



# Common Projects Status

*ATLAS RRB, 21 October 2002*

Marzio Nessi

# List of Common Projects (annex 10 MoU)



*Barrel Toroid Magnet*

*End-cap Toroid Magnet*

*Solenoid → ready*

*Common Magnet Infrastructure*

*LAr Barrel Cryostat → ready*

*LAr End-cap Cryostats (2)*

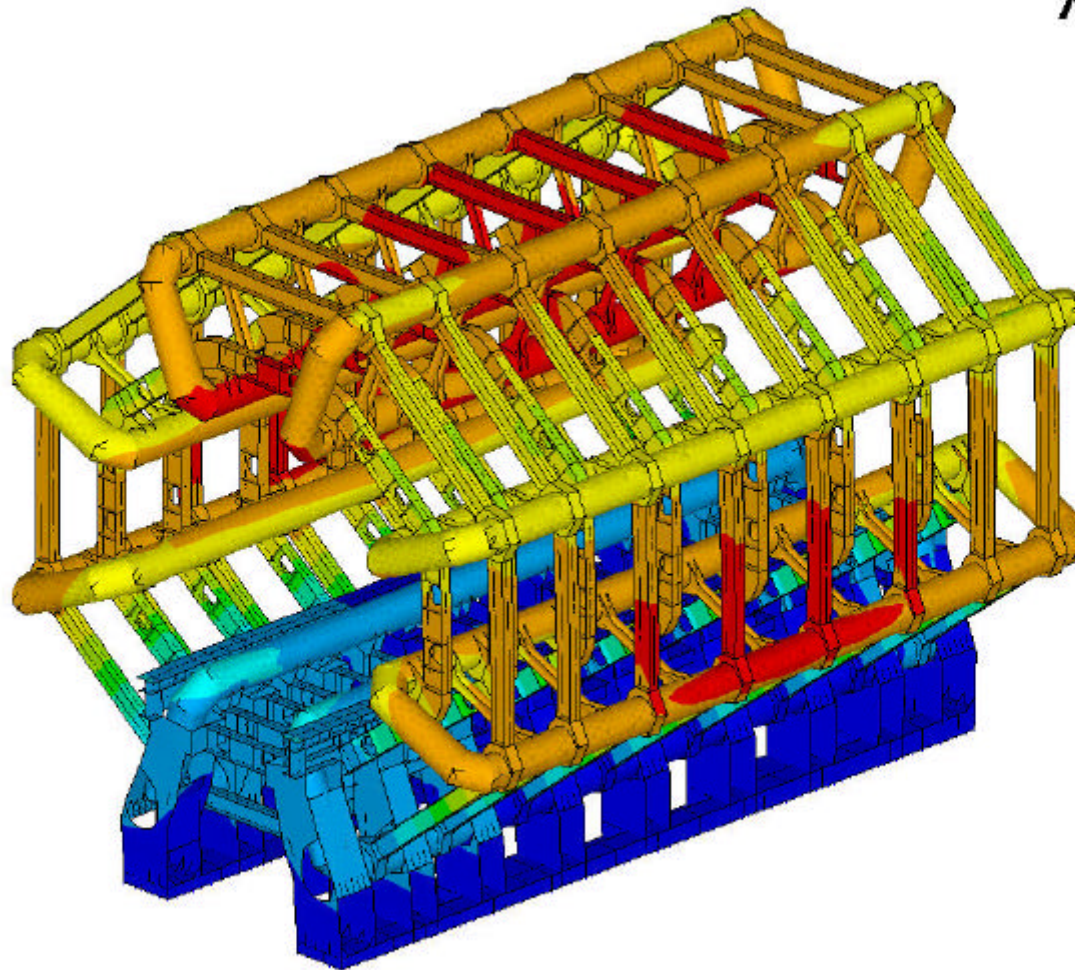
*LAr Cryogenic Plant*

*Part of processors of the trigger (not yet started)*

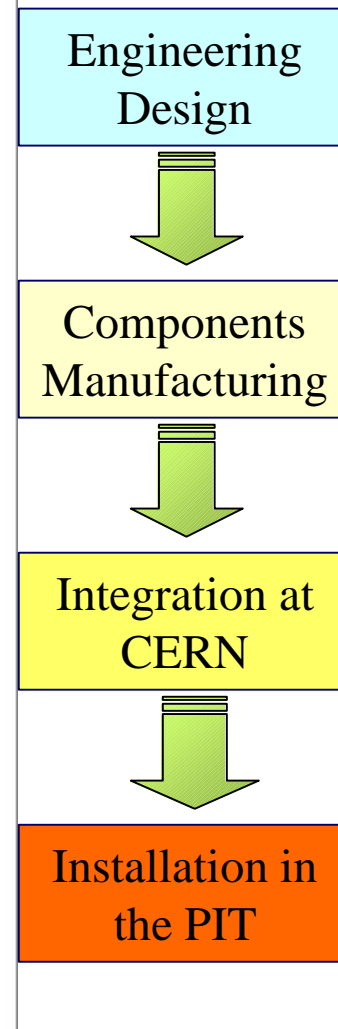
*Radiation Shielding*

*Experimental Infrastructure / Detector Installation*

# Barrel Toroid

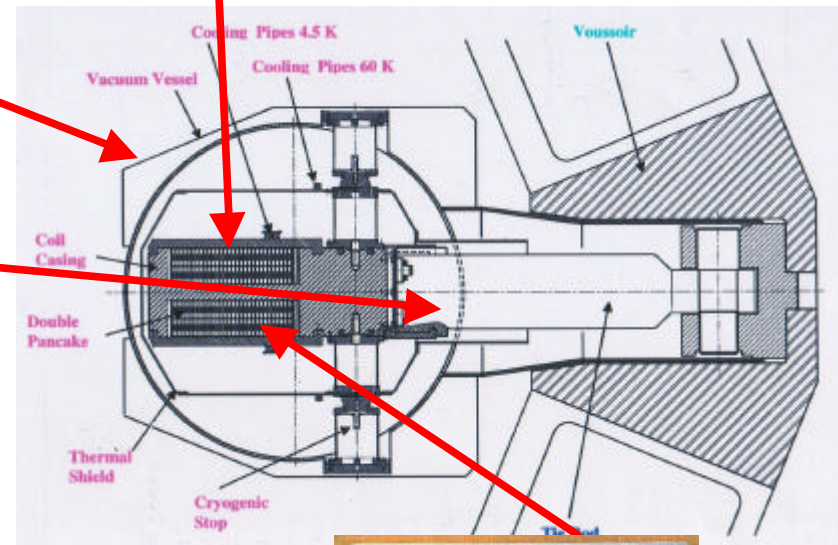
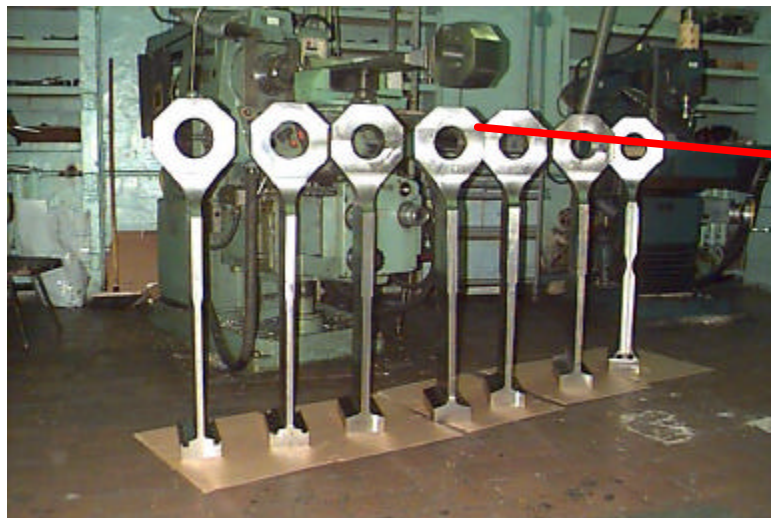


