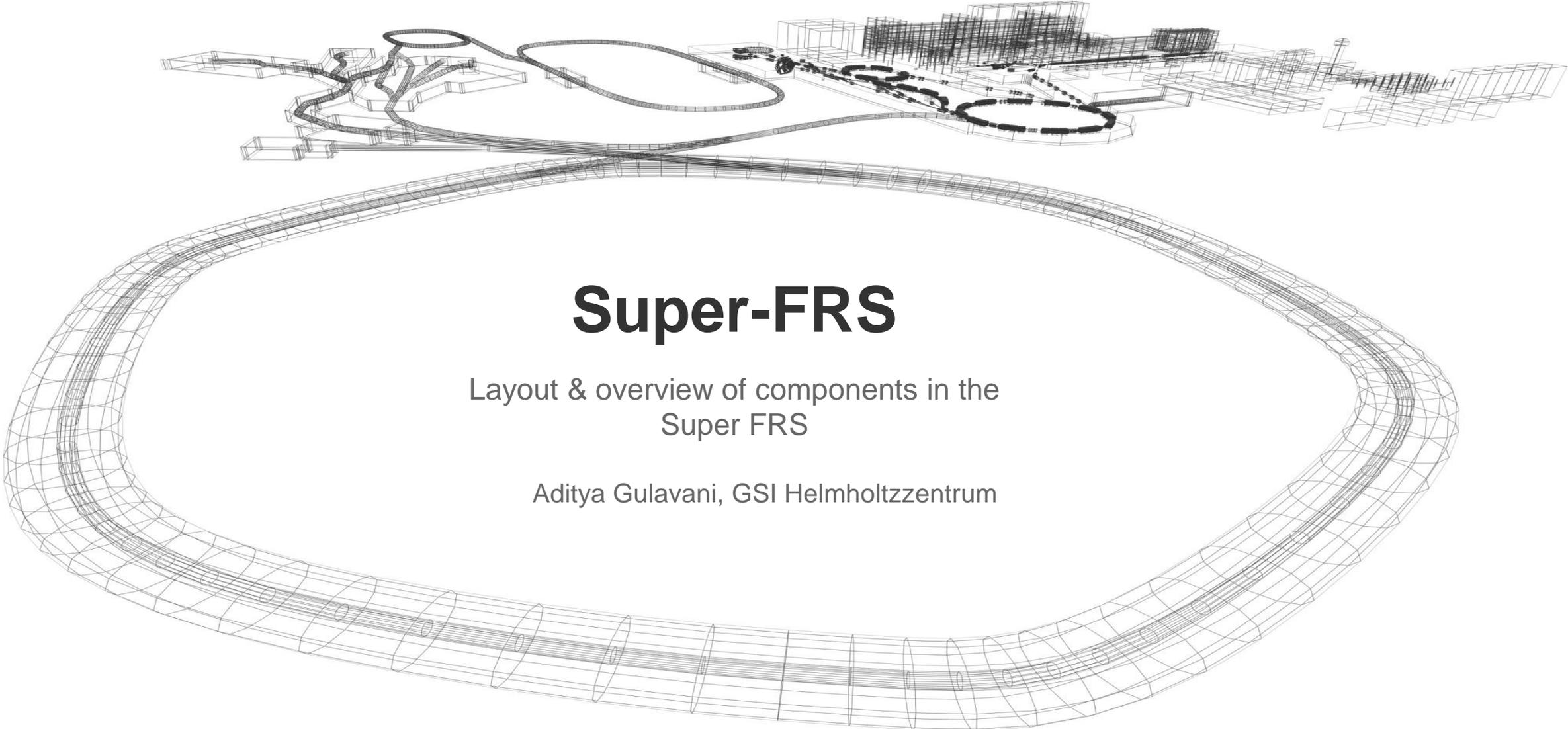




12-13 April 2023, Bose Institute



Super-FRS

Layout & overview of components in the
Super FRS

Aditya Gulavani, GSI Helmholtzzentrum



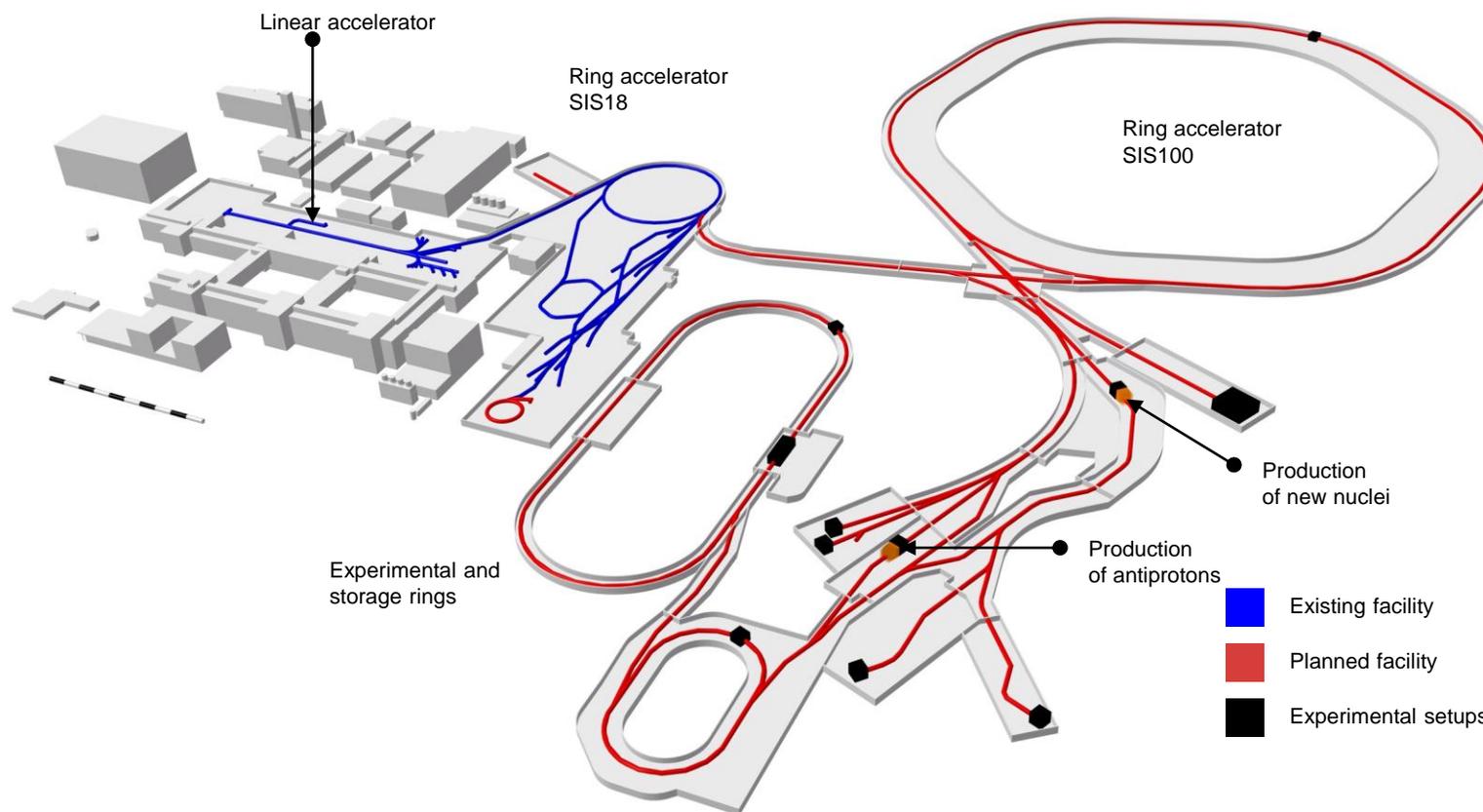
- The FAIR Project
- The Super FRS
- Target Area
- Beam-Catchers
- Iron Roof Shielding
- Hot Cell
 - Transport system
 - Remote Handling

Experiments on:

Nuclear structure,
 Astro physics
 Hadron physics,
 Compressed
 nuclear matter,
 Plasma physics,
 Atomic physics,
 Material science,
 Bio physics

GSI Existing Facility

FAIR – Under construction Facility



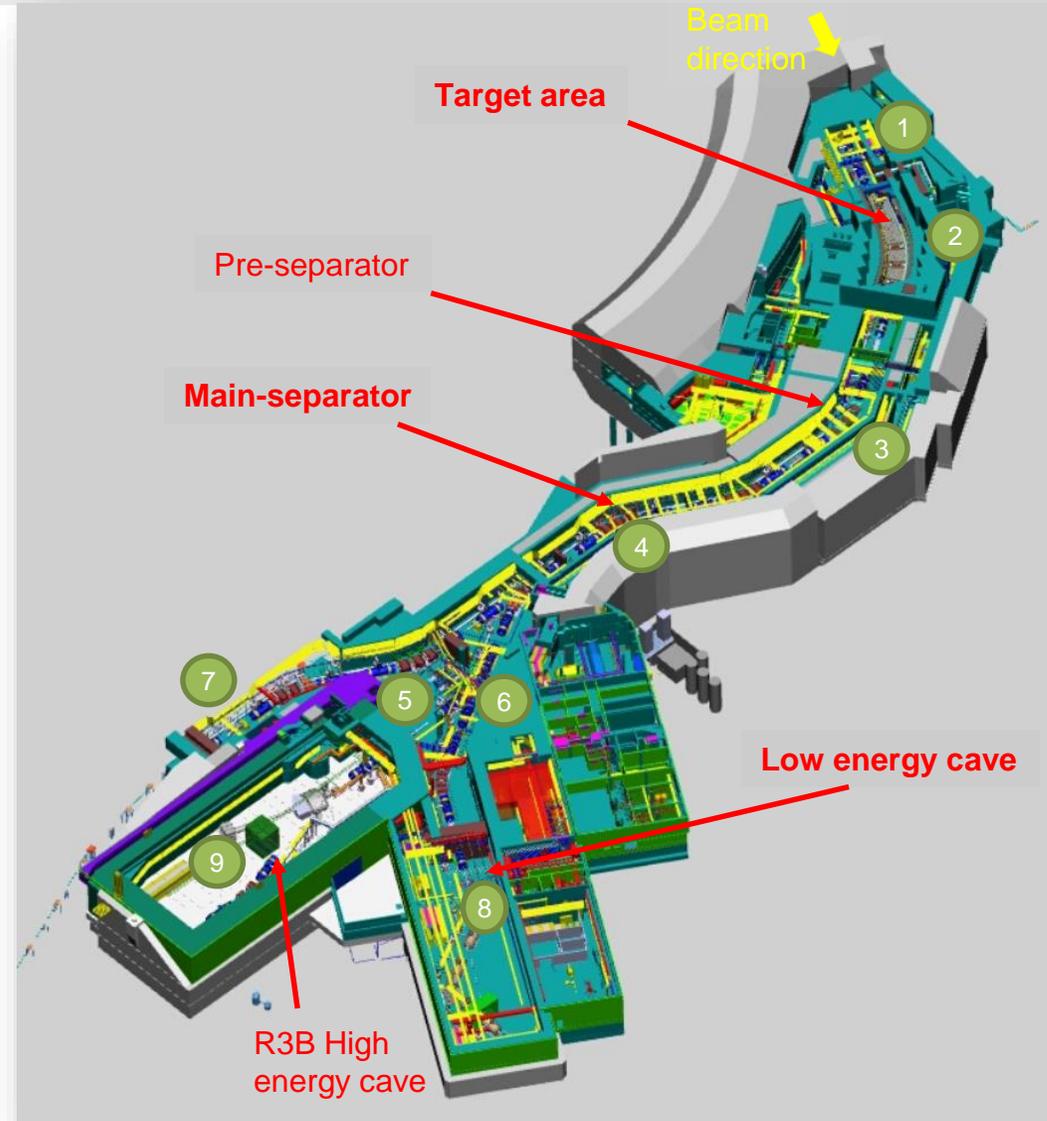
International
 Partners 8+2,
 Germany >50%

