HIE-ISOLDE Project Status Report

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45th Meeting of the INTC
CERN, 23-24 October 2013

- Technical Advances
- Procurement
- Installation works
- Schedule
- Conclusions

Technical Advances

- SC Linac
  - Cavity series production started
  - RF coupler and **tuner** systems are being validated
  - LLRF prototype successfully tested => series production underway
  - SC solenoid design approved=> fabrication starting
  - Cryomodule design finalized => procurement underway for long-lead items
- High-Energy Beam Transfer lines
  - Layout frozen => tracing on the floor
  - Dipole and quadrupole Magnets + supports ordered
  - H/V corrector magnets by end of November
  - vacuum chambers design to be finalized soon
  - Diagnostic boxes under procurement
- Installation works @ ISOLDE
- Design Study for the Intensity Upgrade well underway
  - Target + Front-end (FE8 and 9)
  - **Offline separator test bench**
  - HVAC + Cooling => nuclearization
  - **Charge Breeder => assembly of electron gun, test at BNL (US)**

Surface quality of the inner conductor tip → source of field emission

Central electrode: 20 mm diameter, at earth potential

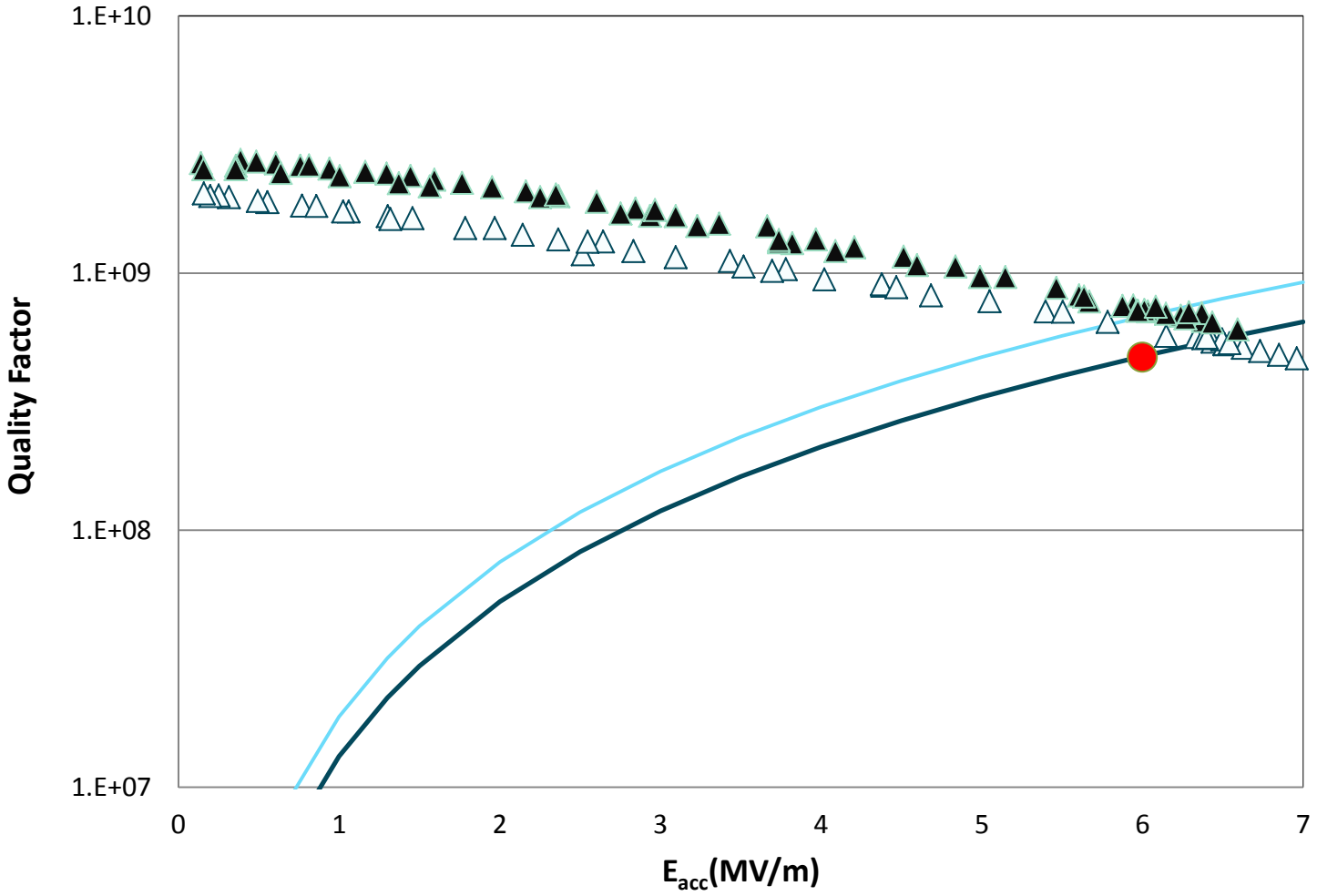
No central electrode

Adhesion on the lower edge (RF contact) was improved using a longer cathode

with 840 mm cathode

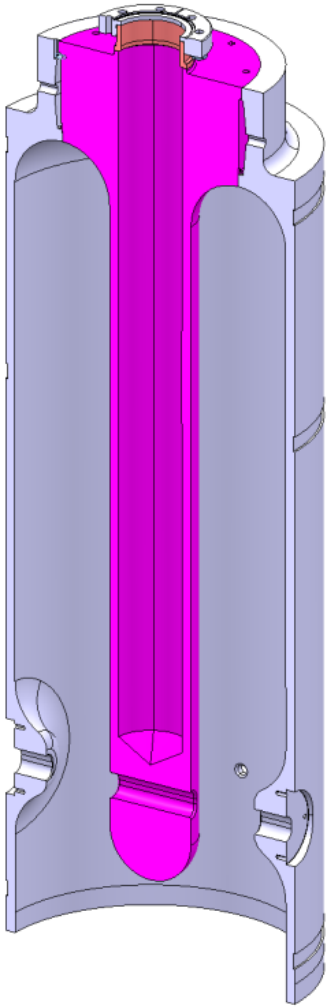
length increased to 870 mm

Ready to start series cavity production



High beta cavity procurement

Version 2



Two series cavities (QP2 and QP3) ready at CERN to start series coating

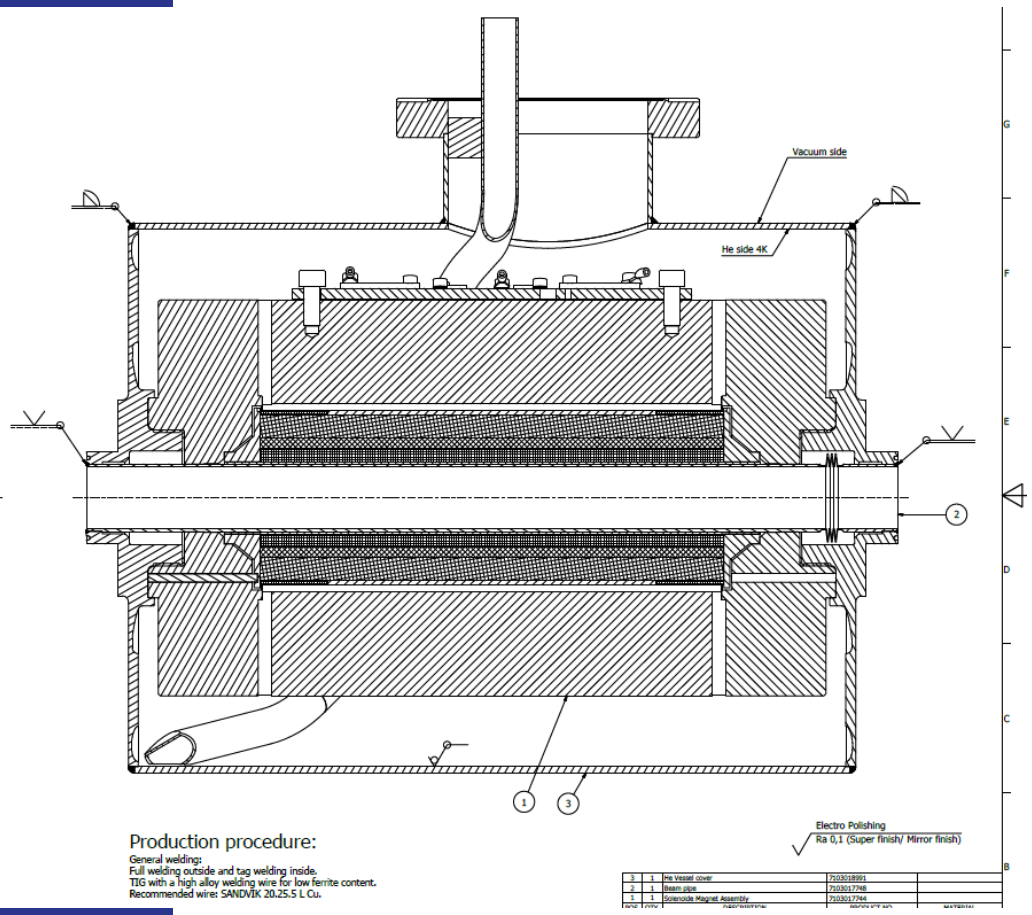
Contract attributed to industry for production

Few welding issues still being finalized: parameters of the welding machine to be set in collaboration with CERN