TB layout as simulated for final mechanical structural analysis



**Engineering & Monitoring @ CEA, LASA**

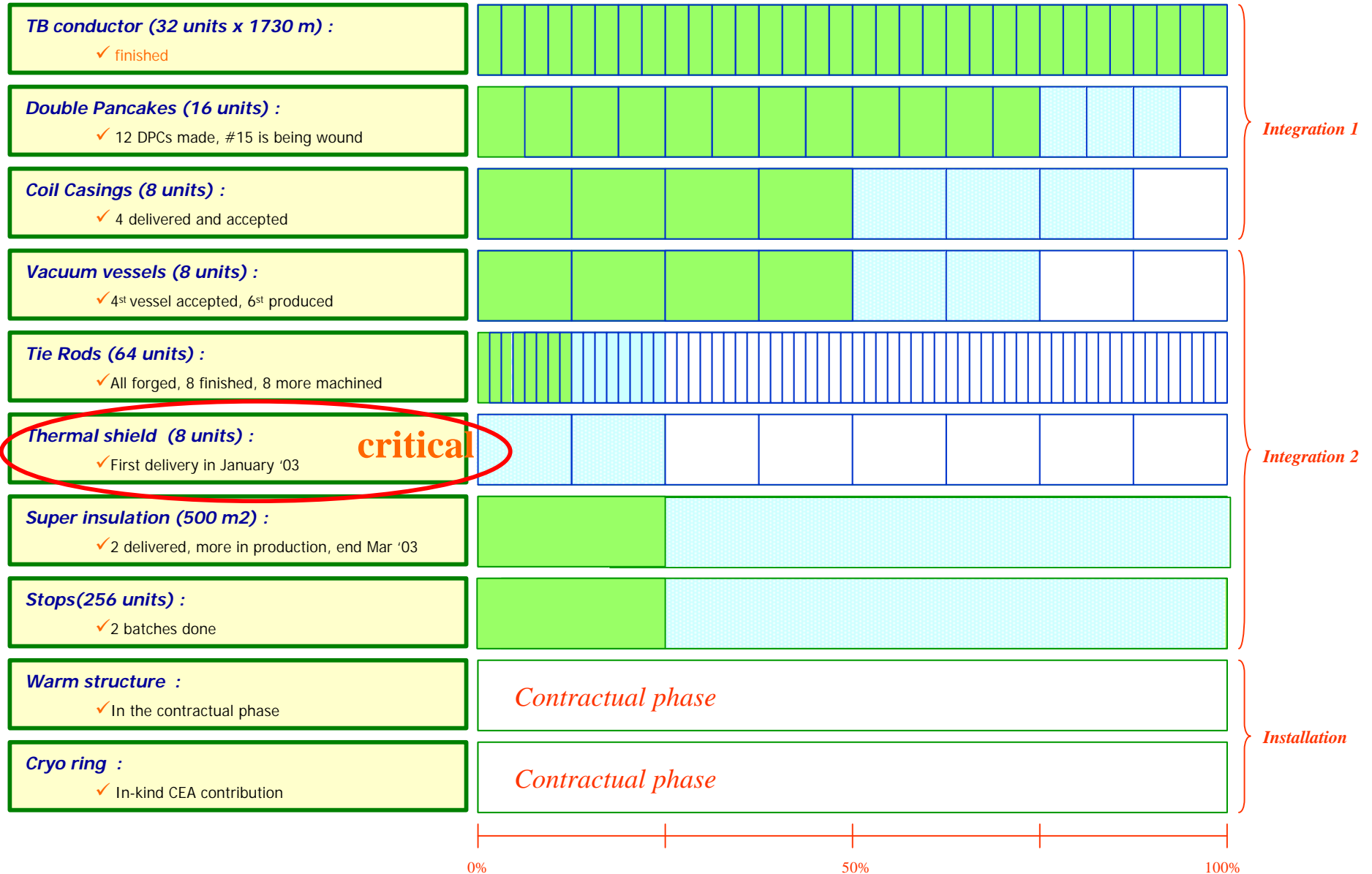
# Components Manufacturing





# Barrel Toroid components production

In production  
Finished

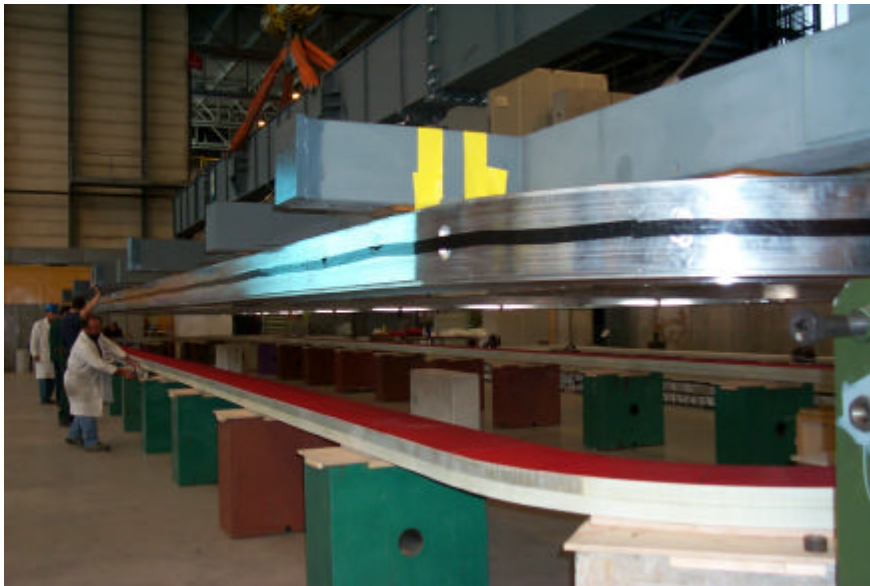


# Barrel Toroid Integration





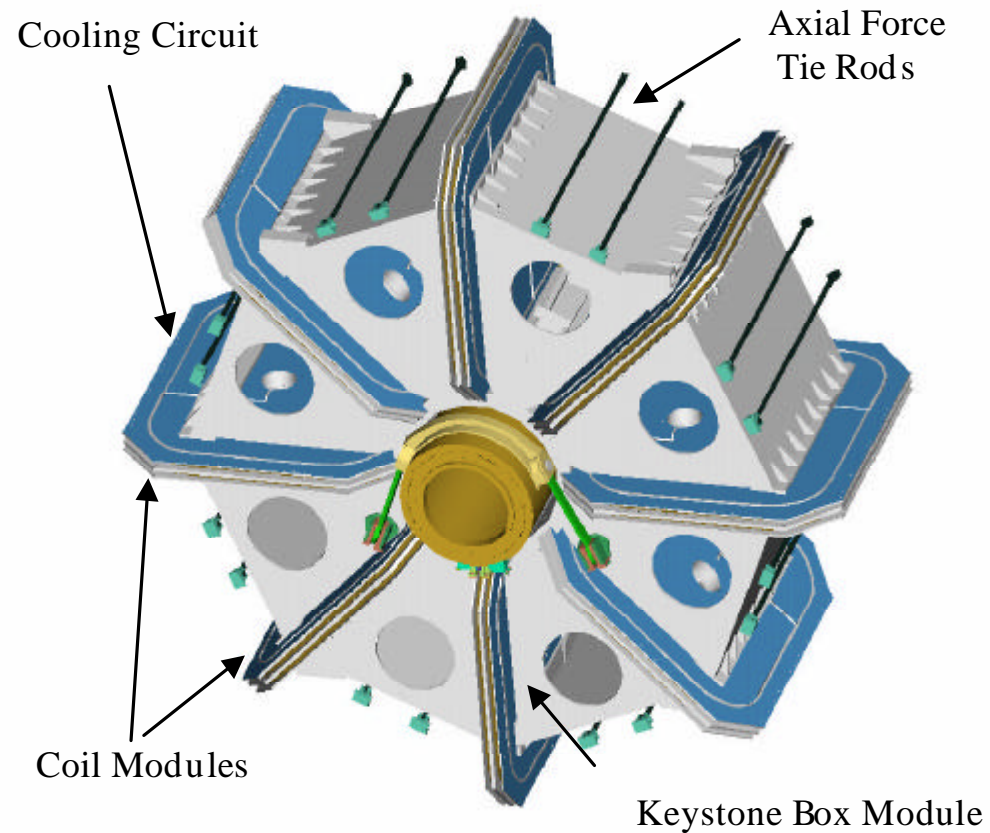
# First Cold Mass Integration has started



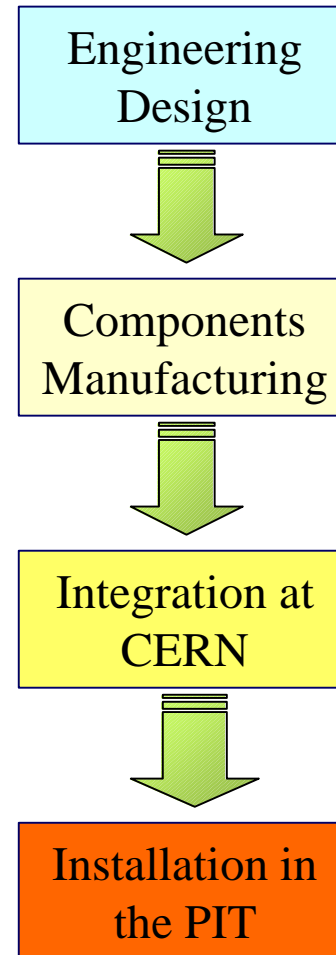
in Bldg 180 at CERN

- ✓ Put 2 double pancakes (DPC's) under pre-stress in coil casing
- ✓ Heavy turning-over tooling constructed
- ✓ First set of DPC's prepared and inserted
- ✓ Preparations for resin injection and curing
- ✓ First cold mass ready on 26 Nov, then Integration 2 (first coils test by Spring '03)

# End Cap Toroid



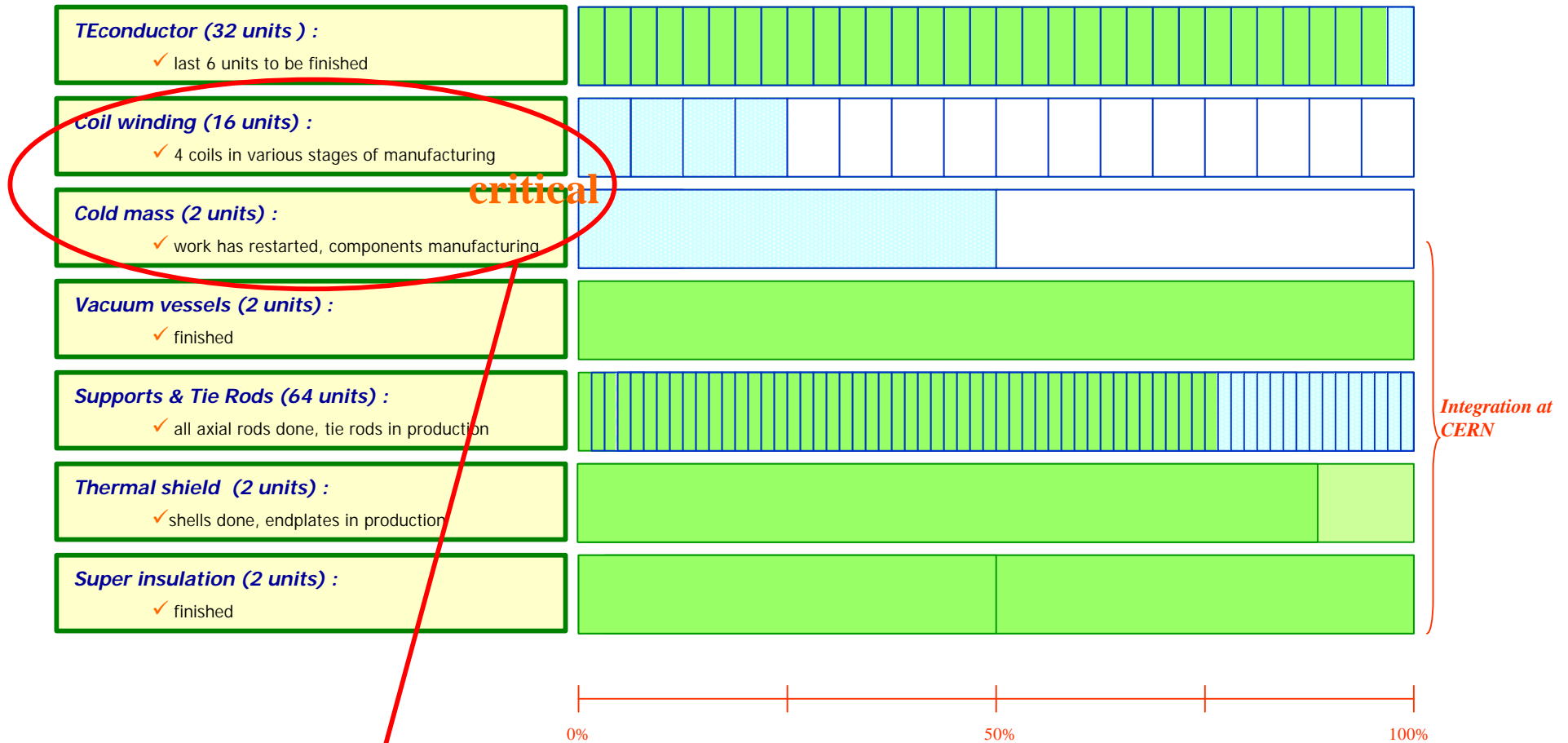
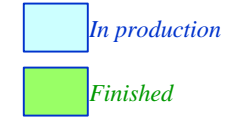
TE layout



*Engineering & Monitoring @ RAL, Nikhef*



# End Cap Toroid components production



*Production ongoing, the firm is working under the constant Nikhef and RAL supervision → first cold mass delivery expected end '03*

# End Cap Toroid Cold Mass @ HMA



*Pancakes winding resumed at Brusch-HMA*

*Web structures manufacturing*



*Next step is impregnation*



# End Cap Toroids Integration @ CERN



- ✓ 2 vessels turned, axis vertical
- ✓ Top flanges removed
- ✓ Installation of MLI
- ✓ Installation of Tie rods
- ✓ Installation of Thermal Shield
- ✓ Then wait for cold mass





# Services : Cryogenics



## Helium Liquefiers

- ✓ 1<sup>st</sup> L'air Liquide machine being overhauled and moved to point 1
- ✓ 2<sup>nd</sup> shield refrigerator in production at Linde, delivery starts in Mar 03
- ✓ This system guarantees cooling down and 15 kl liquid He in dewar
- ✓ Gas, Liquid He+N2 tanks + compressors installation starts in Jan 03

## Proximity Cryogenics

- ✓ 2 He pumps of 1.2 kg/s each
- ✓ Provide He flow in toroids
- ✓ Pumps scaled up and qualified
- ✓ New contract with L'air Liquide
- ✓ New contract for all piping work
- ✓ Delivery and installation in spring 04
- ✓ Ready for BT test in Nov 04



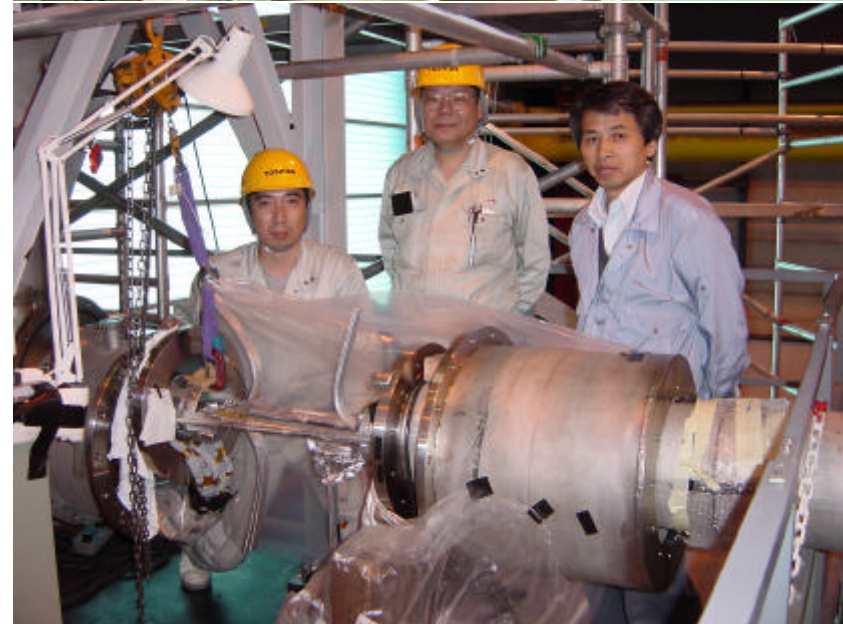
# Central Solenoid ready @ CERN for integration



