BWR Reactor Pressure Vessel Internals Segmentation and Packaging

Background

For more than 30 years, Westinghouse has cut reactor vessel internals. For some plants, this was done in the frame of reactor pressure vessel internals (RPVIs) replacement as part of life-cycle extension programs. In some other cases, Westinghouse cut internals in plants under decommissioning. The underwater mechanical cutting technique has been used in all boiling water reactors (BWRs) since 1999.

Description

Westinghouse systems allow highly irradiated RPVIs to be safely removed, segmented and disposed of in storage buildings. The Westinghouse concept is based on clean, safe and reliable techniques. All segmentation work performed with mechanical cutting complies with nuclear power plant requirements.

Benefits

There are three important factors for both the customer and Westinghouse to keep in mind during the implementation of RPVI segmentation:

- Safety of the personnel and the plant
- Cleanliness of the environment
- Minimization of the total dismantling, disposal and storage costs

Westinghouse has developed segmentation techniques based on mechanical cutting with different band saws, disc saws, tube cutters and shearing tools. The benefits of these techniques include the following:

- Minimal amount of secondary waste
- Full visibility during cutting
- Easy collection of chips from the cutting process
- No production of gas or airborne contaminants
- Customization of all RPVI part sizes, materials and thicknesses
- Safe and reliable techniques

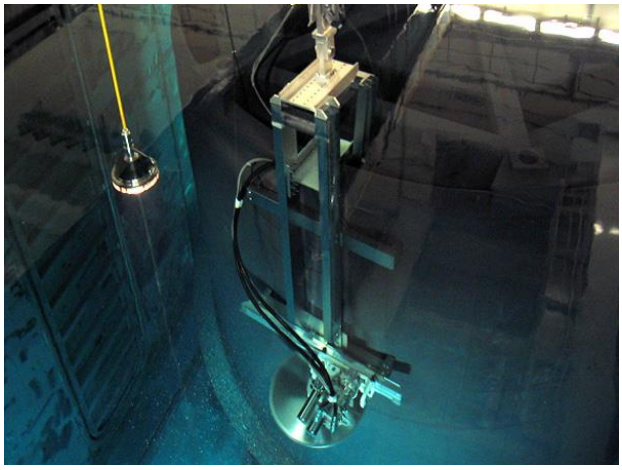
All segmentation projects have been performed with the highest customer satisfaction. Westinghouse's mechanical cutting technique is also well-suited for segmentation of RPVIs.

Band Saw (Barsebäck 1, 2018)

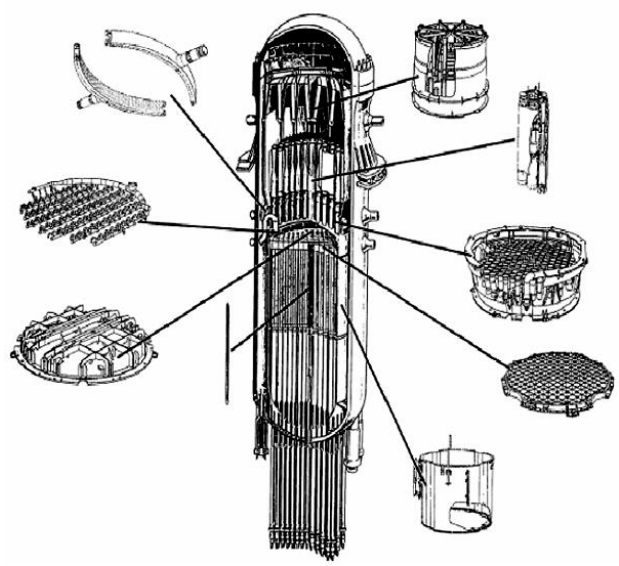
Experience

Westinghouse experience in segmentation RPVI projects is listed in the table below.

Site	Year	Project
Forsmark 1	1999	Core shroud, core support grid
Forsmark 2	2000	Core shroud, core support grid
Oskarshamn 2	2002	Core shroud cover (2 pcs.), core support, misc. pipes and channels
Oskarshamn 1	2003	Core support grid, misc. pipes and channels
Forsmark 1	2003	Core spray system
Forsmark 2	2003	Core spray system
Forsmark 3	2004	Core spray system
Olkiluoto 2	2004	Core shroud cover, core support grid, steam separators (19 pcs.)
Olkiluoto 1	2005	Core shroud cover, core support grid, steam separators (19 pcs.)
Oskarshamn 3	2006	Control rod
Olkiluoto 1	2008	Steam dryer
Olkiluoto 1	2009	Control rod shafts (120 pcs.)
Olkiluoto 2	2009	Control rod shafts (81 pcs.)
Olkiluoto 2	2013	Steam dryer
Forsmark 3	2009	Control rod shafts (46 pcs.)
Forsmark 1	2011	Steam dryer
Forsmark 1	2011	Core shroud cover
Forsmark 2	2010	Steam dryer
Forsmark 2	2010	Core shroud cover
Forsmark 3	2012	Control rod shafts (62 pcs.)
Forsmark 3	2012	Core shroud cover
Grand Gulf	2012	Steam dryer
Oskarshamn 3	2013	Control rod shafts (27 pcs.)
Oskarshamn 3	2013	Core shroud cover
Oskarshamn 3	2014	Steam dryer
Peach Bottom 2	2014	Steam dryer
Mühleberg	2016	Fuel channels
Peach Bottom 3	2015	Steam dryer
Barsebäck 1 & 2	2016	All reactor vessel internals
Philippsburg 1	2017	All reactor vessel internals
Isar 1	Contracted	Internals segmentation and packaging



Disc Saw (Olkiluoto 1, 2009)



BWR Internals