB layers
- 3) one expects that achieving the nominal distance between the dowel-pin hole centres means **milling into the Aluminum inserts** in case in which panels are shorter/longer (usually shorter 1-2mm) than the nominal.