CURRENT STATUS OF THE MANUFACTURING AND TESTING OF THE BPM ELECTRONICS FOR ELETTRA 2.0

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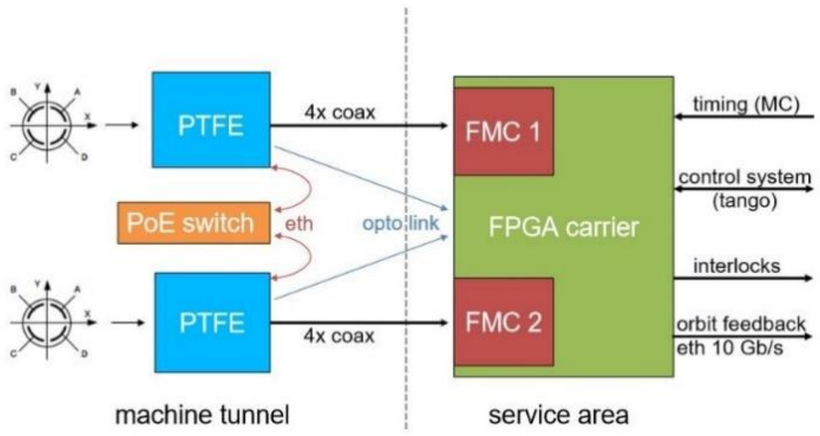
ABSTRACT

In this paper we are presenting the status of the partnership between Instrumentation Technologies and Elettra Sincrotrone Trieste for the realisation of 200 BPM electronics for ELETTRA 2.0. Last year, 200 Pilot Tone Front-End (PTFE) units were successfully developed and produced. During the present year, 100 Digital Acquisition platforms, each one used to digitize and process the signals from two BPM pickups, are in production after the successful pre-series tests.

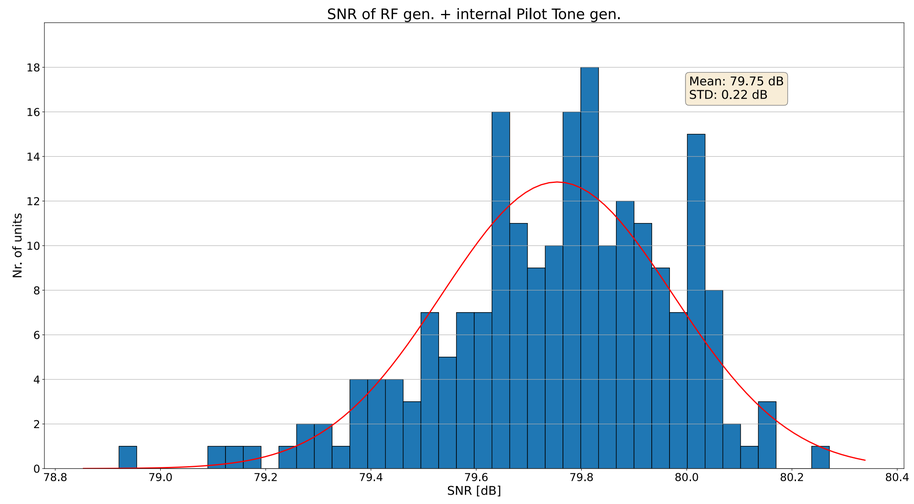
Elettra Sincrotrone Trieste was more involved in concept design, prototype development, and firmware programming, while Instrumentation Technologies was focused on design for manufacturing, implemented rigorous testing procedures, and handled the production. During the project, it was also necessary to overcome a period of material shortages, particularly for the chips used in the digital part.

Testing during the pre-series and series production phases ensured that each unit met the desired performance criteria necessary for stabilizing long-term measurement drifts in BPM systems. Additional units were produced to account for potential failures and performance variations, ensuring that all units delivered performed to specification.

