



Magnet Mapping Plan

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Outline

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- Introductory Description
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- Summary



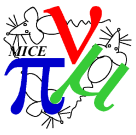
History

- Original plan was to deliver the spectrometer solenoid (*SS*) magnets to Fermilab for magnetic field mapping with “ziptrack”
- Efforts were made to design a test plan: (Hart – MICE Note 0210 and ziptrack software improvements)
- Delays resulted in a loss of proposed space; another space at Fermilab was found
- Mike Zisman suggested to save time by mapping the magnet at the vendor (saves shipping and reinstallation time and risks)
 - Good idea to characterize magnets before they leave Wang NMR
 - Some questions would remain concerning lack of steel at vendor
- After CM27, Alain contacted Felix Bergsma et. al at CERN to discuss their possible involvement in mapping the *SS* magnets



History

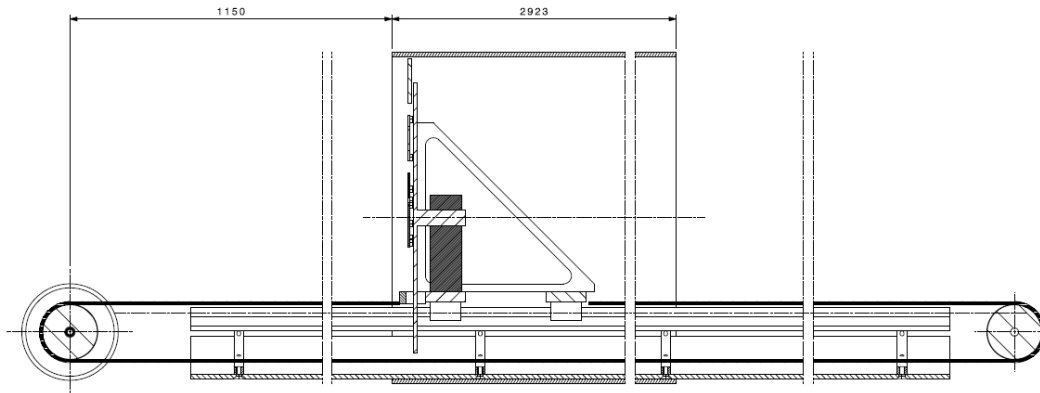
- 13-14 September 2010: A series of meetings were organized by Alain and Andy and held at RAL. Participants were:
F.Bergsma, A.Blondel, T.Bradshaw, J.Cobb, **F.Garnier**, **P-A.Guidici**, T.Hayler, P.Hanlet, A.Nichols, J.Pasternak, J.Pozimski, J.Tarrant, C.Tunnel
- Purpose: “to explore the options for the CERN Magnet Measurement Group to carry out the magnetic field surveys of the major MICE magnets as a possible input to the overall Project Plan”
- Topics of discussion
 - description of the apparatus
 - technical details – *lots of them*
 - mapping other cooling channel magnets
 - devising a possible plan



Motivation

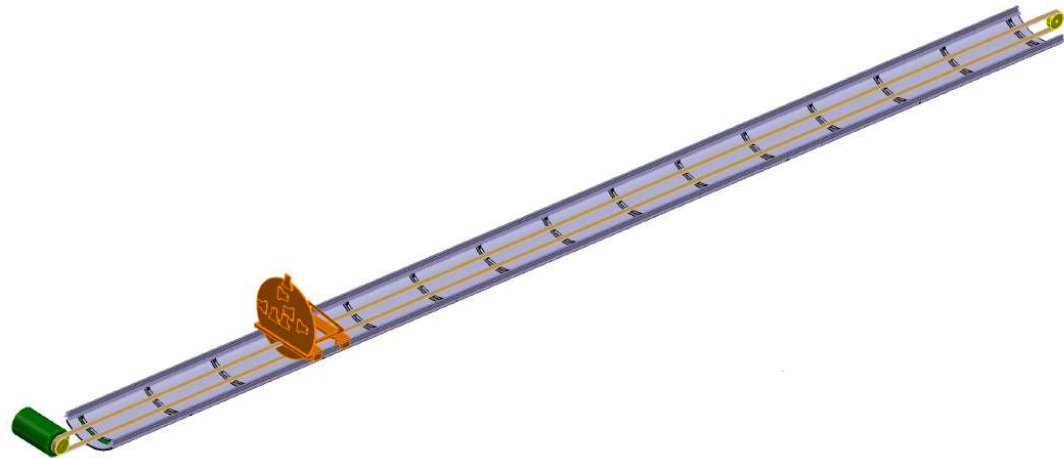
- Want to characterize magnet before it leaves the vendor
- Want to fully characterize magnet in situ
- Expedite installation – ziptrack is not transportable
- Can map all cooling channel magnets in situ
- Precision experiment – 0.1% precision – this requires tight control of systematic errors
 - SS requires a precision map for a precise emittance measurement
 - particularly true of the AFC modules if Step III is skipped
 - CC field on axis will be particularly sensitive to environment of the magnet
- Experimental physics is always filled with surprises and people spend years reverse-engineering corrections for systematic errors –