Kick-off meeting pending

Delivery of first series unit before the end of the year

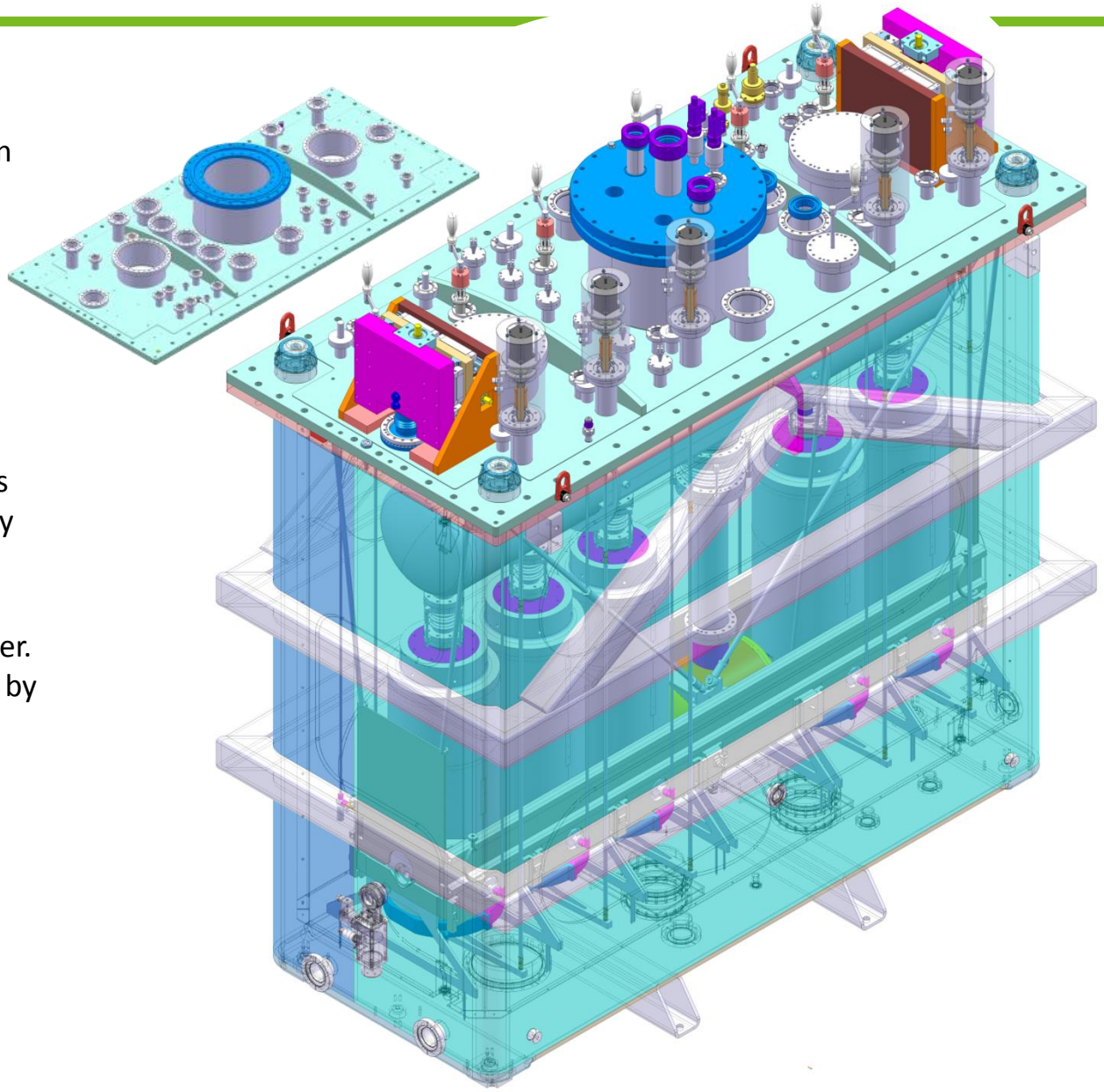
Superconducting Solenoid



- Design was revised in June to cope with differential thermal contractions during cool down transients
- Final Design Report
- Company working on manufacturing drawings and tooling (mandrel, etc.)
- Winding scheduled to start in November
- First solenoid delivery foreseen end February 2014
- Second end March 2014

Cryomodule assembly

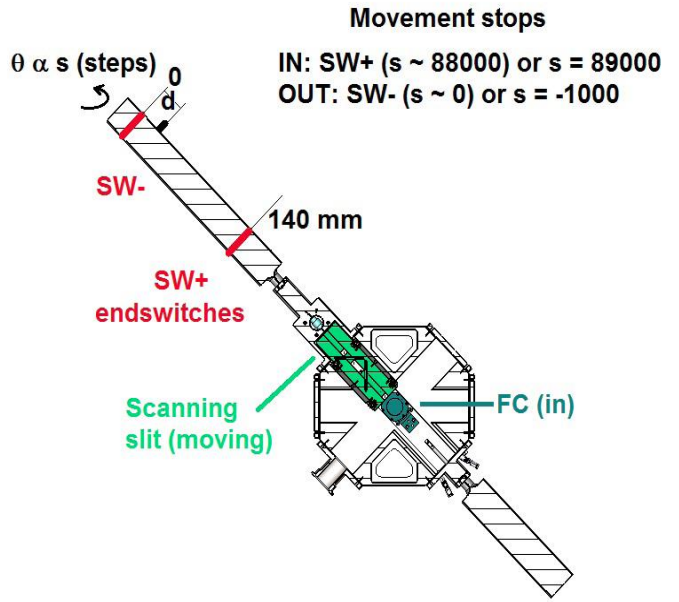
- Vacuum vessel (leading item): tendering process is complete. On 21/10/2013 visiting the (lowest bidder) company. If OK, place contract; delivery: T_0+ 6 months (end April 2014)
- Helium vessel: same stage as vacuum vessel, shorter manufacturing times
- Thermal shield: detailed drawings being produced→ price inquiry by end November
- Suspension system: design complete; final review 6 November. Detailed design and specification by the end of year; price inquiry. Present plan to sign contract in February 2014 for a just in time delivery in May
- Support adjusters: two systems passed acceptance tests, will be delivered at CERN next month.



