

# CENF

-

## Secondary Beam Study Group

Cooling and Ventilation Pre-Design  
Integration study

11/4/2014

Michele Battistin

EN/CV/PJ

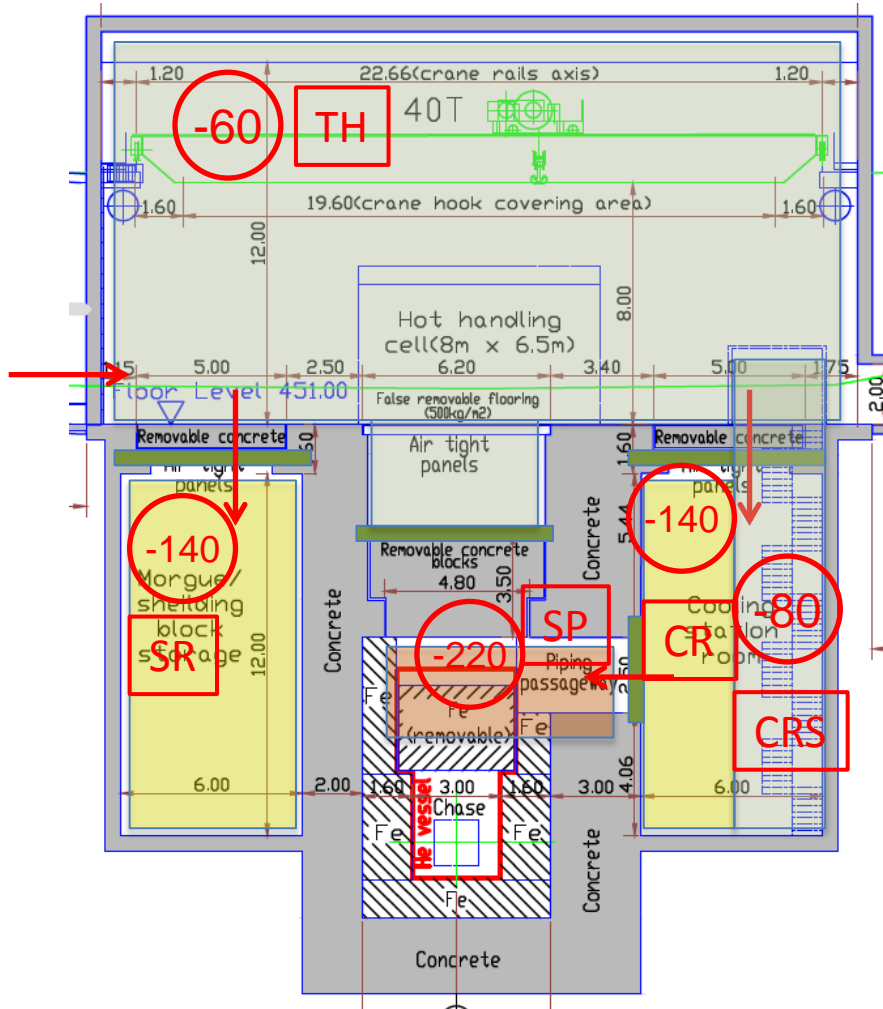
# Cooling and Ventilation design advancement

- Integration of the HVAC equipment
- Integration of the hydraulic equipment
- Helium solutions for target and decay pipe cooling
- Helium vessel conditioning

# CENF ventilation system

- Pressure cascade
- Equipment integration

# Pressure cascade

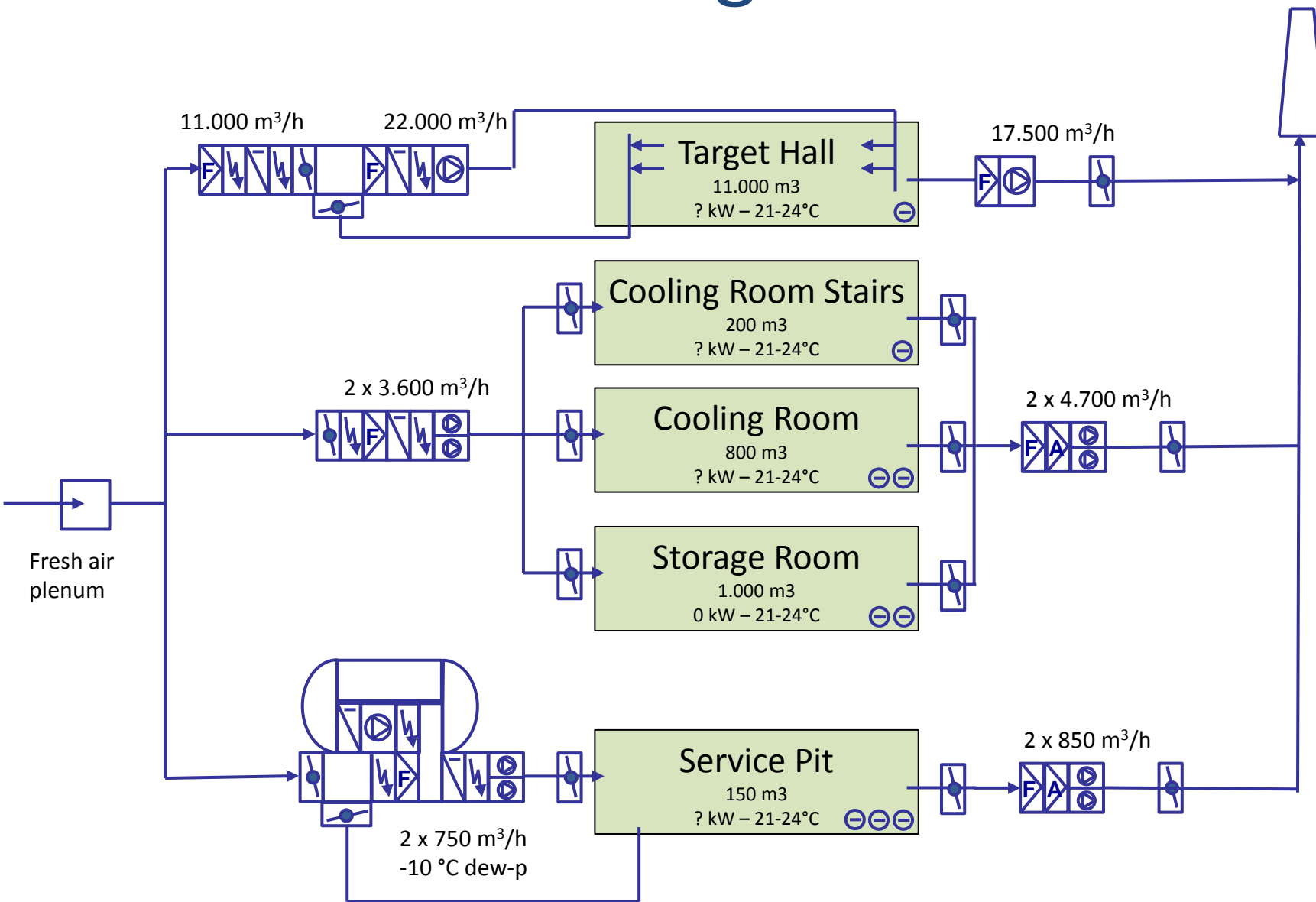


## ISO 17873:2004

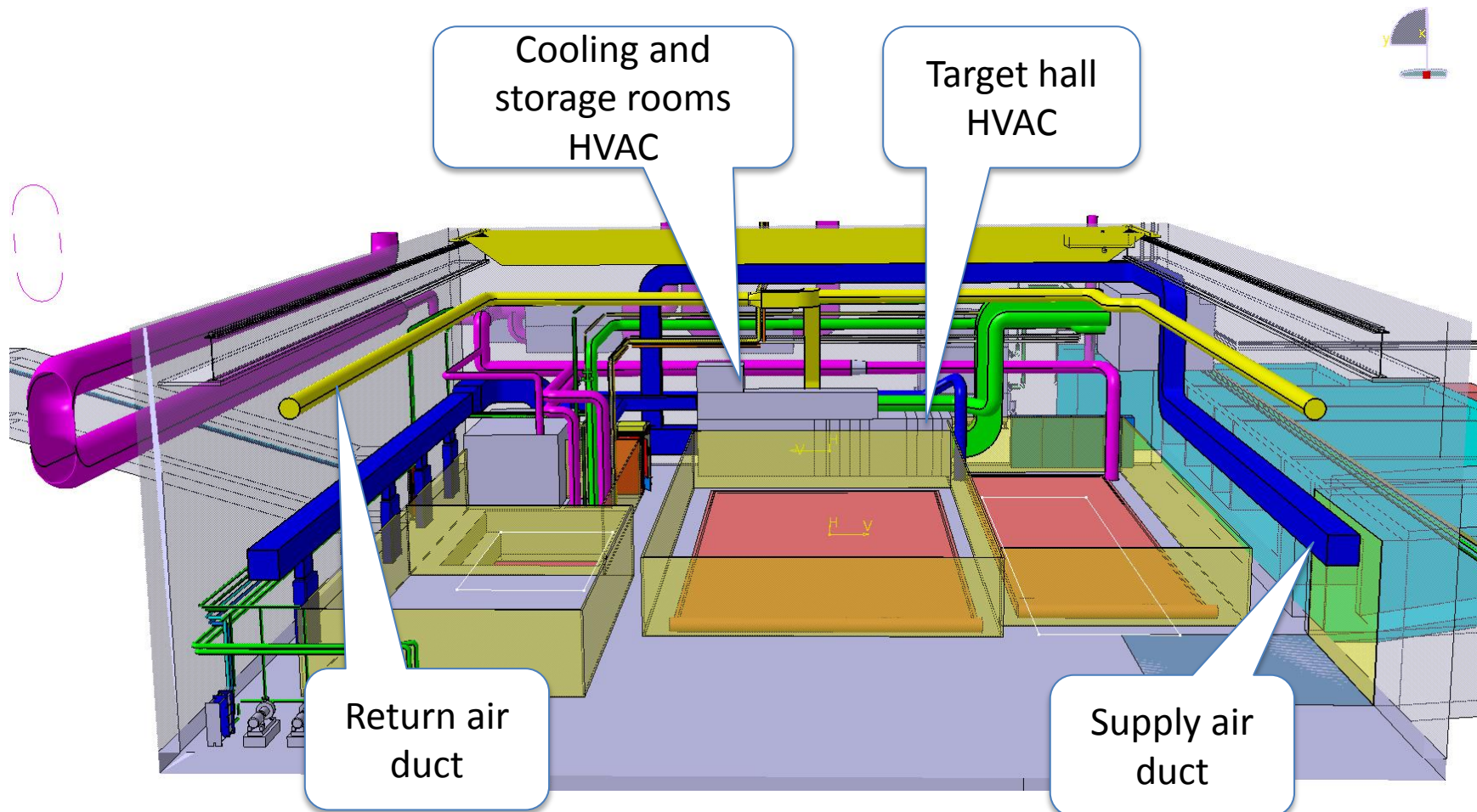
Room	Classification ISO 17873	Volume exchange (h <sup>-1</sup> )	Pressure (Pa)
TH	C1	1	-60
CRS	C1	2	-80
CR	C3	2	-140
SR	C3	2	-140
SP	C4	5	-220