The Super FRS

Super-Conducting Fragment Separator

Early Science

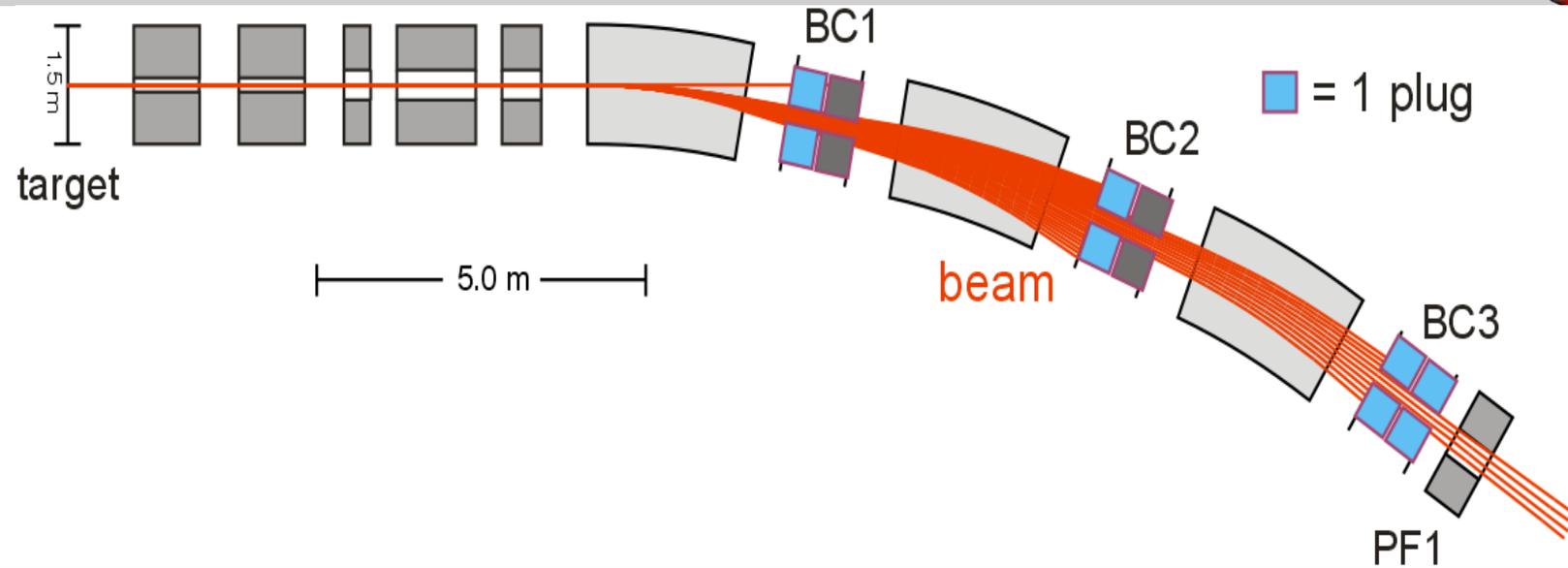
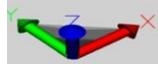
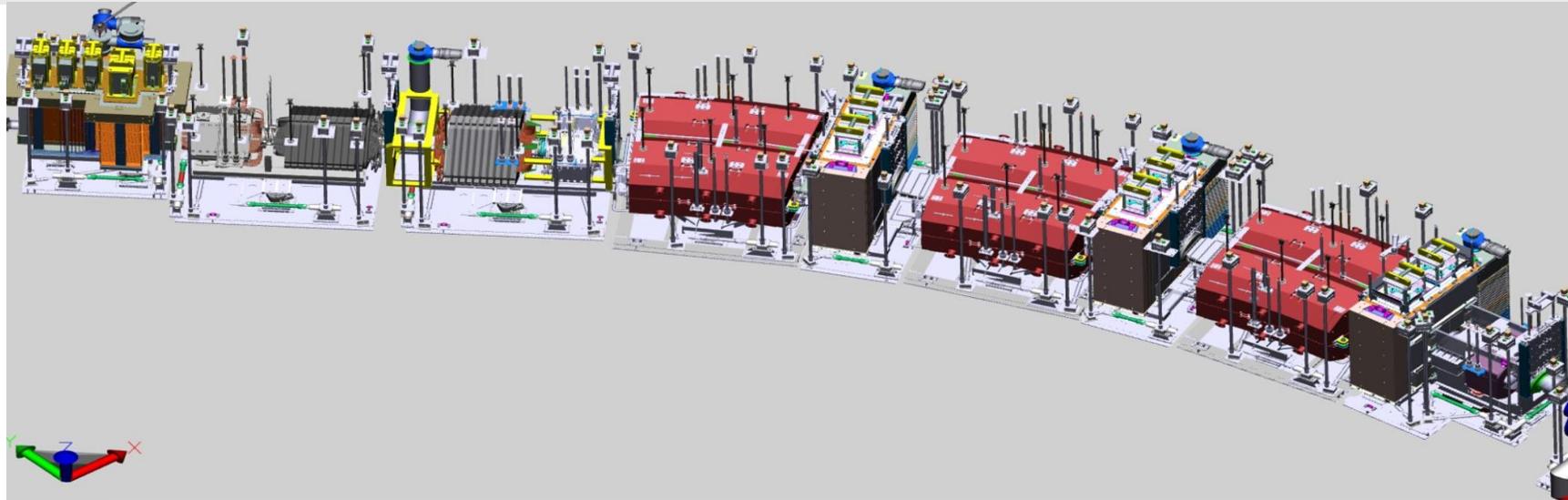
- 1 pre-target
- 2 target area
- 3 pre-separator
- 4 main separator to HEB
- 5 high-energy branch
- 6 low-energy branch
- 7 ring branch
- 8 EB spectrometer, low-energy cave (NUSTAR)
- 9 high-energy cave (NUSTAR)



The SFRS Target Area



The SFRS Target Area

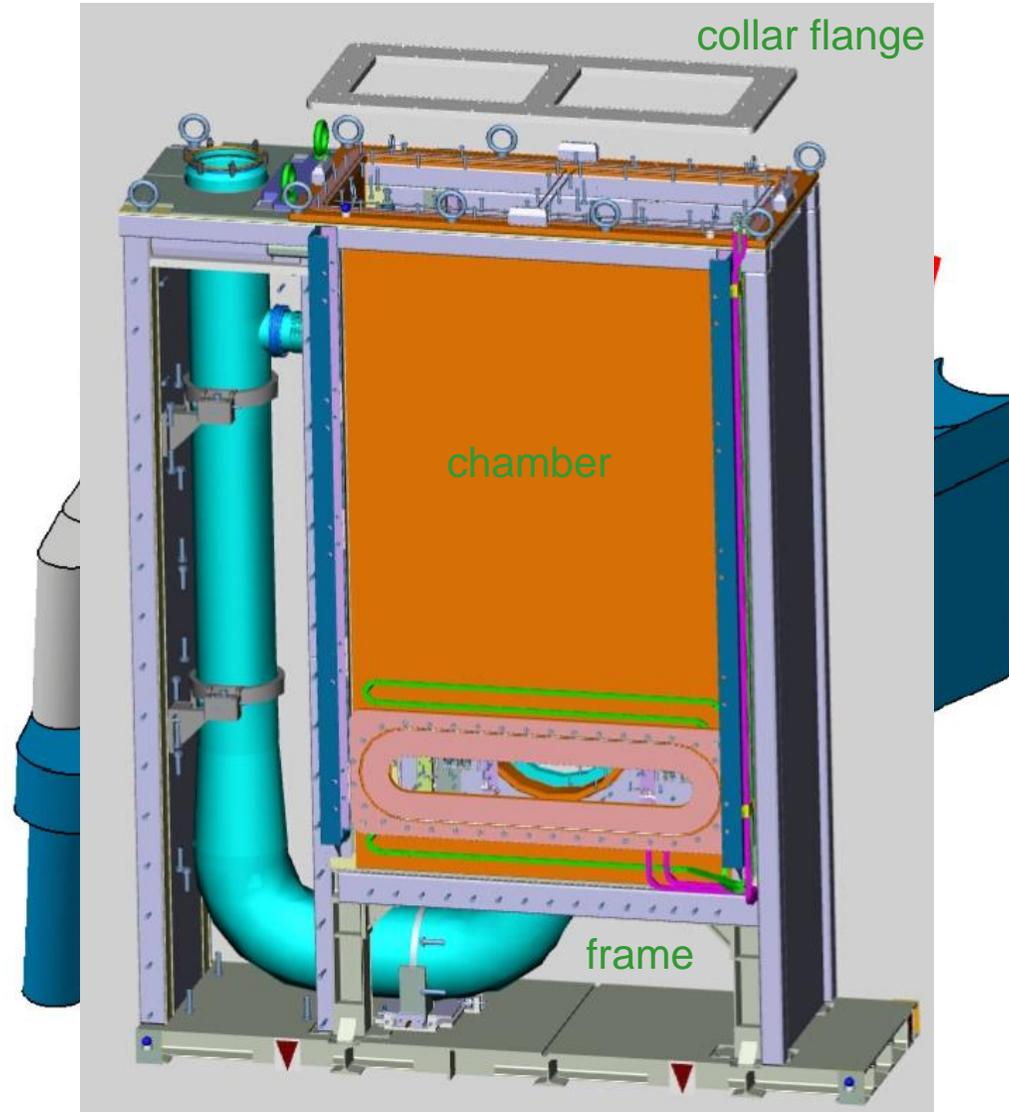


Beam-Catcher Chamber



CSIR - CMERI

सी एस आई आर - केन्द्रीय यांत्रिक अभियांत्रिकी अनुसंधान संस्थान
CSIR - Central Mechanical Engineering Research Institute