# Central Solenoid preparation for integration

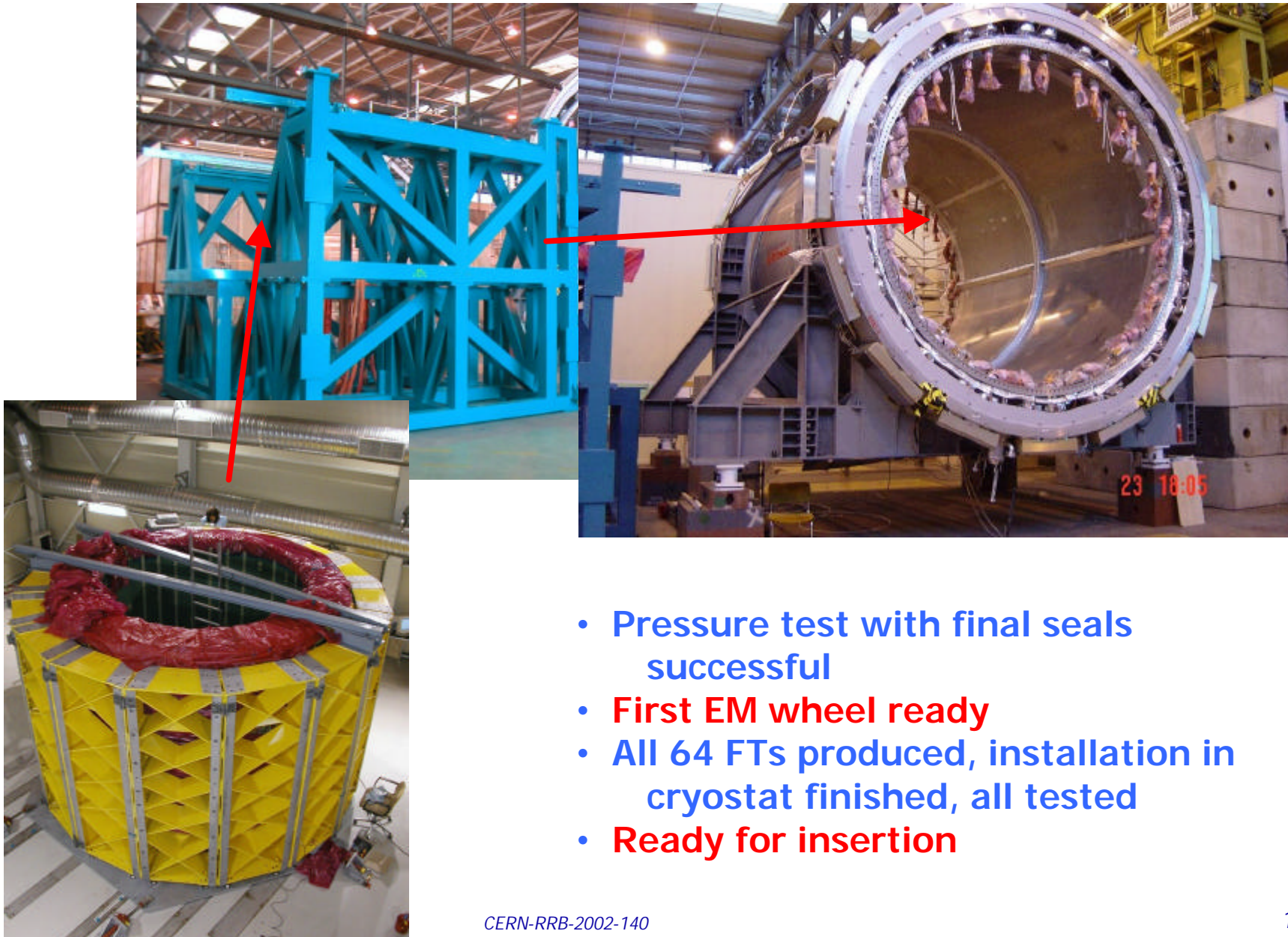


- ✓ Control dewar with control unit and chimney installed at CERN in bldg 180
- ✓ Connection to refrigerator made
- ✓ Horizontal layout with short cut at coil side and temporary connection at dewar side
- ✓ Connected to 8 kA powers supply
- ✓ 1<sup>st</sup> test version of control and safety system
- ✓ Test runs at 4K in Jun-Jul completed
- ✓ Waiting for insertion in the LAr cryostat (Autumn 03)
- ✓ ... and making of connections to the vessel (connection section delivered)





# Barrel Cryostat ready for insertion



- Pressure test with final seals successful
- **First EM wheel ready**
- All 64 FTs produced, installation in cryostat finished, all tested
- **Ready for insertion**

# End Cap Cryostats (C and A)



## End-cap C:

- ✓ Arrived at CERN March 2002
- ✓ Cold test finished, acceptance of cryostat declared
- ✓ A problem with the stoppers between cold and warm vessel discovered after opening the cryostat
- ✓ Needs to be repaired. Delay of five months

## End-cap A:

- ✓ Major delay at producer due to breakdown of bore machine 2002
- ✓ Projected arrival at CERN end March 03. Almost critical !

## End-cap Feedthroughs:

- 28 Fts for first end-cap delivered to CERN waiting to be installed in cryostat EC-C
- Production for second EC cryostat A close to completion

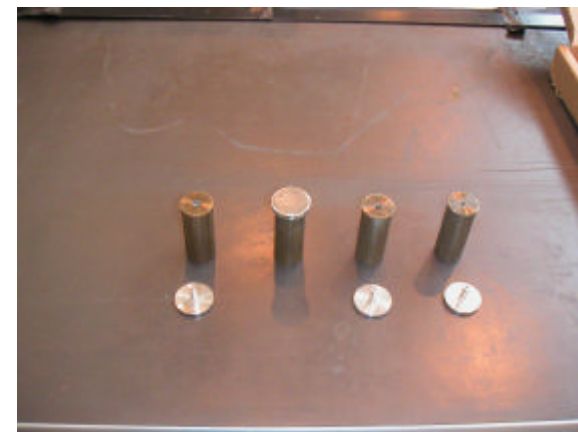
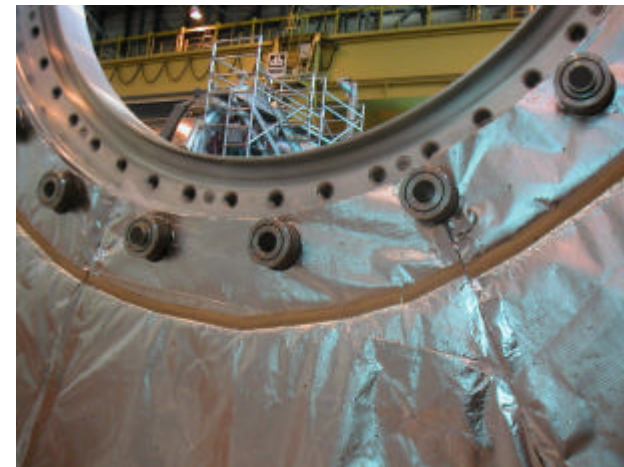
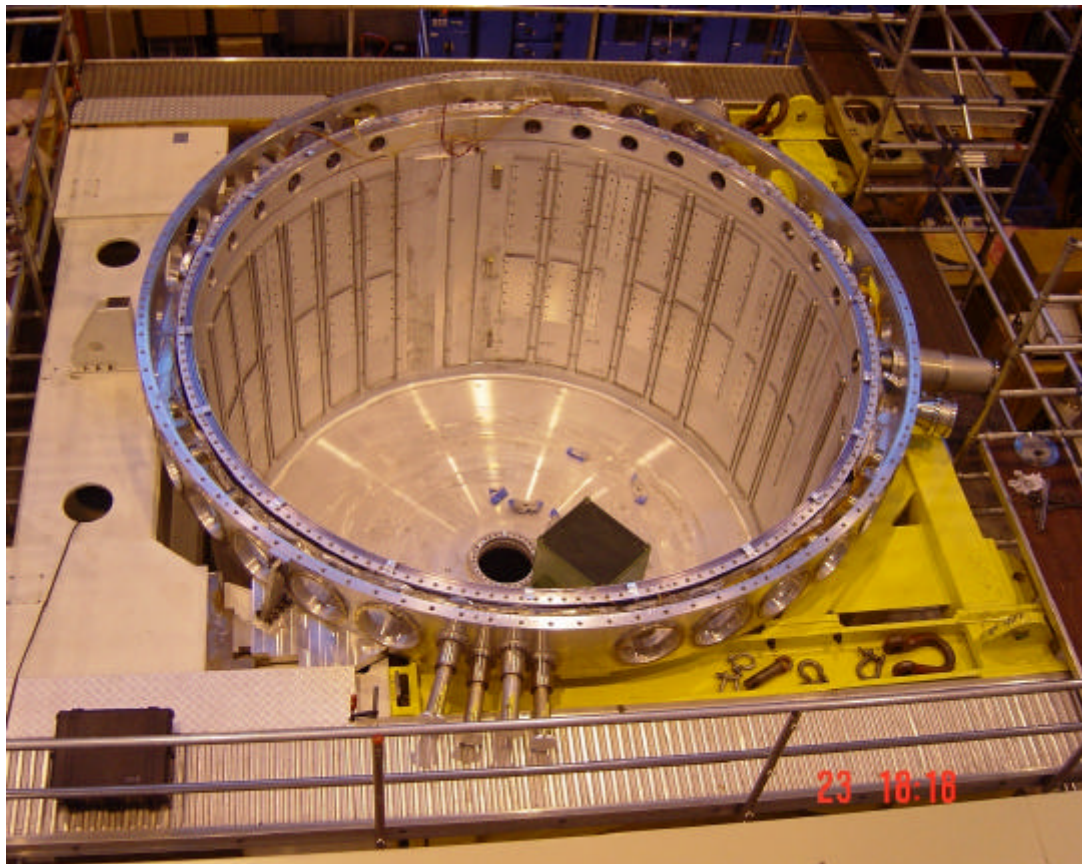


# LAr End-Cap Cryostats – C repair

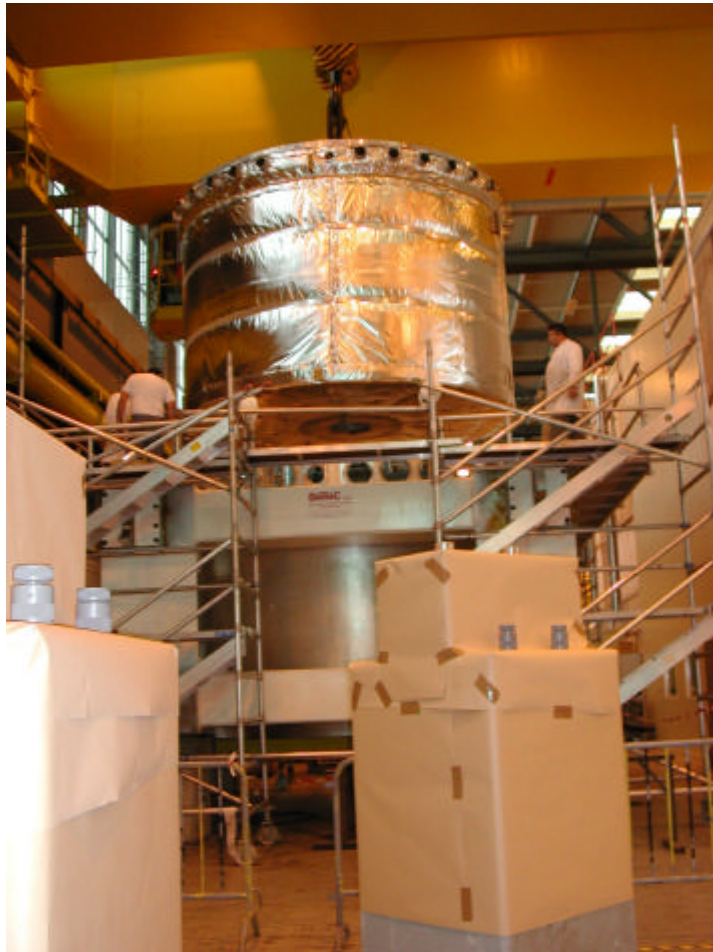


After the June cold test, at CERN, and the opening of the cryostat we observed that some stoppers were damaged.

