Module Testing at Fermilab

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Appreciation

• We would like to express our appreciation to two groups whose assistance was invaluable in helping us get the test stands in working order.
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    • Markus Axer
    • Torsten Franke
    • Michael Poettgens
  • Lyon
    • Laurent Mirabito
    • Patrice Siegrist
ARCS and DAQ test stands in Sidet at Fermilab

We will have 7 ARCS and 4 DAQ test stands in the room with space allocated for rod burn-in.
- 2 ARCS delivered
- 2 DAQ delivered
ARC and DAQ Test Stands

ARC Test Stand

Computer and Memory Expander

Power Supply

SRDAPV

Front End Adaptor and Hybrid/Module

DAQ Test Bench

FEC, FED, TSC and Fiber Optic Cable

CCU, UTRI and Module Carrier

LV and HV Power Supplies
Always practice good handling habits!
We have a web page, so you can see what is going on at Fermilab.

All our results can be accessed through this web page.

You can reach this page through the link below.

uscms.fnal.gov/uscms/subsystems/sitracker/sitracker.html
We are learning how to use the CMS database and will be entering our results. Since we are in pre-production, we made a mini-database that we have been using to help us keep track of our test results.

Sensor 1 (S1) is the sensor closest to the hybrid and S2 is the second sensor of the module.

S1 pinholes correspond to a skipped bond on the hybrid and S2 pinholes correspond to a skipped bond between sensors.
Quality Assurance

- All components will be delivered from Europe to Fermilab.
- We will use the official testing procedures to test the hybrids and modules.
- Fermilab and UCSB are production sites and we will both use the CMS database to track components.
Production Testing Procedure

1. Test hybrid on ARC test stand.
2. Create a module using the hybrid and then test the module on the ARC test stand (make possible repairs, if necessary).
3. Turn modules into rods and burn them in.
4. Test rod with CMS DAQ test bench.
Our Experience with the ARC Test Stand

• In order to commission our ARC test stand, all seven milestone hybrids were tested at CERN with their ARC test stand.

• After the hybrids were shipped to Fermilab, we tested the same hybrids to confirm our ARC test stand was working properly.

• Modules were then constructed using these hybrids and we tested them again using the ARC test stand.

• We found excellent agreement between all tests.
Milestone ARC Calibration

History of Hybrid/Module 01

Defect of pitch adaptor
Our Experience with the DAQ Test Stand

• In order to commission our DAQ test stand, all seven milestone modules were tested at FNAL with our DAQ test stand.

• After the modules were shipped to CERN, we tested the same modules to confirm our DAQ test stand was working properly.

• We found excellent agreement between all tests and found an average noise per chip of 2 ADC counts and CMN ~0.5 ADC.
Milestone DAQ Calibration

DAQ History of Module 49

Pedestal Channel 1

Pedestals

Noise Channel 1

Noise

Pedestal Distribution Channel 1

ped_dist_1

Entries 129
Mean 181.1
RMS 16.4

Noise Distribution Channel 1

noi_dist_1

Entries 129
Mean 1.743
RMS 0.1538
Summary & Conclusions

- We have constructed 7 Milestone 200 TOB modules.
- Six modules were shipped to CERN for test beam studies (all modules survived the journey back to CERN).
- We have all the software for running the test stands and for data analysis. (We ported ARCS to Windows NT).
- We are now preparing our facility for production testing.
- Presently, we have 4 additional hybrids, 22 sensors and 12 frames.