

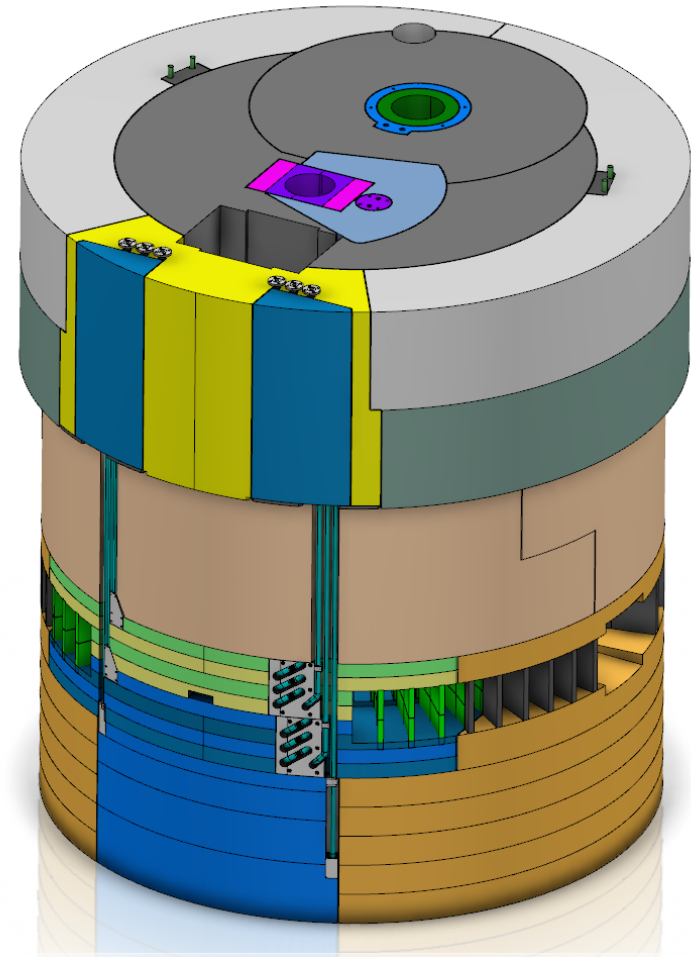
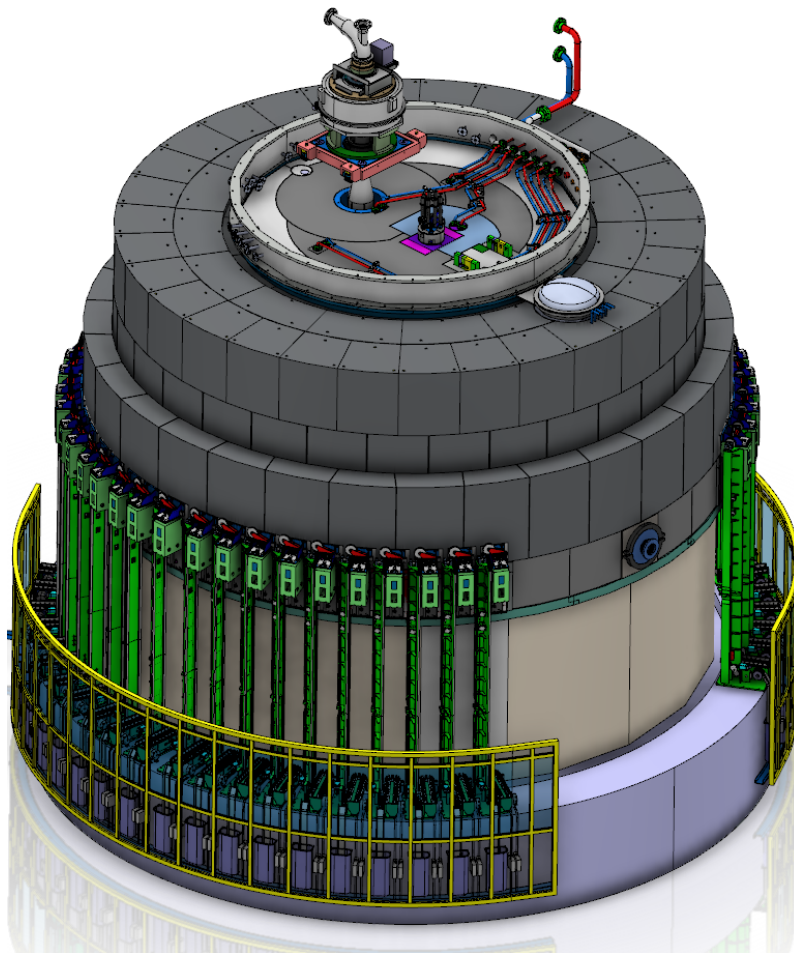
TIK.4.8 Re-Packaging Monolith Shielding Systems

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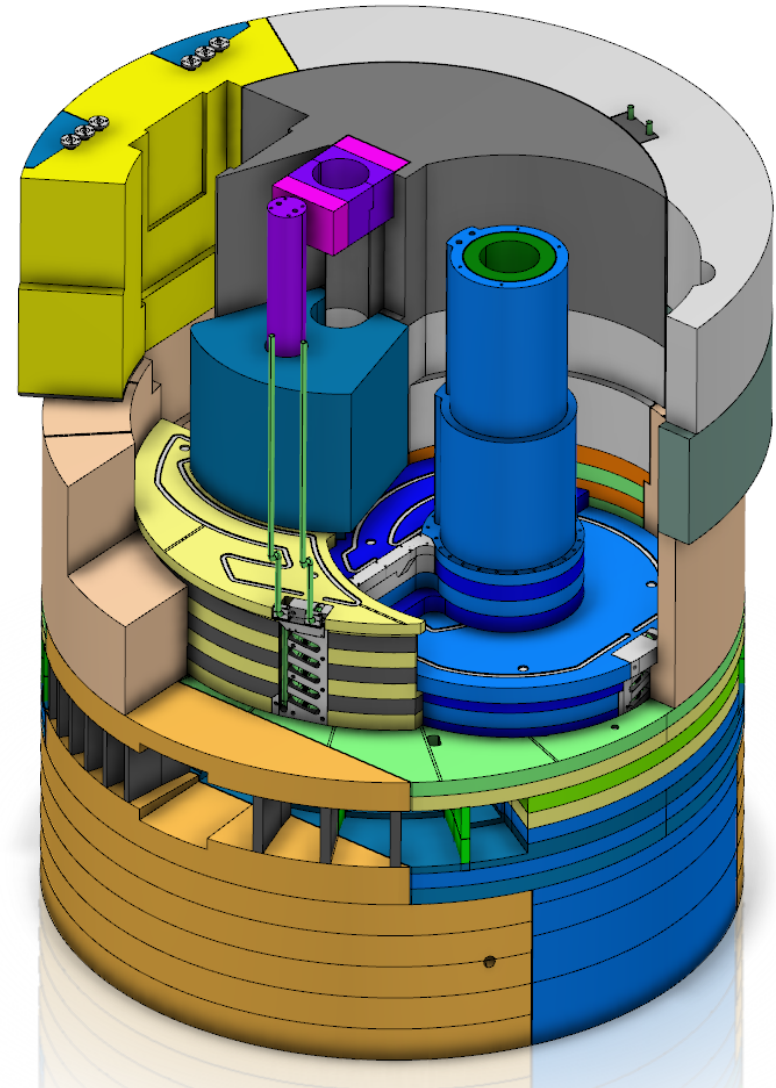
December 17, 2015

Inner shielding, Monolith



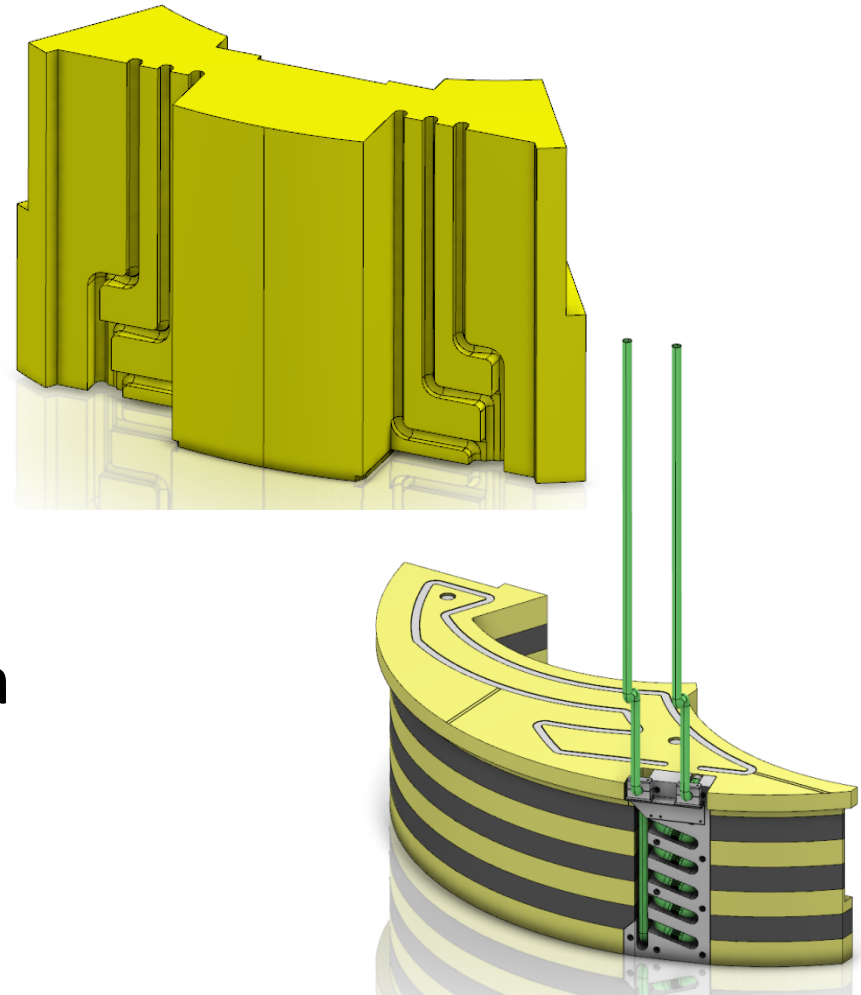
Inner shielding blocks design parameters

- 10mm gap between blocks.
- Steps to prevent neutron streams.
- Hot blocks max weight 55 ton.
- Max crane capacity, 95 ton.
- Blocks needs to be cooled with water up to SR1,5 meter from center.
- Minimize number of lifts to be able to exchange components like moderator, target wheel etc.
- Shielding end of life handling must be considered.