SM18 infrastructure: clean room

- Status of clean room:
  - Rail installed and precisely positioned
  - Ground prepared
  - Clean room mounting started last week

Failure of the prototype short DB



History log of the experimental test done with the HIE DB:

– 20 August 2012: Installation of HIE DB in REX-ISOLDE Hall

– From 20 August 2012 to 5 February 2013: Experimental measurements with stable beams (A/q = 4 and A/q = 3.5); mainly Faraday cup test but also beam profile measurement including movement of the scanning slit (during this period, about 100 IN-OUT scans of the scanning slit were performed).

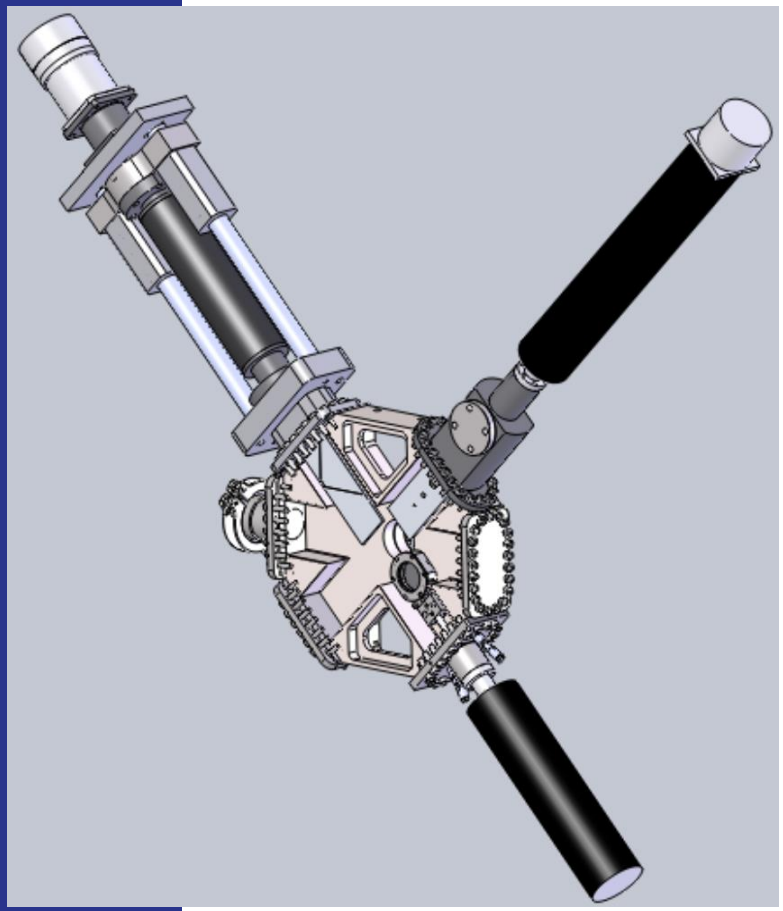
– 8-9 April 2013: Tests of the scanning slit software, approx. 350 IN-OUT cycles.

– 10-15 April 2013: Stress test of the scanning slit mechanism (run of 1340)

Total number of IN-OUT cycles of the scanning slit mechanism: approx. 1800.

HIE-BDB-TN-0001 (edms# 1284254)

Beam Instrumentation



New design with external actuators

The concept of an external actuator was tested successfully at CERN

Contract with AVS is about to be signed for Short Diagnostic Boxes → 6 SDB boxes by August 2014

Supply T0=contract date. T1=Slit prototype acceptance	Latest Delivery dates
Revised manufacturing drawings	8 November 2013
Test of the scanning slit linear motion at AVS	T0+9 weeks (15 January 2014)
Batch of prototype short diagnostic box	T1+7 weeks (5 March 2014)
Batch of three series short diagnostic boxes	T1+31 weeks (6 August 2014)
Batch of two optional series short diagnostic boxes, if option taken up by CERN	T1+31 weeks (6 August 2014)
Batch of two optional spare short diagnostic boxes, if option taken up by CERN	To be advised