- **Bwrđ side: 14 stoppers over 40**
- **Fwrđ. Side: 15 stoppers over 51**



# LAr End-Cap Cryostats – C opening



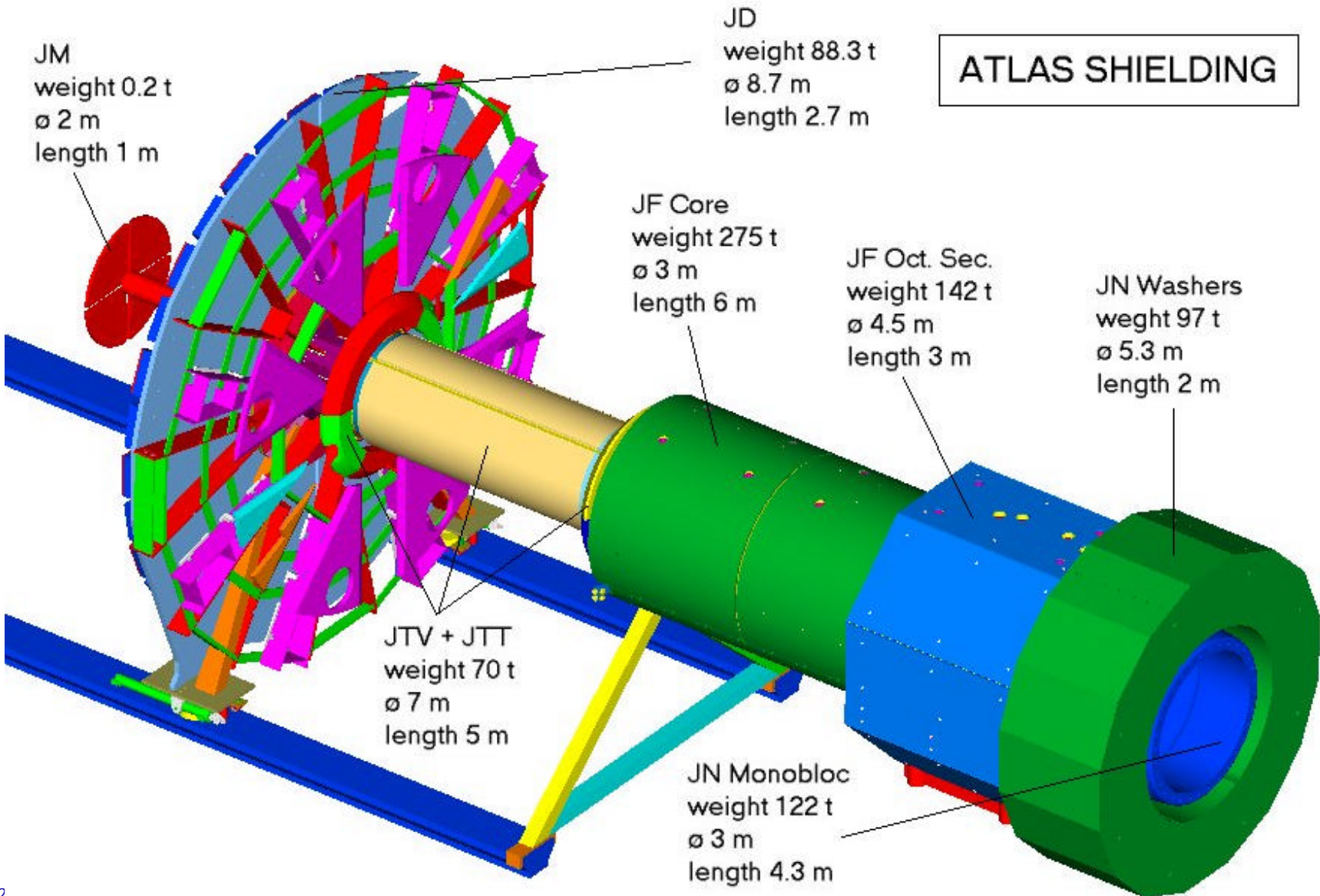
*Opening 11 October 2002 at CERN*



# Shielding project



We have factorized the project such as to ease individual in-kind projects

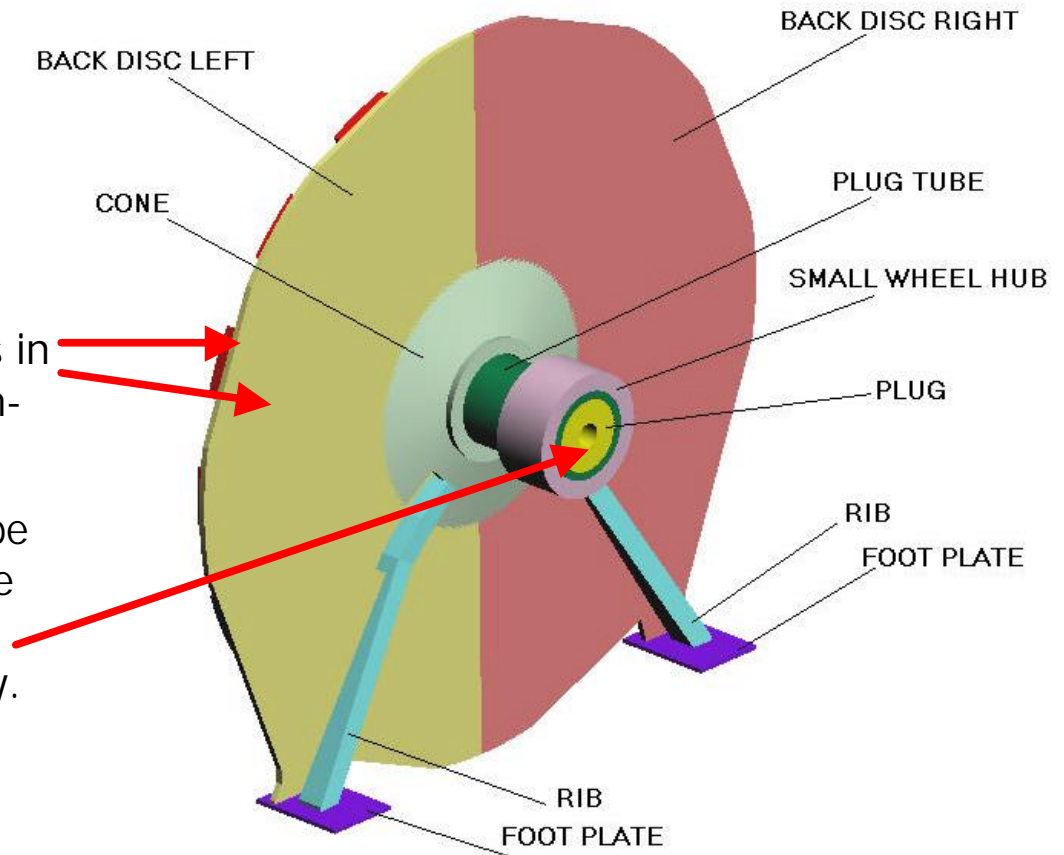


# Radiation Shieldings



## JD Shielding :

- ✓ ~ 9m diameter disk + hub
- ✓ PRR done
- ✓ We have a working solution for the procurement of the disks + various parts in Serbia. We are working out a possible in-kind contribution
- ✓ The copper plug manufacturing can be an in-kind contribution from Armenia. We are preparing a final proposal. Technical solutions have been found in this country.



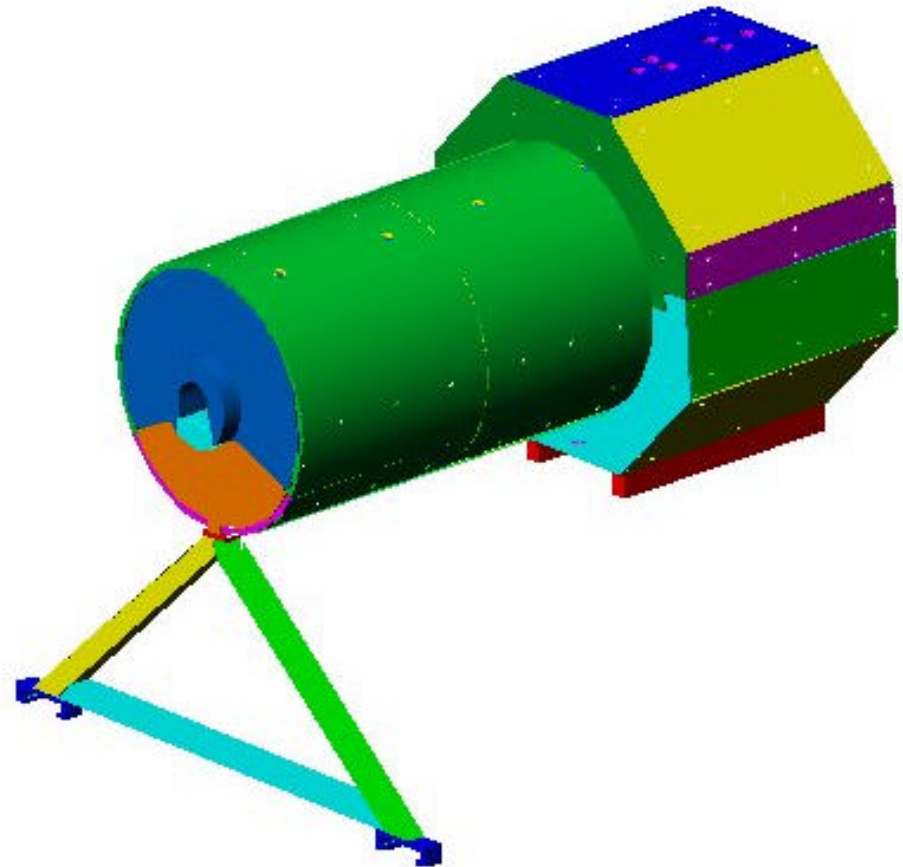


# Radiation Shieldings



## *JF Forward Shielding :*

- ✓ ~ 790 tons of casted material + plastic moderators
- ✓ PRR done
- ✓ Producer selected for the casted steel part and for the moderator claddings
- ✓ We have negotiated a Czech in-kind contribution.
- ✓ Commercial contract ready

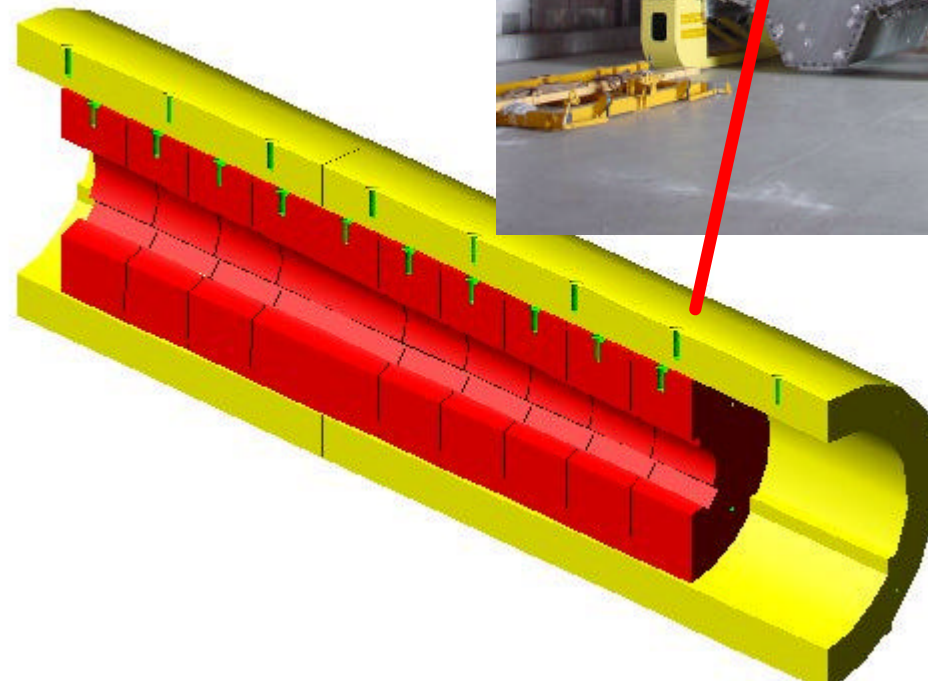
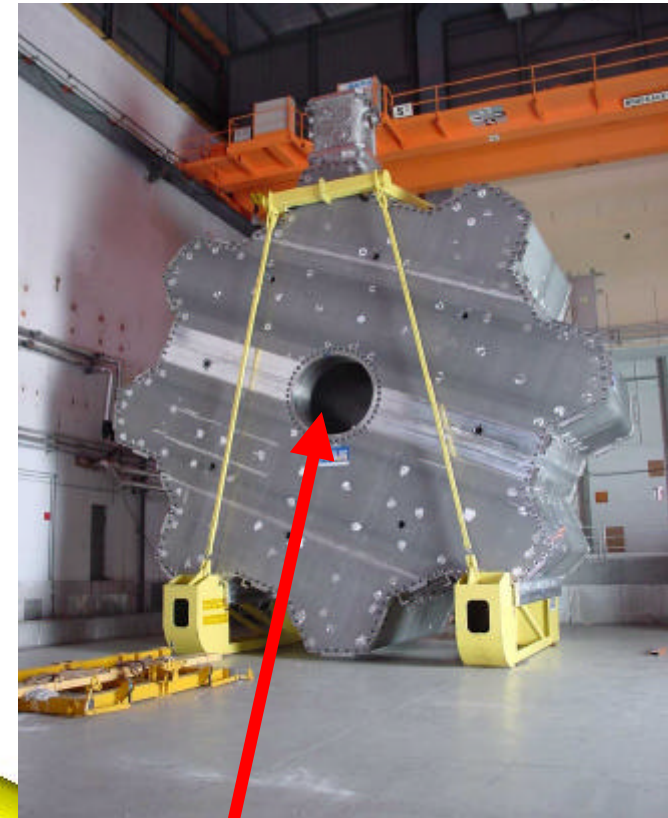