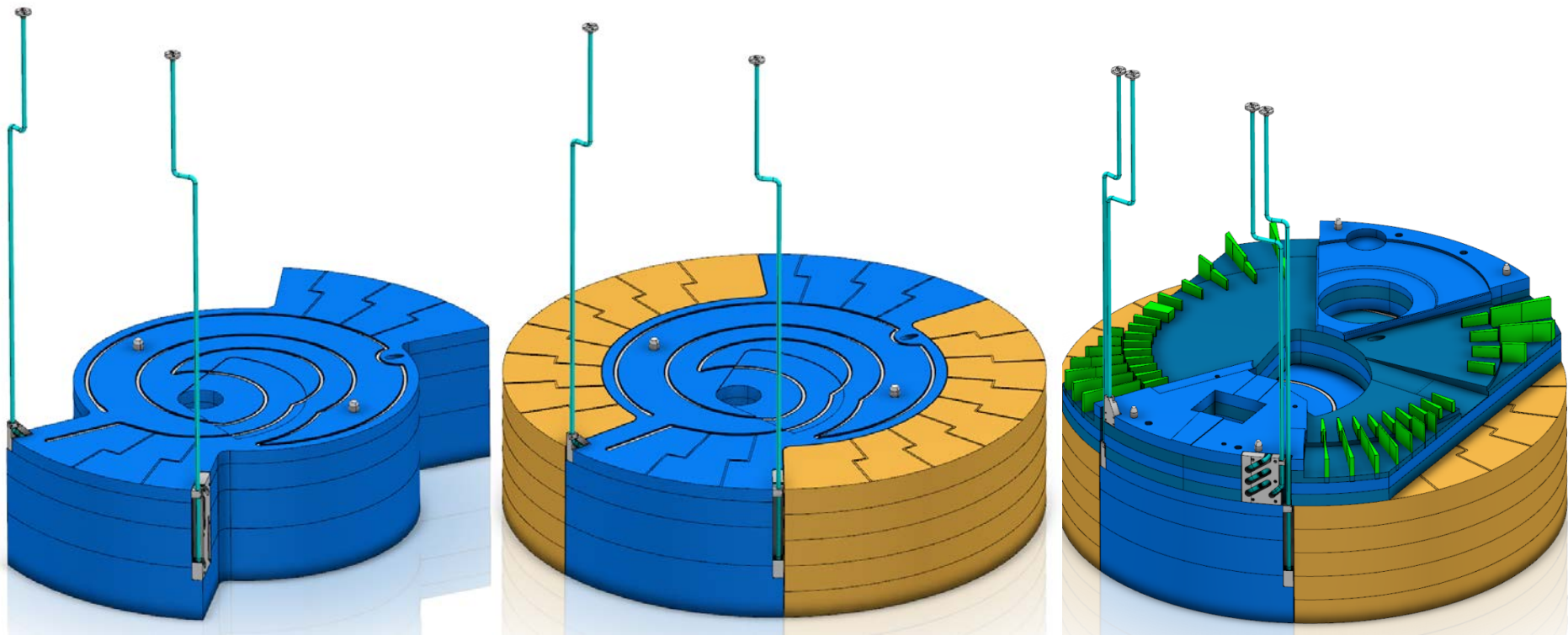


Type of blocks and build method

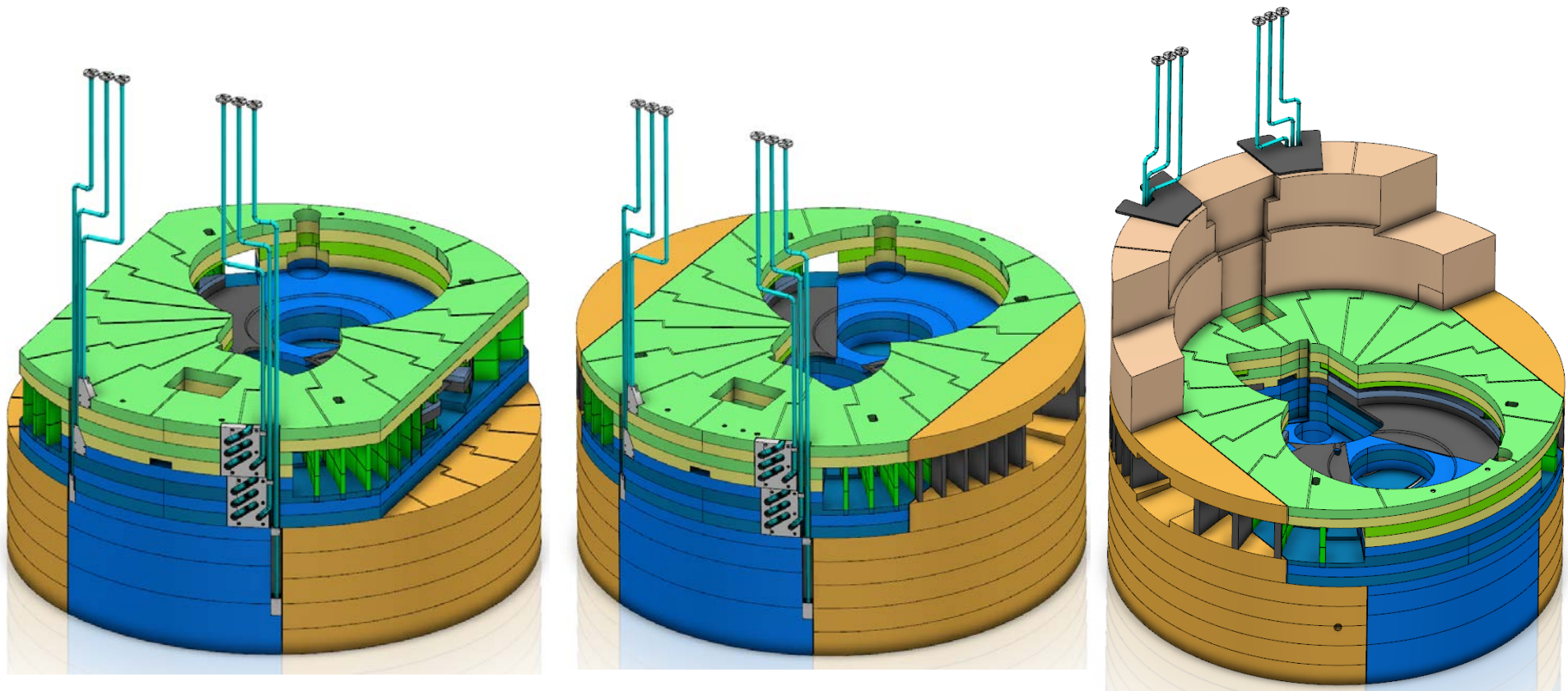
- Blocks with cooling.
- Blocks that just fills space.
- All large cooled blocks built from stacked plates. Plates bolted together to form a complete block unit.
- Scrapped blocks can be taken apart for easier handling.