Building leak rate: 0.6 Vh<sup>-1</sup>

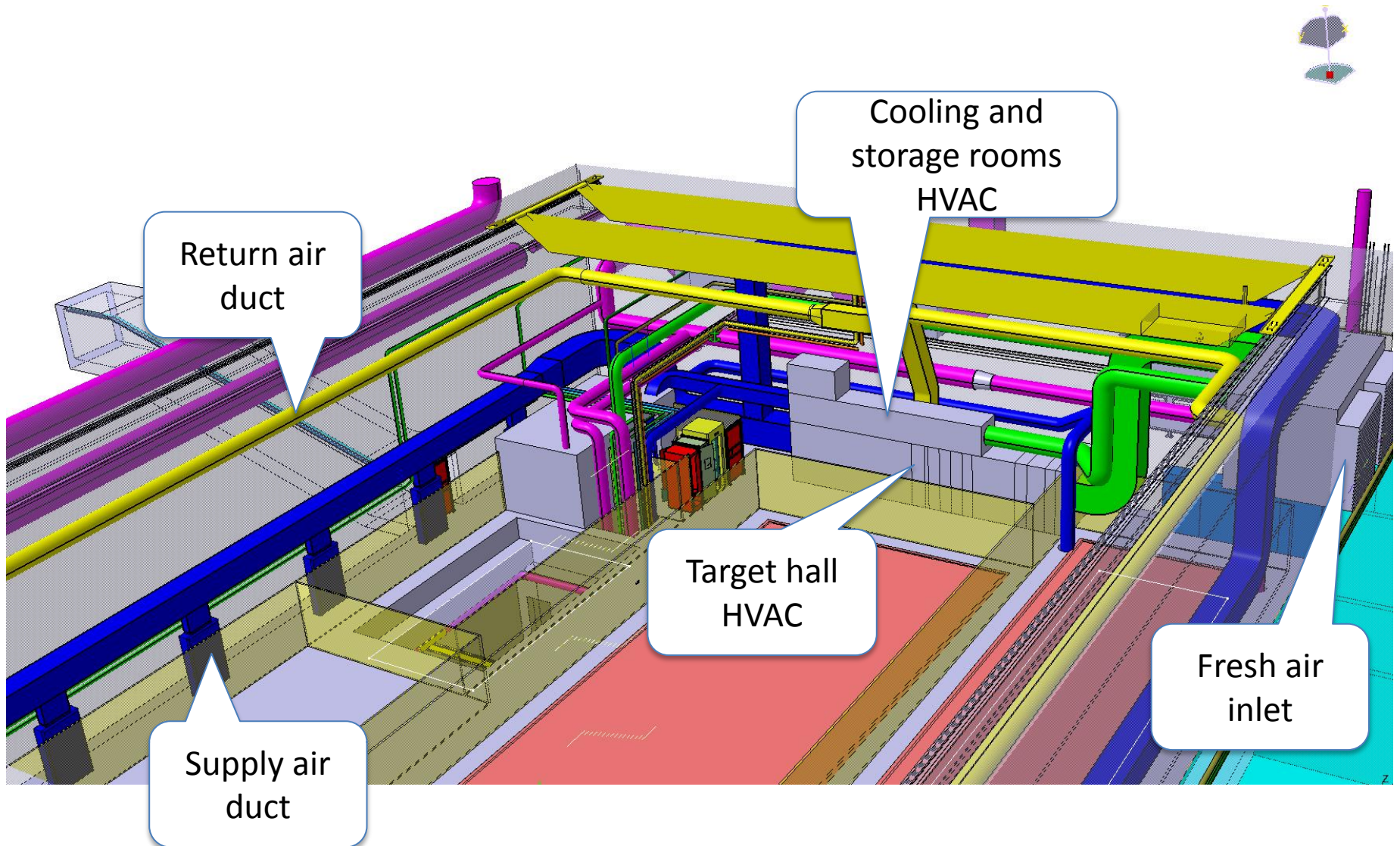
# AHU Target Area



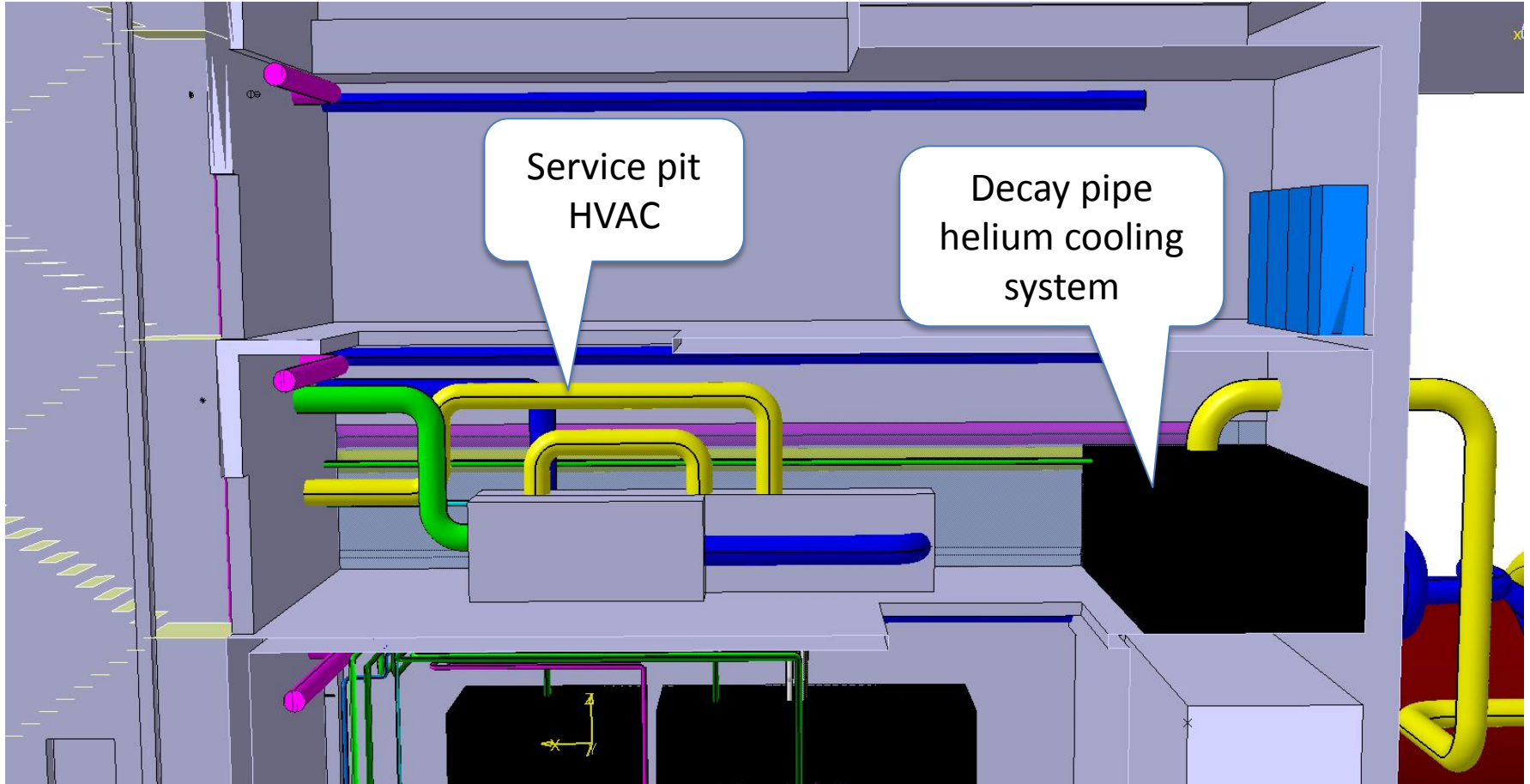
# HVAC integration – Target Hall



# HVAC integration – Target Hall

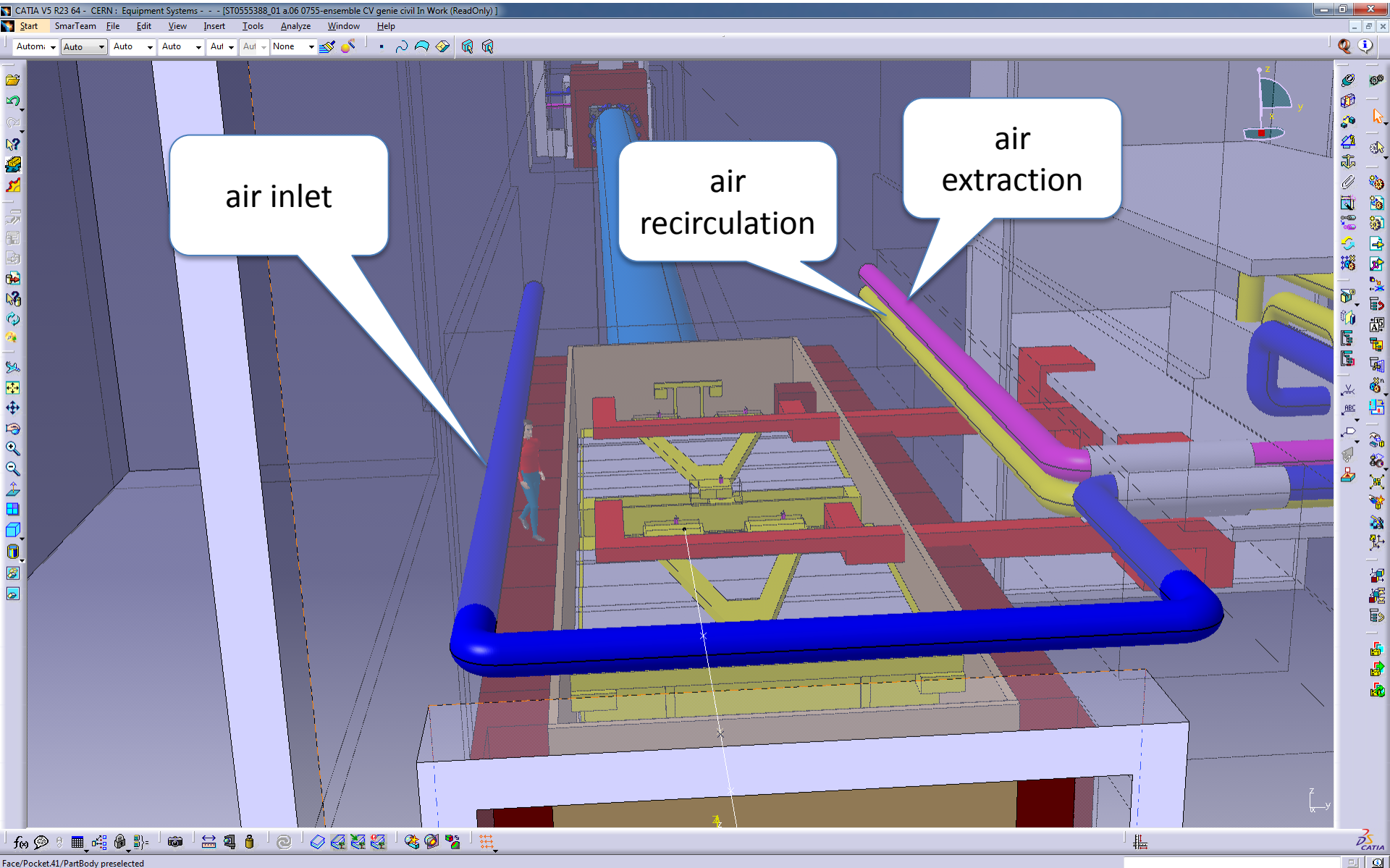