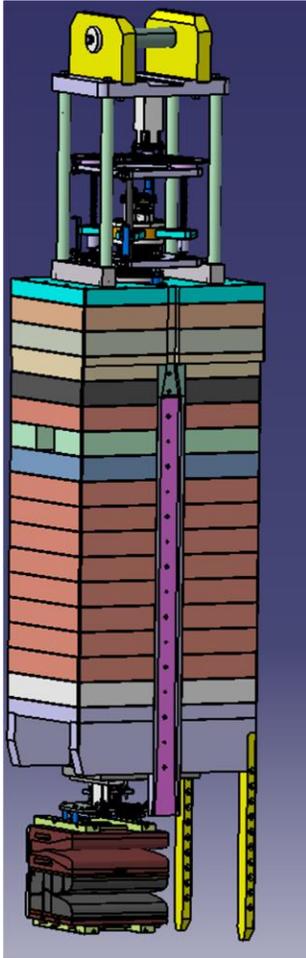
Beam-Catcher

Design

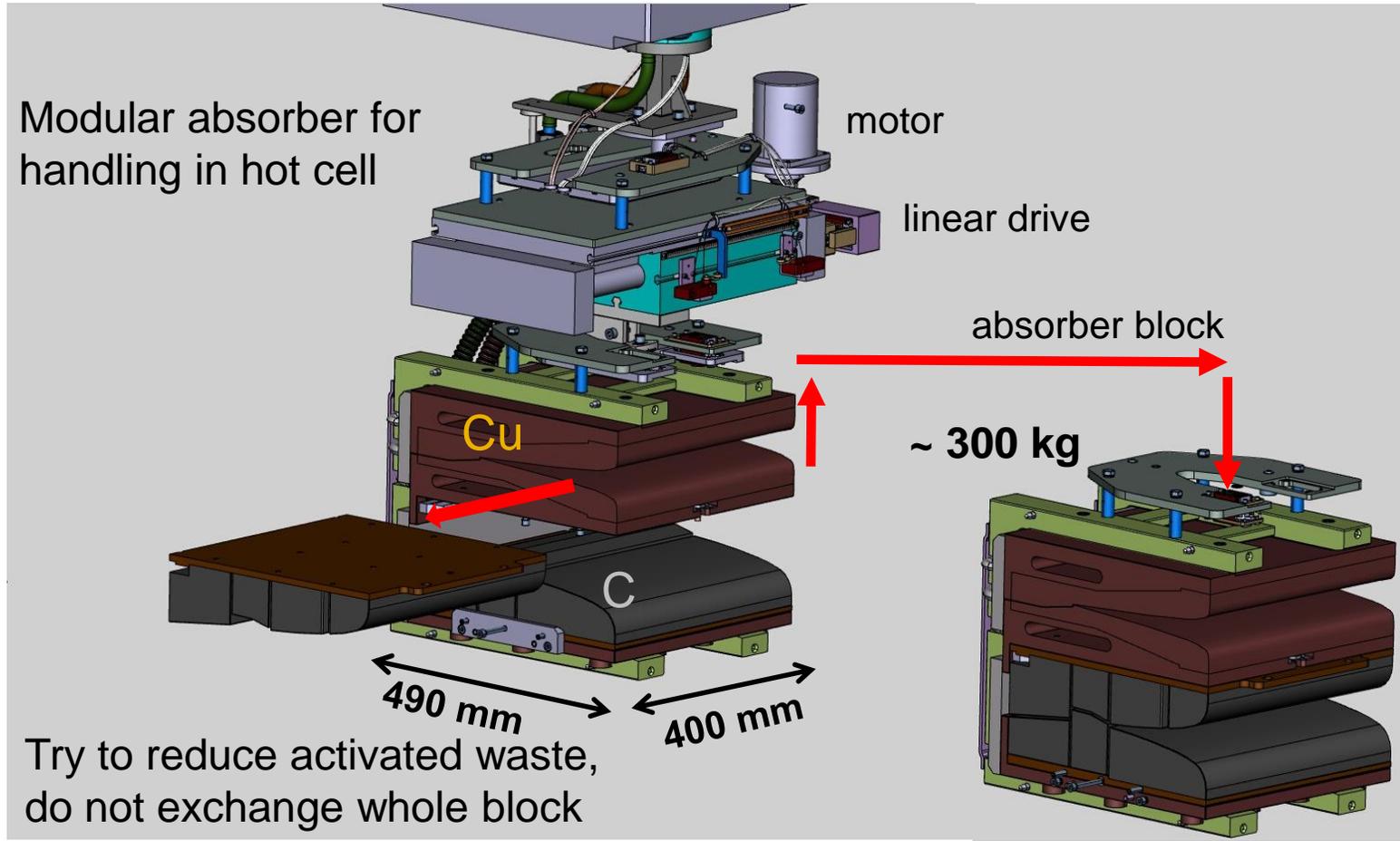


CSIR - CMERI

सी एस आई आर - केन्द्रीय यांत्रिक अभियांत्रिकी अनुसंधान संस्थान
CSIR - Central Mechanical Engineering Research Institute