# Radiation Shieldings



## *JT Copper Shielding :*

- ✓ Design ready ~ 140 tons of Casted Copper Alloy
- ✓ Production in Armenia possible within the core estimation
- ✓ We are investigating the best way to continue with this procurement (ISTC,...)
- ✓ PRR expected beginning 2003

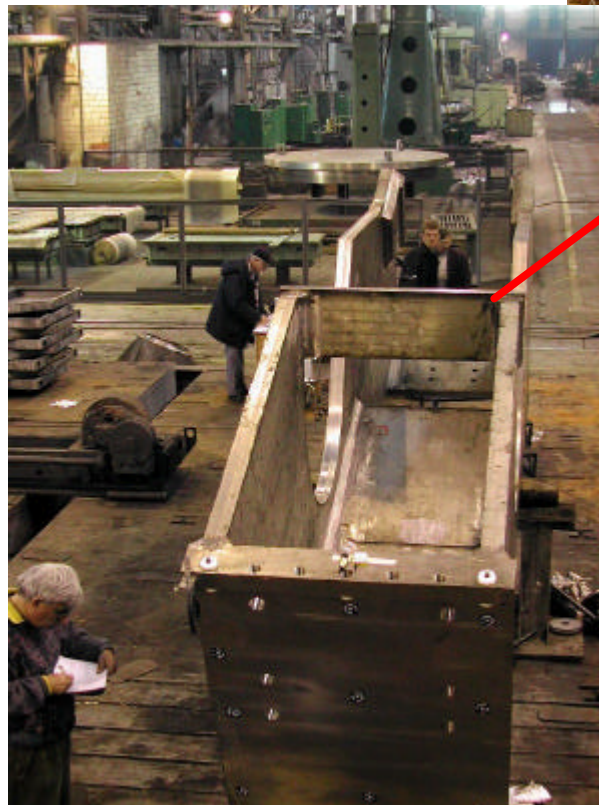
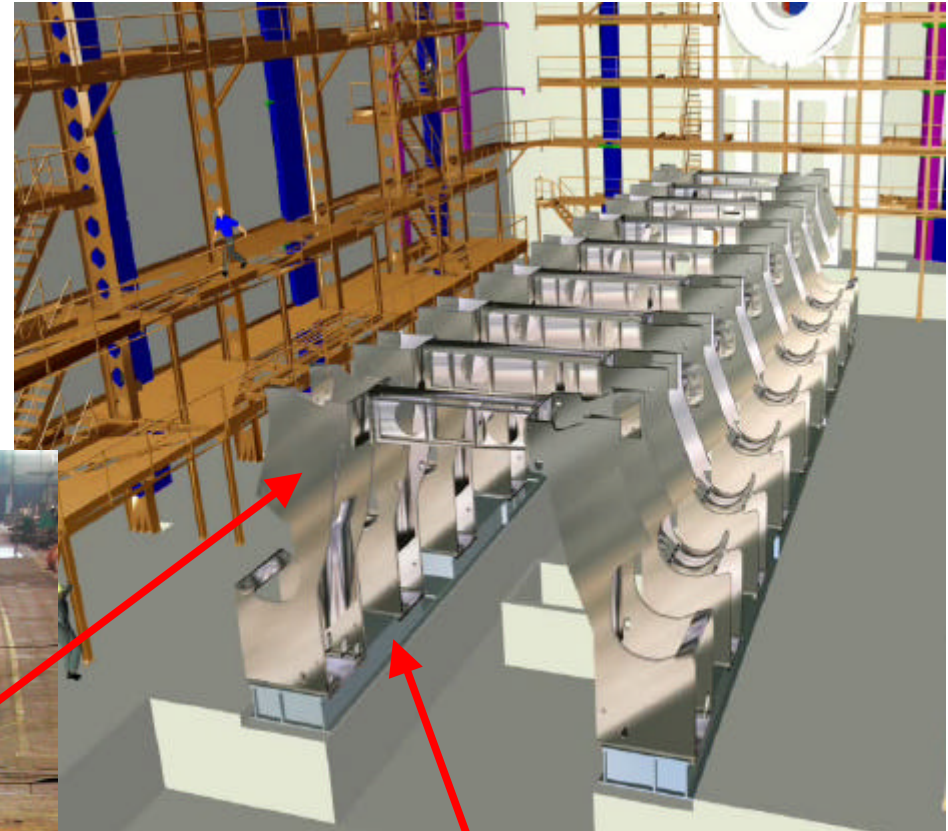


# Parts of Experimental Infrastructure



## Feet & Rails :

- ✓ 2 Feet constructed
- ✓ Bed plates manufactured
- ✓ Redesign of some critical elements (girders, cradles) done with minor interference on the running contract → **delivery-end summer 03**



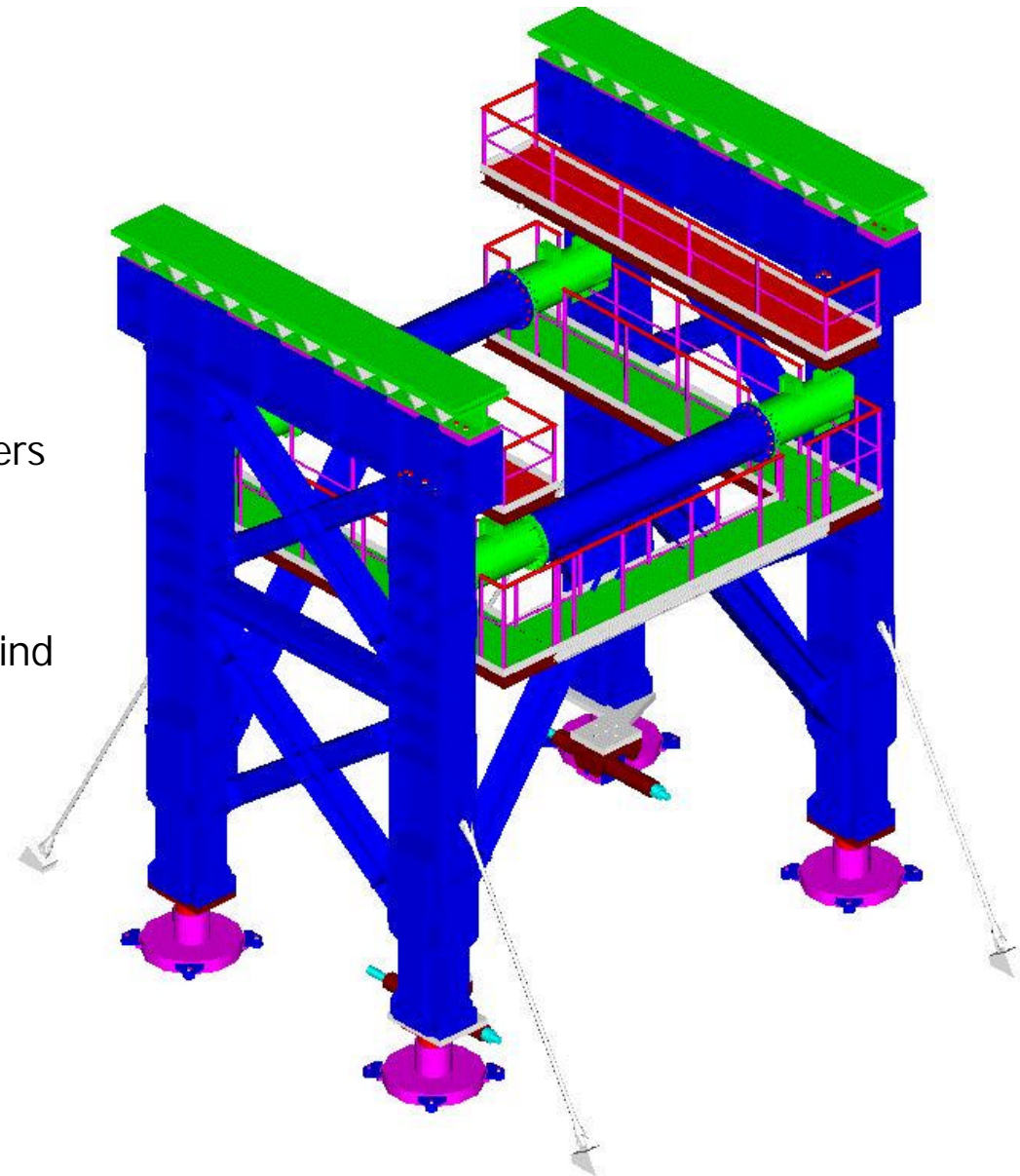


# Parts of Experimental Infrastructure



## External rails (trucks):

- ✓ Final engineering done in Poland
- ✓ PRR done
- ✓ 2 trucks for 1600 tons
- ✓ 2 trucks for 500 tons
- ✓ support platforms for the calorimeters installation
- ✓ Producer selected
- ✓ Proposal presented for a Polish in-kind contribution





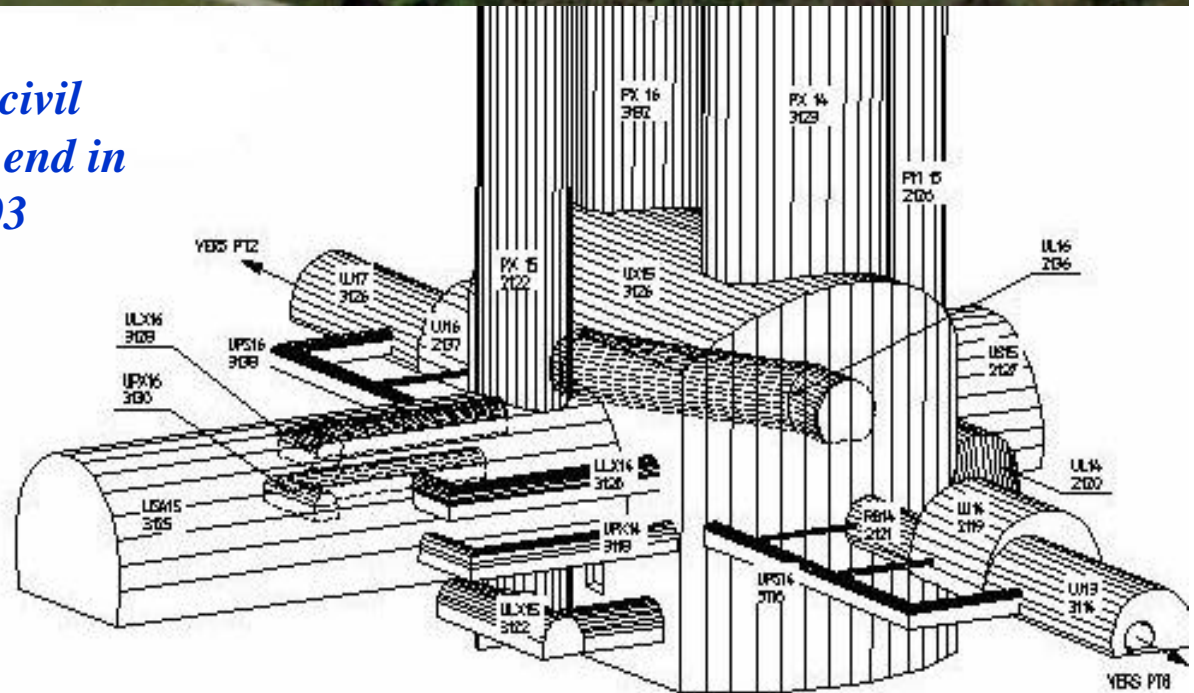
# Exp. area

Most of the surface building will be handed over to ATLAS Oct-Nov '02



Underground civil engineering will end in Spring '2003

ATLAS will start installation at Point 1 in April '03



# Infrastructures



## *All major orders placed :*

- ✓ Cranes and lifts
- ✓ HVAC, primary cooling plants (SF1, SUX1, USA15) and piping
- ✓ UX and USA metallic structures
- ✓ Cryogenics (compressors, buffers, dewars)
- ✓ Racks chassis
- ✓ Electrical infrastructure

## *Major contracts to come:*

- ✓ Warm cryo-piping (FC November 2002)
- ✓ Sniffer system (FC March 2003)
- ✓ Fire, gas & oxygen deficiency detection (FC June 2003)
- ✓ Fire fighting circuits underground (incl. UX15) (FC June 2003)
- ✓ HVAC counting room SDX1 (Oct. 2003)
- ✓ TX1S cradle, shielding, TX1SO (FC March 2004)

