

## Half Nozzle Repair

### Remote Machining and Welding

Framatome is the only vendor in the U.S. market to perform Bottom Mounted Nozzle (BMN) Repairs.

#### Challenge

Many plants have the potential for Primary Water Stress Corrosion Cracking (PWSCC). As the nuclear fleet ages, the likelihood of PWSCC occurring in a Dissimilar Metal (DM) weld increases substantially.

Many Alloy 600 nozzles and their associated welds present a unique challenge for repair and replacement activities when configuration and material types are considered. Like for like replacements would require a through wall repair introducing challenges with RCS inventory, FME control, radiation exposure, and Post Weld Heat Treatment (PWHT).

#### Solution

Framatome has performed numerous half nozzle repairs in the industry in response to Alloy 600 PWSCC degradation, both in PWRs and BWRs. The approach is a well-known technique with field-proven technologies that has been used on pressurizer heater sleeves, bottom mounted nozzles, and instrument nozzles. The repair can be easily adapted to other nozzles in the fleet.

Framatome's half nozzle repair allows a replacement nozzle to be installed without a through wall repair, no PWHT, no radiography, and in some cases can be performed water backed allowing RCS inventory to be maintained.

A half nozzle repair can be deployed quickly, reducing impact to overall outage duration in emergent repair scenarios, while still offering the desired balance of plant life repair and mitigated from future PWSCC susceptibility.



#### Customer benefits

- Only U.S. vendor to perform BMN repairs
- All-in-one source saves time and enhances efficiency
- Field proven, robust technology enhances reliability
- Full in-house NDE & Engineering organization supports your needs
- Remote capabilities reduce costs, risks, time, and dose
- In-depth knowledge and robust experience with ambient temperature temper bead Alloy 52/52M weld pads
- Does not require pre-weld or post-weld heat treatment
- ASME Code and industry experts support your regulatory & licensing needs and vastly smaller footprints

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

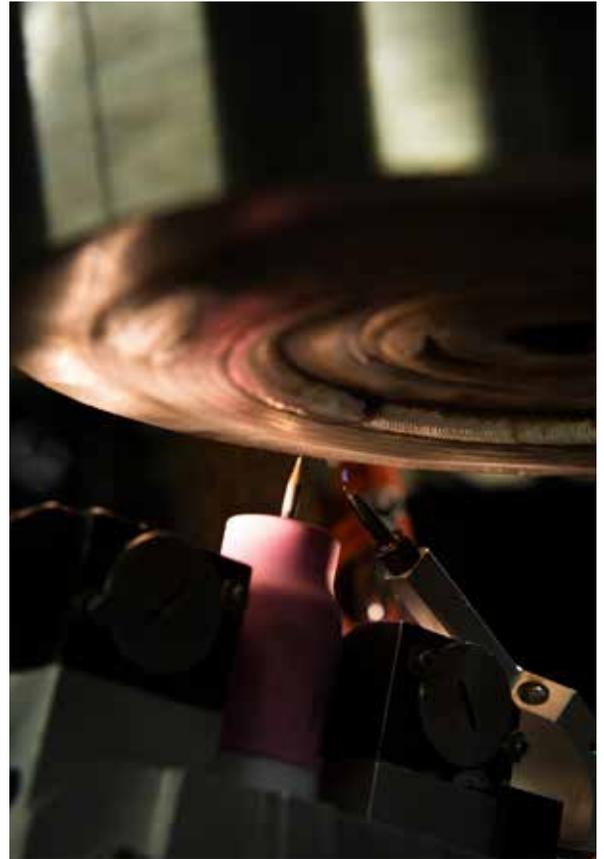
## Bottom Mounted Nozzles

Framatome is the only vendor in the U.S. market to perform BMN repairs — in 2003 and 2013. Our robust, field-proven technologies and in-depth experience with ambient temperature temper bead GTAW Alloy 52/52M weld pads make Framatome the right choice to support your needs. Our breadth of knowledge and turnkey solutions with a focus on first-time quality give you the most efficient response to your critical path, emergent repair needs. Framatome's proven half nozzle repair approach eliminates all Alloy 600 from service and implements a permanent solution for continued BMN integrity. We can perform BMN half nozzle repairs with the RV in a flooded condition, reducing radiation exposure and impact to your outage schedule.

## 2014 NEI Process TIP Award

A utility in the U.S. was recognized as a recipient of a 2014 NEI Maintenance TIP Award for the emergent BMN repair performed with Framatome. This challenging and complex repair, with many first-of-a-kind aspects, was completed in only 32 days from issue discovery, far less time than the 72 days required for a comparable industry repair in 2003. The results highlight our commitment to the industry with zero safety incidents, human performance issues, PCEs, or FME issues.

And more recently, Framatome performed a half nozzle repair on an emergent basis for a BWR utility ahead of schedule and under dose with first-time weld quality, and no safety or human performance issues.



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