Modular absorber for handling in hot cell

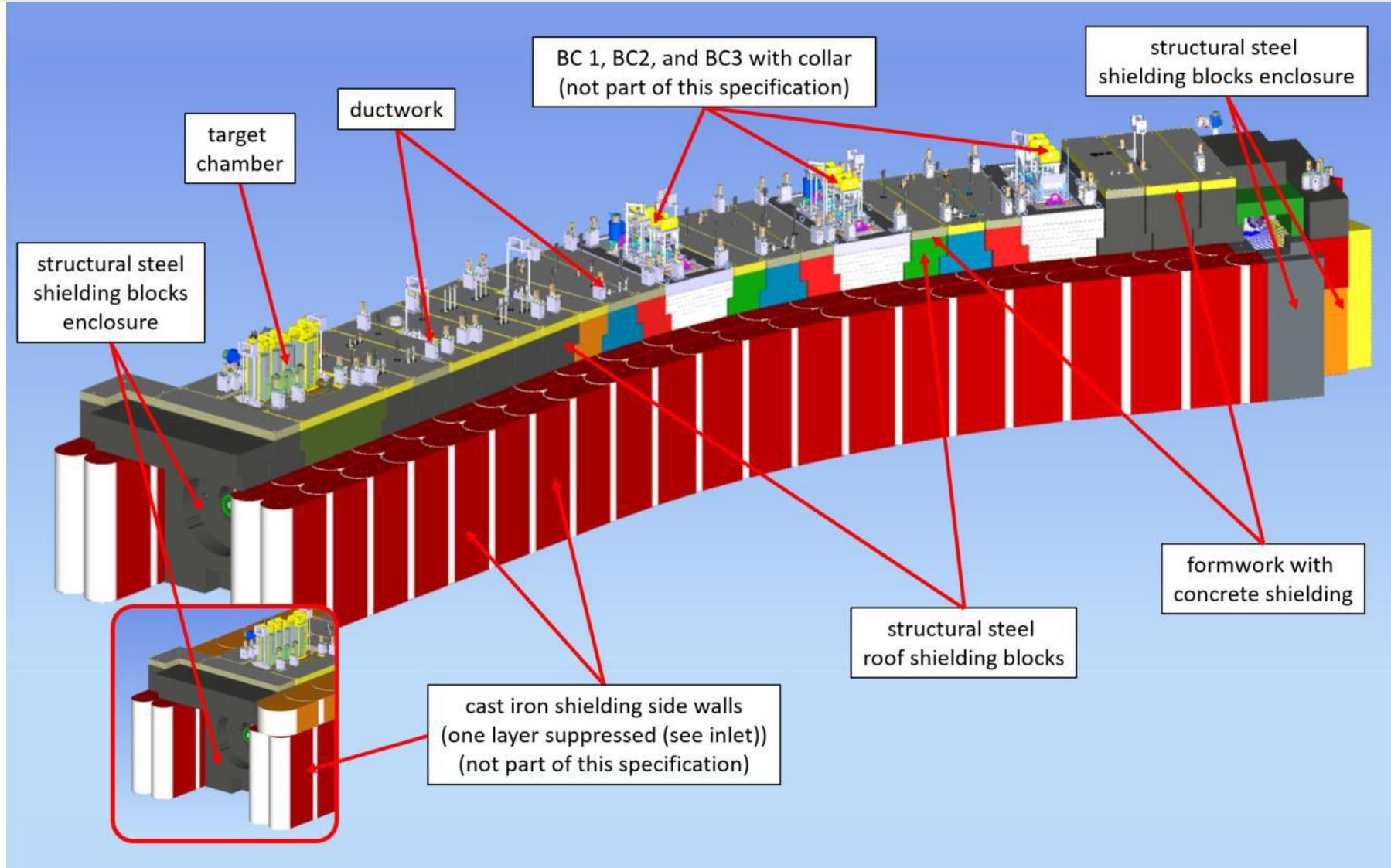


CSIR - CMERI

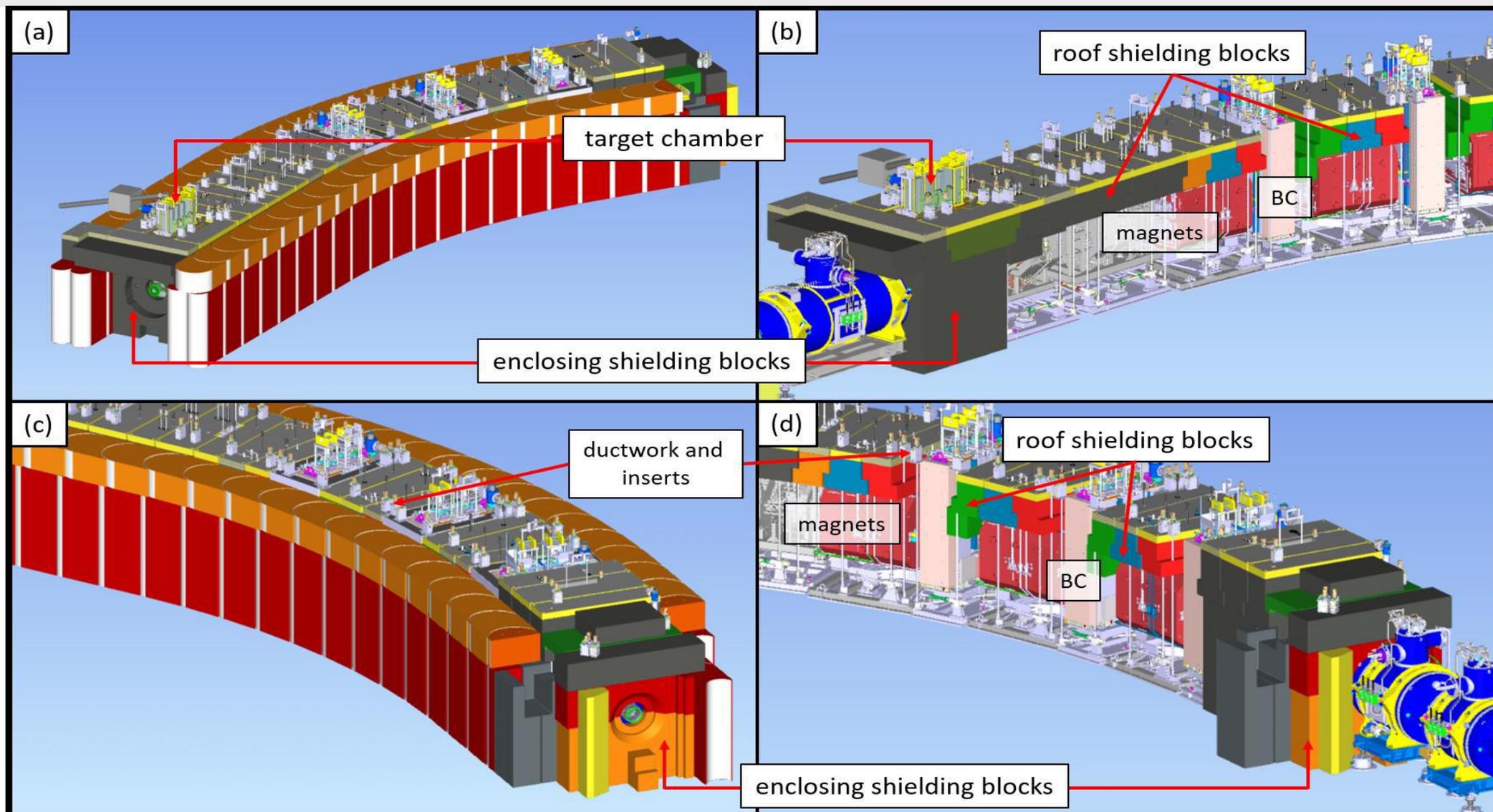
Abhijit Mahapatra

Iron Roof Shielding

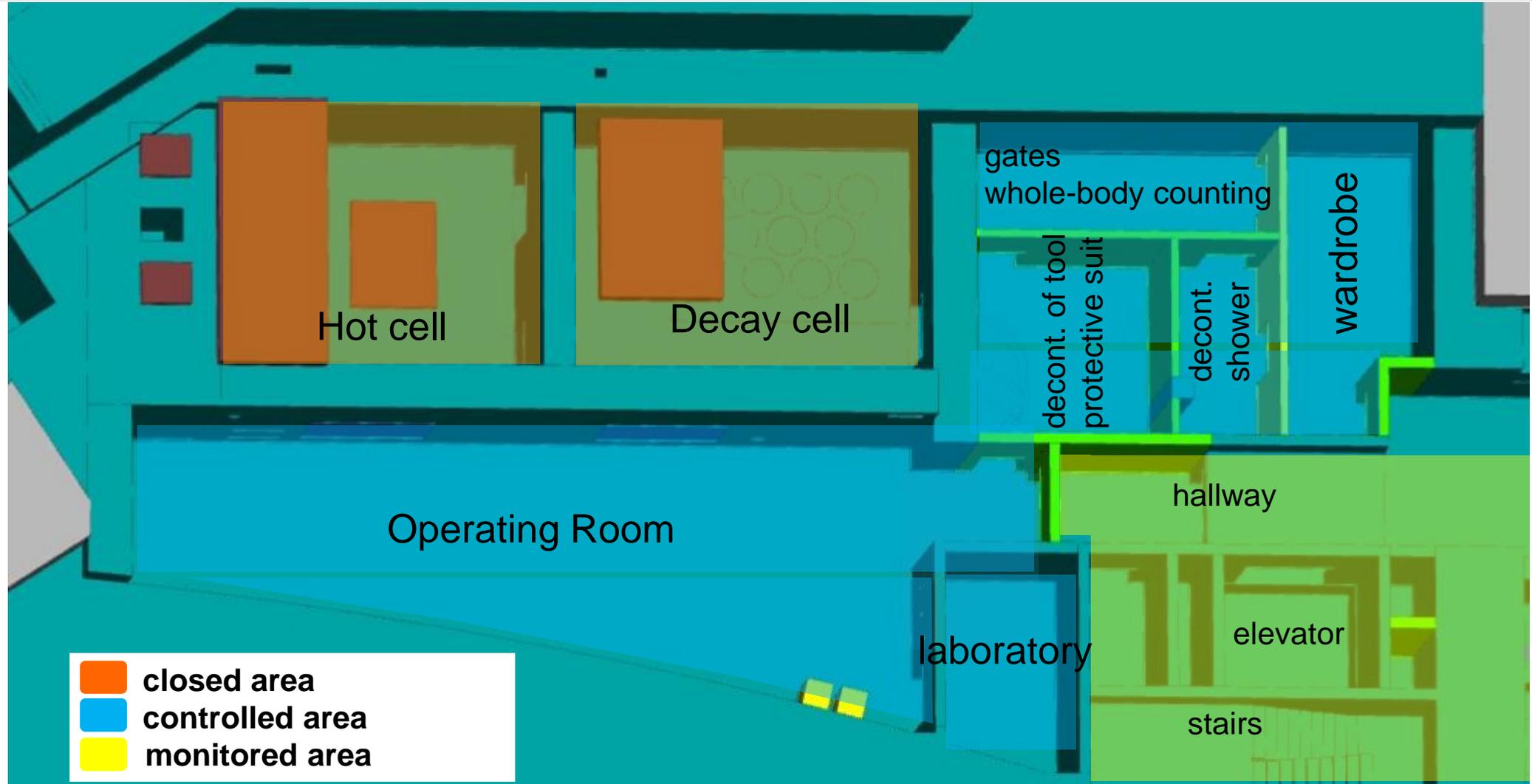
Tunnel Layout



Iron Roof Shielding Blocks

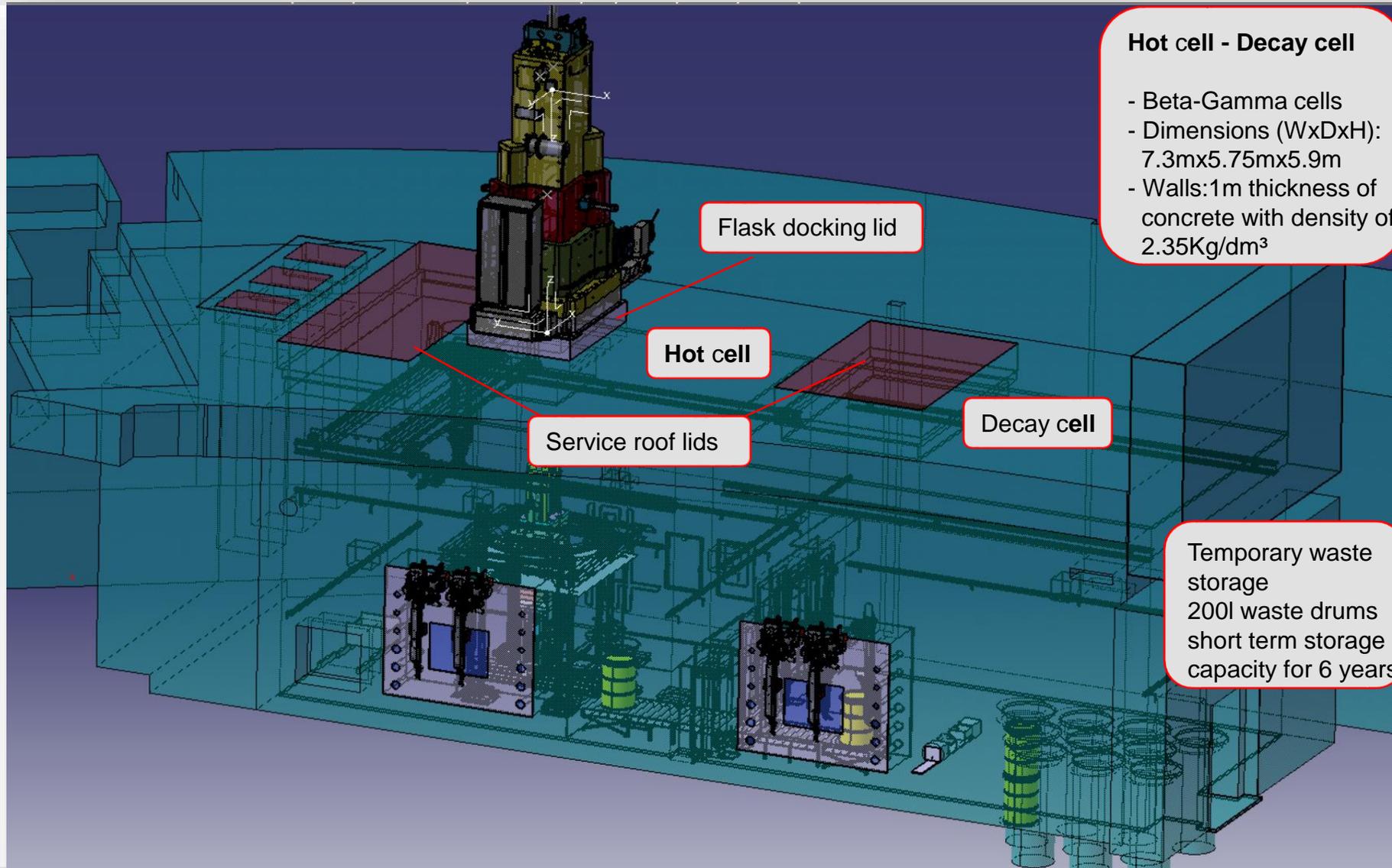