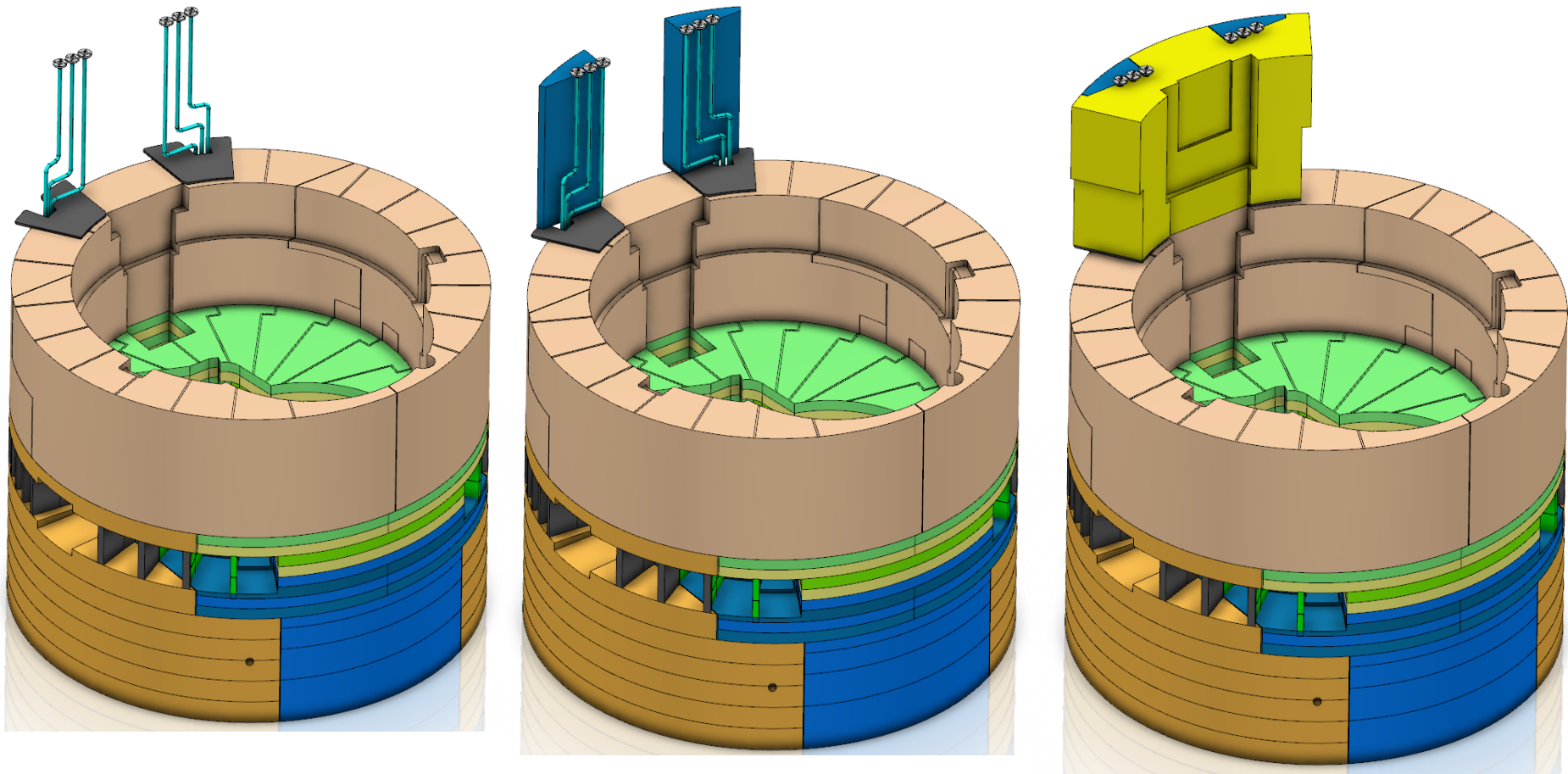
Shielding block assembly steps, 01



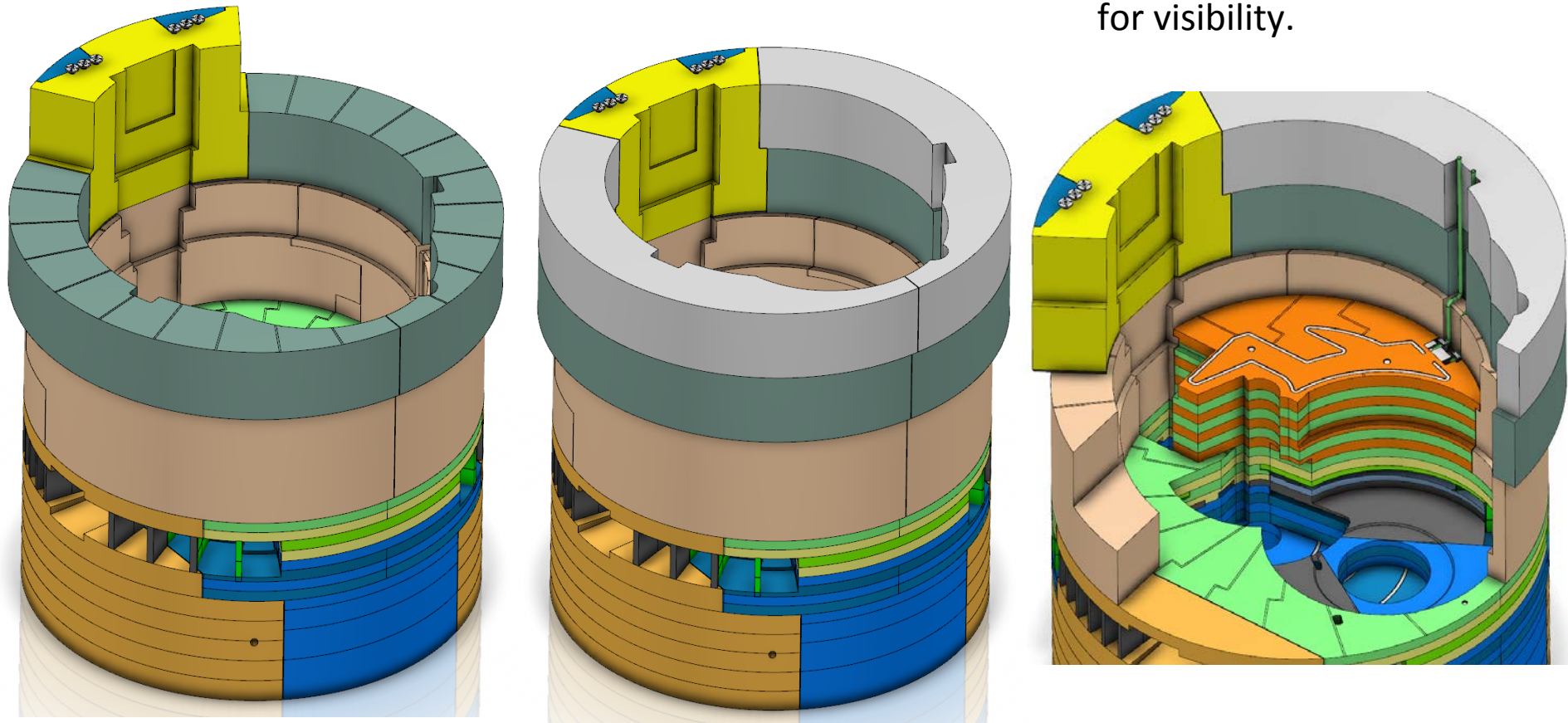
Shielding block assembly steps, 02



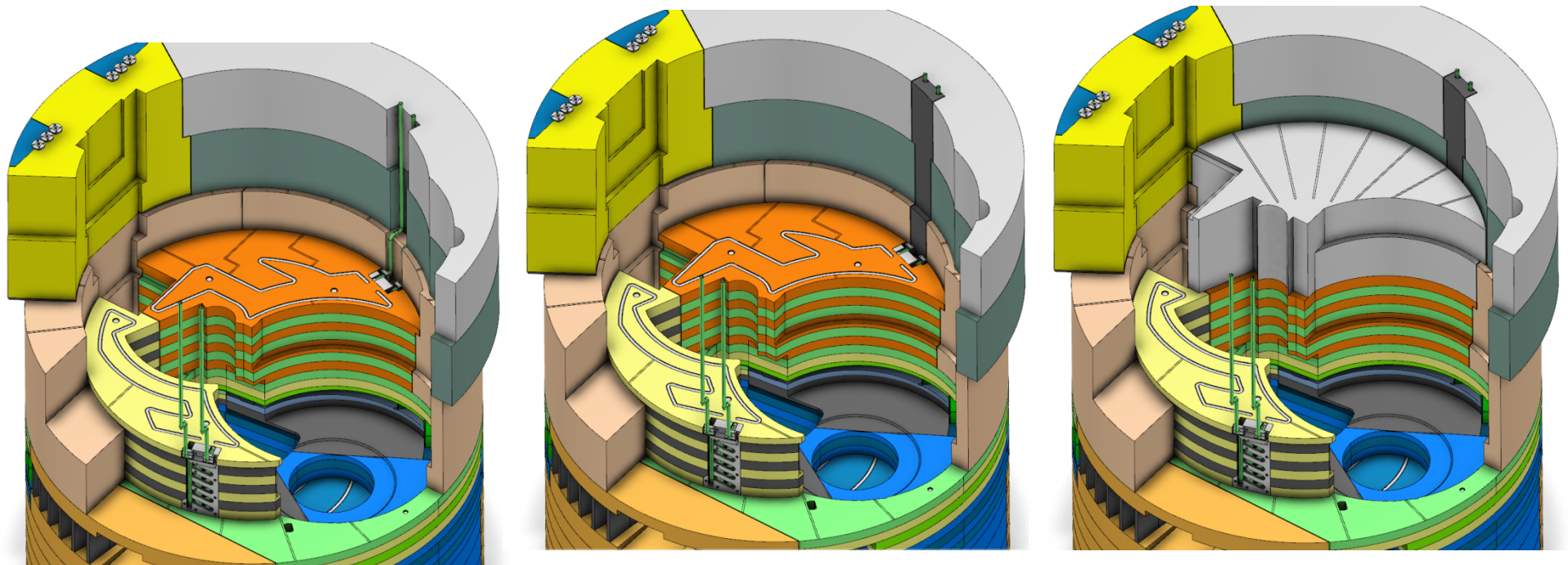
Shielding block assembly steps, 03



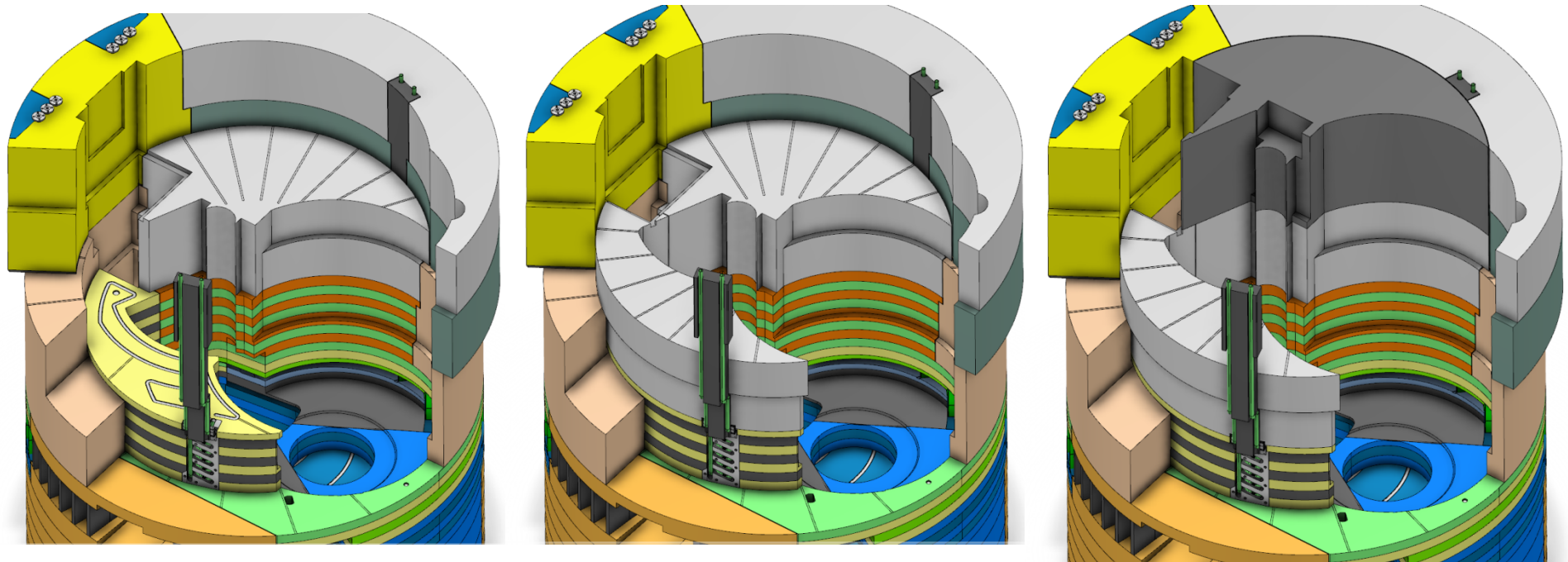
Shielding block assembly steps, 04



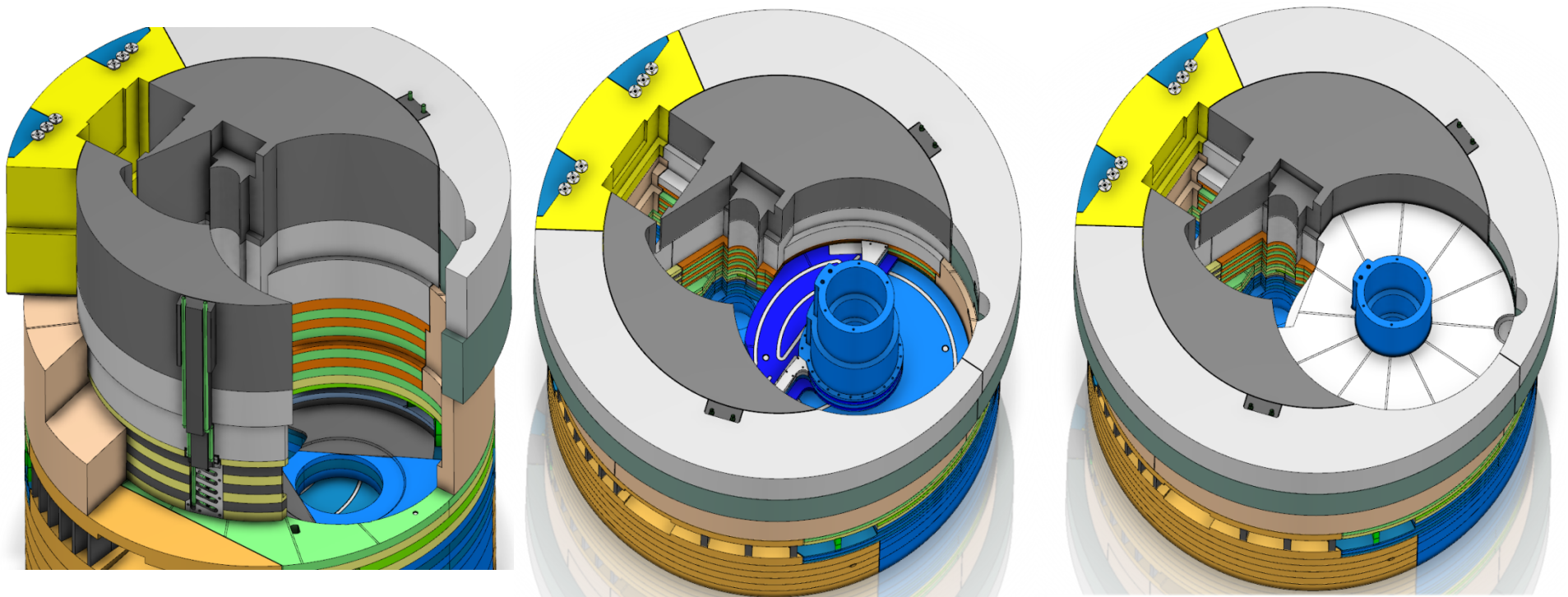
Shielding block assembly steps, 05



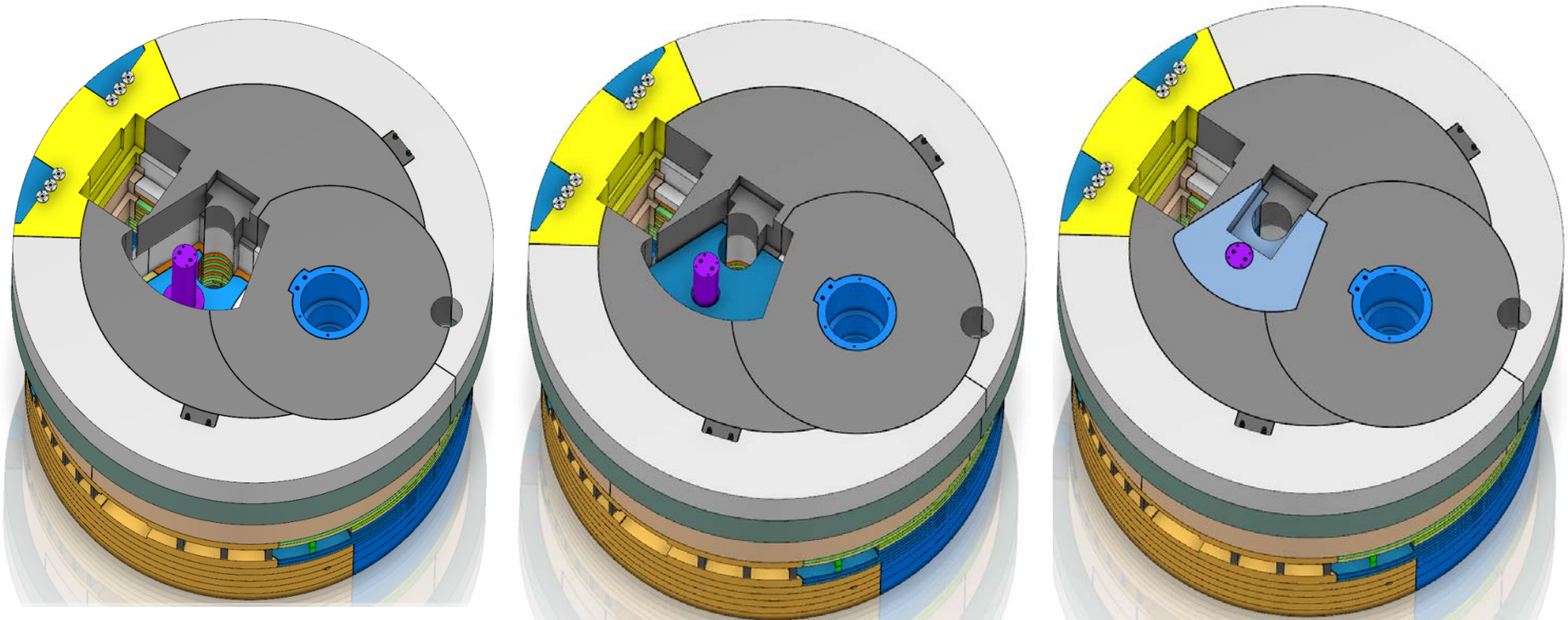
