

11 February 2004

Production Readiness Review for the Muon MWPC, PNPI Production Sites.

The report from the referees.

The referees were

Hans Jurgen Hilke, Antonio Pellegrino and Olav Ullaland.

Ex-officio:

Alexey Vorobyev, Giovanni Carboni, Burkhard Schmidt and Werner Witzeling.

The PRR was held at the Petersburg Nuclear Physics Institute, PNPI, the 30 January 2004. It was followed by a visit to the chamber production sites at PNPI I and PNPI II. The agenda and the transparencies that were presented can be found at

<http://agenda.cern.ch/fullAgenda.php?ida=a04431#2004-01-30>

This review followed the EDR with reference EDMS No 381 979.

The following items were covered

- Wire pad chambers for M2R4 and M3R4
- Chamber assembling procedures and tests
- Quality control
- Data base issues
- Material procurement and shipping

General comments.

This was the third evaluation in a series of production readiness reviews for the muon system of LHCb and it was again very well prepared and the material presented fully covered all aspects which needed discussion. We take this opportunity to congratulate the PNPI team for the very clear presentations and for the excellent state of the production sites. Even though only a small sample of chambers have been produced at the PNPI I site, the site is, in the view of the reviewers, very well thought through and optimised for handling and speed of production as well as a continuous and rigorous quality control. It is also clear that the team is highly stimulated and specialized in all aspects of the chamber production. The PNPI II site has all the qualities to be equally good.

The production schedule is very aggressive and the learning curve has therefore to be especially steep and the material flow flawless. The rate of production must consequently be verified and exercised. We understand that there are detailed questions still open and that some must be left to be solved under time pressure at the production site. We would still urge the Muon Project to make a better use of the EDMS system together with a meticulous engineering approval procedure. This is in our view particularly essential in a project with this very broad production grid. We would also stress that the general information flow ought to be improved as well as the feedback between the end user and the material provider. It should furthermore be noted that even though these chambers will be placed in a less hostile radiation environment, the production procedures ought to be applied homogeneously to ensure the highest quality of material handling and that the production routines are maintained throughout in all production sites involved in the Muon Project. The nomination of a global production supervisor would, in our view, be very beneficial for the project.

Matters arising from the EDR.

The reviewers were satisfied with the actions taken on the points listed in the recommendation in the EDR report. We will come back to some specific points below.

Recommendations for the production.

1. The final acceptance test of a chamber should be decided. This is a recurrent recommendation and we feel very strongly that this procedure should now be agreed by all collaborating laboratories and applied uniformly to all production sites. In the particular case of the PNPI production site, we clearly support the motion to test all chambers at PNPI with the final electronics. We furthermore recommend that the Muon Project, as much as possible, standardise the use of Travellers, log sheets and work instructions.
2. The final closing of the chambers should be revisited. The use of a silicon based tube as a temporary O-ring might not be optimal. We would also discourage to leave this tube inside the closed chamber. We also notice the difficulties to ensure leak tightness around the holes for the centring pins. This could force a redesign in this area. The safety margin of the final gluing (e. g. in terms of maximum overpressure before breaking) should be quantified.
3. The optimisation process of the wiring machine and the measurement of the wire tension should have the highest priority. This is clearly a prerequisite for keeping the schedules.

4. HV connections and HV leads currently proposed should be discussed and approved by the GLIMOS of LHCb together with the CERN TIS commission. The gas connections and the use of plastic piping should also be revisited. The gas distribution scheme at the experiment should be reanalysed in order to verify the maximum dynamic pressure drop in the lines and maintaining a gas amplification uniformity of $\pm 25\%$.
5. The reviewers were happy to see the effort that had gone into the creation of an ORACLE based database for the measurements done during the construction of a chamber. We understand that there might be a need for different solutions at the different production sites, but we urge the Muon Project to develop a uniform interface between these local databases and the Detector Description DataBase (DDDB) as well as the Conditions DB for LHCb.
6. Some safety aspects at the production sites should be revisited. The use of isopropyl alcohol, the radioactive sources and the evacuation of solder fumes at the soldering station should be referred to the PNPI department for work safety.

Conclusion.

The conclusion of this PRR is that the PNPI I Site is ready for production, subject to the points mentioned above are properly addressed in due time. The PNPI II Site should, if possible, be assessed when it is in a more advanced stage.