The Hot Cell Complex



The Hot Cell

3-D Layout



Hot cell - Decay cell

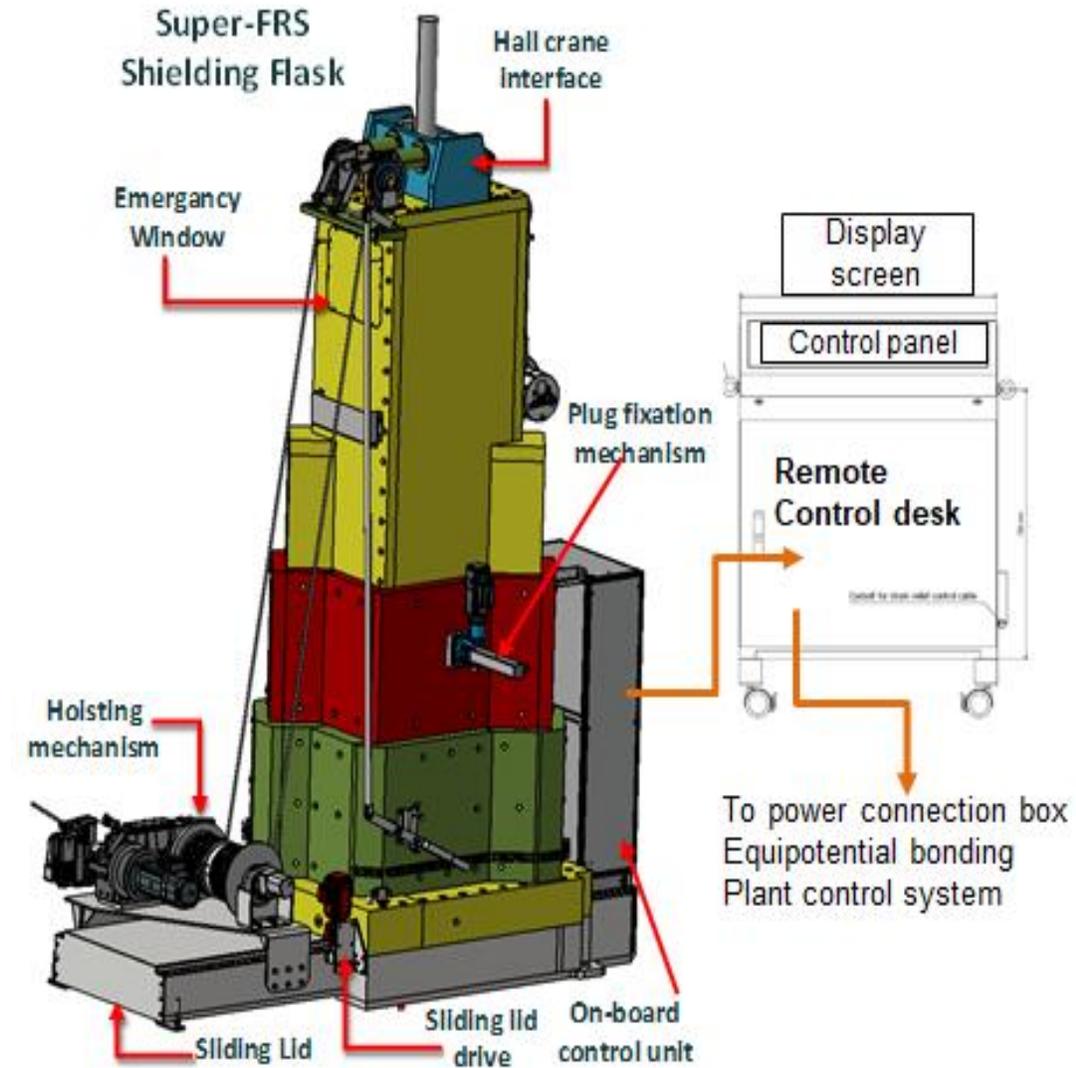
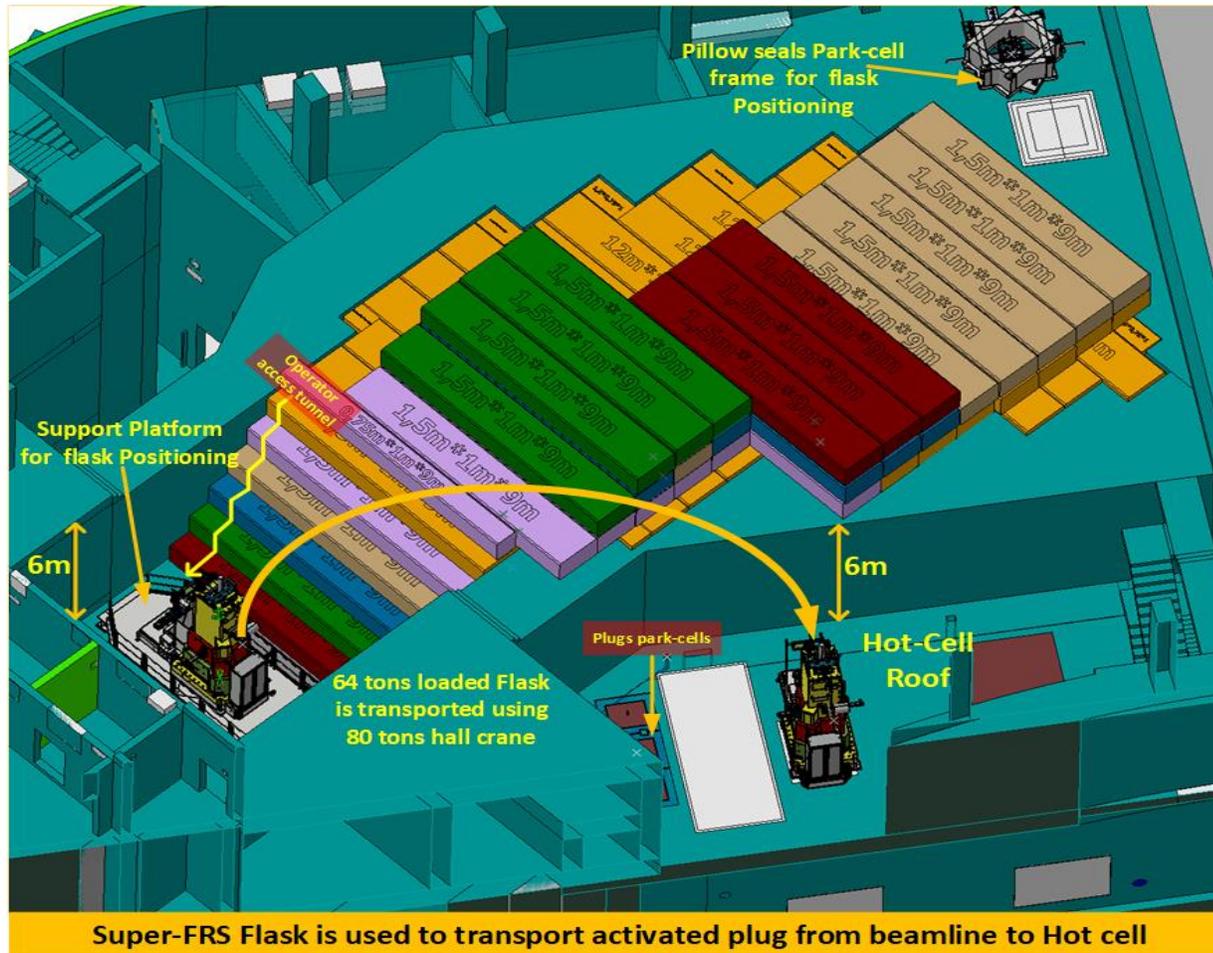
- Beta-Gamma cells
- Dimensions (WxDxH): 7.3m x 5.75m x 5.9m
- Walls: 1m thickness of concrete with density of 2.35Kg/dm³