If we never need the detail, it's OK, but Murphy would ensure that we would need it if we never measured it.



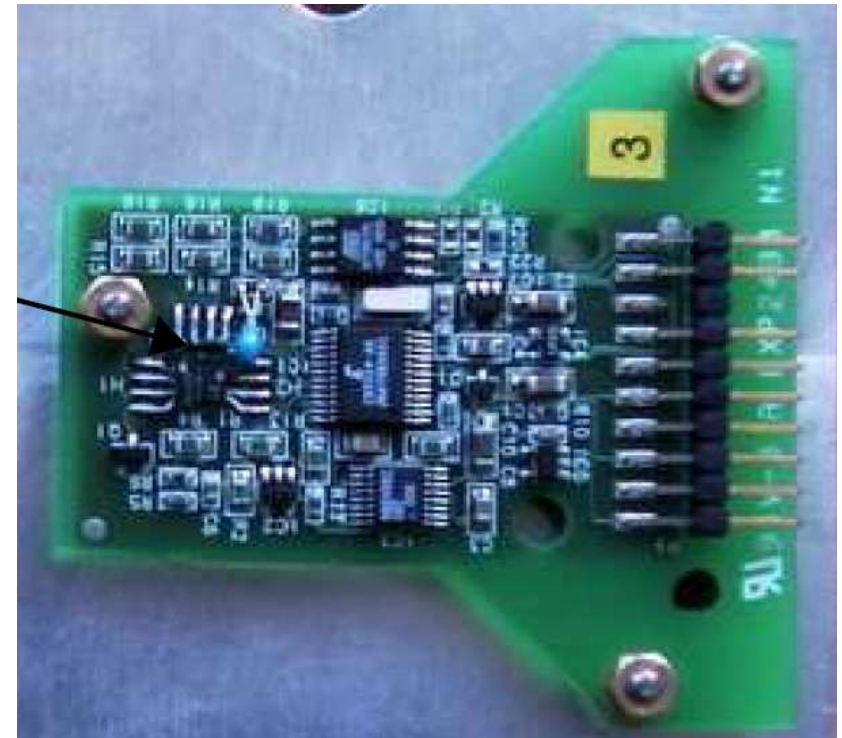
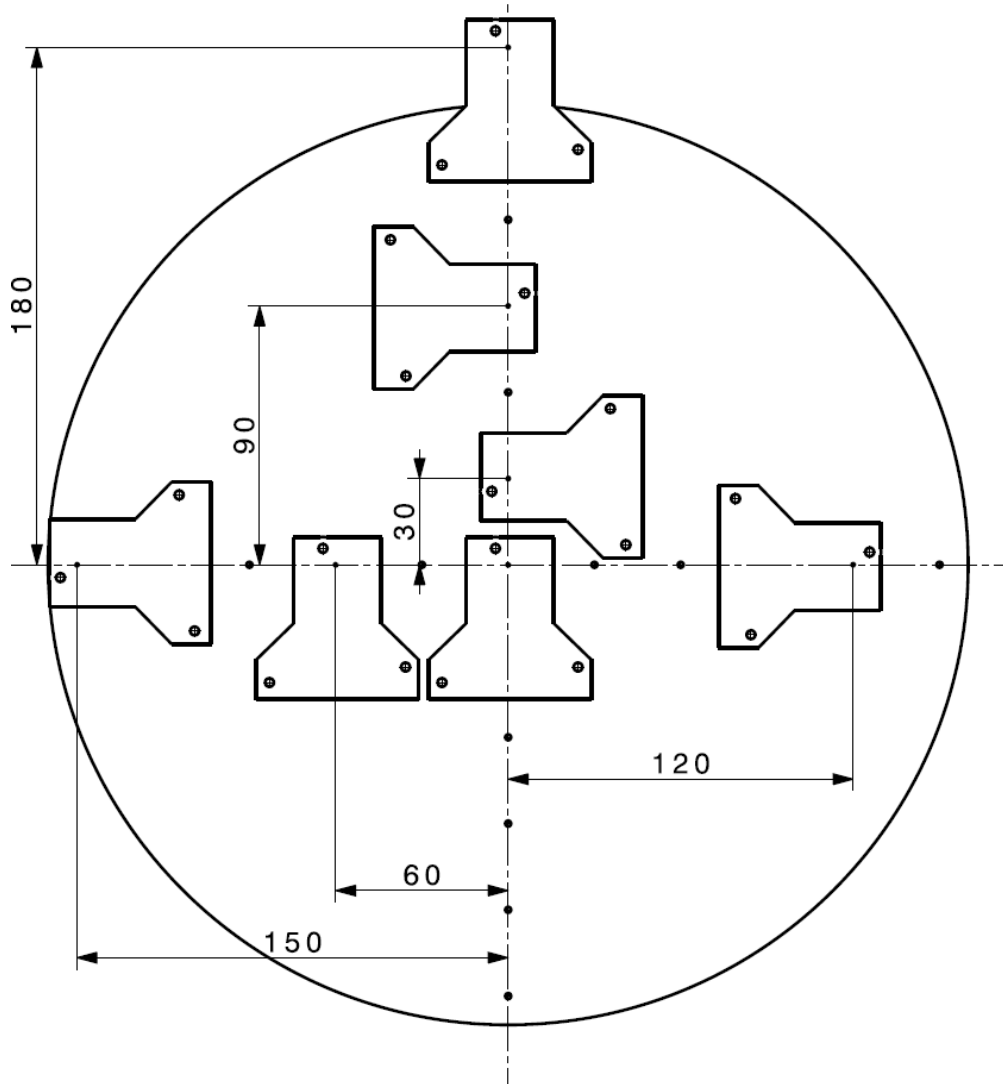
Side view of the mapping system

