



CNGS Project

PROTOTYPE FOCUSING HORN MECHANICAL DEVELOPMENTS

CERN-EP-EOS / CNRS-IN2P3-LAL Orsay Collaboration

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Summary

- **CNGS horn prototype**
 - ✓ Goals of the 1st phase of tests.
 - ✓ Horn mechanical parameters.
 - ✓ Test parameters (1st phase)
 - ✓ Goals of the 2nd phase of tests.
 - ✓ First measurements (vibration analysis)
- **Horn handling in target area**
 - ✓ Approach
- **Horn connection / disconnection**
 - ✓ Approach



Horn prototype - Goals of the 1st endurance test

(1.5 million pulses from Feb. to May 2000)

- **Certification of the new horn mechanical developments, in particular :**
 - ✓ **Reliability of the EBW inner conductor.**
 - ✓ **Efficiency of the new geometry of the sprayers.**
 - ✓ **Fast interchangeability of the cooling pipes installed on the horn itself.**
 - ✓ **Reliability of the “spiders” (for the centering of the inner conductor) and of the thin wall end flanges.**



Horn prototype - Mechanical parameters

- **Total length : 7 meters (symmetrical electrical connections included)**
- **Total length of the inner conductor : 6571 mm**
- **Average wall thickness of the inner conductor : 2 mm**
- **Neck cross section : 490 mm²**
- **Minimum cross section opposite to the neck : 590 mm²**
- **Outer diameter of the neck : 25.3 mm**
- **Wall thickness of the outer conductor : 8 mm**
- **Inner diameter of the outer conductor : 788 mm**
- **Material for inner/outer conductor : Al alloy (AlSi1Mg)**



Horn prototype - Main parameters of the 1st phase of tests (Feb-May 2000)

- 1.5 million of pulses
- 150 kA
- 1 pulse / 4s
- Pulse length : 11 ms
- Cooling water flow : 30 l/mn
- Number of sprayers : 21
- Cooling water pressure (pump outlet) : 2 b
- Secondary inlet/outlet water cooling Δt ($^{\circ}\text{C}$) : 5



Horn prototype - 2nd endurance test

(1 million pulses / Aug-Nov 2000)

Improvements for the 2nd phase of tests

- Optimization of the water cooling circuit
- Installation of flexible copper square grids between the strip-lines and the horn to allow horn position adjustments (+/- 3 mm)
- Installation of a pulse transformer with a ratio 20 instead of the existing one (ratio of 32)
- Modification of electrical circuits to verify double pulse working point (5.7 ms / 50 ms / 6 s)

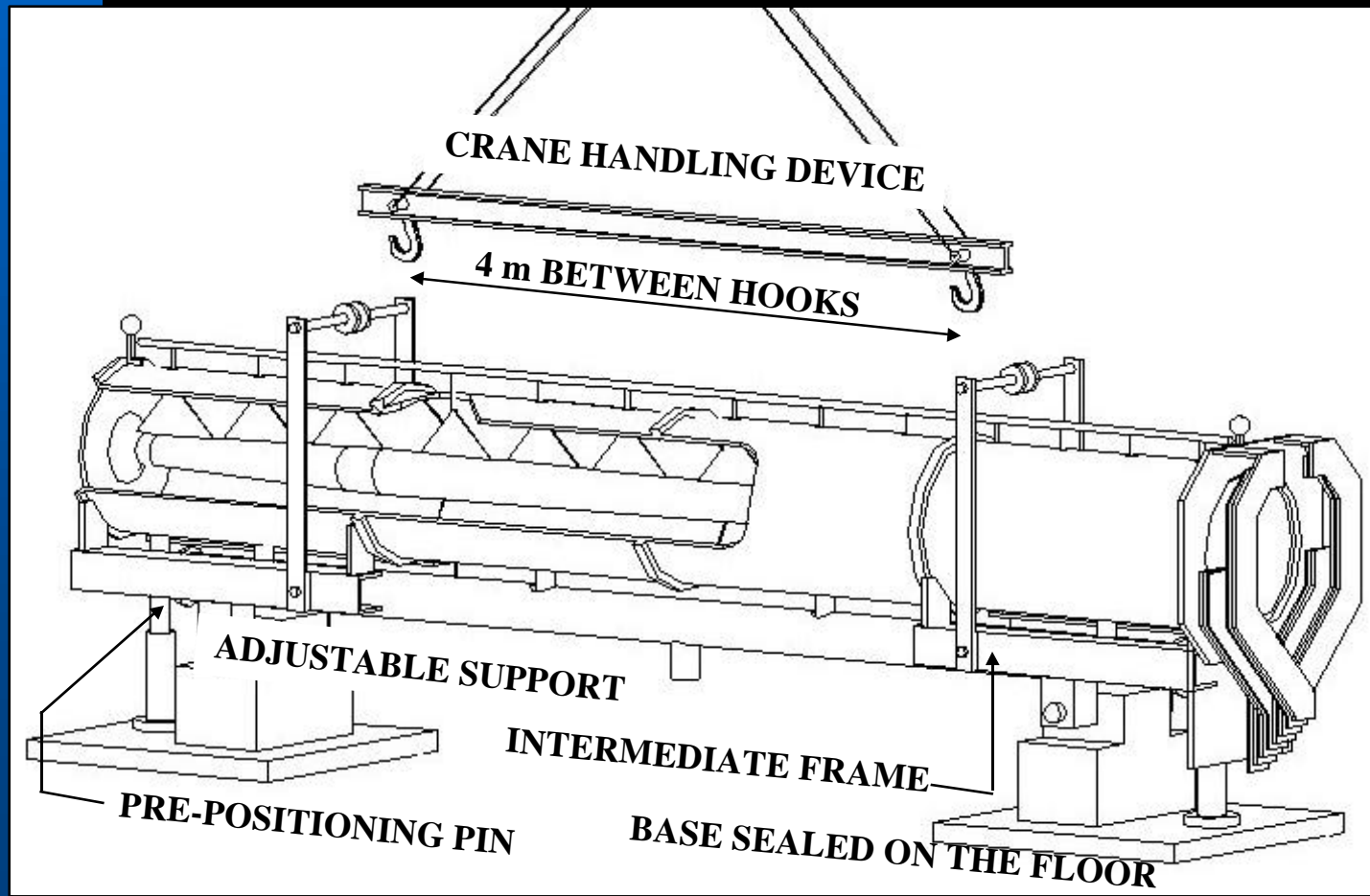


Horn prototype - complementary tests

- **Medium term studies**
 - ✓ Measurements and calculations of vibration modes are starting
 - ✓ Measurement of the end flange deformation under magnetic pressure (capacitive sensor)
- **Future developments**
 - ✓ Prototype for a quick horn (dis)connecting apparatus
 - ✓ Handling and transport of radioactive horns to the storage chamber



HORN HANDLING IN TARGET AREA





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HORN CONNECTION / DISCONNECTION