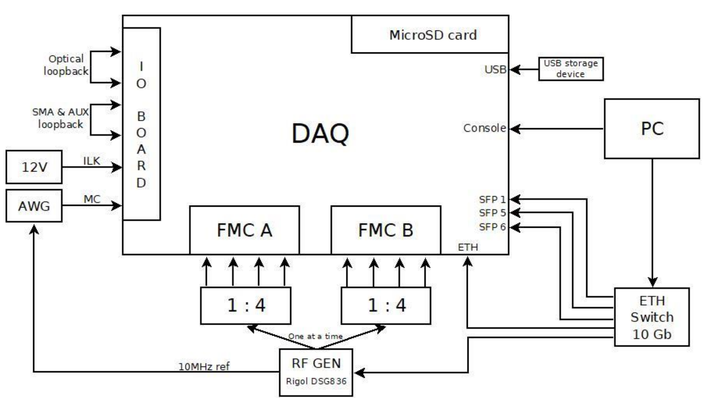
BPM ELECTRONICS ARCHITECTURE

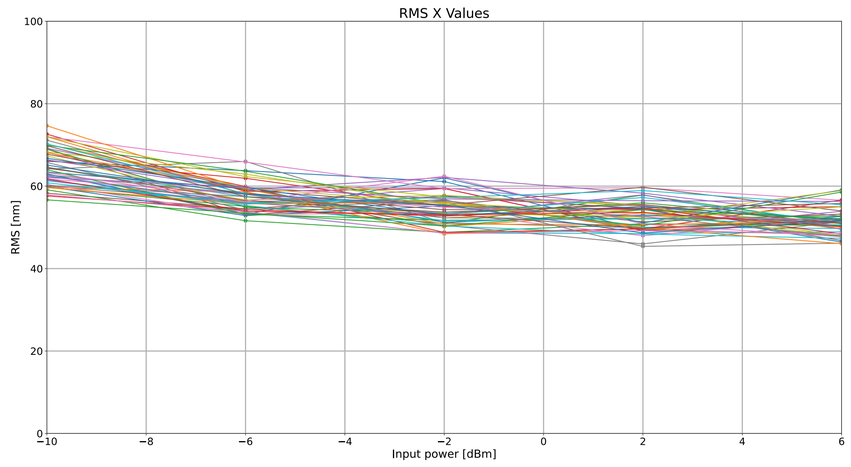


PILOT-TONE FE: FAT SNR STATISTICS FOR 200 PCS



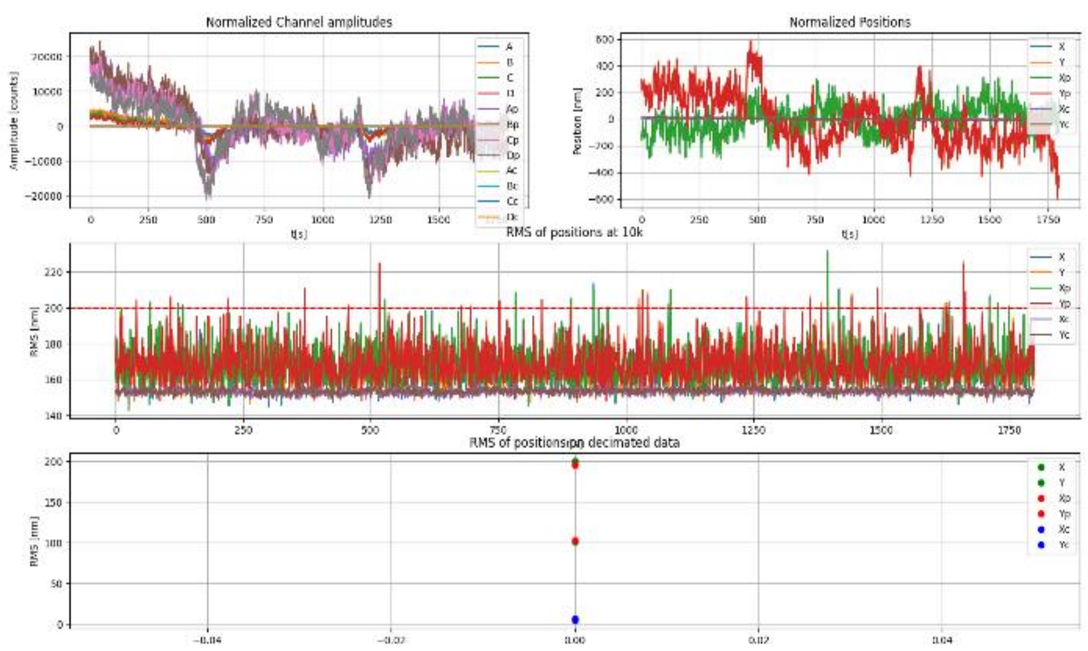
DAQ: MANUFACTURING TESTS STAND, FAT TEST SETUP AND PERFORMANCE

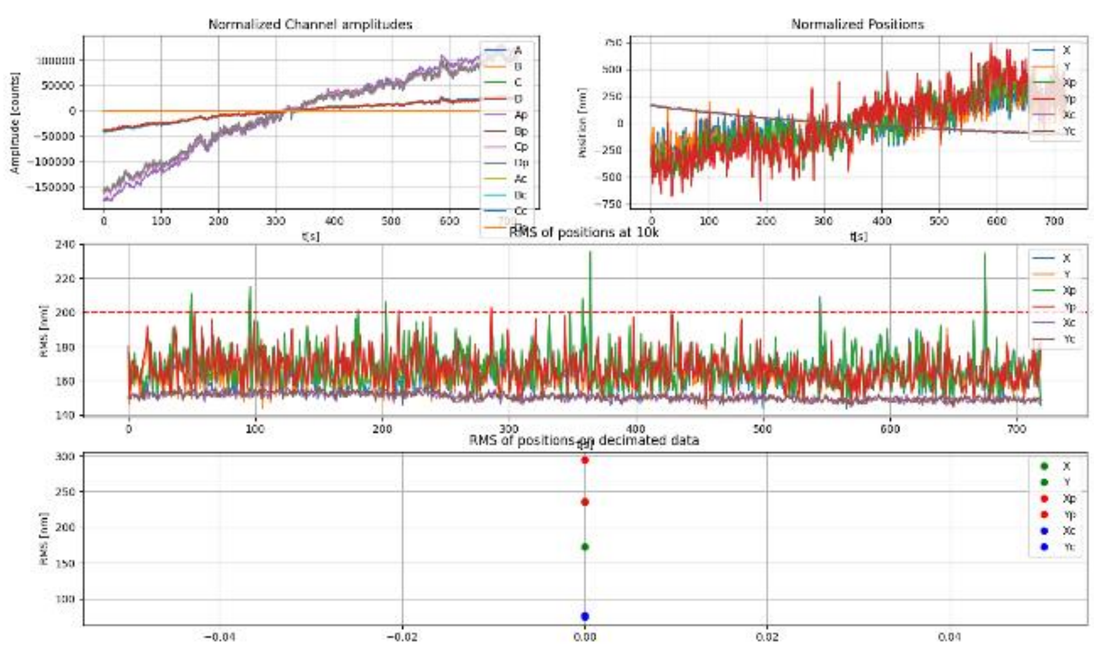




BPM ELECTRONICS: SAT MEASUREMENTS @ ELETTRA

30 MINUTES





12 HOURS

CONCLUSIONS

The test results of the 100 digital acquisition platforms together with 200 PTFEs confirm that the industrialization of the new BPM readout system for Elettra 2.0 was successful. All the produced devices passed the test having very similar performance.

As expected, a couple of failed units/boards were discovered. A lesson learned was to pay special attention while assembling the DAQs and to perform a last-minute cleaning before inserting FMC cards into their slots in the FPGA board. This approach will help in minimizing potential issues in future assemblies, while also saving assembly and testing time. Overall, both the PTFEs and the DAQ platforms proved to perform well together, providing at the same time, excellent beam position resolution and long term stabilization capability.

SERIES PRODUCTION STATUS

INSTRUMENTATION TECHNOLOGIES