Shielding block assembly steps, 06



Shielding block assembly steps, 07

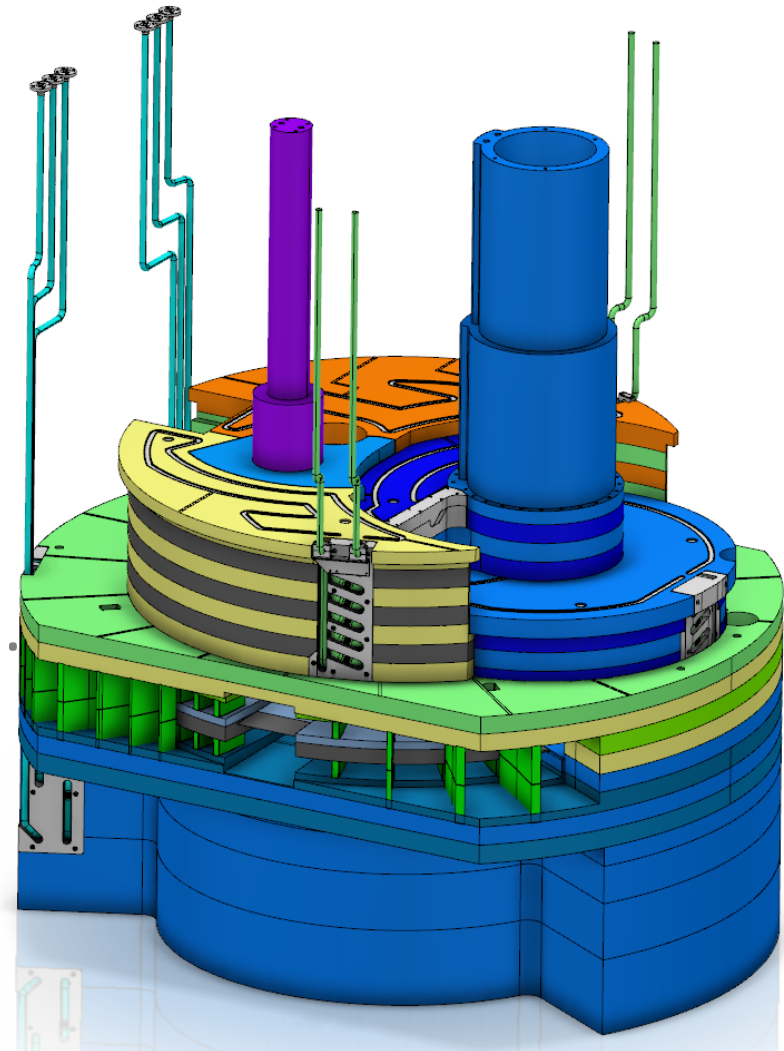


Shielding block assembly steps, 08



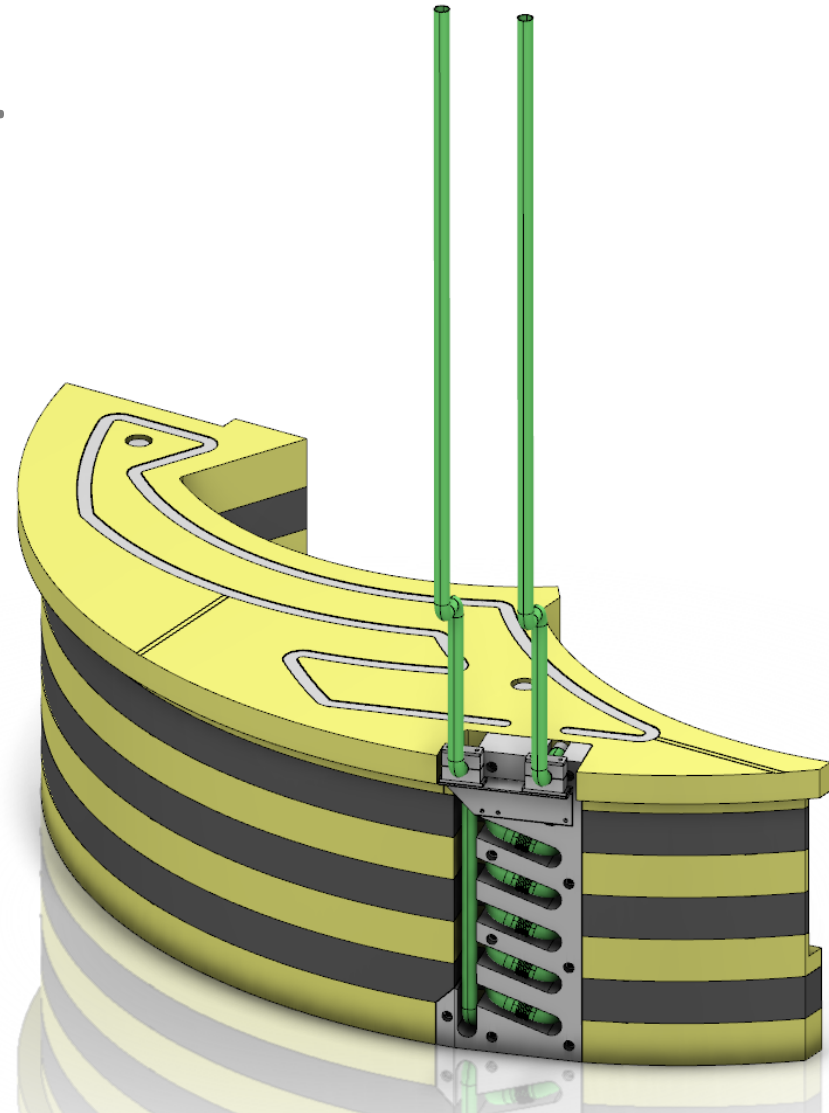
Cooled blocks

- North block, yellow and grey.
- East block, purple and blue.
- South block, orange and green.
- West block, blue and dark blue.
- Pancake top, green and yellow.
- Pancake bottom, blue and green.
- Reflector base, blue.