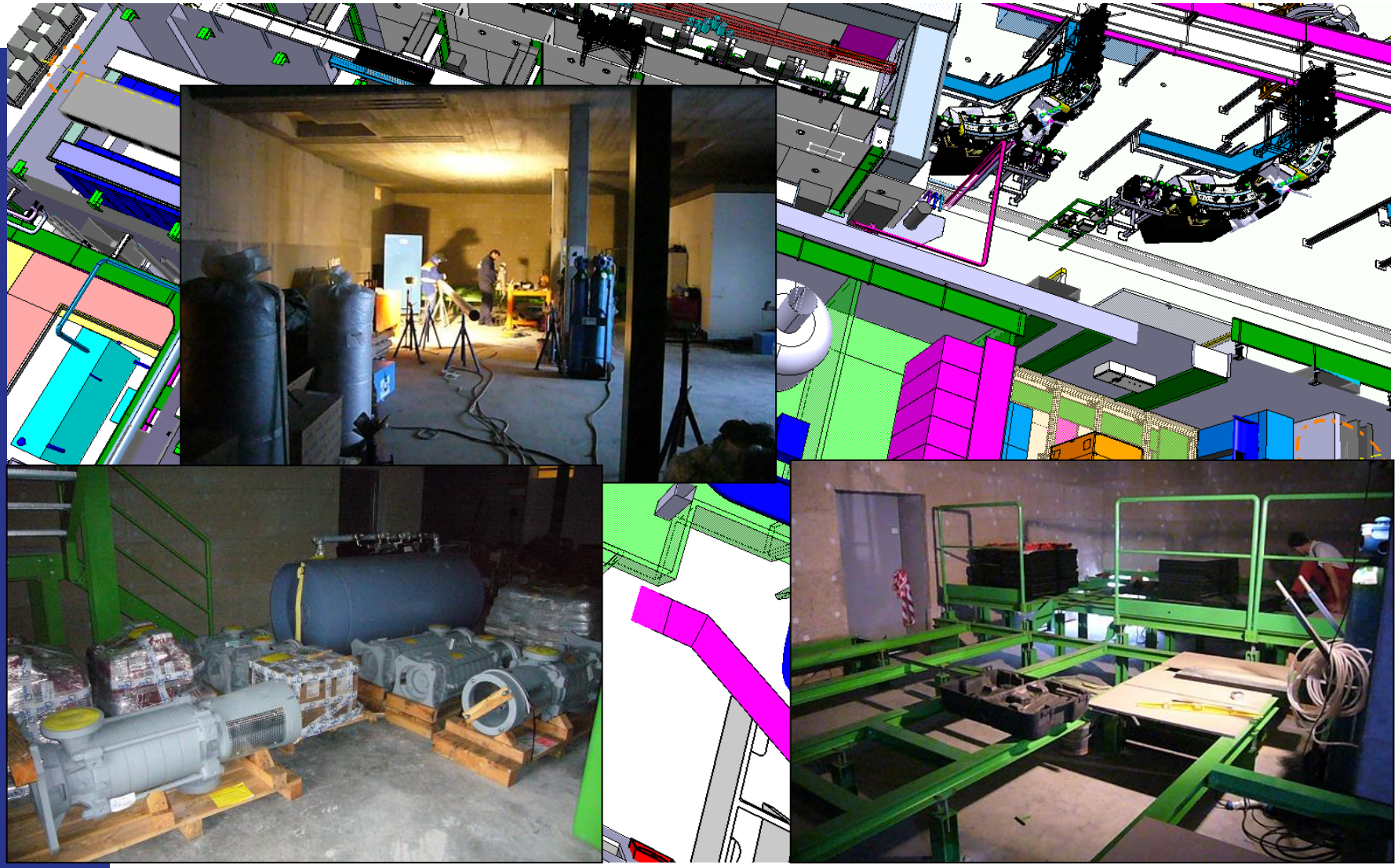
Tendering for Long boxes (LDB) needed in the transfer lines will start by end of this year as soon as CERN has recuperated the intellectual property of the drawings

HIE ISOLDE installation works

Compressor building 198

Cooling & ventilation and EL systems:
Steel structures, Ventilation Unit, Electrical cabinets, Pumps and Piping in place as well as large parts of the ducts and cable trays

