Conceptual Design of Isotope Separator On-Line Target for Rare Isotope Accelerator

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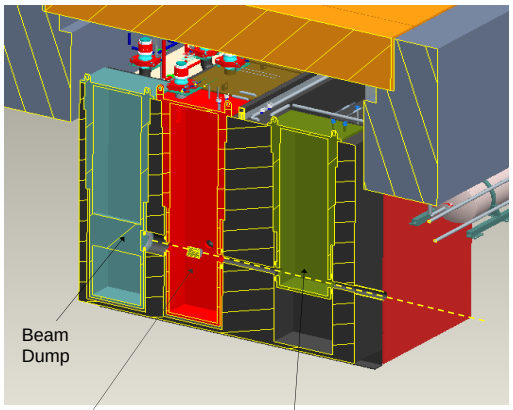
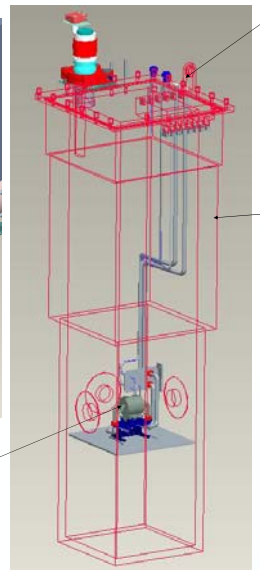
Rare Isotope Accelerator

- Accelerator for ions from hydrogen to uranium
- Providing a better understanding of exotic nuclei

- Up to 400 kW beam
- Two Beam Fragmentation Lines
- Two ISOL Lines with the ability to expand to three





ISOL Target Requirements

- Primary target of tungsten (15 cm in length)
- Secondary target of 133 uranium carbide disk surrounding the tungsten

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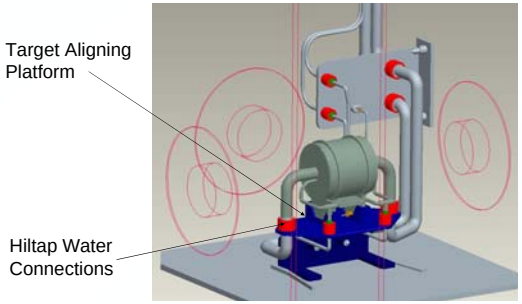
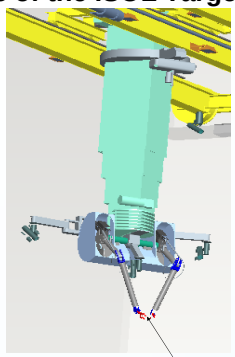
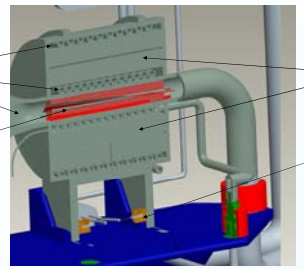
Three Essential Design Objectives of the ISOL Target

- Easy replacement with remote handling equipment
- Cooling the target during beam operation
- Analyzing the stresses in the piping

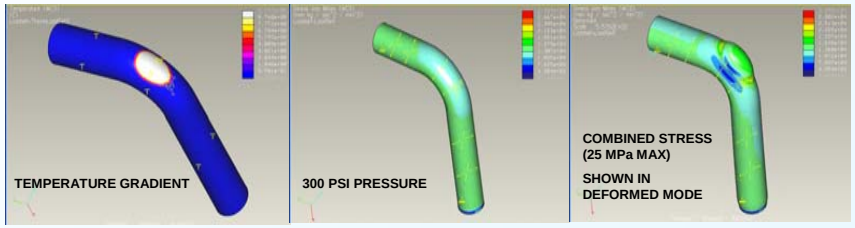




- The ISOL Target has to be frequently replaced
- High levels of radiation force all operations to be done remotely



- Tungsten is cooled by water being forced through spiraling channels cut in the tungsten
- Two pipes coil around the inside and outside of the uranium carbide disk
- Temperature needs to be maintained at 2000° C while beam is activated



- The ion beam passes through the pipe that provides water to the tungsten
- The pipe experiences stresses from the temperature gradient and water pressure
- Stainless steel and aluminum with thicknesses of 0.5 mm to 1.5 mm were analyzed using Mechanica
- Aluminum with a thickness of 1.5 mm was found to have the greatest factor of safety