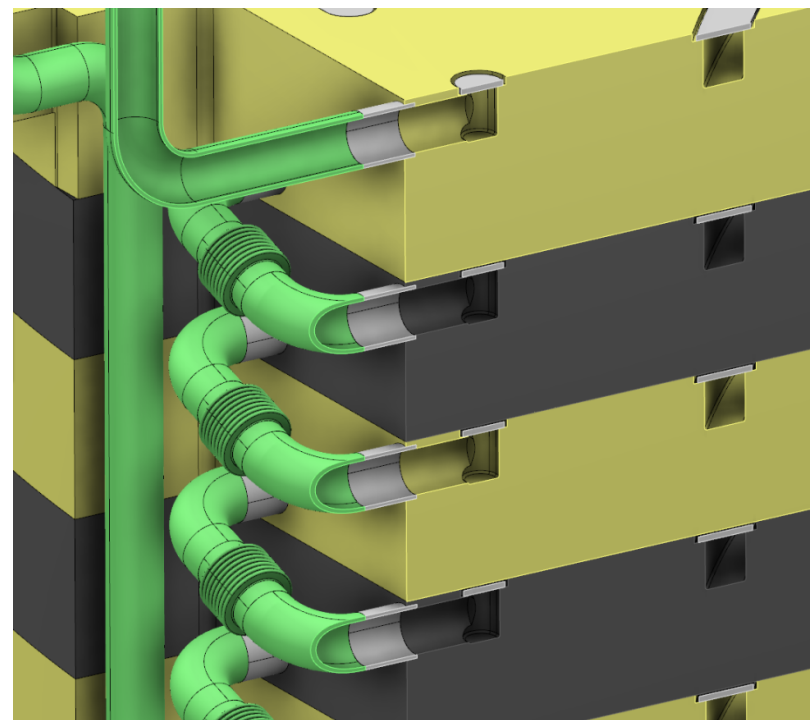
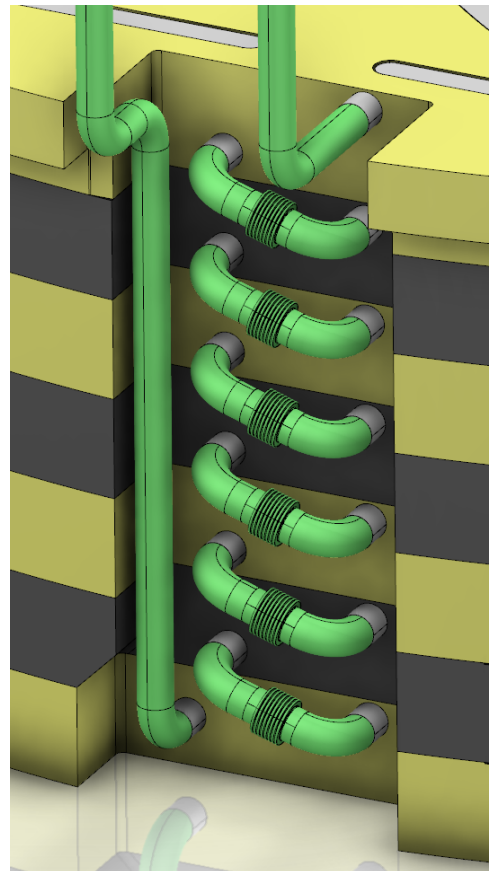
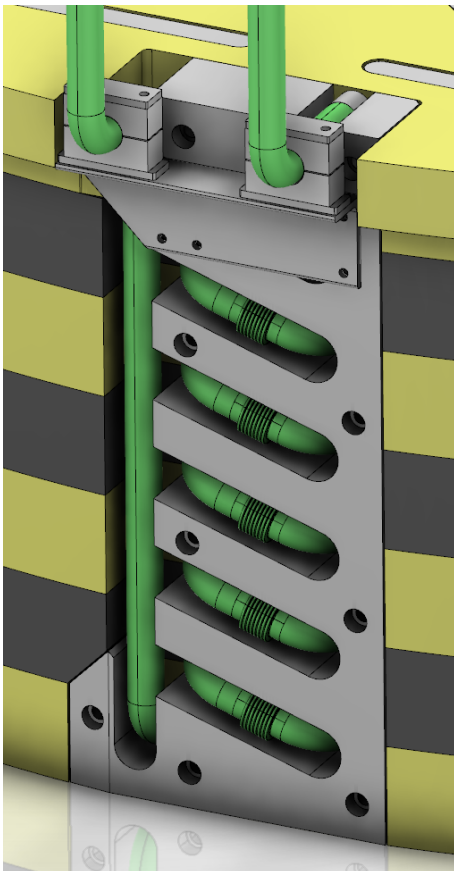
North cooling block

- North block weighs 19,8 tons.
- Length = 3,52 m.
- Width = 1,33 m.
- Height = 1,00 m.
- Plate thickness, 140-160 mm.
- Note that pipe flanges are missing.



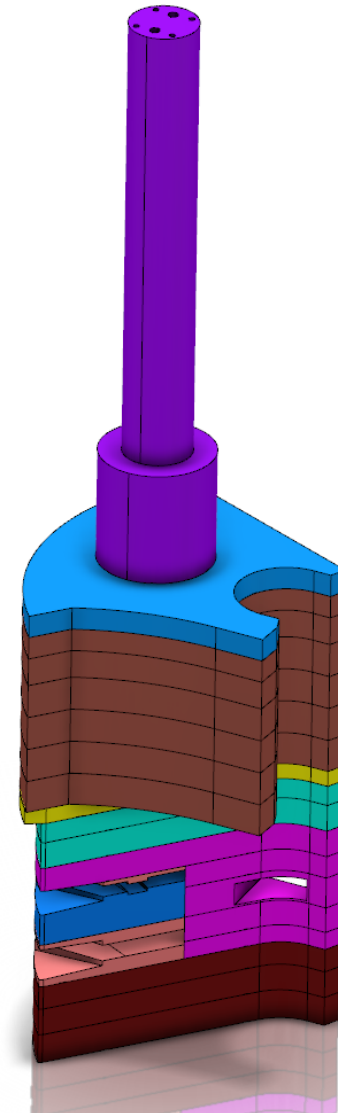
North cooling block details

- Cooling pipe shielding and pipe clamps.
- Cooling pipes, welded to pipe studs.
- Cross section through pipes, studs and cooling channels.



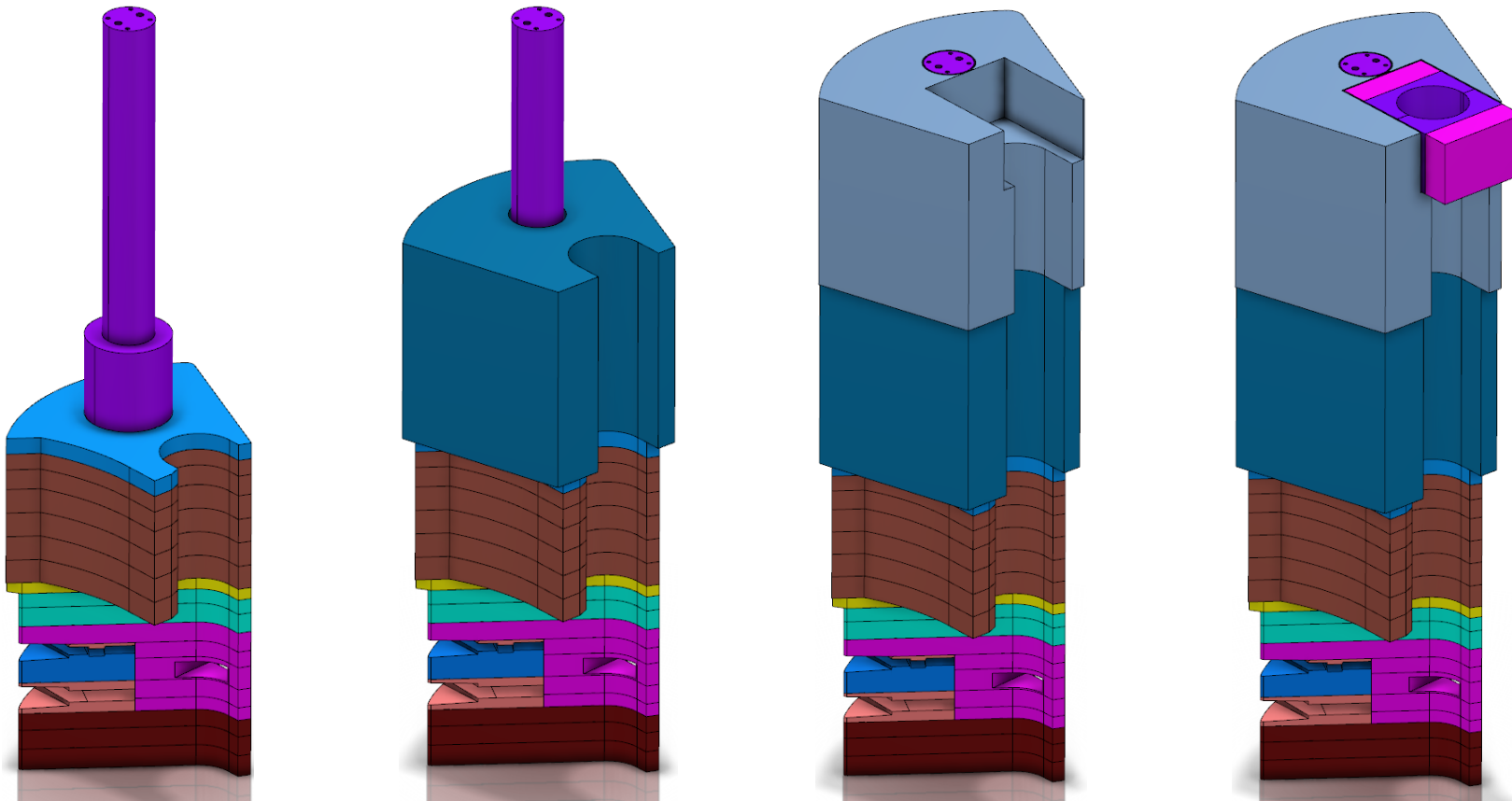
East cooling block, around moderator

- Block weighs 14,5 tons.
- Length = 1,36 m.
- Width = 1,30 m.
- Height = 4,61 m.
- Plate thickness, 140-160 mm.
- Note that pipe work is not finished.