Temporary waste storage
200l waste drums
short term storage
capacity for 6 years

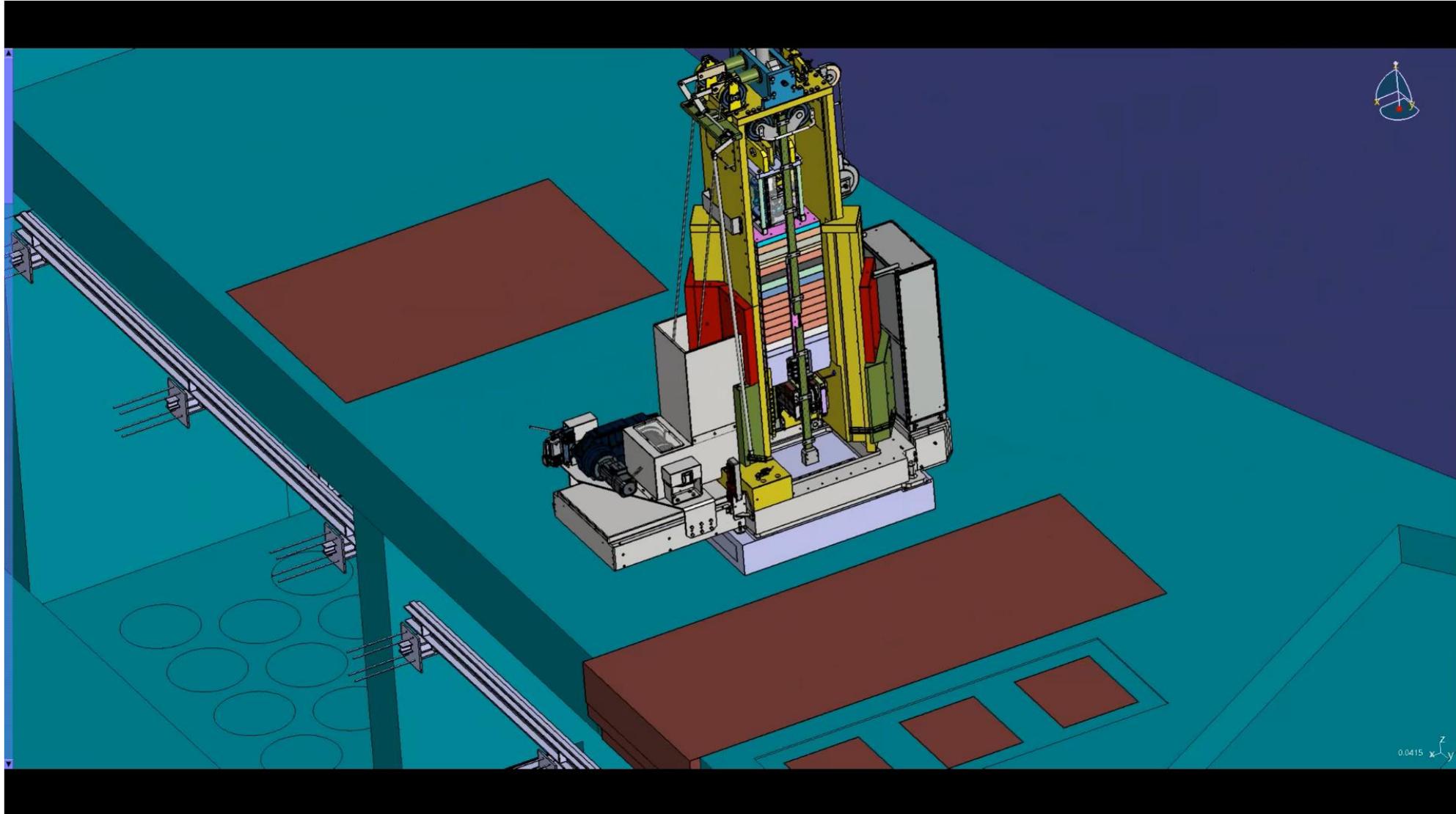
Hot Cell-Transport system

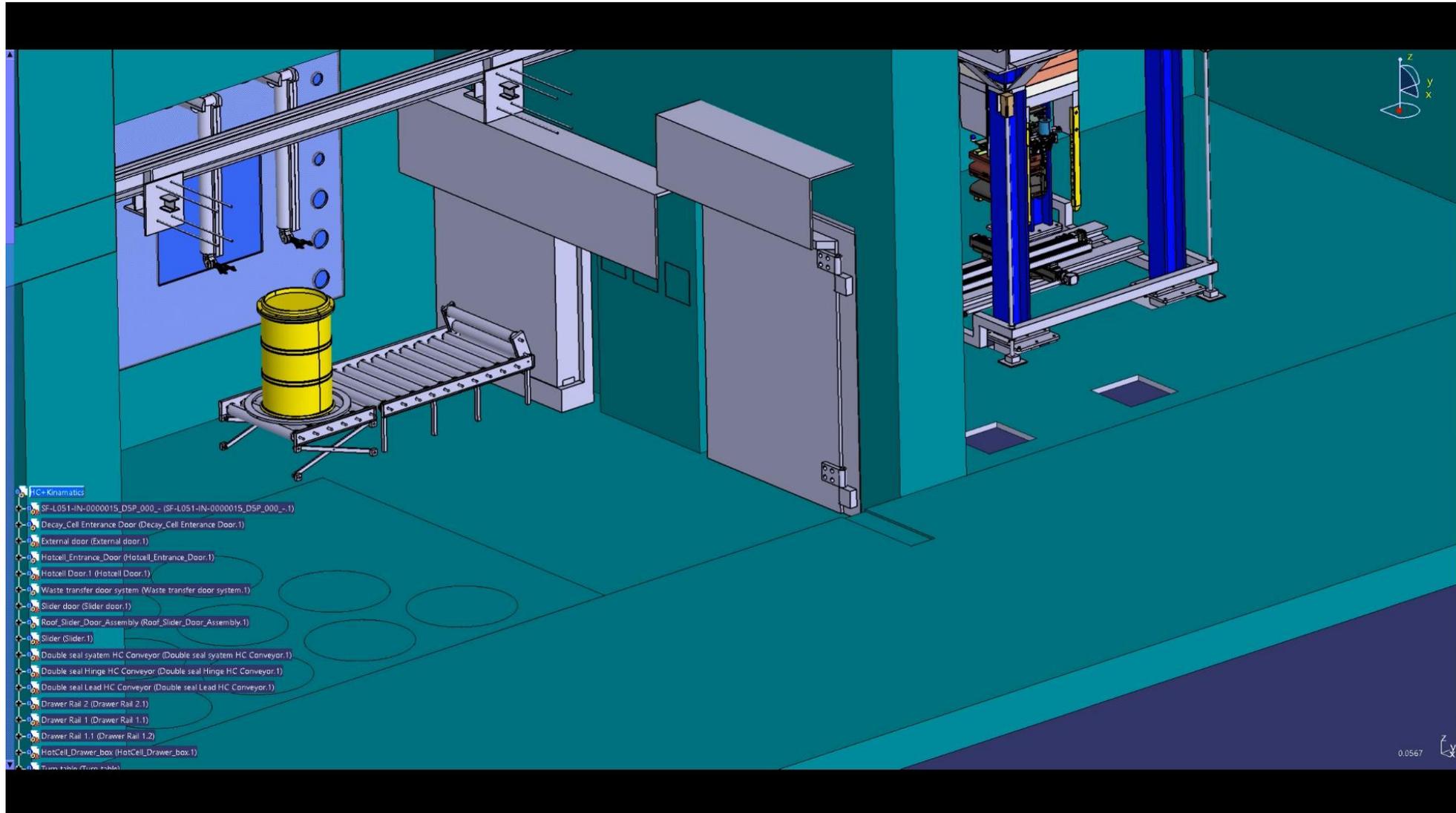
Shielding Flask

Remove 5-6 layers of concrete, place bridge, pull plug into flask, move to hot cell (80t hall crane)



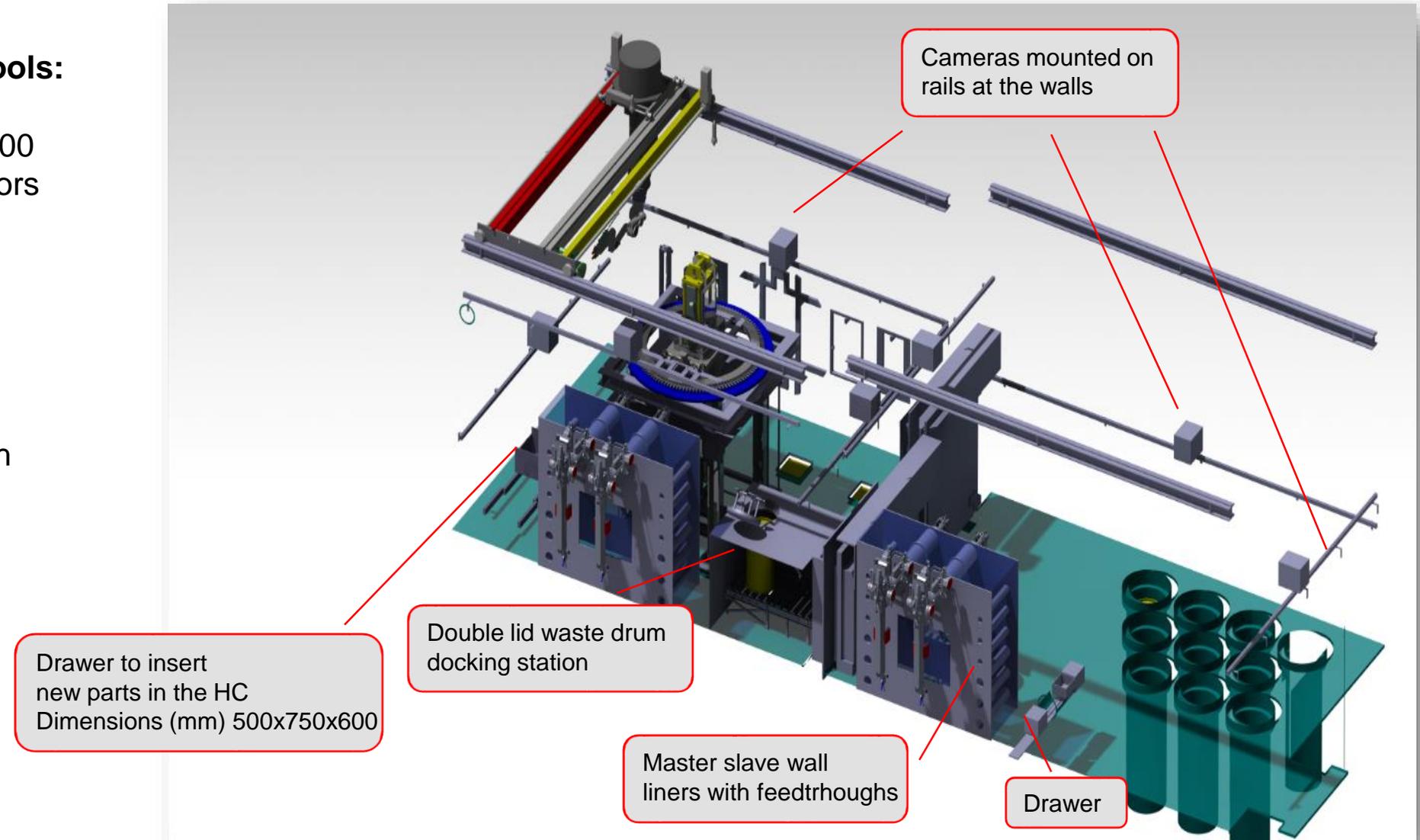
Shielding Flask with Hoisting sequence





The main manipulation tools:

- 2 pairs of Gettinge MT200 Master-slave manipulators
- Power manipulator Wälischmiller A1000
- Plug turntable with integrated Z- axis lifter
- Hydraulic Scissors
- BC extractor
- Waste drum convey with double lid gate
- Funnel drawers
- General purpose small tools



