AD-Horn test-bench

10th AD-Target Consolidation Meeting

Aurelio DE MACEDO (EN-STI-TCD)
Horn failure 21/05/2019

- Short circuit on the horn after ~ 150k pulses
- Slow degradation of the current over the last hour before short circuit
- Last pulse with higher current triggered and interlock

Thanks to N. Magnin and G. Grawer (TE-ABT) for the analysis
Horn failure 21/05/2019

- Horn post-mortem
  - Screws got loose after ~150k pulses
  - Weak plate-horn contact leading to electric arcs
  - Molten areas on the plate and horn flange
  - No damage on horn bi-conical shape

Loose screws
Molten areas
Improvement and testing

- Horn equipped with Nord Lock washers
- Specific design for secured tightening
- Being tested on the TB
  - 128/150k pulses performed: 108k@6kV, 20k@7kV
  - Screws are still perfectly tightened!

**How it works**

- When the fastener is tightened, the cams lock and the serrations on the outer faces of the washers grip into both the fastener and the clamped part, creating clear impression marks in both. Clamping load has been created by the bolt, keeping the assembly locked in place.

- Because the cam angle ('α') is greater than the thread pitch ('β'), a wedge-locking effect secures the fastener against rotational loosening, even under the most severe conditions.

- When the fastener is untightened, sliding will occur between the two washers. The upper washer is locked to the nut or bolt head by the serrations. The lower washer does not rotate as its serrations are locked into the surface being clamped.

- As the cams slide over each other, the clamping load from the bolt is first increased as the bolt stretches, before being released as the cams pass each other.

 Marks for visual inspection

Monday, September 16th, 2019
Schedule

• Next activities:
  • Week 38 (this week): Nord-Lock washers testing to finalise
  • Coming weeks: equip other horns with Nord-Lock washers
  • By end 2019: testing of newly assembled components
  • Damaged horn to be repaired:
    • 1 new horn inner conductor available
    • 1 plate to be produced: production time to be validated with Main Workshop or subcontracting
Thank you for your attention!