

Minutes BWS Upgrade: Electro-Mechanical Design Meeting #12 -- 13th July 2016 --

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Agenda (<https://indico.cern.ch/event/543918/>)

1. Communications (R.Veness)

- PSB ECR already launched and progressing on the approval
- **Forks 2-3 units are out of tolerances.** The work has to be redone, which would delay the pieces availability to end of August.
- For mounting test (on august) 1 of these fork will be modified to fix the tolerances with some bricolage.
- The error comes from a perpendicularity deviation Shaft-Fork.
- The assembly test will be performed in August and the device plans to be available for functional testing on September.

2. Alxion Standard and Special Motor testing (J. Emery)

- Tested Alxion Standard and Special version with modified airgap (300V)
- **Back-EMF normal version: Show nice results and 1% deviation respect to specs**
- **Back-EMF special version: Show also nice results with 4% deviation respect to "estimated" specs.**
- Not clear if special version was tested by Alxion before procuring specifications or they approximated by calculations
- Speed and profiles tests with Special Alxion show satisfactory results with Dspace, calculated torque ~ real required torque
- **Problem found after motor testing:**
 - ◆ Appeared after the week-end (test finished Friday, problem appeared Monday)
 - ◆ Motor generates a strange noise even when not moving and holding position
 - ◆ Effect is not symmetrical, appears in In & Out Scans but seems stronger in Out scans.
 - ◆ Currently trying to work out the reason:
 - ◇ During movement the currents are showing a strange behaviour
 - ◇ Motor dismantled, visual inspection (Dmitry) show no frictions
 - ◇ Isolation on phases seems not to be the problem, tests show that they're ok.
 - ◇ Cross-Check with Parker motor--> No problem seen
 - ◇ Test with older compiled code --> Problem still seen
 - ◇ Generator Mode --> the output voltages are Ok
 - ◆ Next steps:
 - ◇ Try standard Alxion
 - ◇ Try another Alxion stator 300v
 - ◇ try standard rotor.
 - ◆ For the moment the reason still unclear.

3. PSB Acquisition system: Installation proposal (J.L. Sirvent)

- **Installation requirements: 1 Functional system (PSB standard) + 1 Test flexible test platform (Independent systems)**
- Base line is **acquisition on surface** , both options send their analog signals to surface
 - ◆ In PSB short cables & long bunches --> Fine for BW point of view (bunch pile-up)
 - ◆ Gain in noise reduction << Risk of failure of acquisition Front-End for radiation exposure
 - ◆ In any case allow installation of a Front-End for testing purposes
- The idea is to procure a operational (PSB) system 100% available for functional validation

- Allow space & cabling flexibility to test different scintillator + photo-detector configurations
 - ◆ Standard Cylindrical 30x30mm
 - ◆ New Rectangular 100x100x10mm
 - ◆ MaPMT, HPD, Filterweels
 - ◆ Space reservation for 1 Front-End
- 3 Set-up Configuratoins show using the same cabling requirements.
- High dynamic range acquisition system (no required filter / pmt gain tuning)
 - ◆ Strategy 1. HPD + QIE10/12 (1e5)
 - ◆ Stregety 2. MaPMT + ICECAL (1e5)
 - ◆ Stragety 3. MaPMT + 2 x QIE10/12 (1e7?)
- **New mechanics required to procure for both assemblies:**
 - ◆ FilterWeels
 - ◆ PMT/MaPMT/HPD shielding
 - ◆ Scintillator/Waveghides holder
 - ◆ Supports
 - ◆ **All these details are not included on ECR**
- **Studies on PSB needed to:**
 - ◆ Estimate required dynamic range on PSB
 - ◆ Adjust acquisition systems working point
 - ◆ Cross-Check PSB simulations
 - ◆ Check possible improvements by changing Scintillator Geometry
 - ◆ Check Light yields on scintillator per impacting proton on wire (for different energies/intensities)
- Proposed ways to proceed:
 - ◆ Trust on simulations ? Check with Roberto Rocca.
 - ◆ Estimate light yield trough measurements stored on measurements DB
 - ◆ Prepare measurement campaign new systems when installed.

4. Comments from Dundee Visit (R.Veness)

- Some issues were identified thanks to the visit
- **Residual material** observed on measurements:
 - ◆ It reduced the reflectivity on some disk areas
 - ◆ Comes from some abrasive liquid used for finishing the laser slits.
- **Smooth transition** Reflective/Non Reflective
 - ◆ Such smoth transition did not allow enough "flat" reflective area between slits
 - ◆ Sample and laser are in a fix position, Laser scans the disk by angular movements
 - ◆ Laser loses focal point, which produces wider slits
- For Dundee Equipment, 20 um width slits was already on the limit (we asked for 10um slits)
- The fabrication of full size disk would produce worst slits due to equipment configuration
- **Dundee required XY Stage + Controller system (and maybe new laser) to produce high quality slits.**
 - ◆ Estimated Cost > 10KCHF
 - ◆ In collaboration with other sections and other uses foreseen, if required cost may be splitted by 3.
 - ◆ Jose's remarks:
 - ◇ With commercial company we reach the results required for the slits.
 - ◇ Does it worth it? we'd need a guarantee that this new equipment would produce better slits than commercial.
 - ◇ In any case, the sensor weak point is the surface quality (roughness, defects, reflectivity)
 - ◇ Instead of spending time/money in building very spensive disk it may worth it to improve the sensor robustness with some minor modifications for metallic disks usage (more scanning dots / different configuration).

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