# HVAC int. – Cooling Room

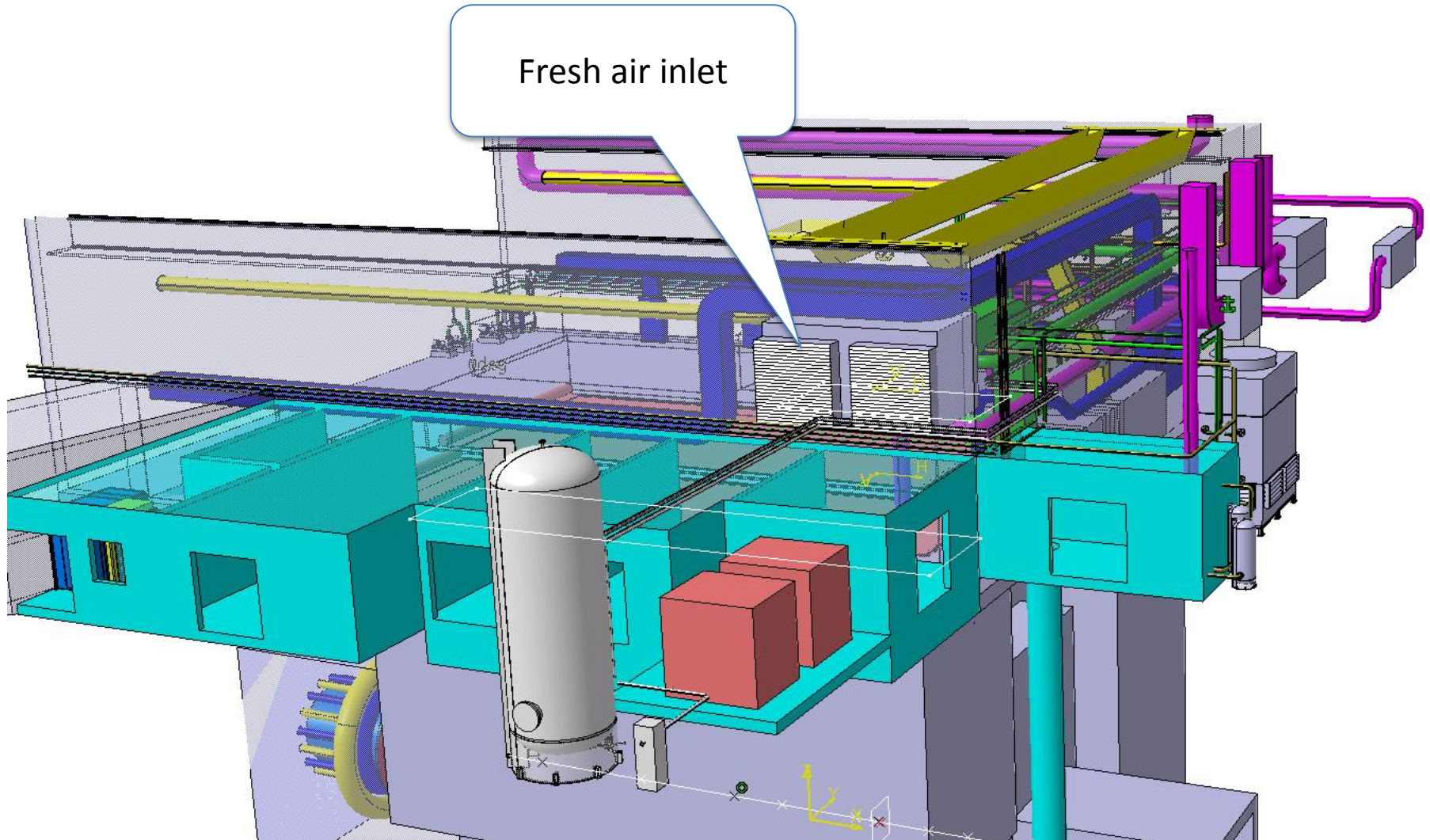




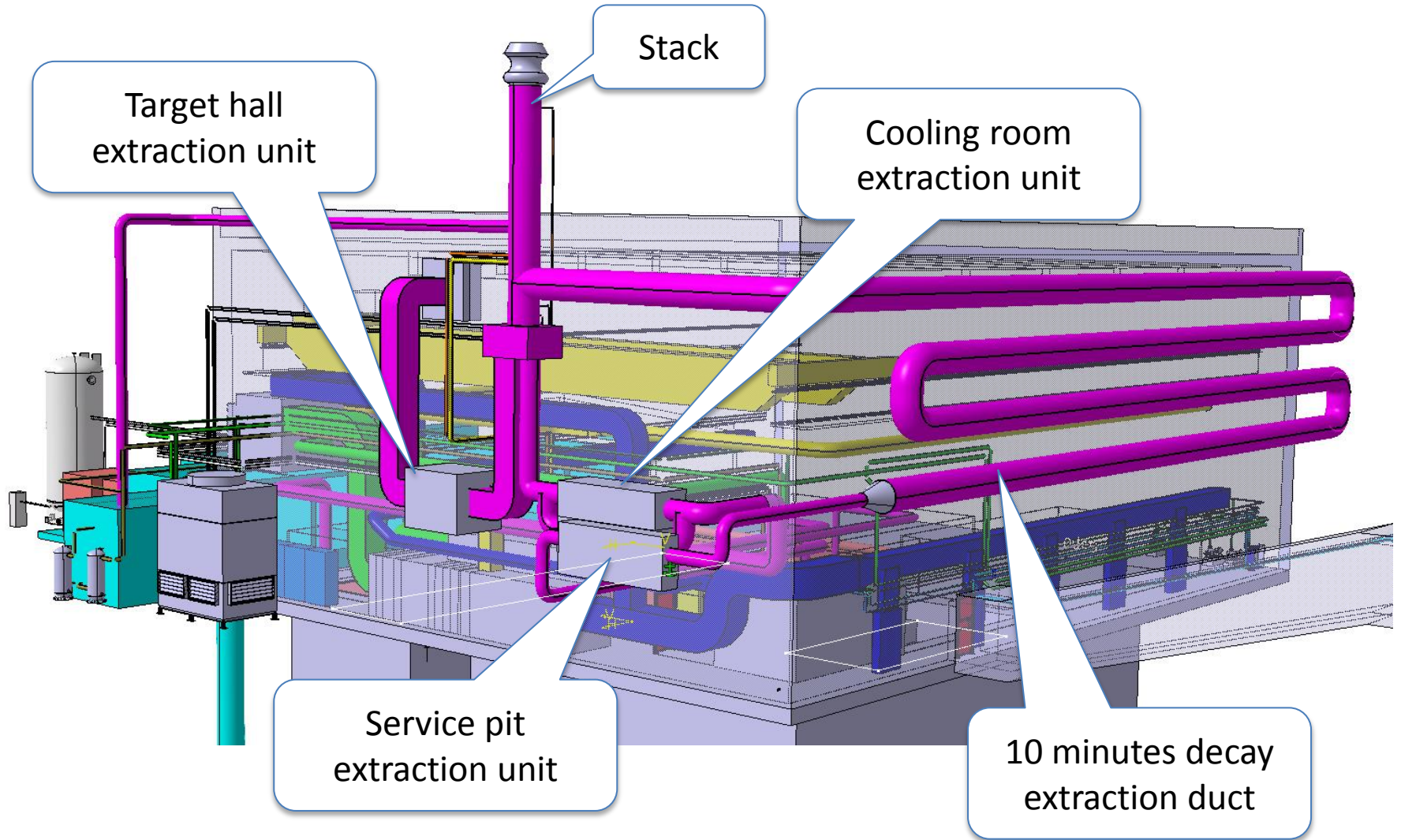
# HVAC int. – Service pit



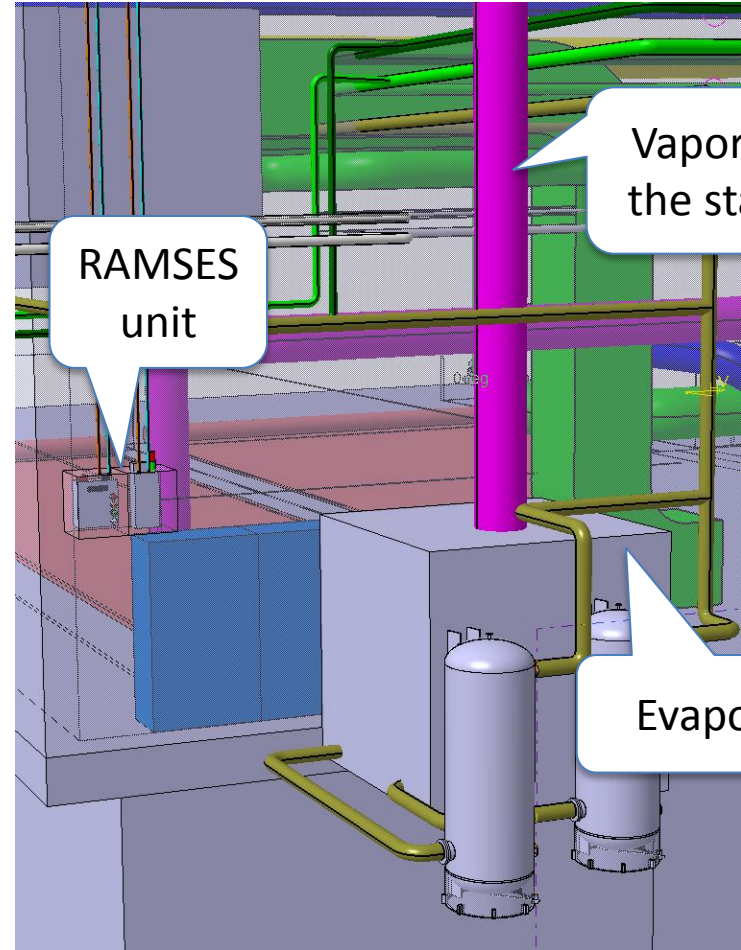
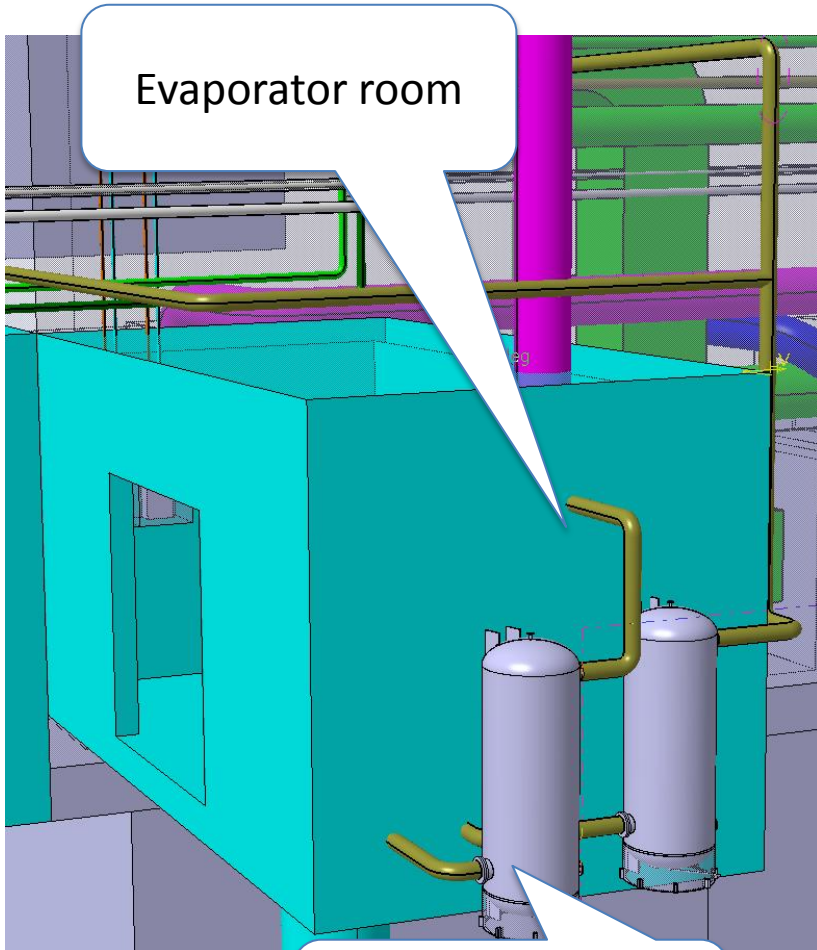
# Fresh air inlet