***All contracts include installation work at POINT 1***

# Installation work



- **USA15 infrastructure installation has started according to planning (version 6.0)**
  - ✓ gas room, elect. safe room, fire shelters completed
  - ✓ lifts
  - ✓ Primary piping
  - ✓ Temporary ventilation, lighting , power
  - ✓ Main activities will start after the shaft crane will be installed (Oct 2002)
  - ✓ Next metallic structures, cable trays, electrical infrastructure
  
- **Main cavern installation work will start in April 2003 :**
  - ✓ According to the planning : version 6.0
  - ✓ Work organized in Work Packages
  
- **Overall installation management at POINT 1 has just started**
  - **Dedicated team of ~7 people**



# USA15 service cavern





# UX15 civil engineering





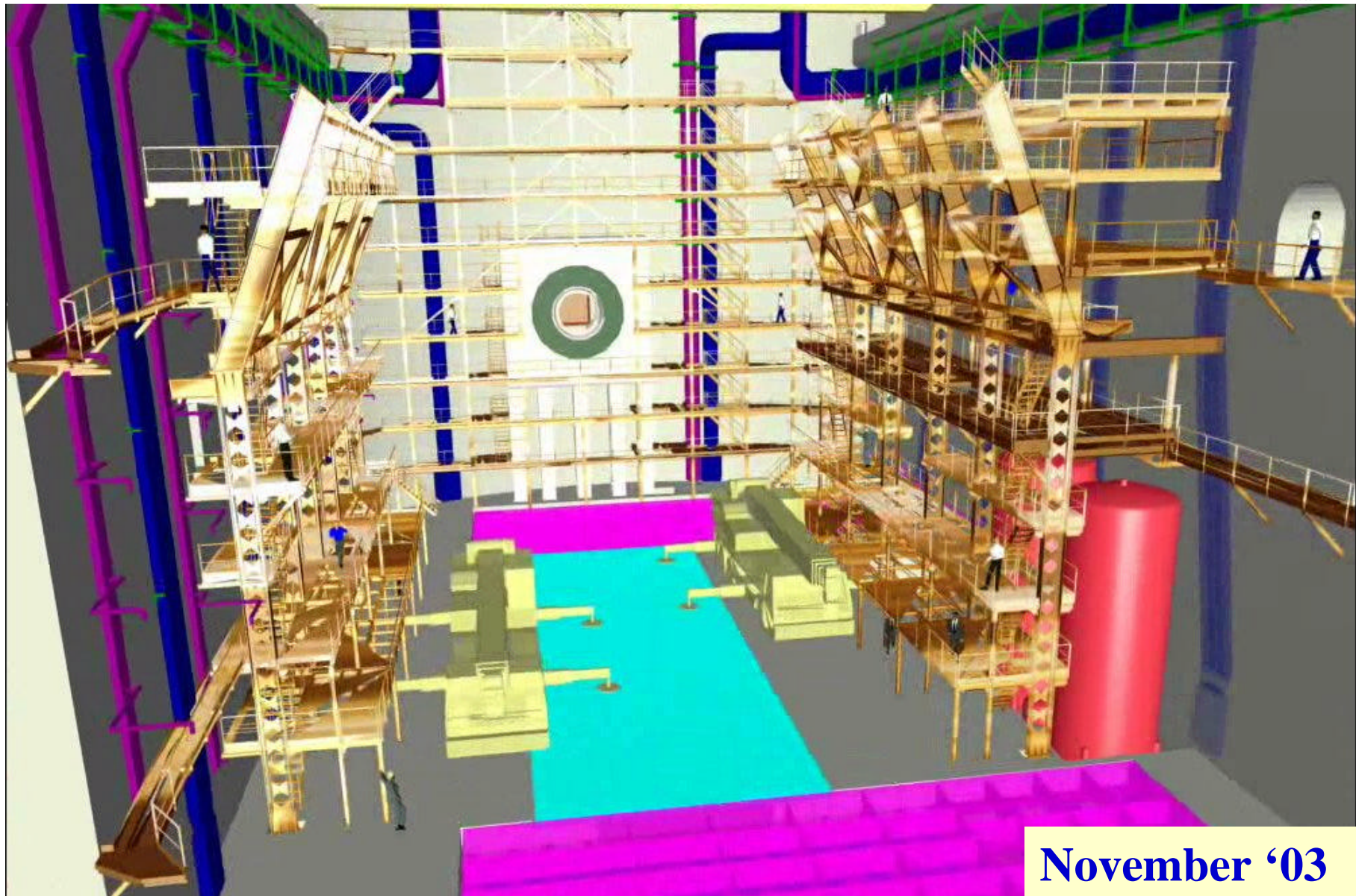
# UX15 civil engineering



October '02



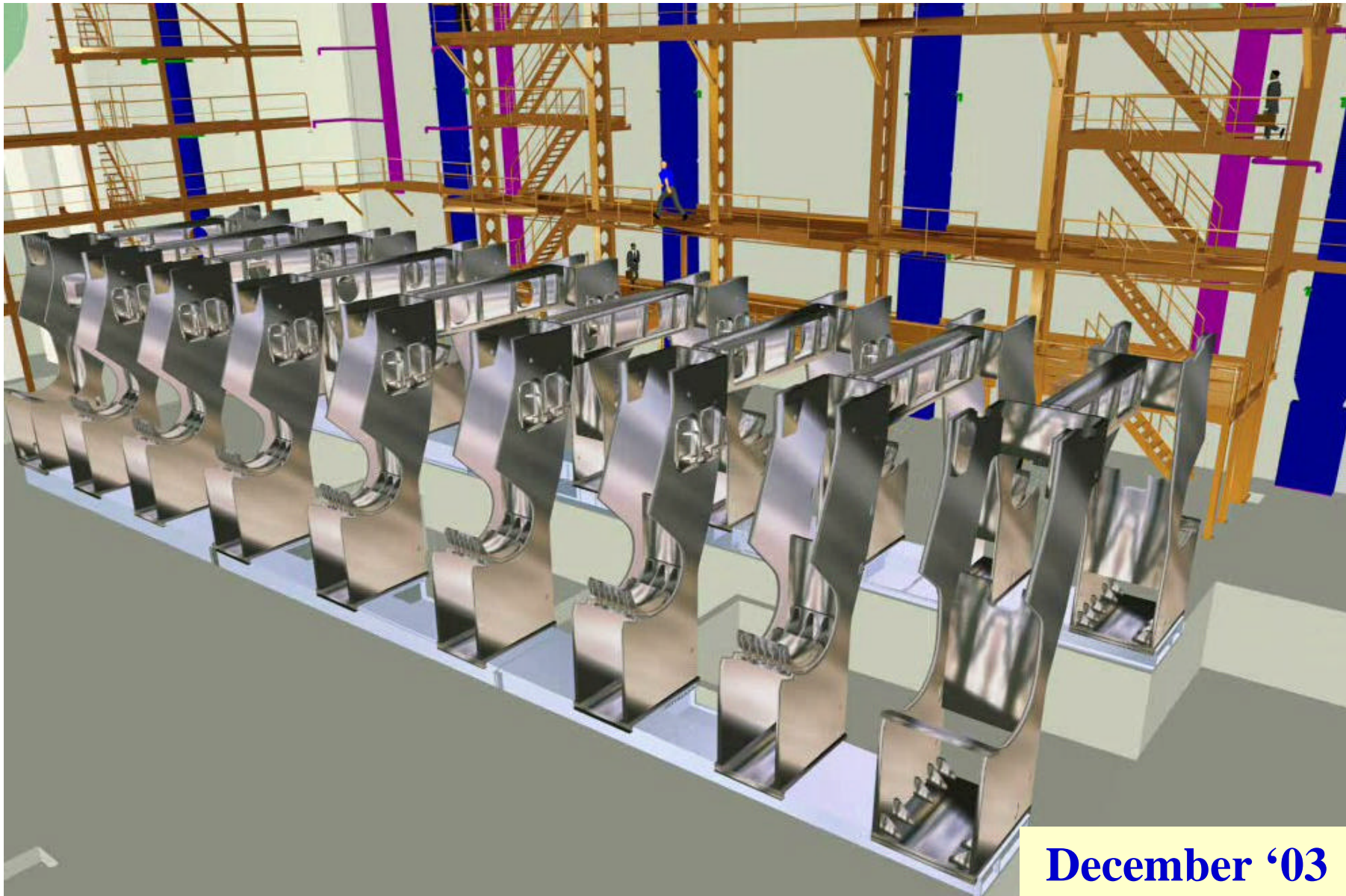
# Installation sequence (Infrastructure)



November '03



# Installation sequence (Feet)



**December '03**



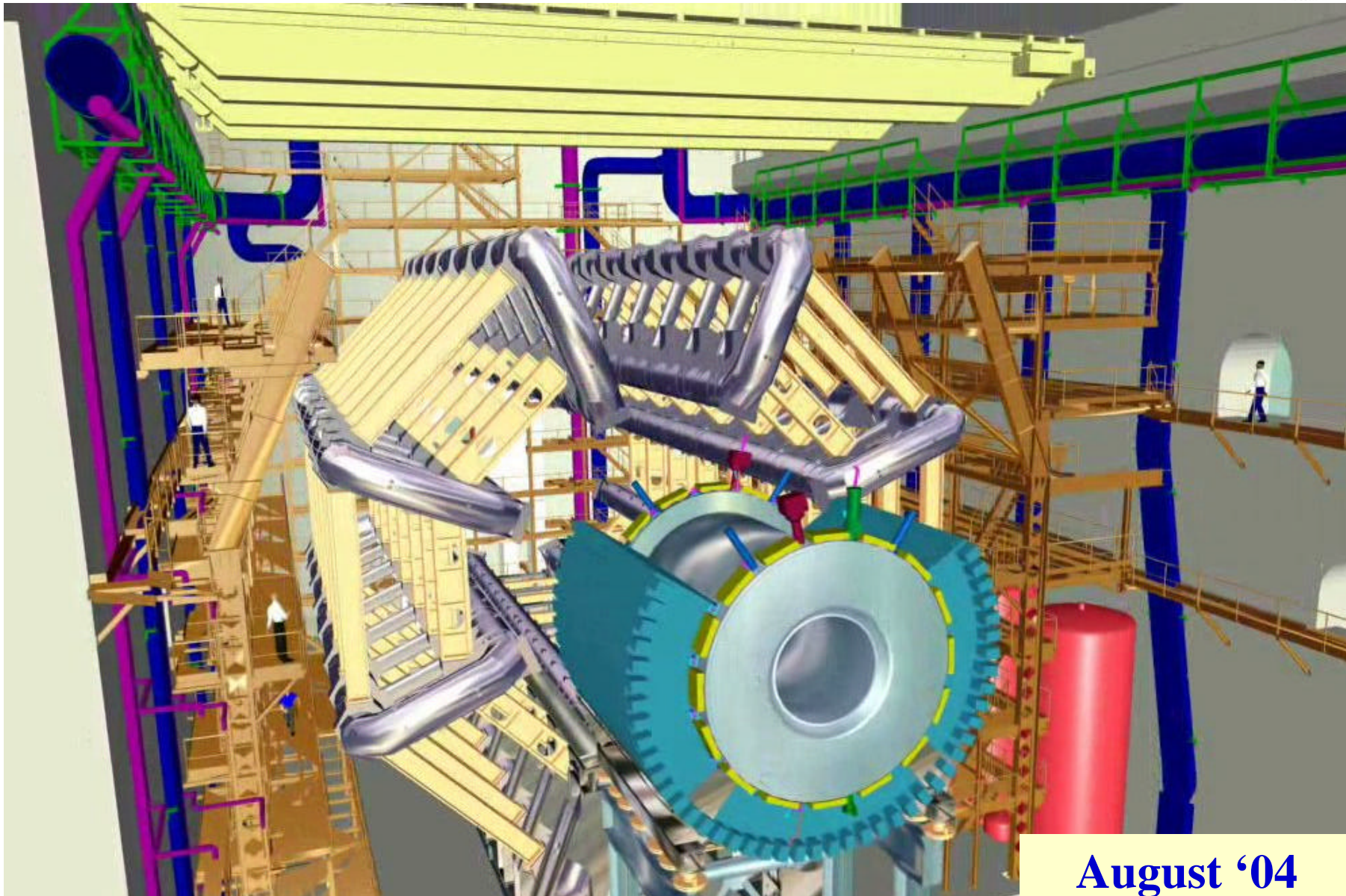
# Installation sequence (Coil 1 + 2)