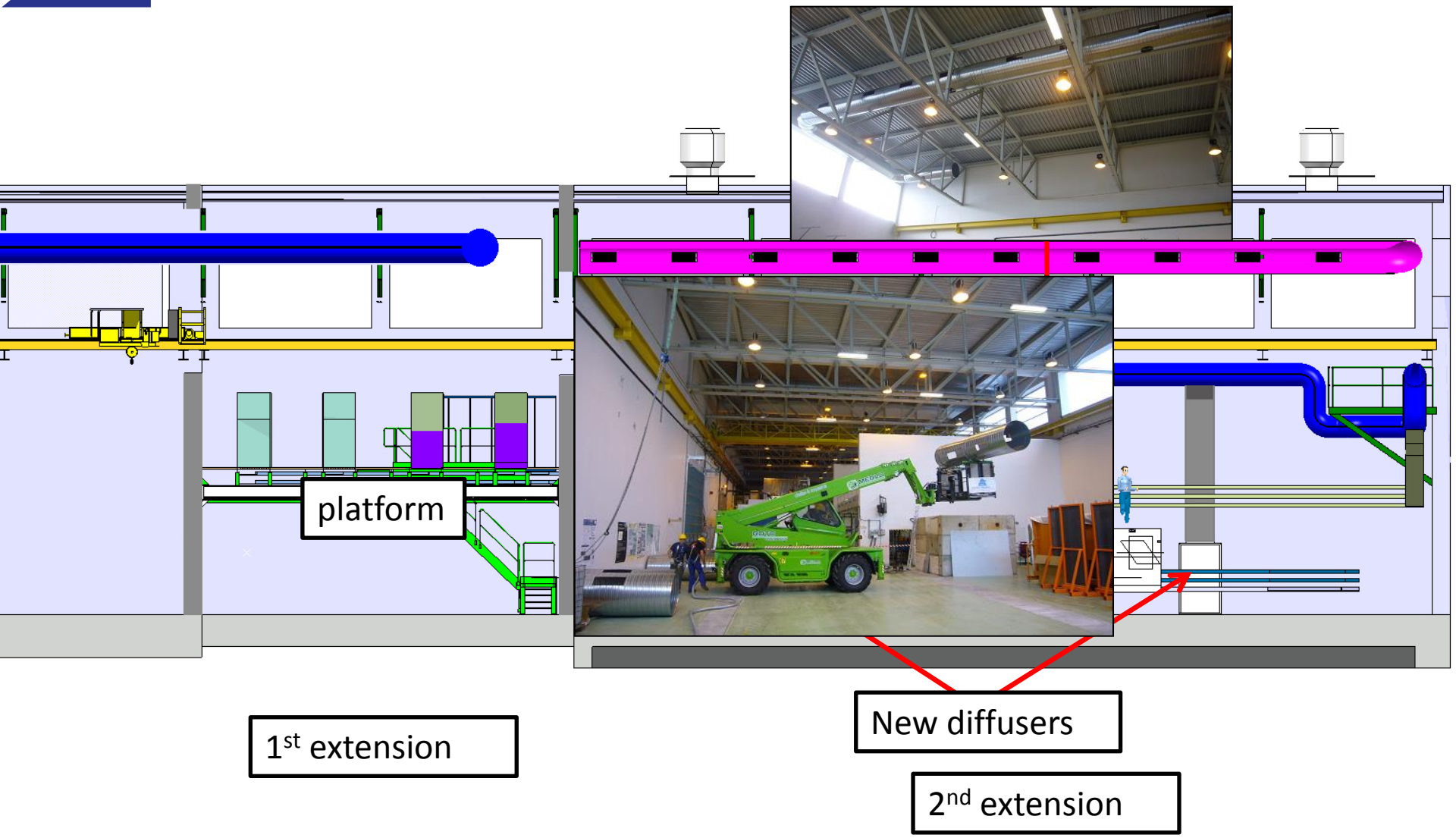
Cold Box building 199



EL systems ground floor:

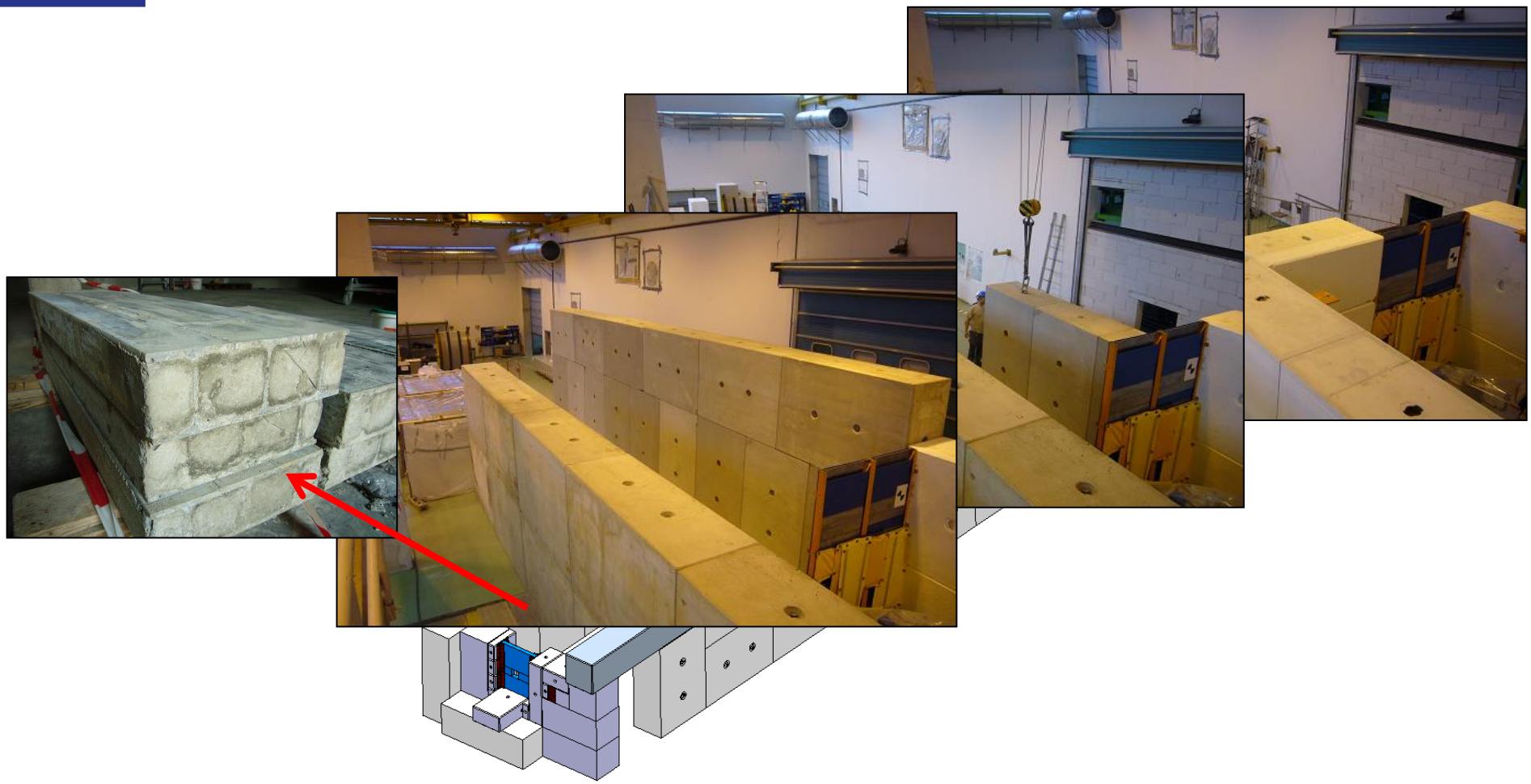
False floor structure in place for the 3.3kV (Compressors power)