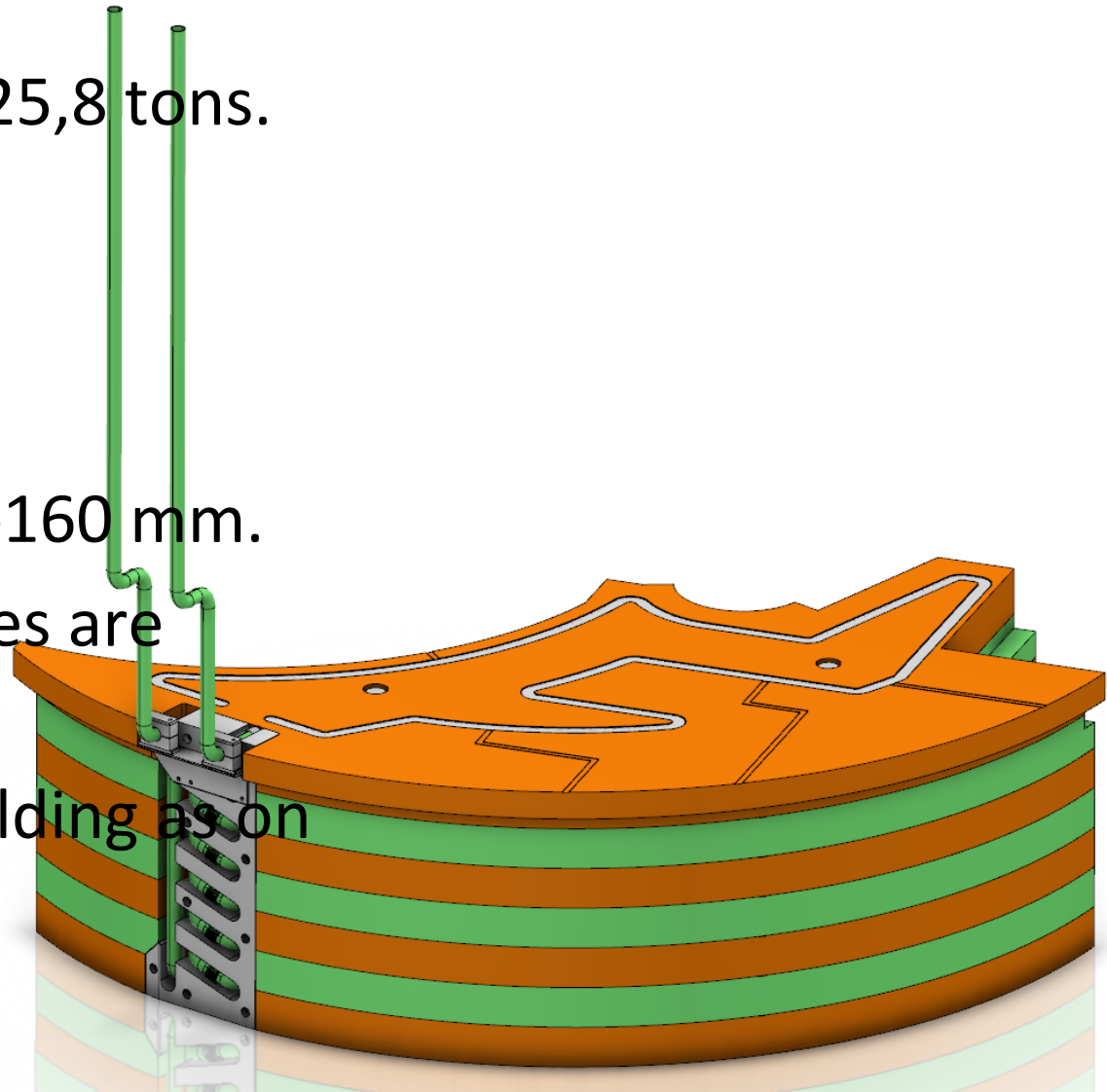
East cooling block details

- East cooling block should be matched to the shielding blocks above since geometry is complex.
- One supplier should make all components.



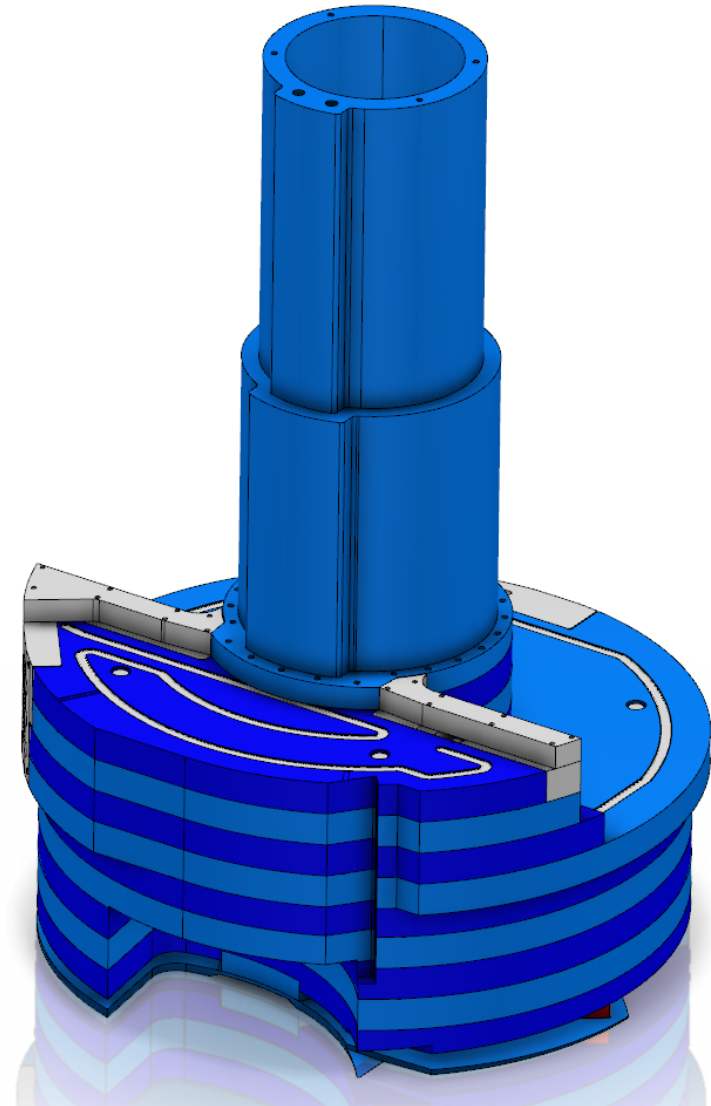
South cooling block

- South block weighs 25,8 tons.
- Length = 3,38 m.
- Width = 1,73 m.
- Height = 1,00 m.
- Plate thickness, 140-160 mm.
- Note that pipe flanges are missing.
- Same pipes and shielding as on North block.



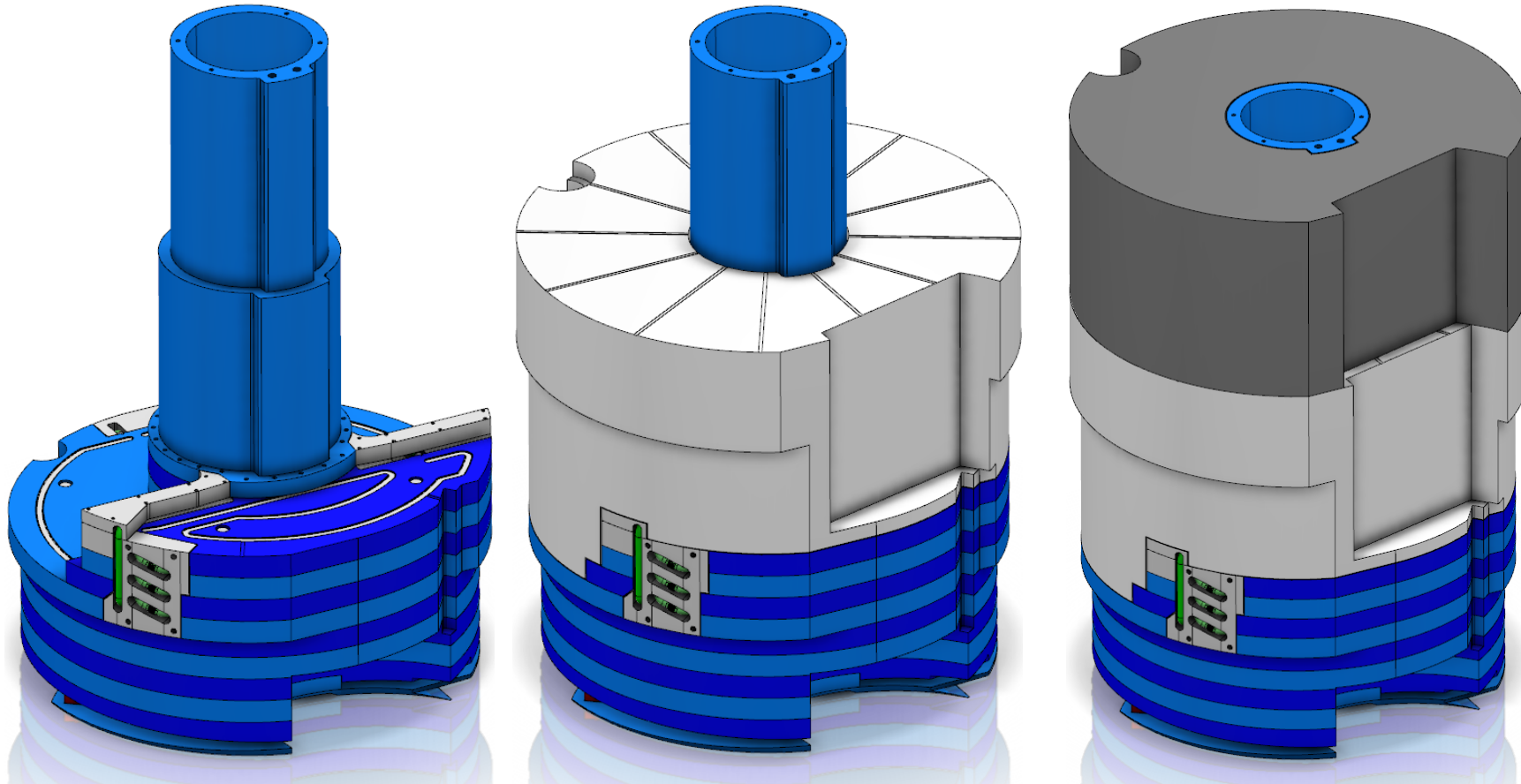
West cooling block, above Target Wheel

- West block weighs 50,2 tons.
- Length = 2,72 m.
- Width = 2,72 m.
- Height = 3,93 m.
- Center pipe with holes for lifting points and water feeds.
- Shielding blocks (grey) for pipe protection and shielding.