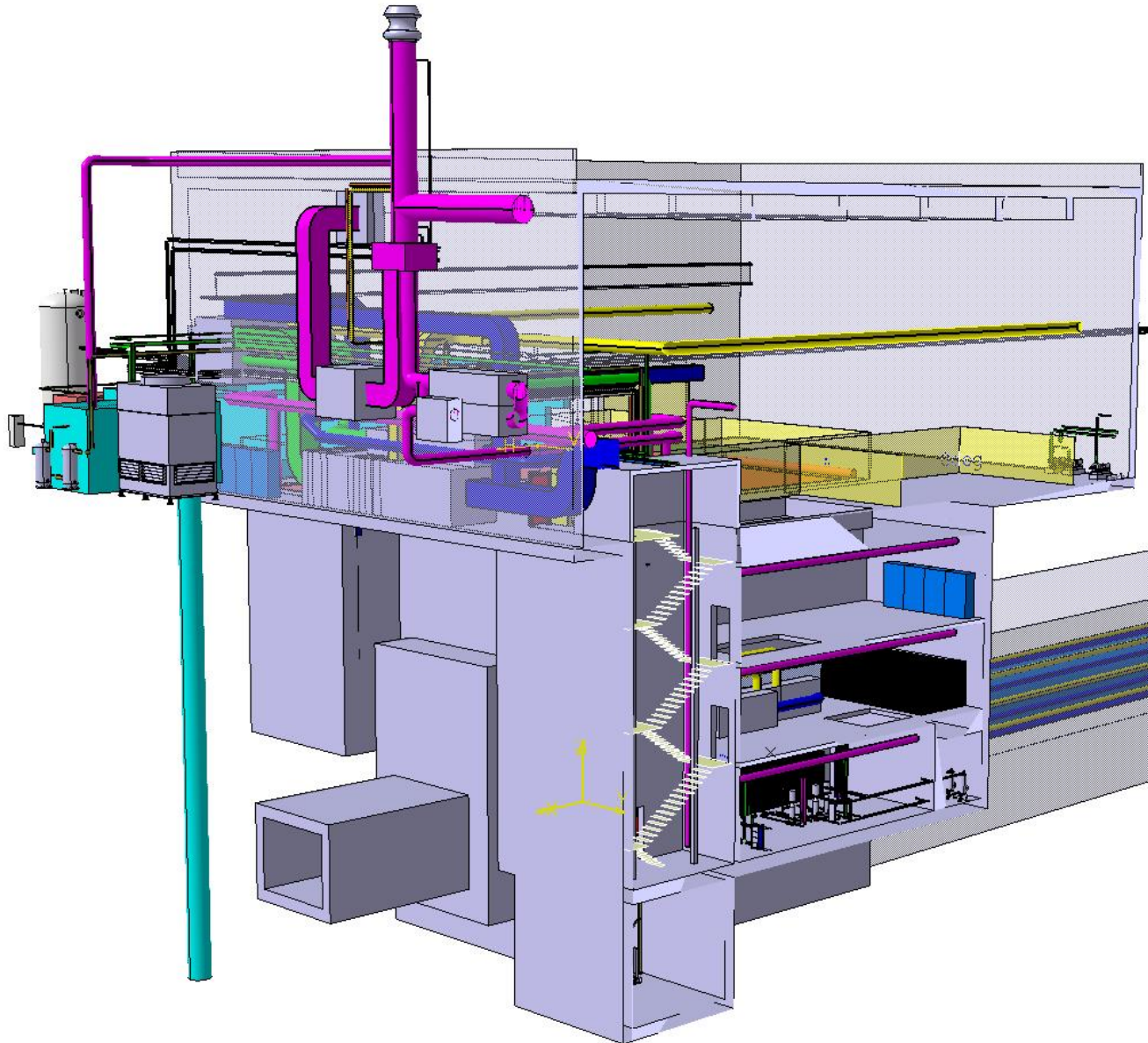
# Air extraction



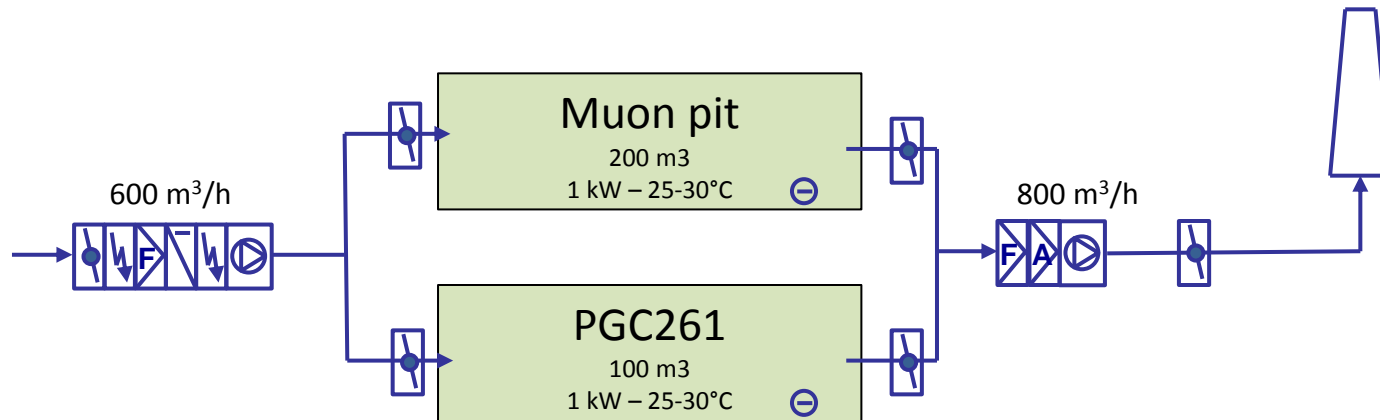
# Evaporators and Radiation Monitoring



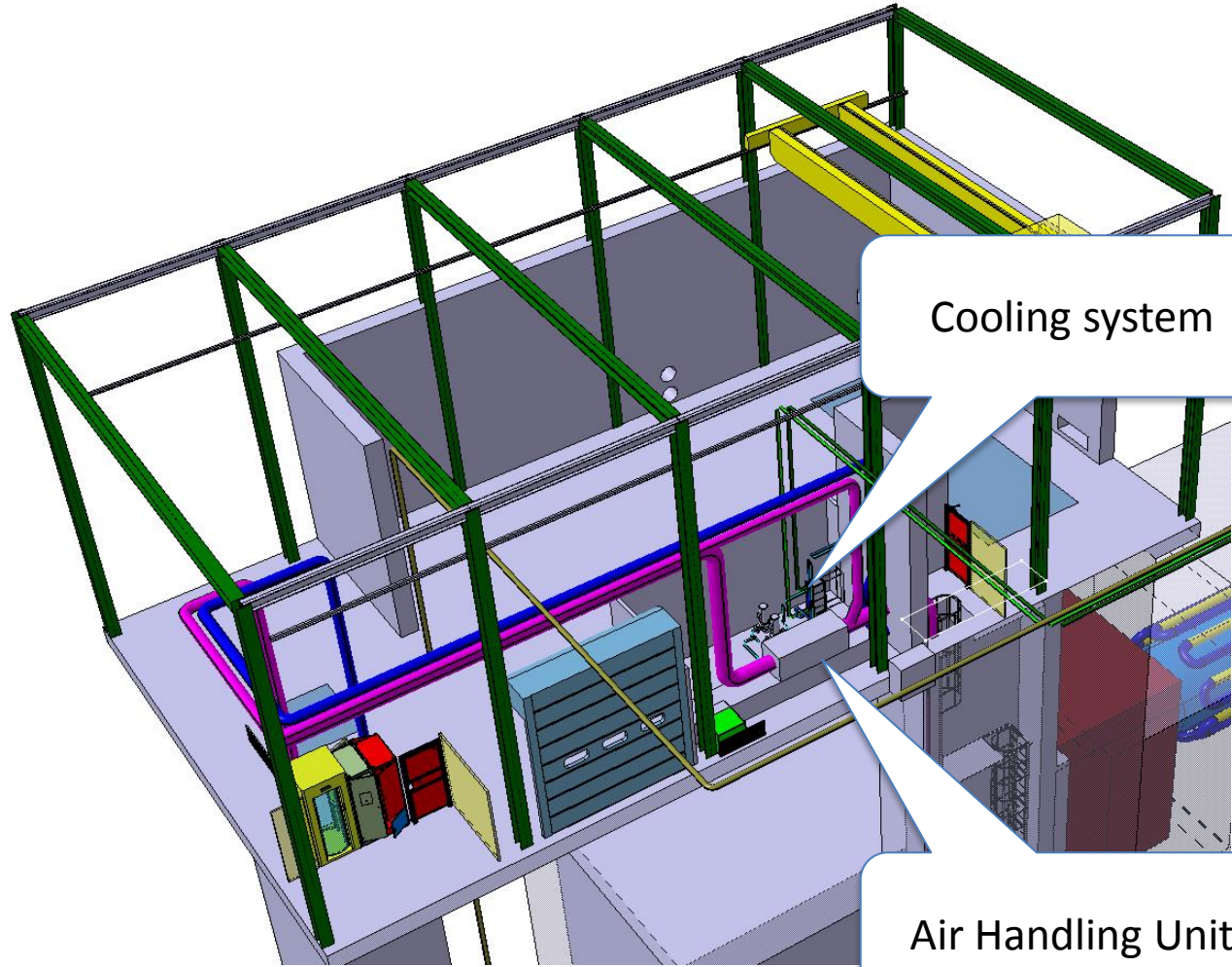
# Overall integration in the area



# Ventilation Muon Pits



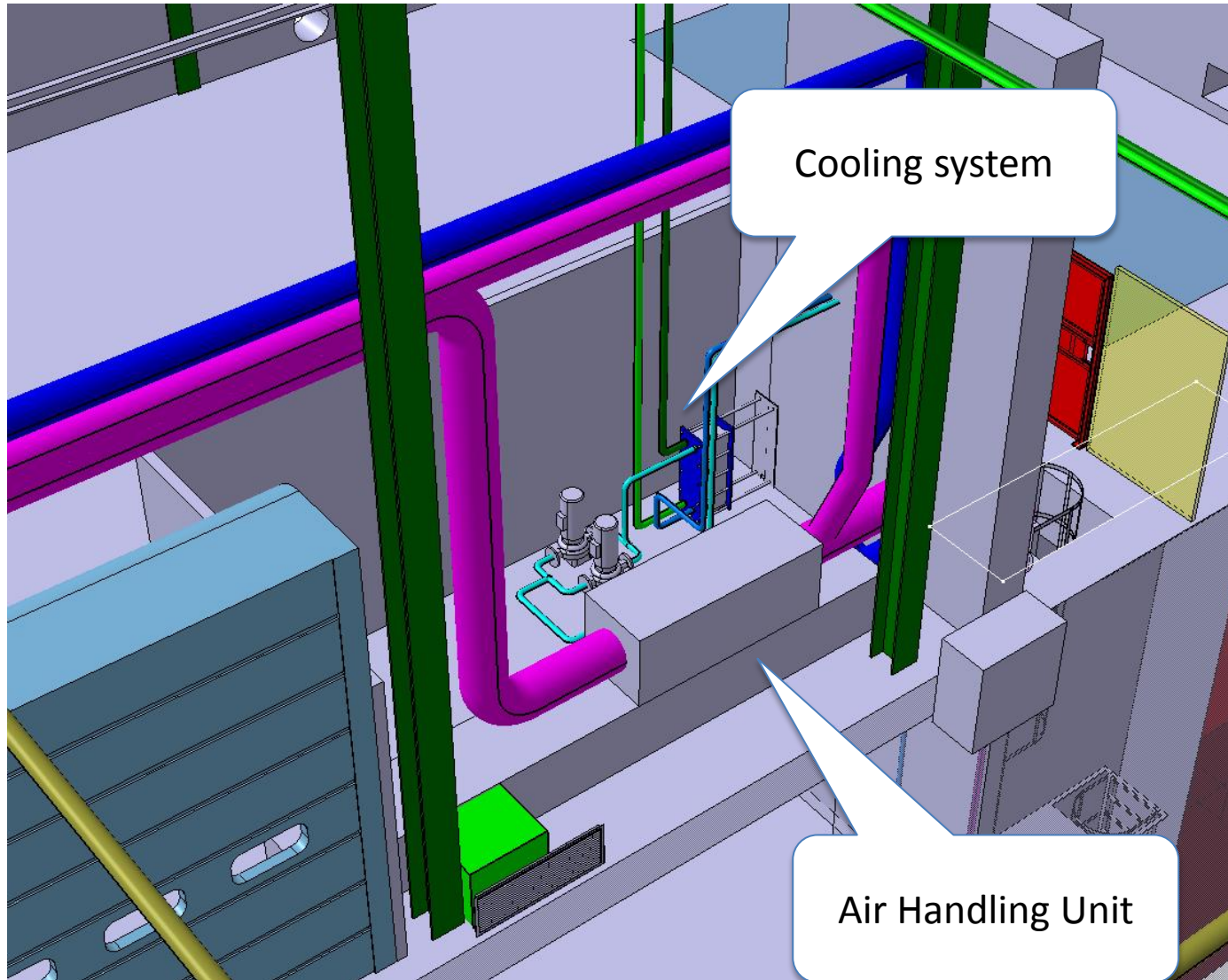
# HVAC int. – Muon pits



Cooling system

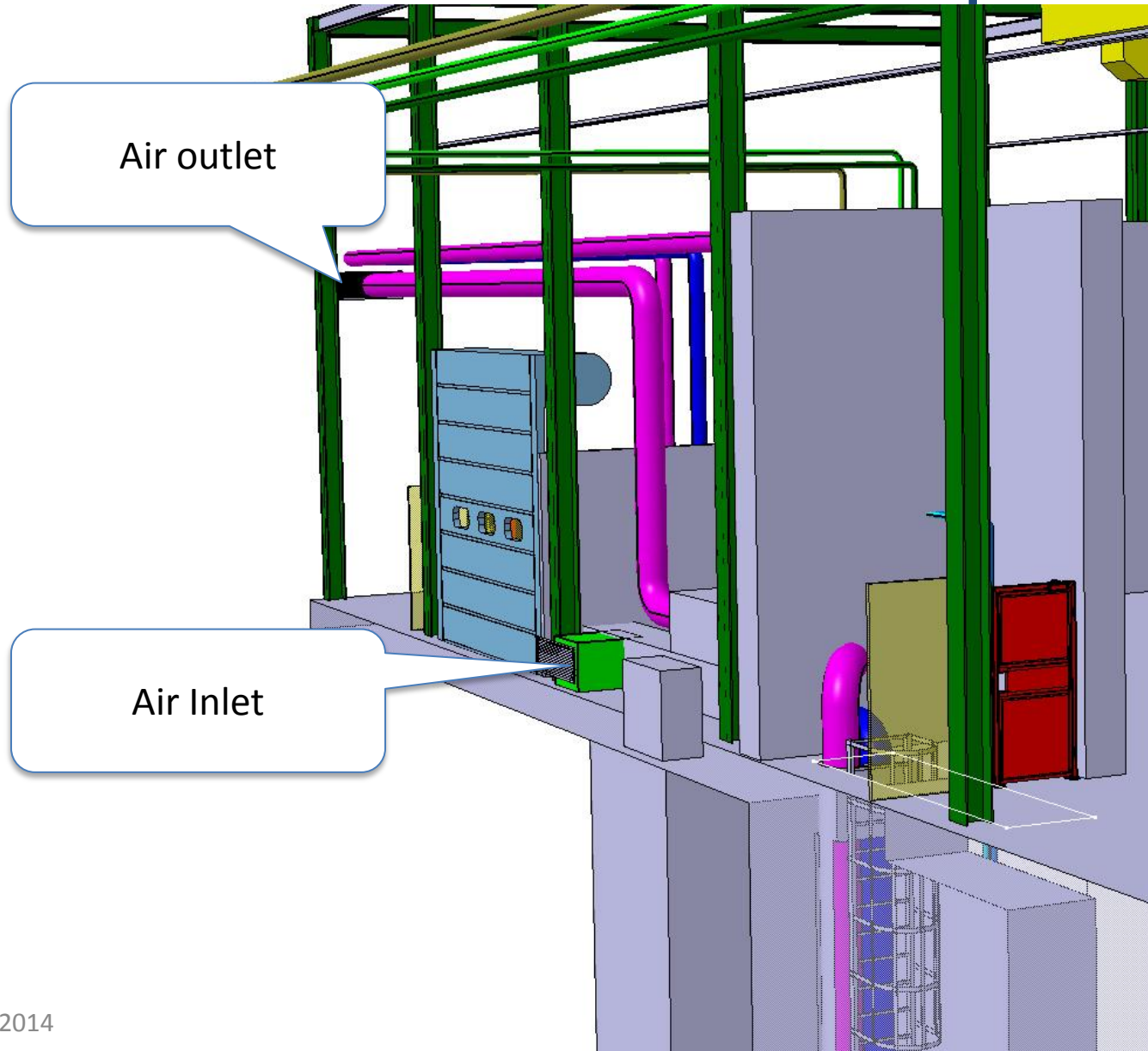