Hall 170 ventilation systems



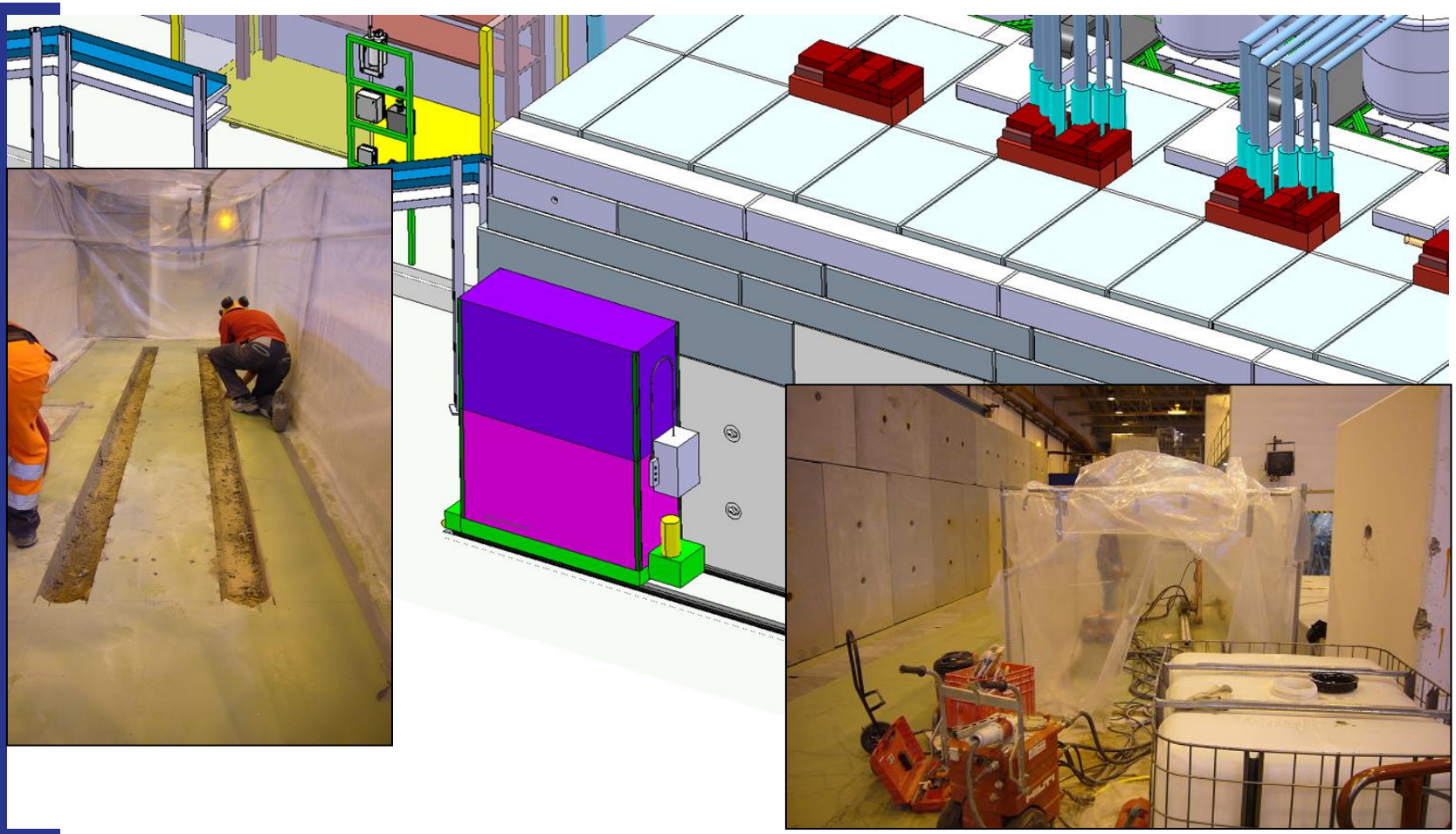
ISOLDE hall 170: Ventilation ducts put in place