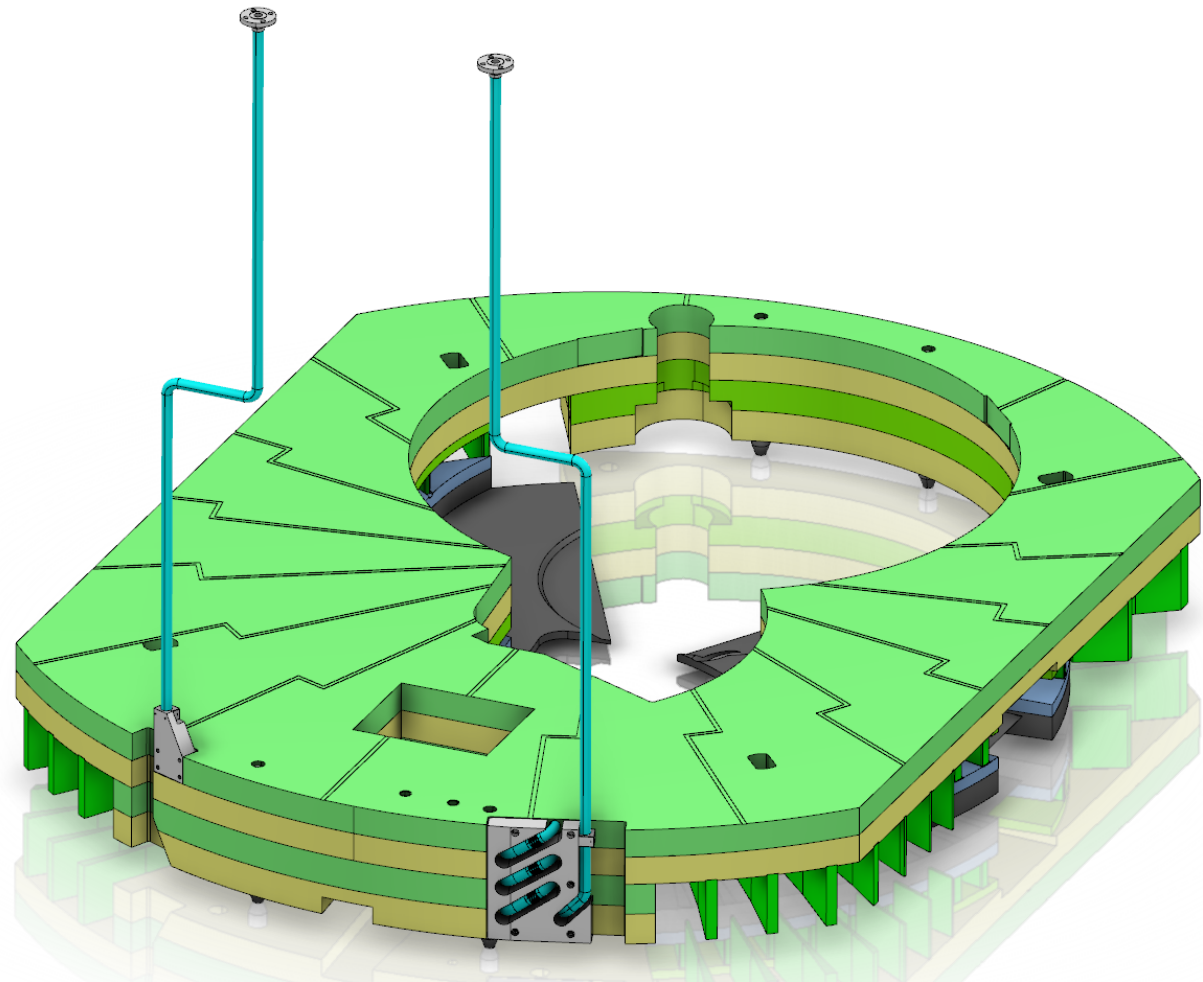
West cooling block details

- West cooling block should be matched to the shielding blocks above since geometry is complex.
- One supplier should make all components.



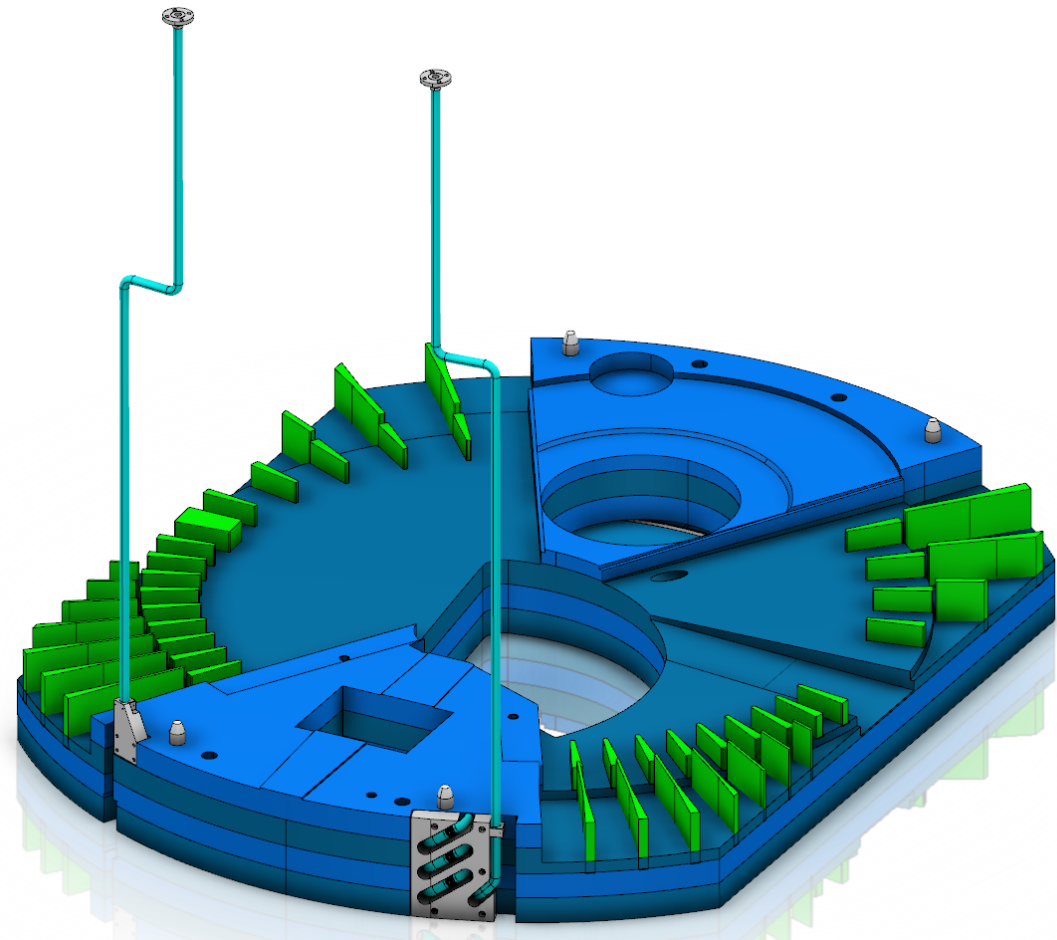
Pancake top cooling block

- West block weighs 42,7 tons.
- Length = 5,36 m.
- Width = 3,98 m.
- Height = 0,55 m.



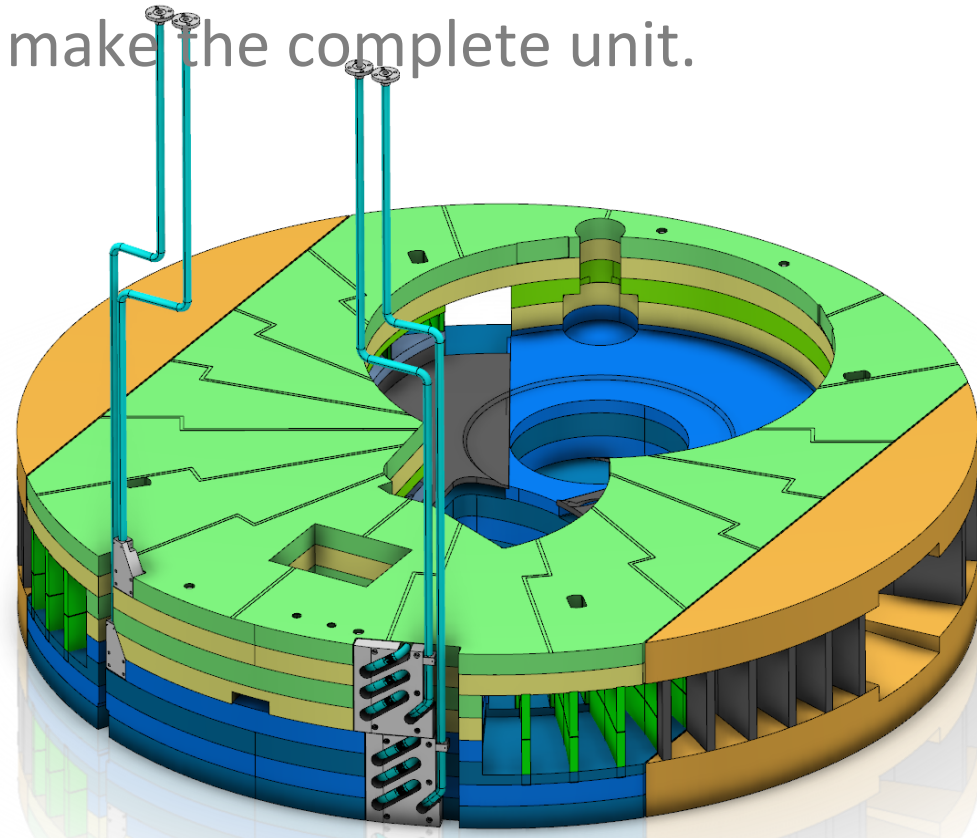
Pancake bottom cooling block

- West block weighs 56,9 tons.
- Length = 5,36 m.
- Width = 3,98 m.
- Height = 0,57 m.



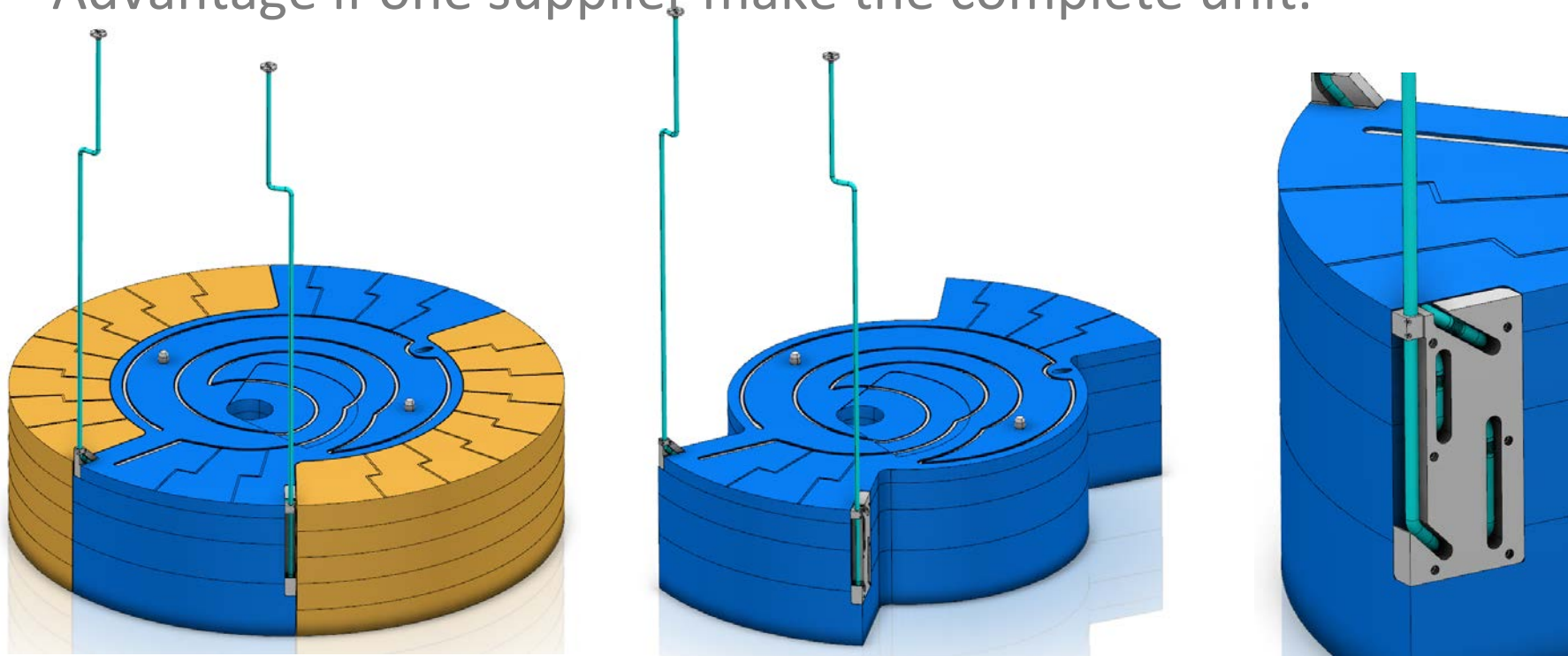
Pancake top and bottom

- Cooling blocks are to be matched to each other.
- Shielding on sides (orange) have shield plates and slots that must match features on cooling blocks.
- Advantage if one supplier make the complete unit.