Air Handling Unit

# HVAC int. – Muon pits





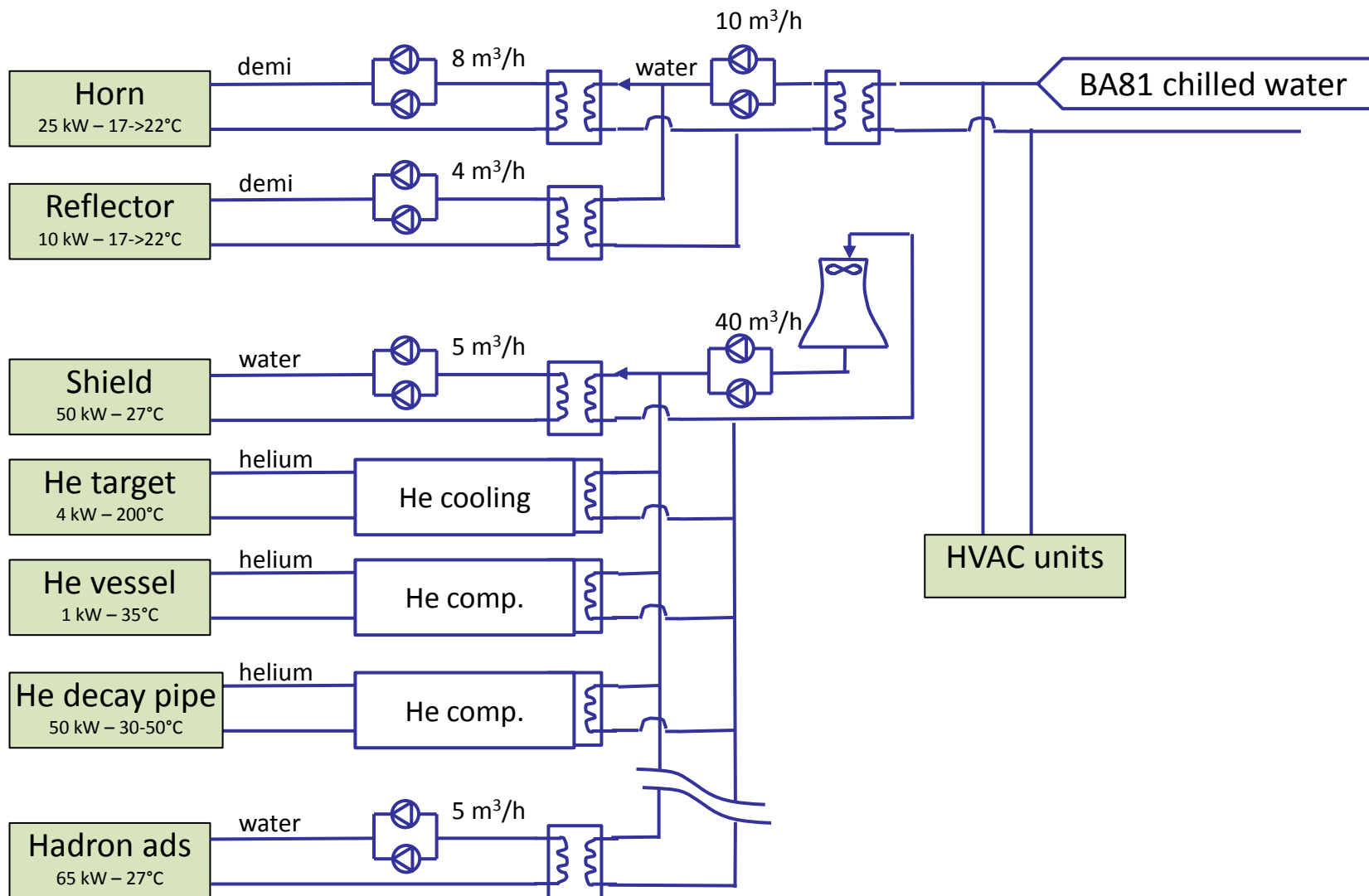
# HVAC int. – Muon pits



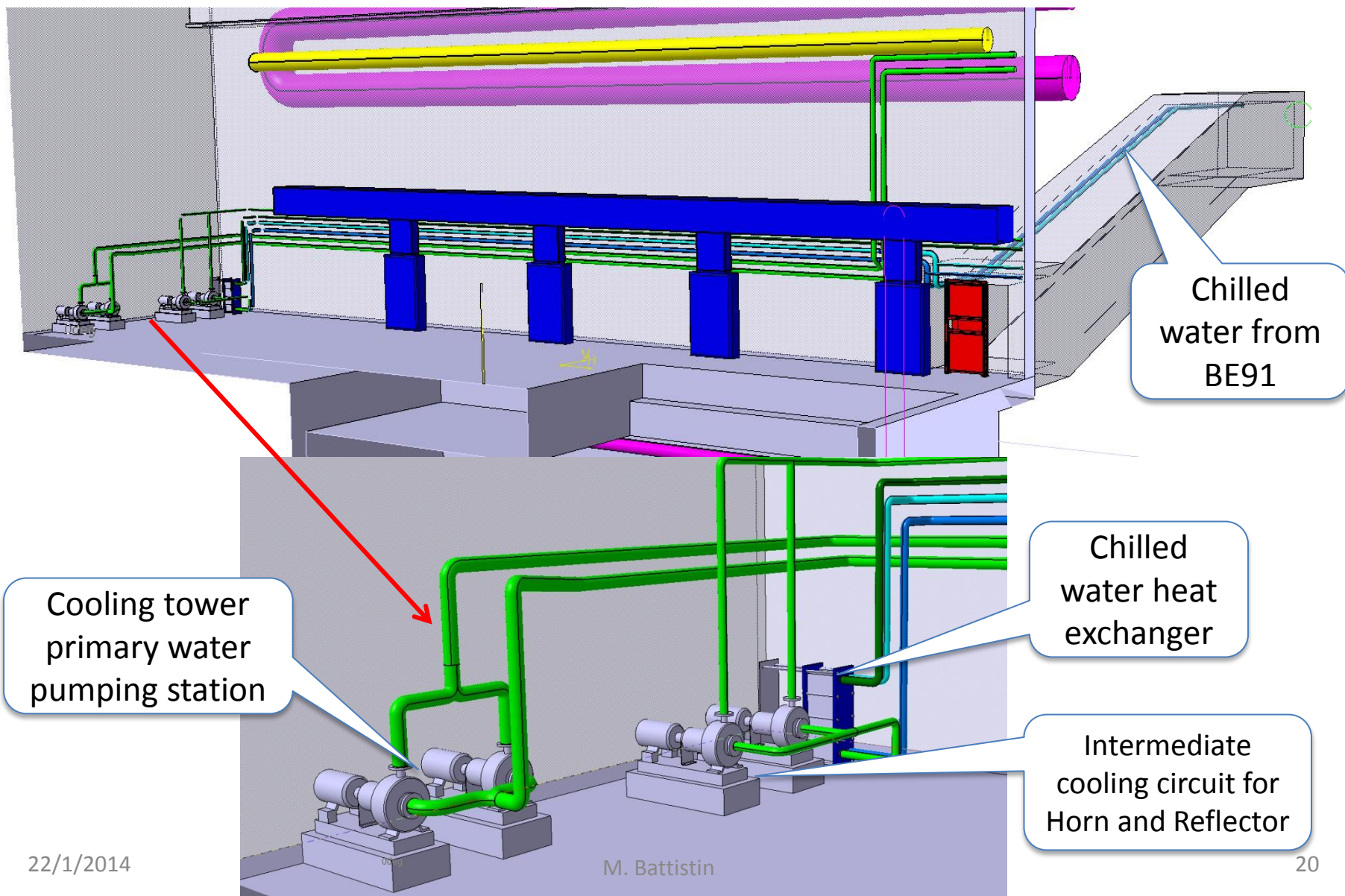
# Hydraulic Integration

- Chilled water for Horn and Reflector cooling + HVAC
- Local primary circuit for all other cooling + helium systems
- Water and helium secondary circuits