Shielding tunnel Hall 170



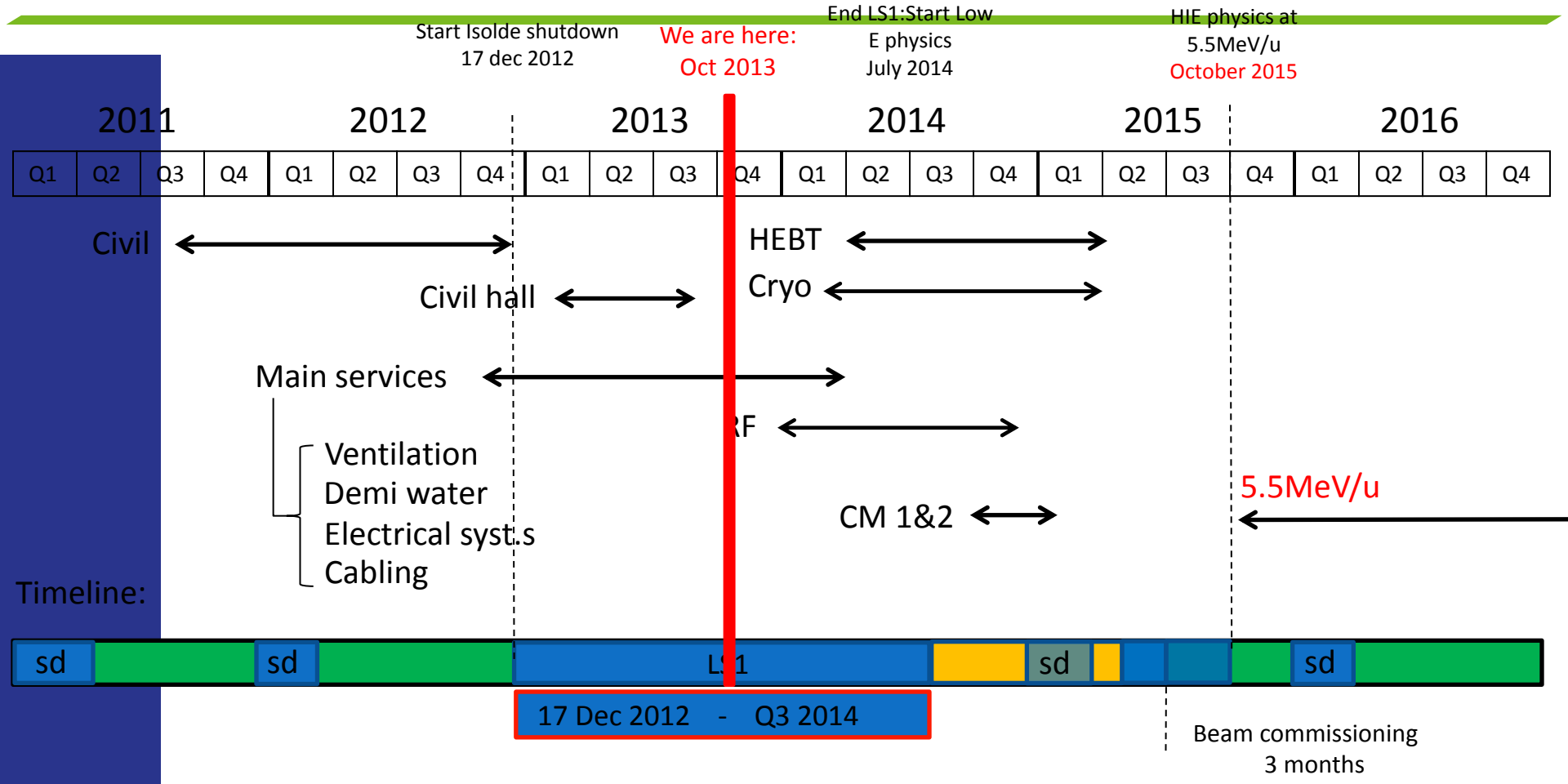
ISOLDE hall 170: Civil engineering
Installation of the new shielding tunnel walls

Shielding tunnel Hall 170



ISOLDE hall 170: Civil engineering
Installation of the shielding door rails

HIE Simplified Planning



shutdown

Isolde Ops

HIE installations and tests (Isolde normal operations)

Machine Check-Out (Isolde normal operations)

Beam Commissioning (Isolde normal operations)

Status of Expenditures
Machine part

		Phase 1	Charged + Committed	%
Costs	R&D – *Prototyping* – *Upgrade and consolidation of production facilities*	1’179 *848* *331*	1’035 *704* *331*	88% *83%* *100%*
	Design office work	3’369	3’172	94%
	SC Linac	5’059	1’974	39%
	HEBT	2’620	401	15%
	Installation & Commissioning	956	0	0%
	Advanced procurement of phase 2 components	753	753	100%
	Total expenses	***13’936***	***7’335***	***53%***
Income	Income to fund the expenses including CERN loan	8’049	7’248	90%
	CATE funds	375	87	23%
	Total income	***8’424***	***7’335***	***87%***

Conclusions (1/2)

- Technical Activities: progress is tangible on most of the machine parts => however one has to carefully monitor the following items:
  - ✓ Series cavity production
  - ✓ Tuning system procurement
  - ✓ Procurement of CM parts and instrumentation
  - ✓ Tooling for clean room assembly
  - ✓ Cryogenics for SM18 test
  - ✓ Transport solutions
  - ✓ Reliability issues
  - ✓ Safety
- Installation Works: High activity in the hall and service buildings; Despite delays we are still in line with the overall schedule which aims for low energy physics during 2014 and HIE physics as of Oct 2015. Critical paths for some activities are being addressed (cryogenics & cryomodule installation)

Conclusions (2/2)

- Safety:
  - ✓ Shielding study finished – Report under preparation
  - ✓ Beam losses and dump study to be finished
  - ✓ CFD simulations of He leaks done by EN/CV have helped to discuss the access to the tunnel during steady state
  - ✓ Safety folder => Demonstrative part to be finished
  - ✓ Safety review planned for November 2013
- Budget and Resources:
  - ✓ Financial situation analysed in-depth:
    - ✧ 5.8 MCHF shortfall for the completion of Phase 1 (5.5 MeV/u)
    - ✧ 8.6 MCHF shortfall in total up to Phase 2 (10 MeV/u)
    - ✧ 13.8 MCHF shortfall including Phase 3 (10 MeV/u + Low-Beta)
  - ✓ Staffing of clean room assembly is an issue
  - ✓ Extension of CATHI fellows beyond 31st Oct. 2014 => no funding available
- Planning: consolidation ongoing

Acknowledgement

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