**February '04**



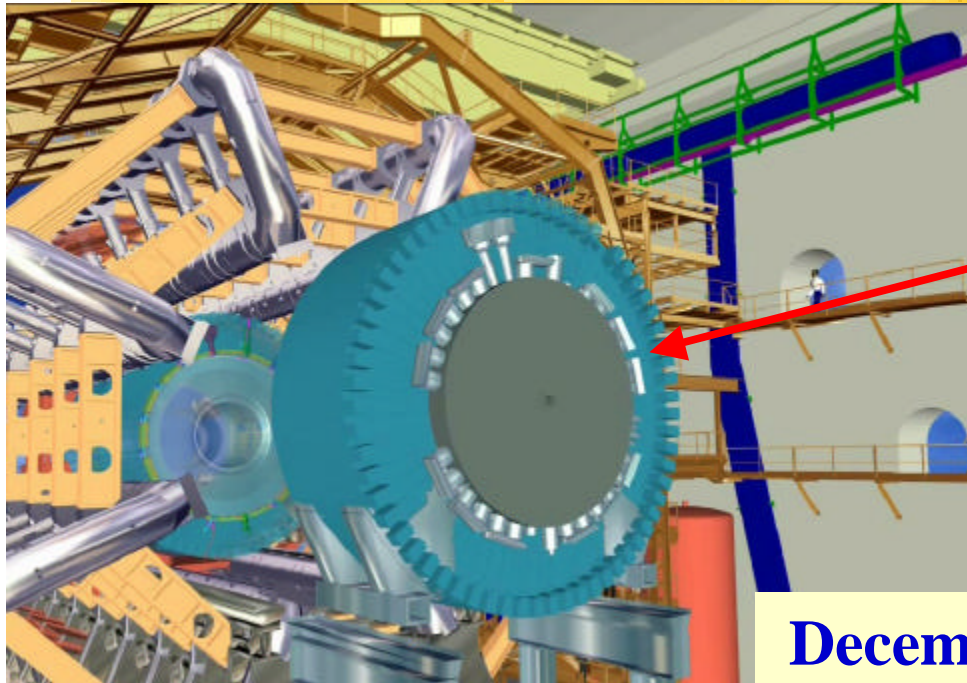
# Installation sequence (Barrel Toroid + Barrel Calorimeter)



August '04



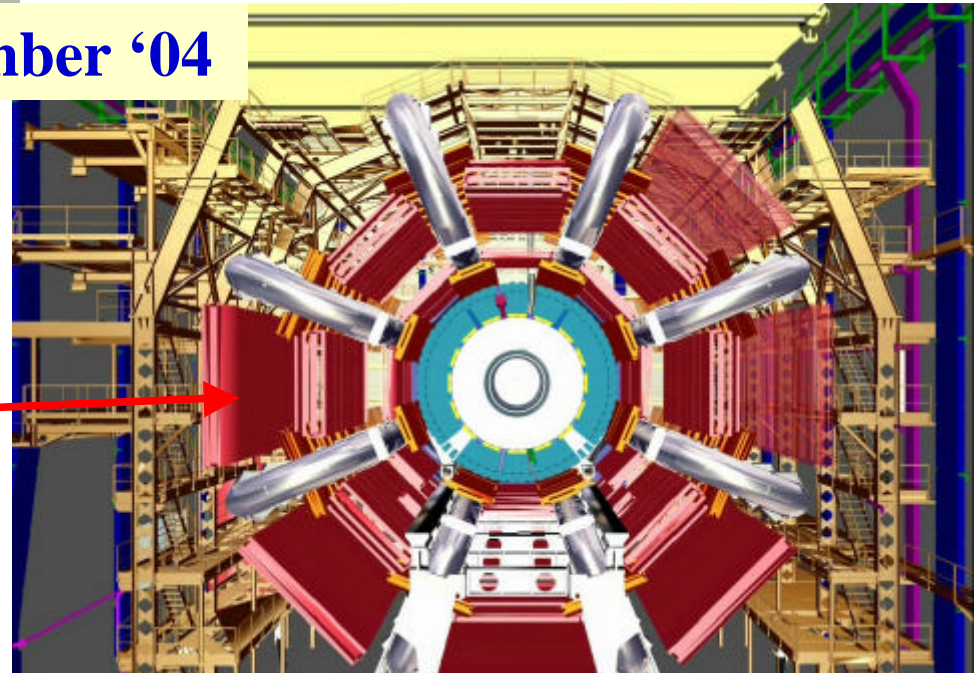
# Installation sequence



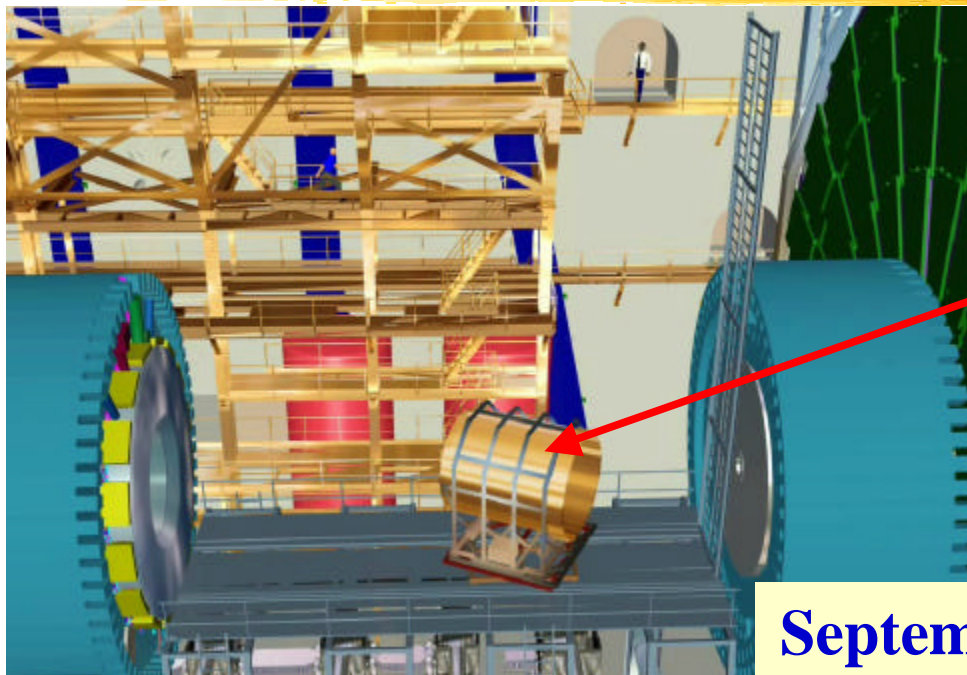
*Side C* : End Cap calorimeter installation

December '04

*Side A* : Barrel muon chambers installation



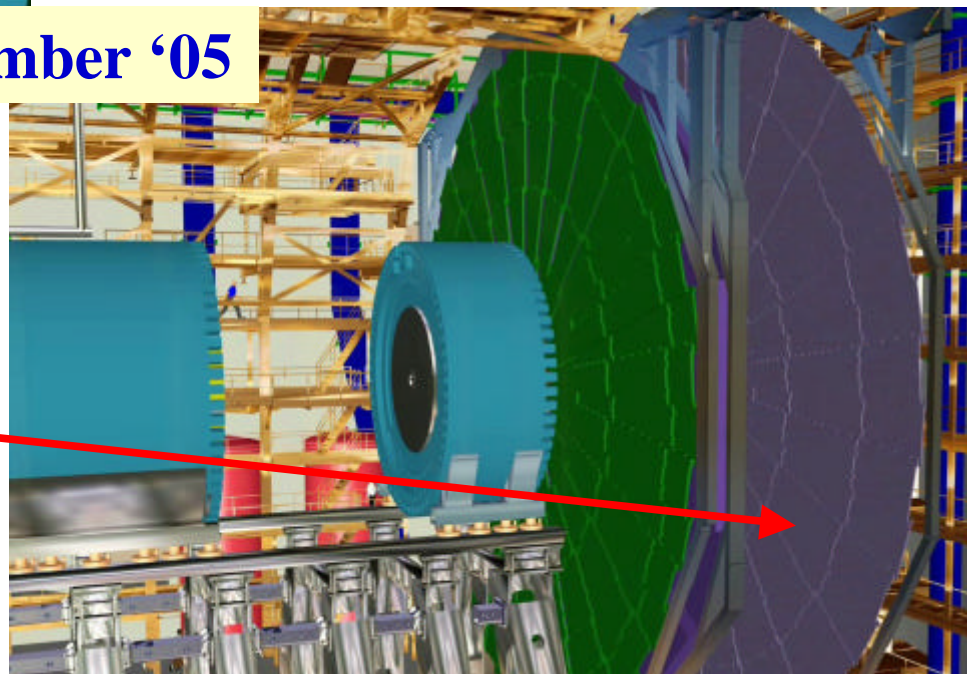
# Installation sequence



*Side C* : Barrel Inner  
Detector installation

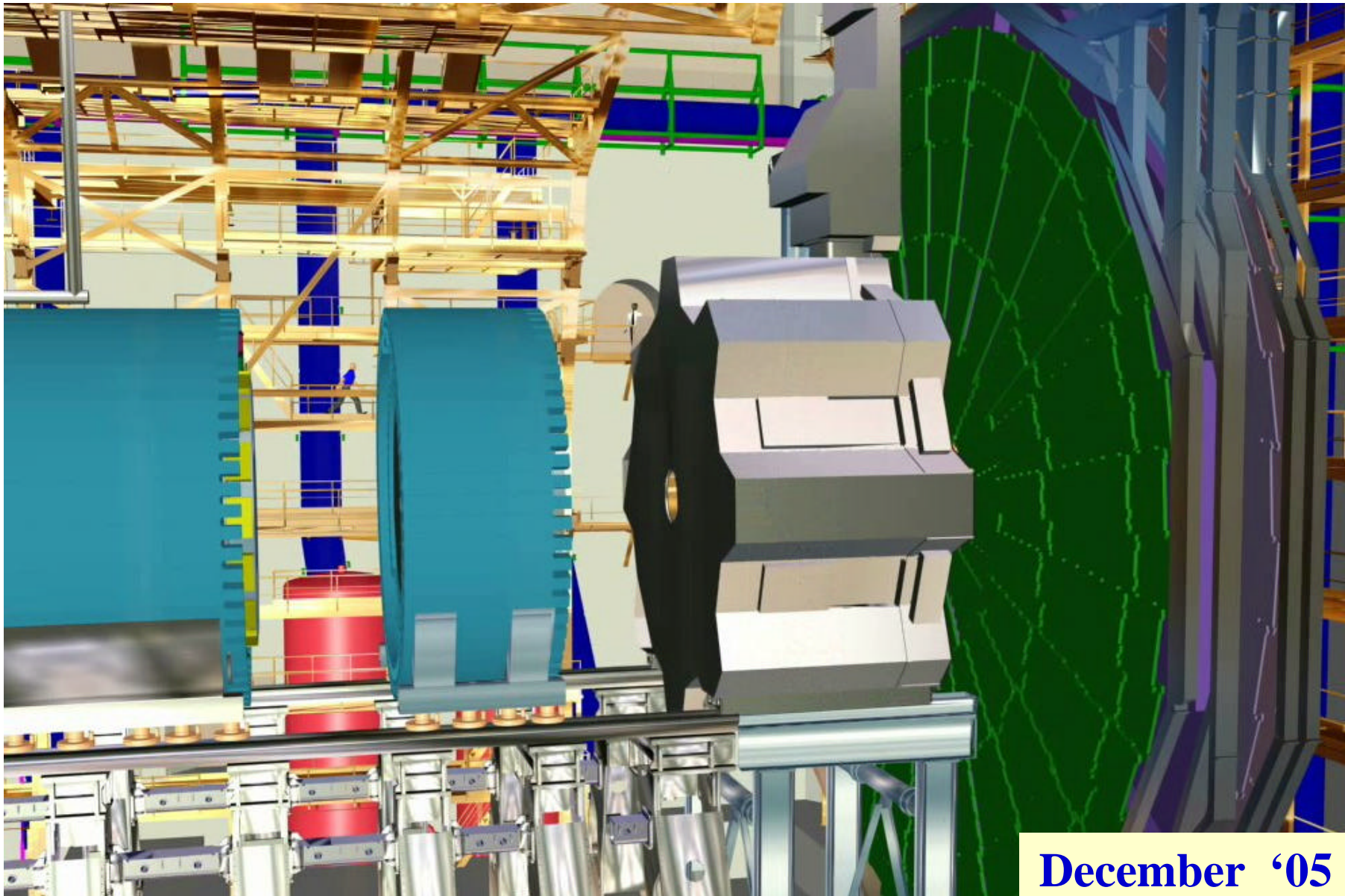
September '05

*Side A* : Forward muon chambers  
installation (Big Wheels)