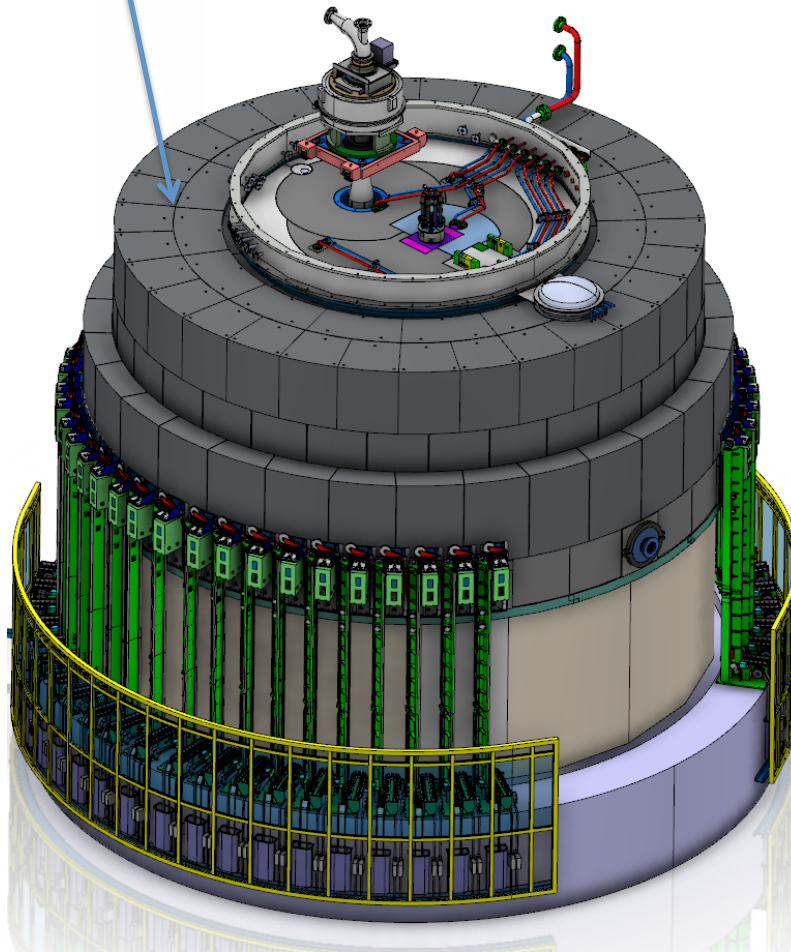
Reflector base

- Cooling block and outer shielding are to be matched to each other.
- Pipe welding must be done inside vacuum vessel.
- Advantage if one supplier make the complete unit.

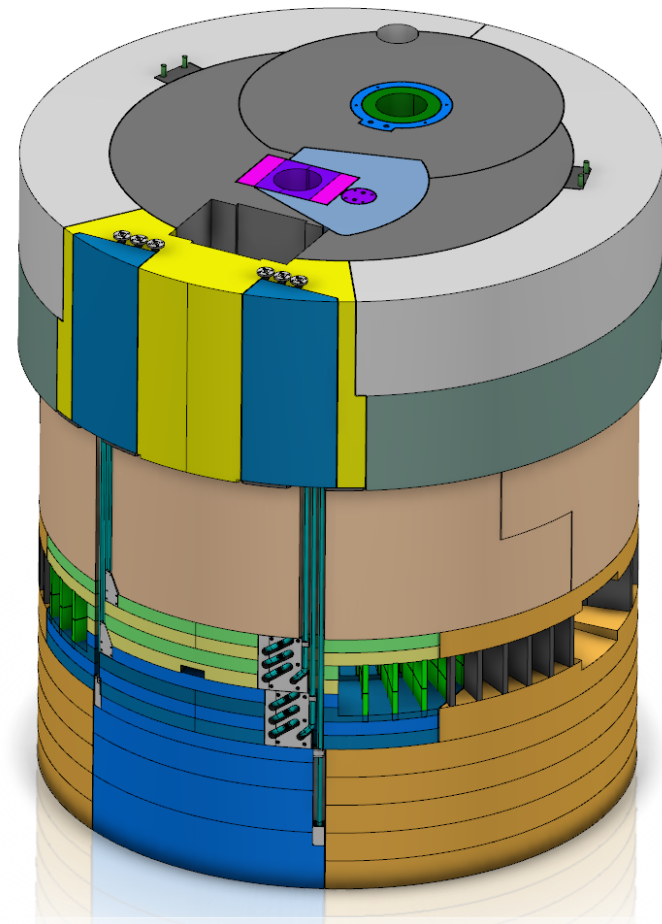


Potential sub-packages

Package “Upper Outer Bulk Shielding”
(Approximately 1600 ton)

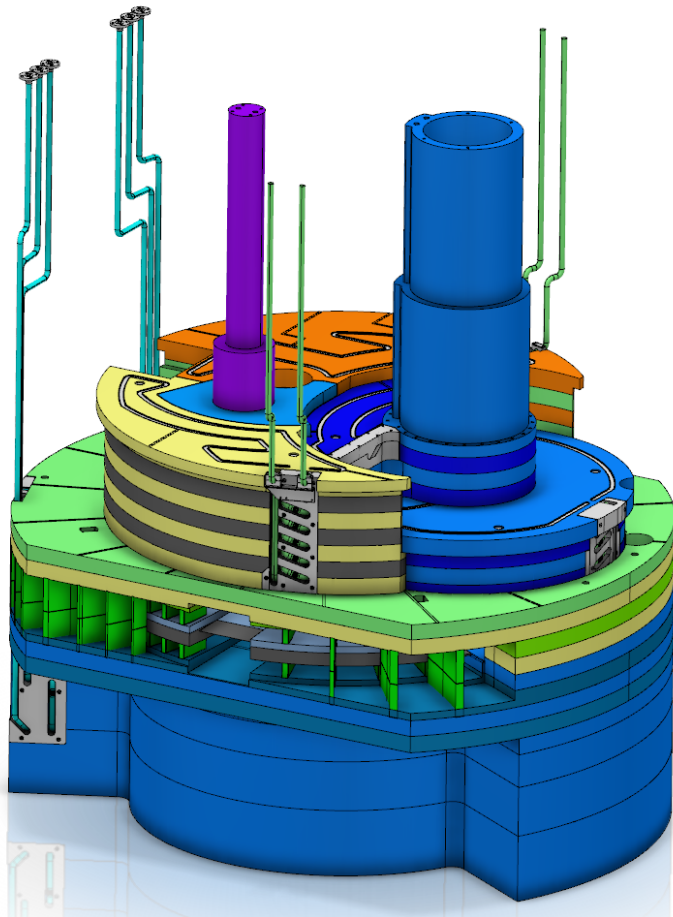


Package “Internal Shielding”
(Approximately 1000 ton)

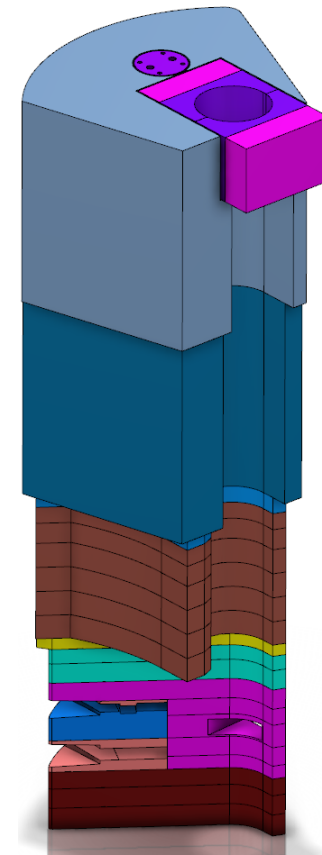


Potential sub-packages

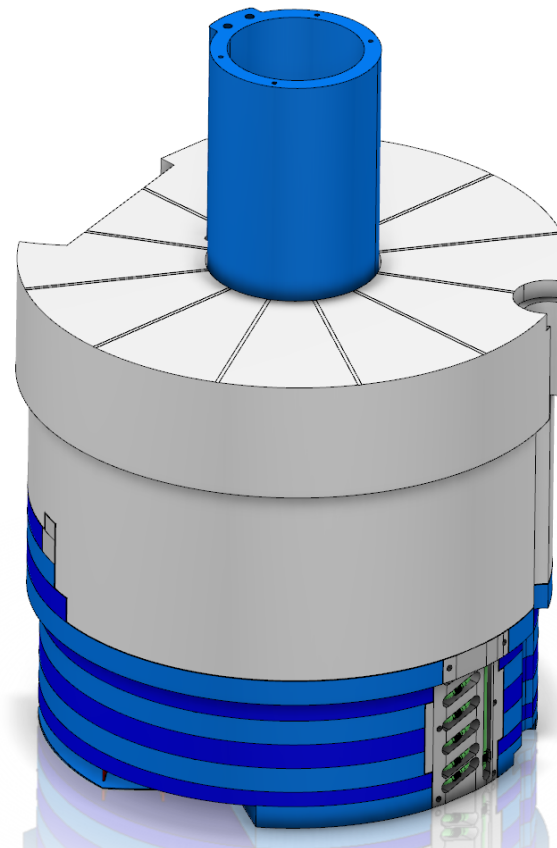
Package “Water-Cooled Shielding”
(Approximately 400 ton)



Package “MR Shielding Stack”
(Approximately 150 ton)



Package “TW Shielding Stack”
(Approximately 150 ton)



Next steps and timeline



- Next steps
 - Perform a revised and more detailed cost estimate, based on the current preliminary design
 - Decide on appropriate re-packaging, taking into account feedback and proposals from potential in-kind partners
- Timeline
 - Sub-packages to be released by TTB #4