Remote Handling

Master-Slave and Power manipulators

Example of Power Manipulator



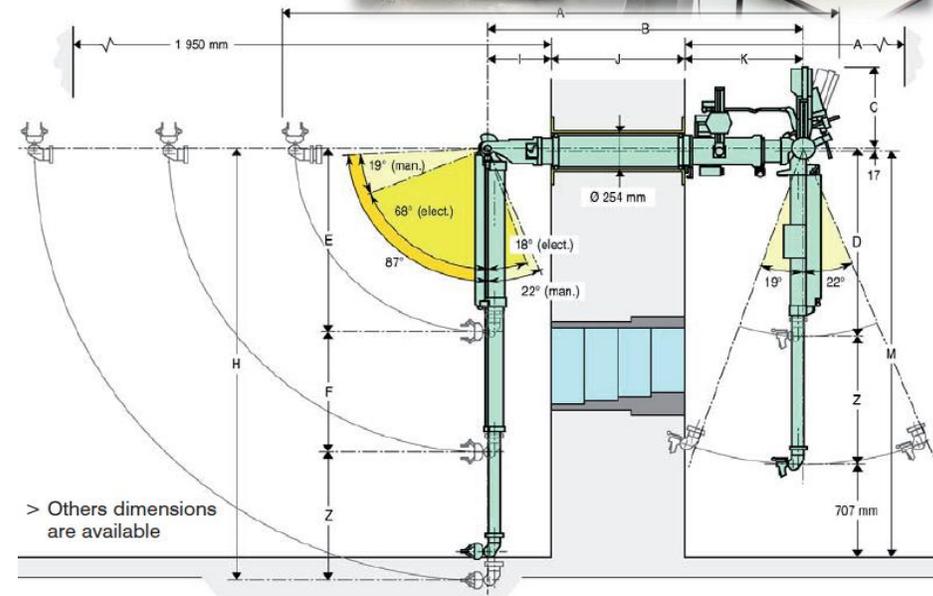
Getting MT200 Technical Specs

- Max load capacity: 20daN
- Max tongs force: 22daN
- Max tongs opening: 90mm
- Total length extracted: E+F+Z: 3270mm
- Detachable gripper and tongs
- Booting on slave side



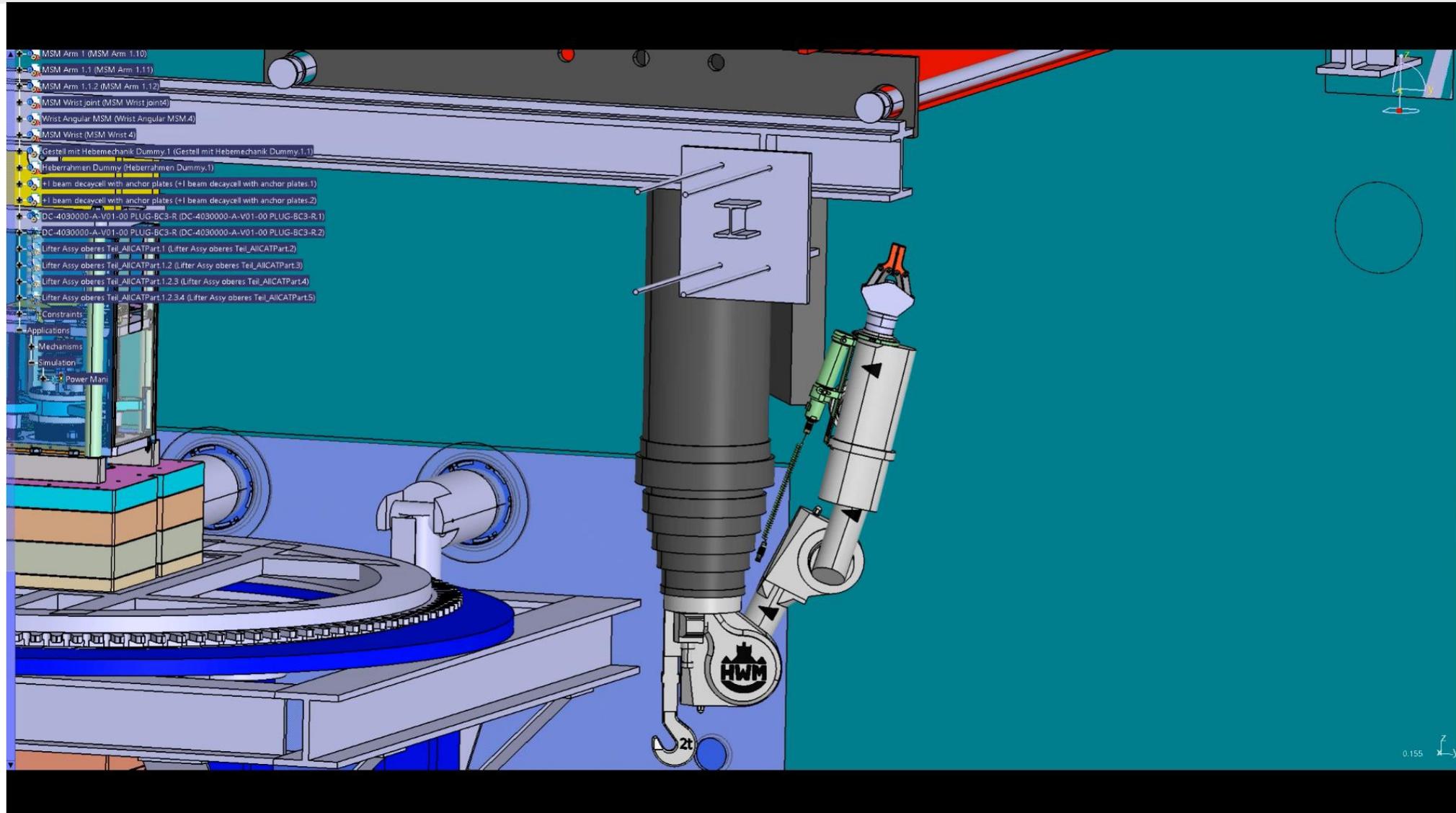
Wällschmiller A1000 Technical Specs

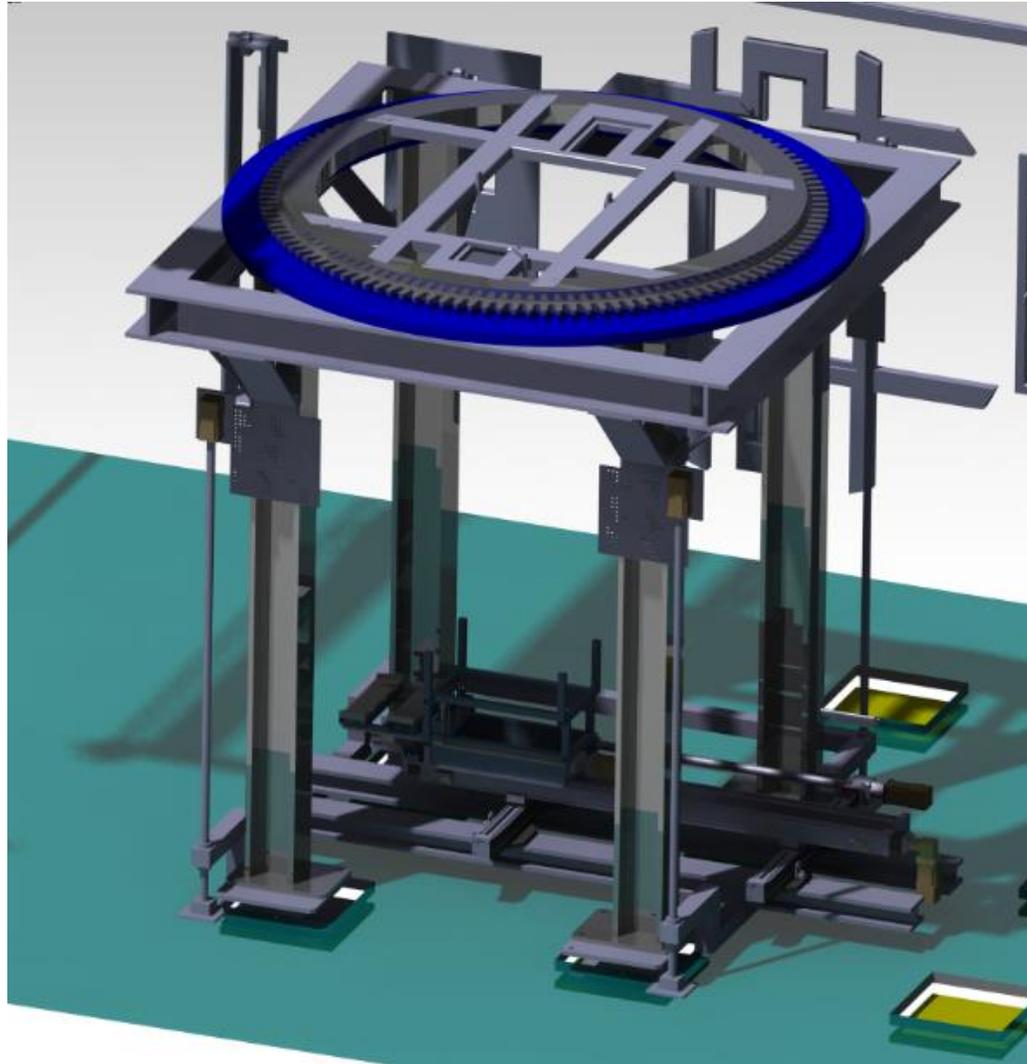
- Max load capacity: 200 daN
- Max crane load capacity: 2 Tonnes
- Force feedback
- 6 axis movement
- Radiation resistance: 1MGy