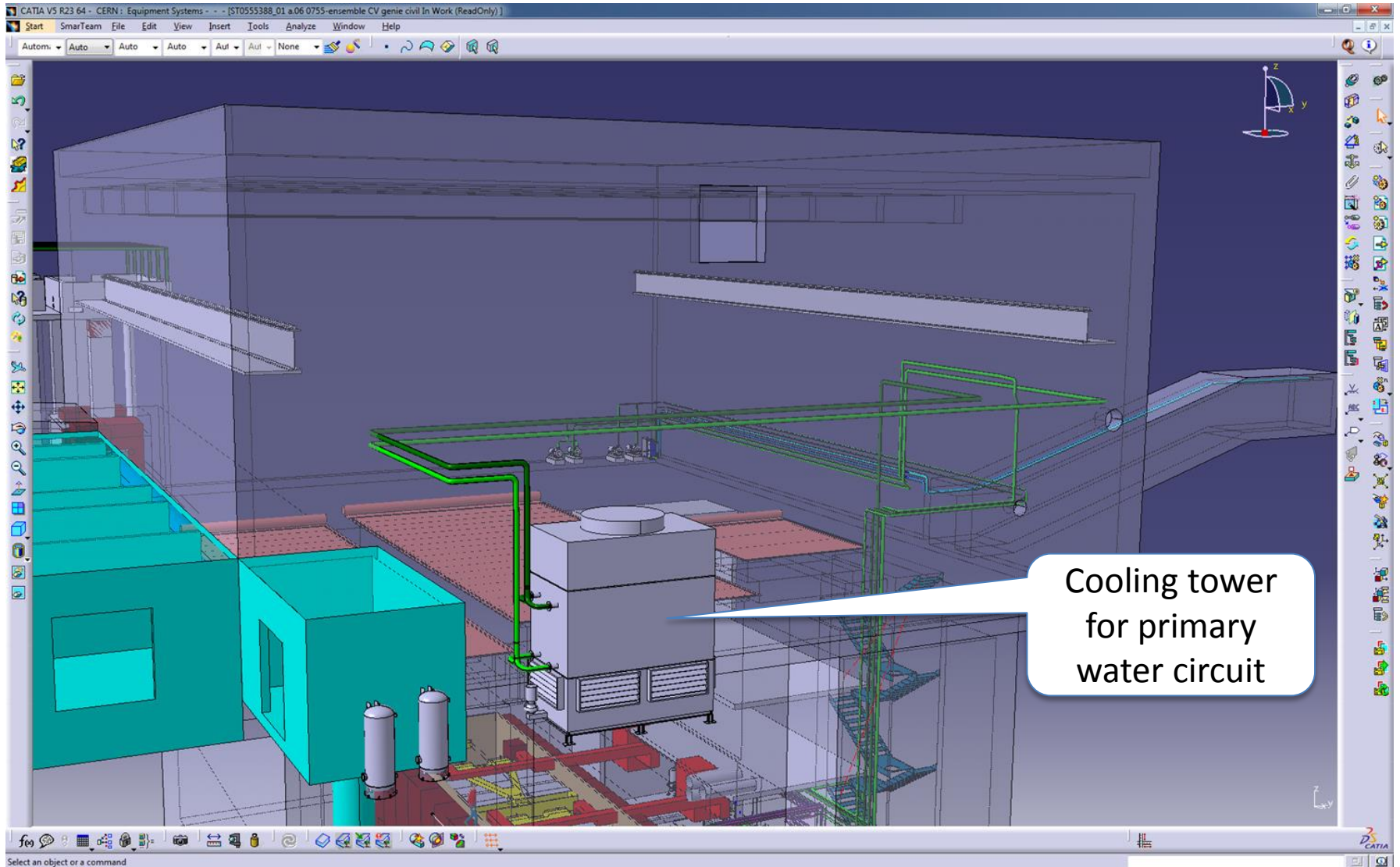
# Cooling P&ID



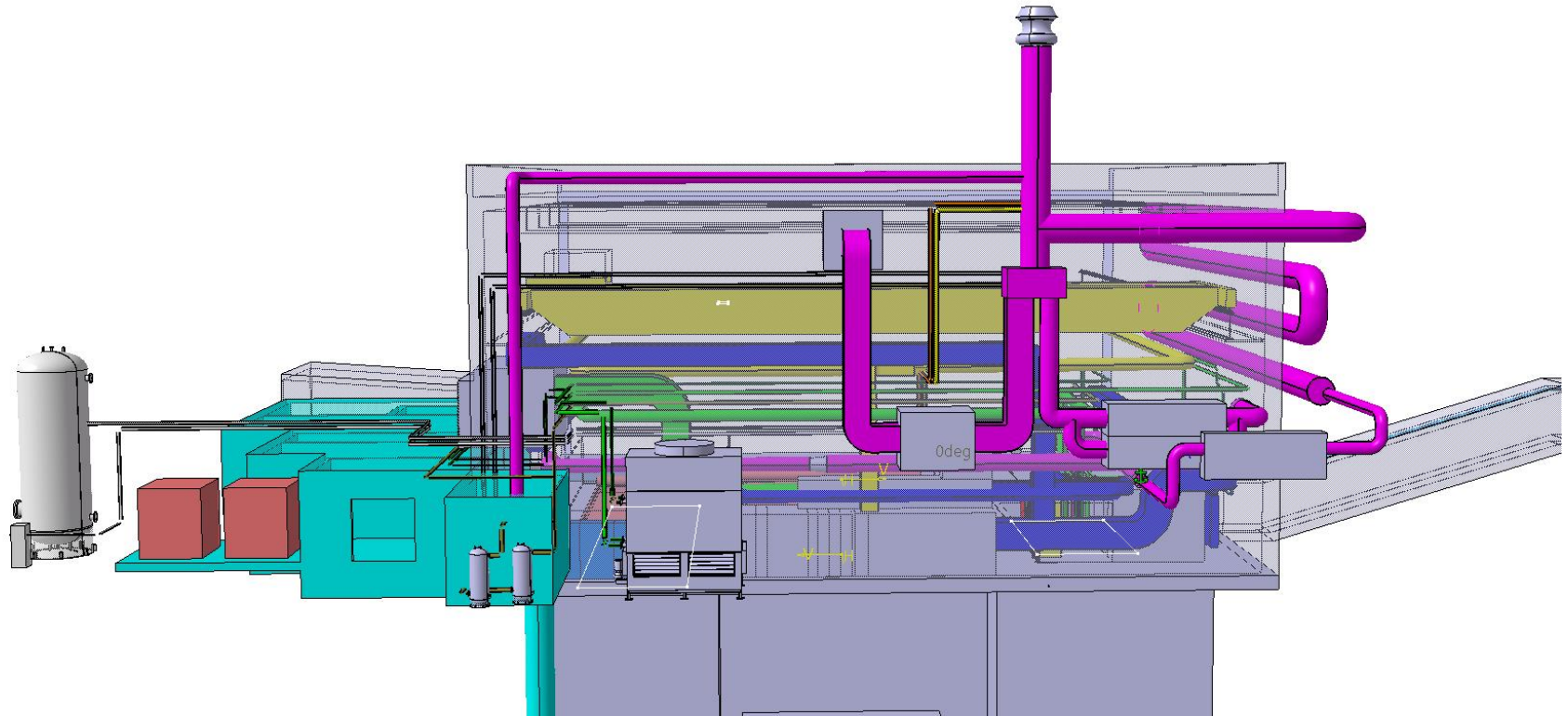
# Chilled water supply in target hall



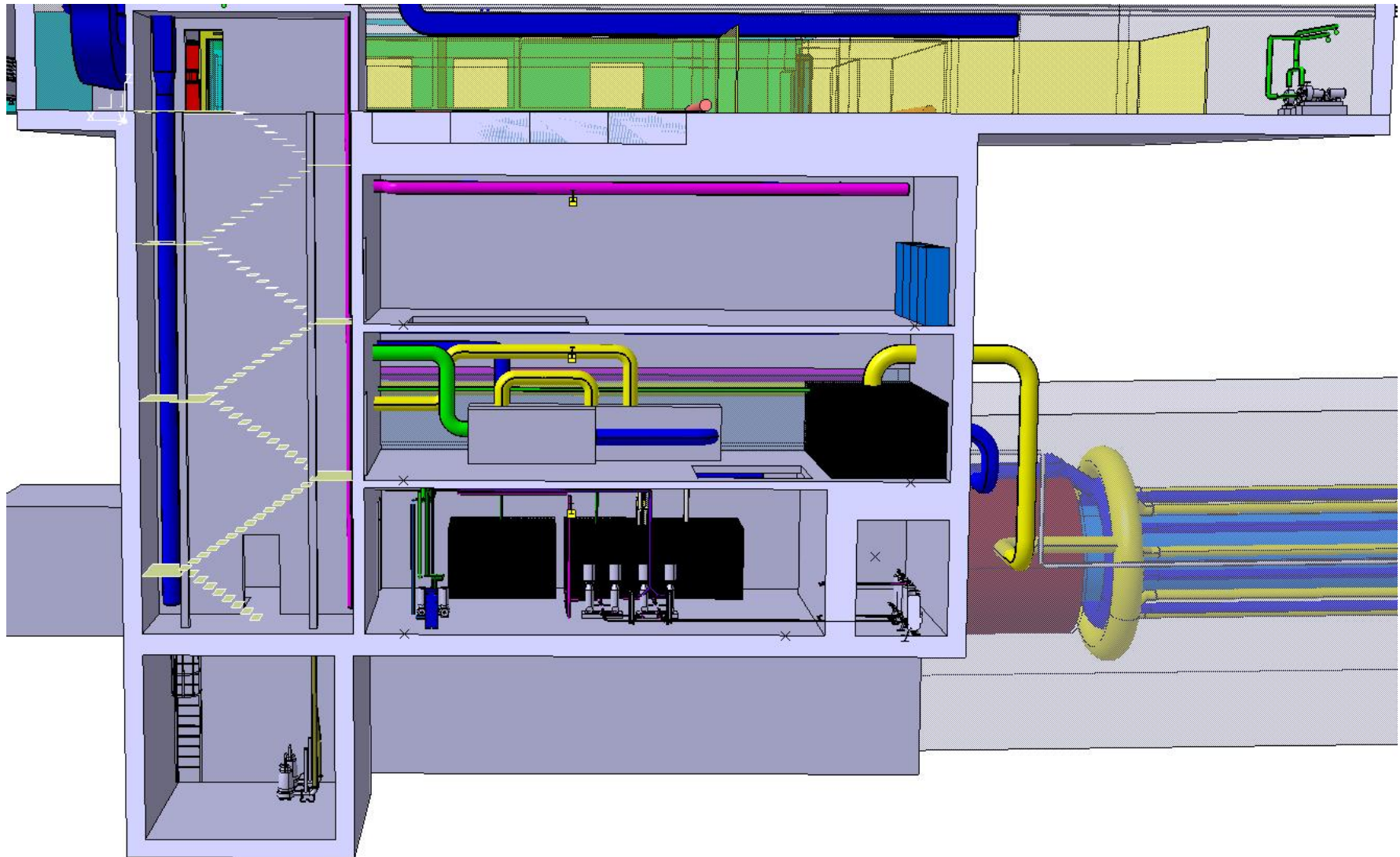
# Cooling tower



# Outside integration



# Cooling room general integration



# Cooling circuits in the cooling room

Shield + 2xHelium cooling: 27-> °C

