framatome

Baffle Bolt Replacement

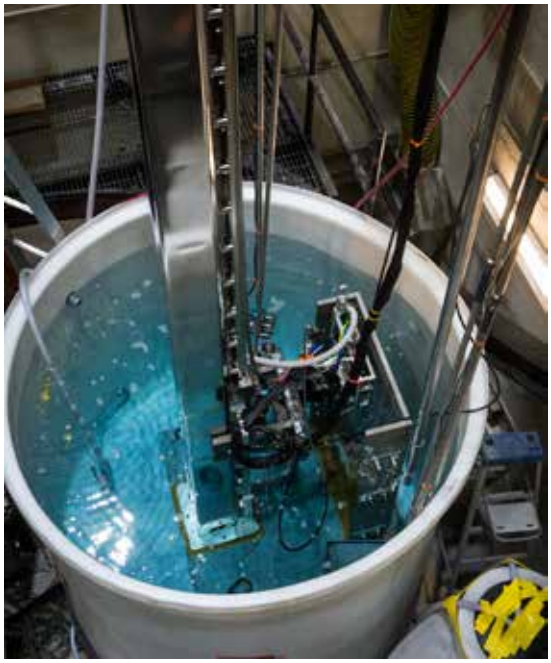
Challenge

As part of the nuclear industry's rigorous attention to safety, nuclear plant equipment is continuously monitored and inspected, and repaired or upgraded where necessary. Among the safety-related components regularly inspected are stainless steel baffle bolts that secure removable liner plates around pressurized water reactor vessels.

Inspections began to reveal reactor internals degradation and baffle bolt indications were discovered as a result. Recent industry events have led to a heightened awareness and need for a solution should indications be found during baffle bolt inspections. Recent history shows emergent issues with baffle bolt indications/failed bolts in Westinghouse 4 loop plants — missing heads, cracked lock bar welds, missing lock bars, etc. Potential impact: loose parts from loose bolt heads resulting in fuel damage, baffle plate wear on fuel, extended outage duration, and Reactor Vessel (RV) left in unanalyzed condition (risk during LOCA event.)

Solution

Framatome offers nuclear plant operators a roadmap for baffle-to-former bolt evaluation that includes risk-based modeling, award-winning inspection capabilities and extensive replacement experience. This allows plant operators to proactively plan examination intervals, replacement patterns and outage duration — all to control costs. Our solution addresses normal bolt removal and installation, broken bolt/shank removal and installation, and broken bolt/oversize threading and bolt installation. Our schedule savings are proven, and our Electrical Discharge Machining (EDM) technique eliminates inherent foreign material risk associated with traditional machining operations.



Customer benefits

- Increase production rates - ~10 bolts per day with single mast to 15-20 bolts per day with dual mast
- Optimized bolt design for lower stress concentrations
- Crimp cup locking mechanism — eliminates welding for install
- Mast extension allows replacement with core barrel in vessel
- Compact tool heads do not require hoists for removal
- Improved EDM filter system designed for lower dose and higher water clarity
- Framatome's EDM technology — best approach to eliminate FME concerns and machine highly irradiated baffle bolt material

Your performance
is **our** everyday **commitment**

Our Technology

- 4-loop plant bolt design
- Contingency oversized bolt design
- Improved mast system
- EDM tools modified to remove lock bar and machine counterbore for lock cup in one operation
- Impact driver to reduce number of stuck bolts and decrease removal time
- Custom-designed and fabricated EDM swarf filtration systems
- Modified bolt installation tool to install bolt and crimp lock

Replaced Over 8,700 RV Internals Bolts in the U.S. and Europe

Replacement of Baffle & Barrel Bolts in the U.S.

Nuclear Power Plant	Year	Number of Bolts Replaced
Oconee 1,2,3	1980s	288
ANO-1	1980s	216
Rancho Seco	1980s	216
Crystal River	1980s	348
Davis Besse	1980s	348
DC Cook	1990	1
Point Beach 2	1999	176
Ginna	1999	56
Ginna	2011	25
DC Cook	2013	28 Clevis Bolts

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