Remote Handling

Hotcell drawer and Power manipulators



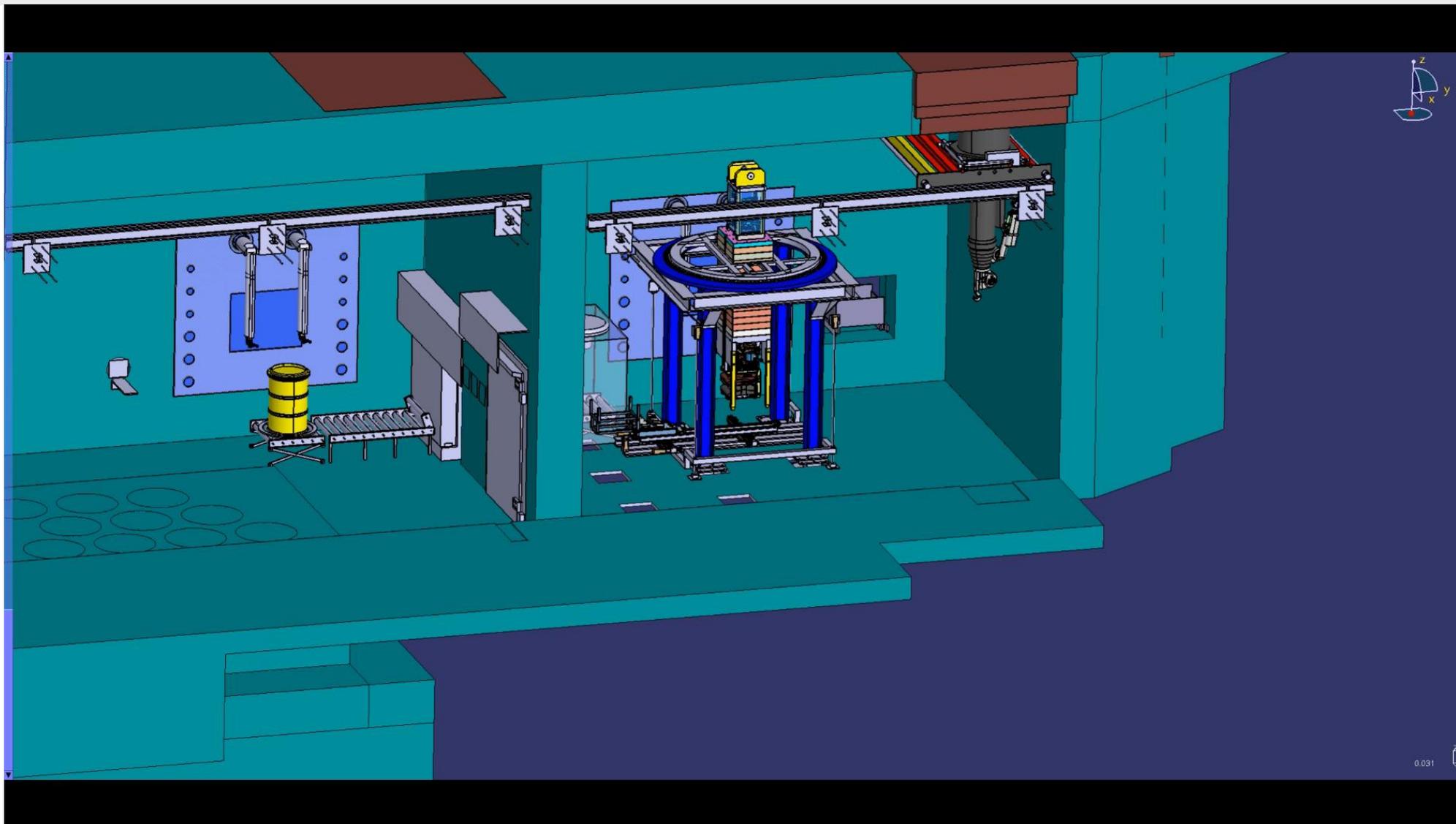


Requirements

- Max load capacity: 10t
- Rotation: 360° infinite
- Z-axis frame (lifter) integrated
- Redundancy for both movements
- Footprint 1500mmx1500mm
- Compatibility with all plugs means of adapter plates
- Attachment of the BC extractor on the Z-axis frame
- Mounting of tools for the disassembly/cutting p-bar parts
- Integrated temporary tool / bolts storage

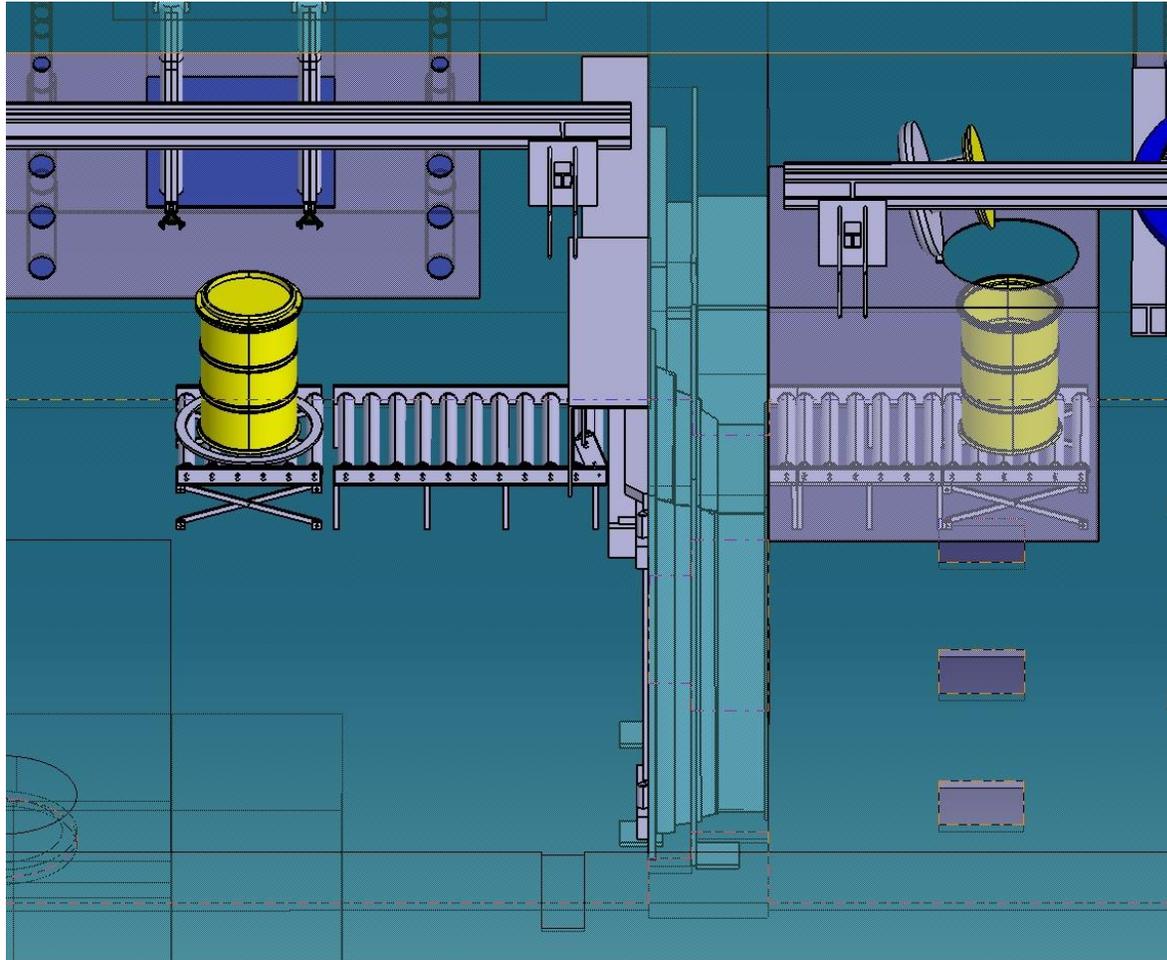
Remote Handling

Turn Table with Extractor accessory



Remote Handling

Double lid and Conveyor system

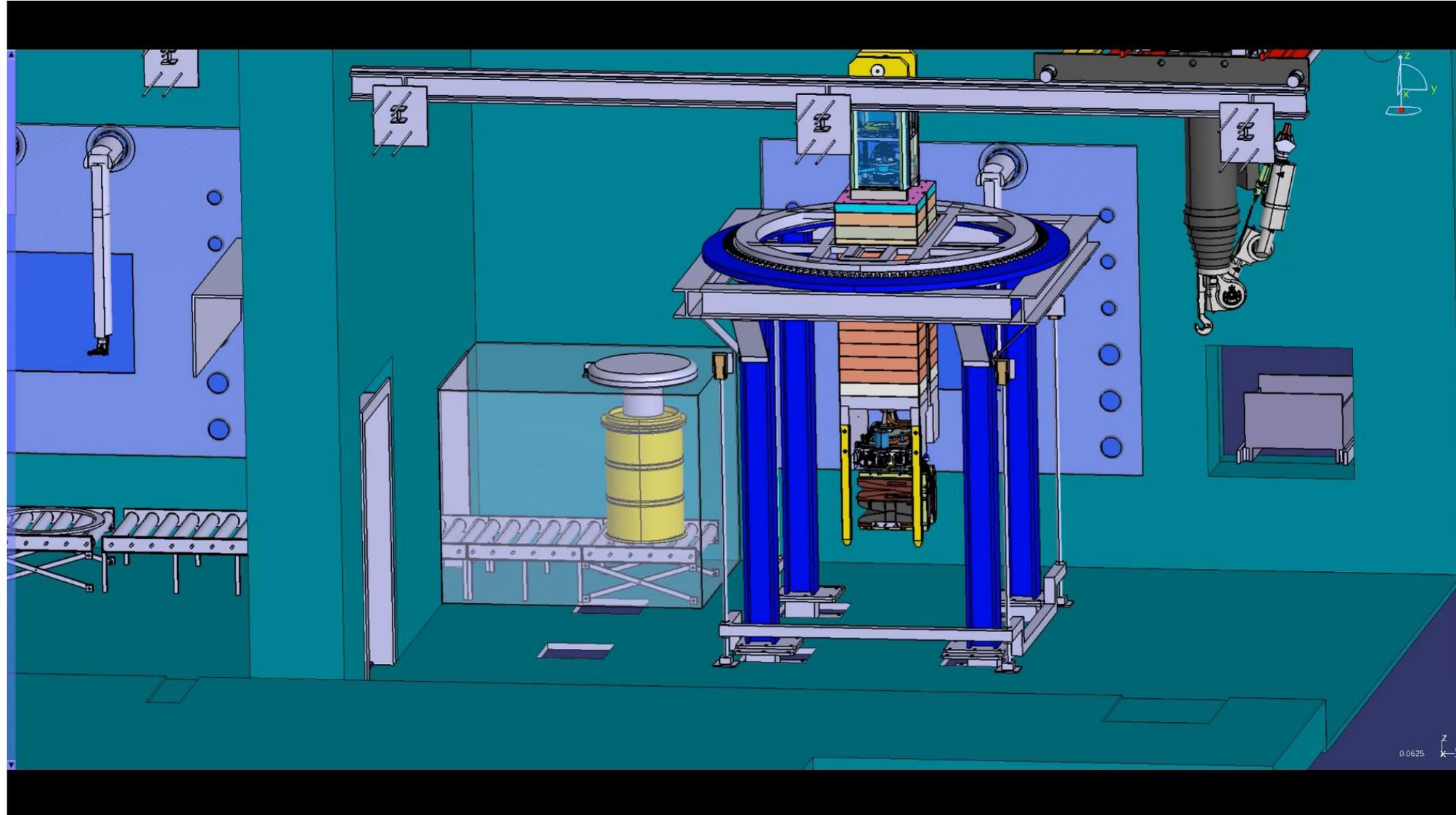


Requirements

- Max load capacity: 200 L
- Rotation in Decay cell: 360° infinite
- Redundancy for both movements
- Connection with sliding door
- Movable bridge system
- Double lid inside the HotCell

Remote Handling

Double lid and Conveyor system





Open Points

- The Turn table
- The Slider on roof top for shielding flask
- The waste drum conveyor system with double lid
- The Power Manipulator
- Other equipment of the HC (cameras, power supplies, tools, etc.)
- Activation measurement station in hot cell and decay cell
- Waste storage drums, radioactivity measurement system



Thank you . . .

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