Carriage for mapper



A laser tracker is used to accurately measure positions

Introductory Description(2)



Nikeff Hall probes

Hall probes are mounted on disk



Possible Plan - first few magnets

- I. Alain submitted proposal to CERN
- II. Understand how to fund the mapping device (cost is 56CHF, ~35k£)
- III. Measure first SS at Wang NMR (~1–2 weeks)
- IV. Transport mapping system back to RAL with first SS
- V. Complete map in situ with different operating configurations
- VI. Transport mapping system to Tesla to test focussing coil
- VII. Transport mapping system to RAL to test focussing coil in situ; SS1 moved into offline position
- VIII. Transport mapping system back to Wang NMR and map second SS
- IX. Transport mapping system back to RAL with second SS
- X. Roll SS1 and RFC1 in offline positions, and perform complete map of SS2 in Step III configuration

All needs to be included in the overall Project Plan



Summary and Conclusions

- new plan under development to map cooling channel magnets and recover time in MICE schedule
- characterize spectrometer solenoid magnets before they leave vendor
- all magnets are included; map in situ to have accurate map in presence of steel shielding walls, etc.
- mid-September meeting held at RAL to develop plan with CERN magnet mapping experts
- details of the mapping to follow (see Felix's talk)
- initial plan is underway; desire input to formalize plan
- cost seems reasonable