Helium Vessel Conditioning With cryo trap

Horn & Reflector Cooling: 17-22 °C

Demineral cartridges

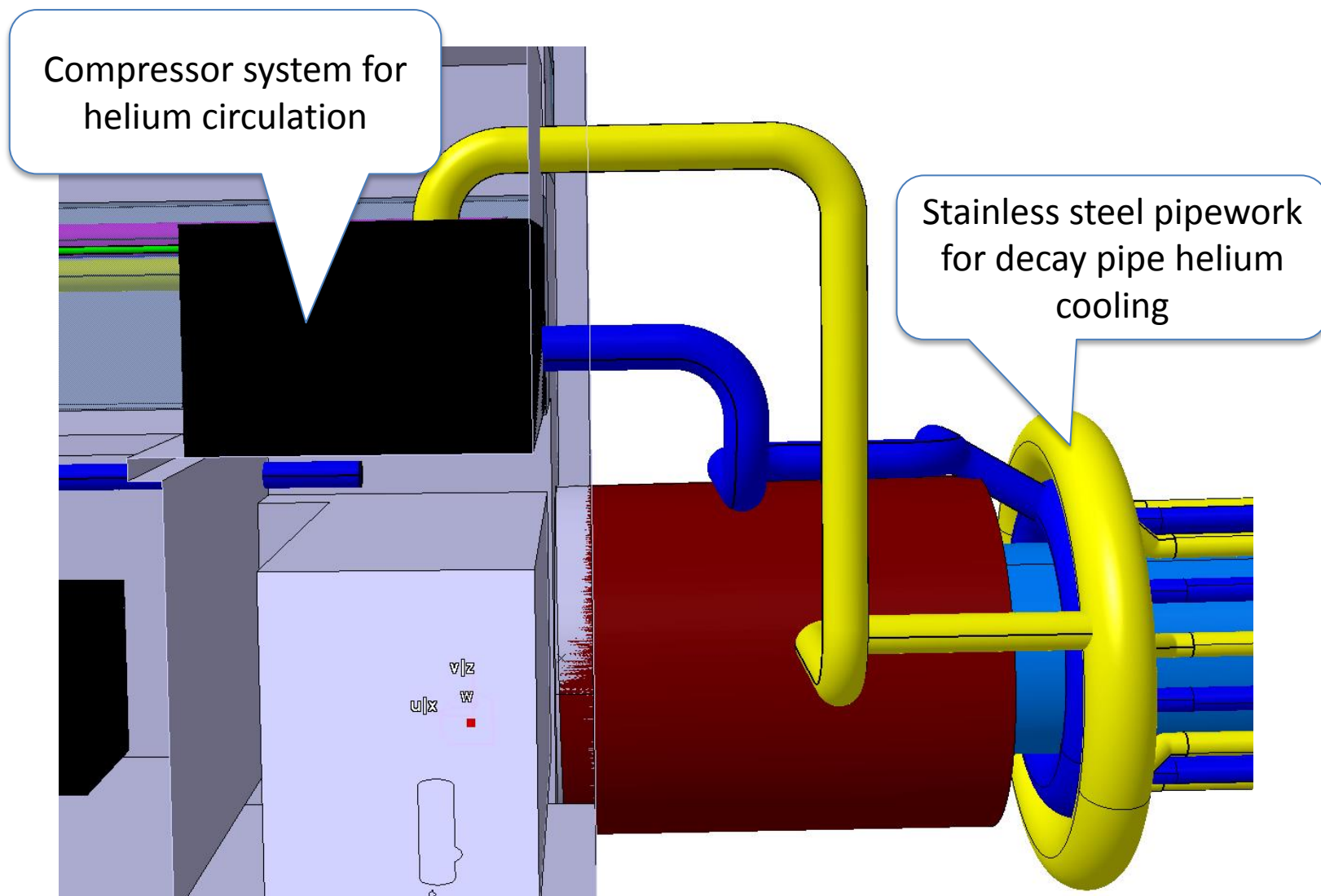
Helium Target Cooling

Transport volume

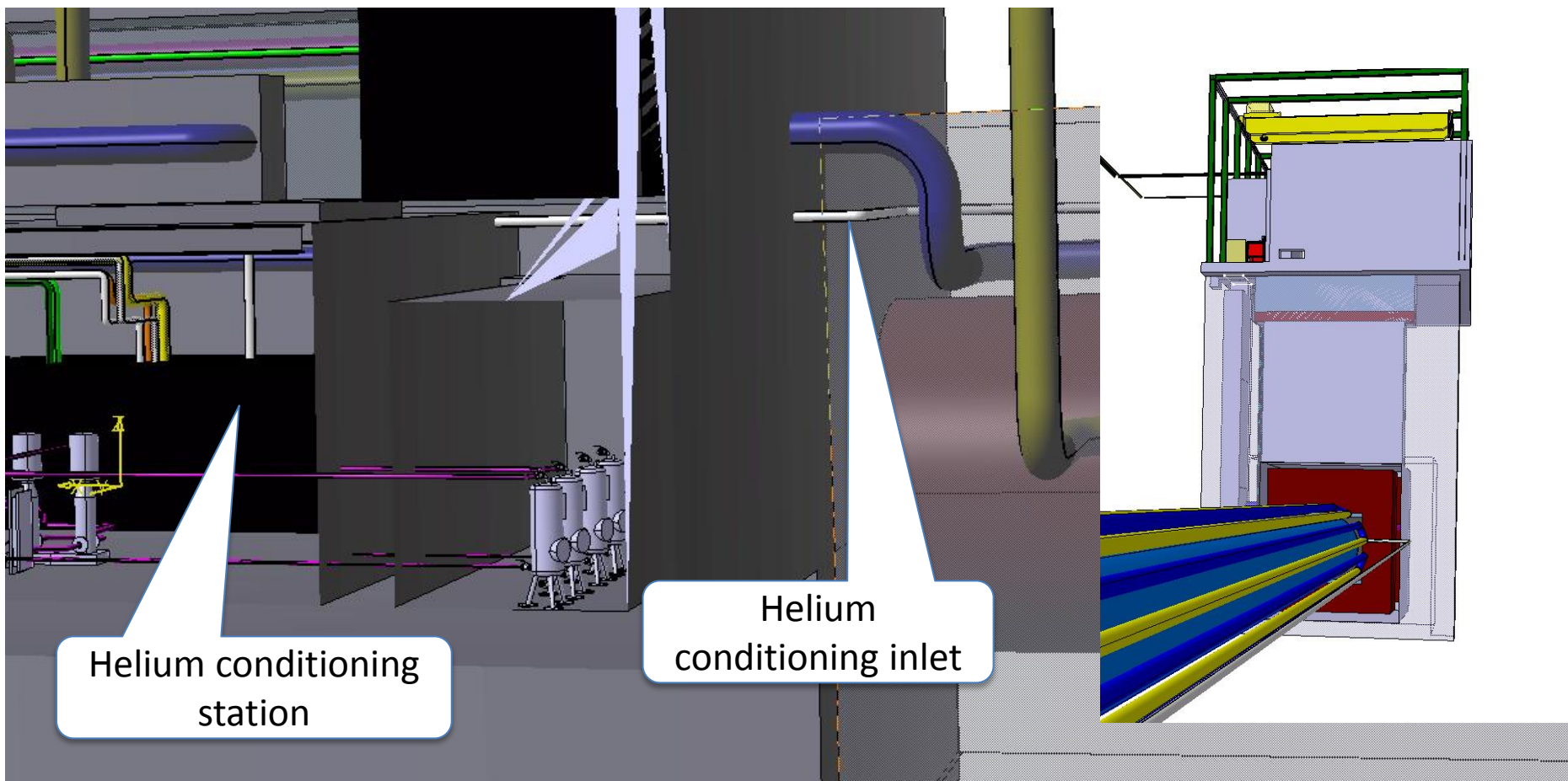
80 cm concrete wall to shield the demineral cartridges