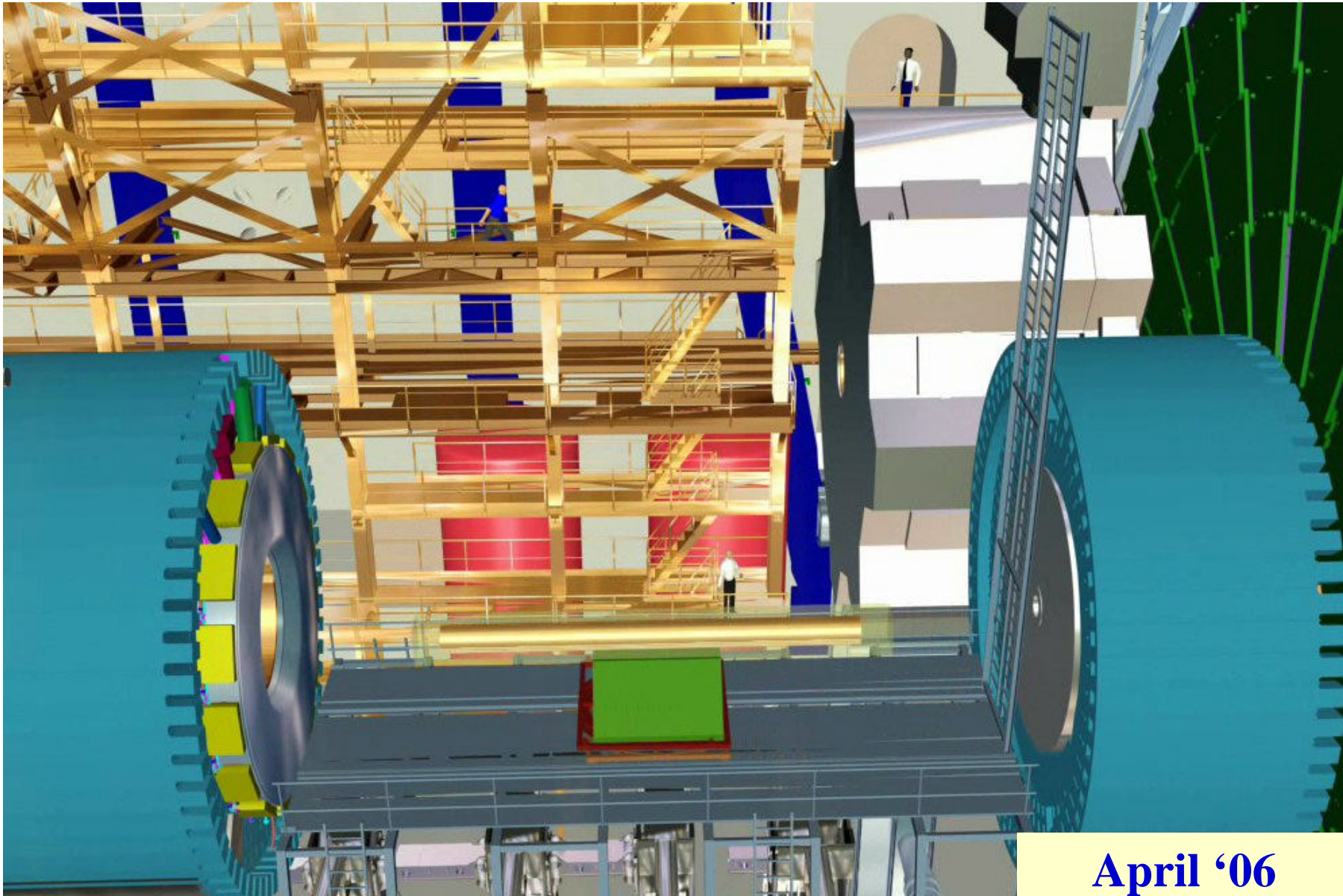
# Installation sequence (End Cap Toroid C)



December '05



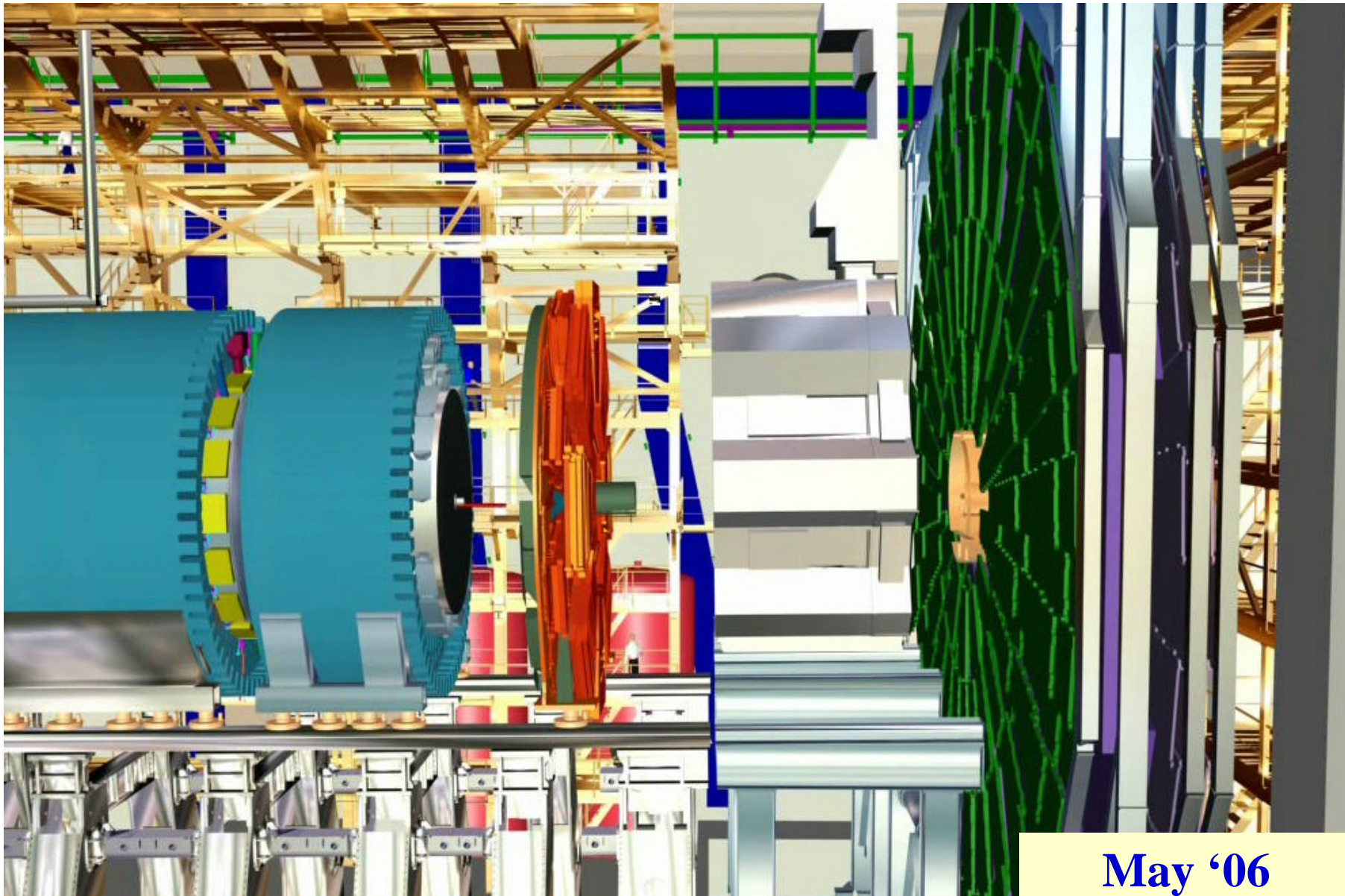
# Installation sequence (Pixel detector + Be pipe)



April '06



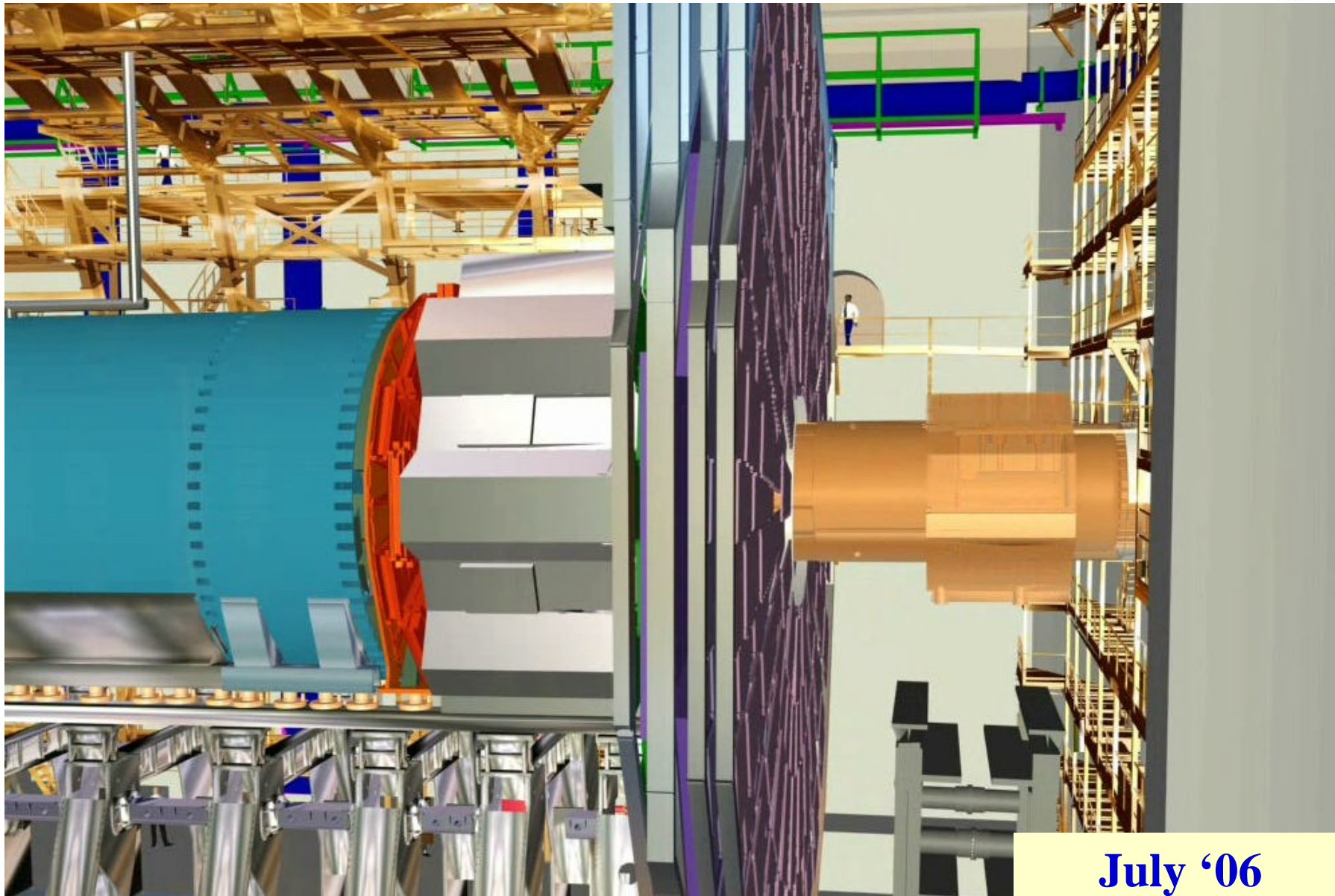
# Installation sequence (Small Wheel C)



May '06



# Installation sequence (Forward Shielding C)



July '06

# *In-kind summary*



## New in-kind contributions presented for approval

- *Busbars (CORE: 420 kCHF; Russia)*
- *Diode-resistor dump & switch system (CORE: 400 kCHF + 80 kCHF; INFN)*
- *BT super insulation assembly (CORE: 150 kCHF; Russia)*
- *Trucks for Feet & Rails (CORE: 400 kCHF; Poland)*
- *Shielding components (CORE: 300 kCHF + 400 kCHF; Czech Republic)*

## Adjustments of previously agreed in-kind contributions (for approval)

- *Parts of LAr proximity and external cryogenics (CORE: 1445 kCHF; IN2P3)*

## Under negotiation (to take note)

- *BT cryoring (CORE: 0.6 MCHF + 1 MCHF; CEA/France)*
- *Movable air pads (CORE: 0.3 MCHF + 0.45 MCHF; Germany/MPI)*
- *Copper JD+JT shielding plugs (CORE: 450 kCHF + 150 kCHF; Australia, Armenia, Serbia, China)*
- *Solenoid power supply circuit (CORE: 0.9 MCHF; Japan)*