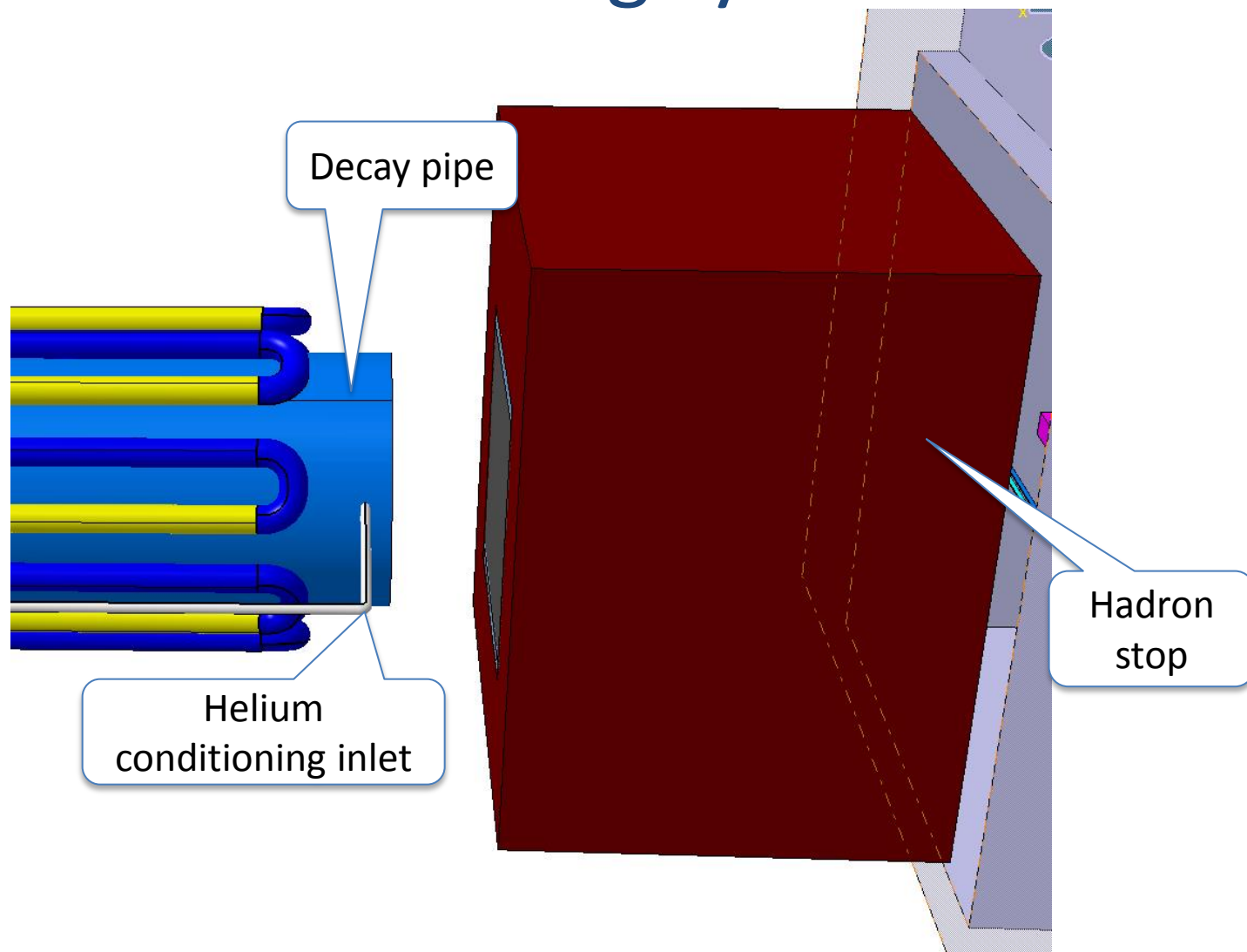
# Decay pipe helium cooling



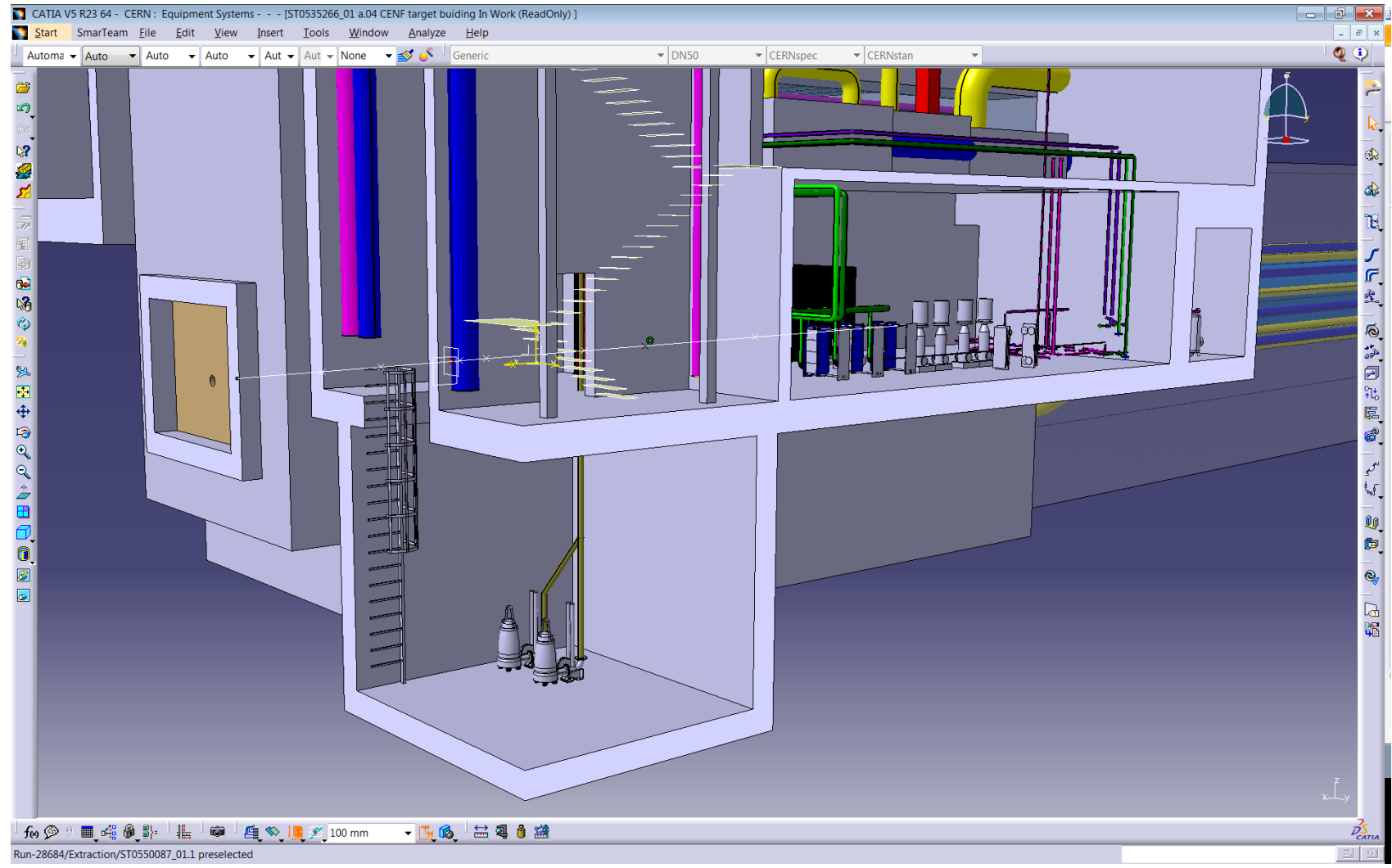
# Decay pipe and vessel helium conditioning system



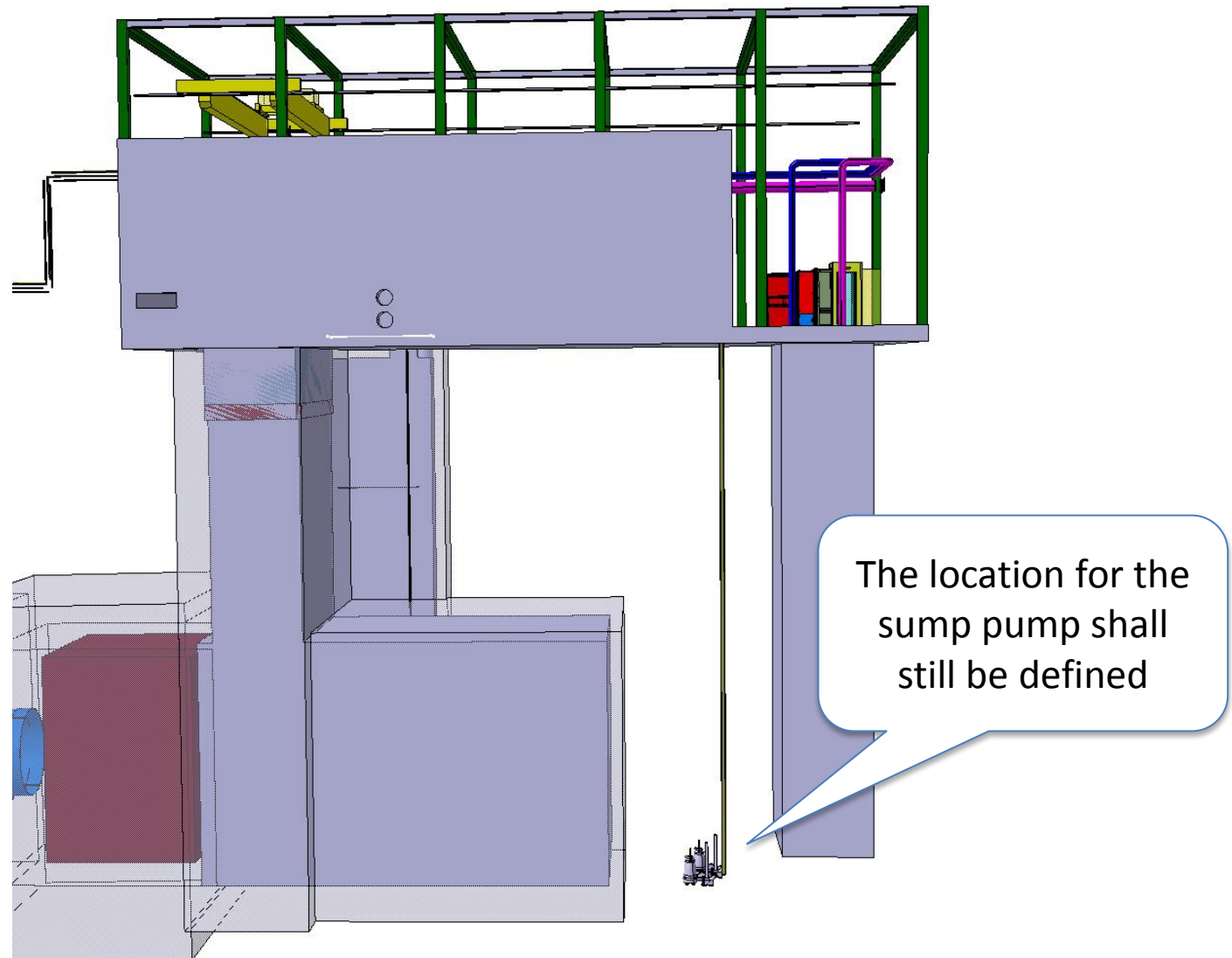
# Decay pipe and vessel helium conditioning system



# Sump pumps



# Sump pumps at Muon pit



# Conclusions

- HVAC and hydraulic systems integration in the CENF area are close to be finished.
- Helium cooling system for the decay pipe and for the target cooling shall be designed: external support requested.
- Helium purification system is under investigation. Helium purity target defined (0.1%).