

Fuel Rod Anti-Fretting Clips

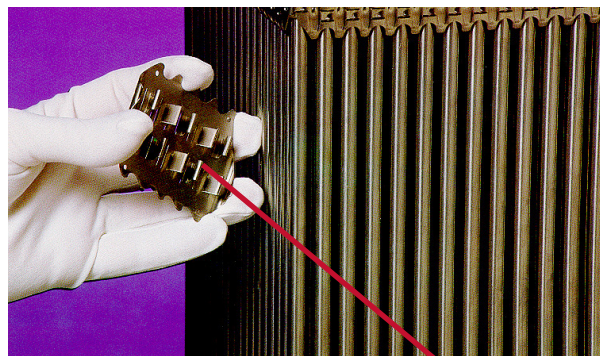
Framatome provides services to fabricate and install anti-fretting clips on PWR fuel assemblies that are subject to high flow vibrations attributed to baffle jetting. The clips are placed on the Fuel Assembly (FA) faces on the core periphery locations susceptible to baffle jetting. The clips provide support to increase rod stability such that the coolant cross-flow induced vibration is minimized to prevent fuel rod fretting and damage. Clips have been designed for installation on un-irradiated and irradiated PWR fuel assemblies.

Typically, anti-fretting clips are installed on first or second cycle fuel assemblies and removed after one cycle of operation during the refueling outage. Operating experience shows that the clips have been very successful in preventing fuel failure attributed to this phenomenon.

Tooling for clip installation and removal (see photos) is staged on top of the spent fuel storage racks and is remotely operated such that the clips are installed or removed during the refueling outage. Typical clip installation or removal rates are achieved in approximately one hour per FA excluding fuel transfer times or tool carriage clip reloading.

Features and Benefits

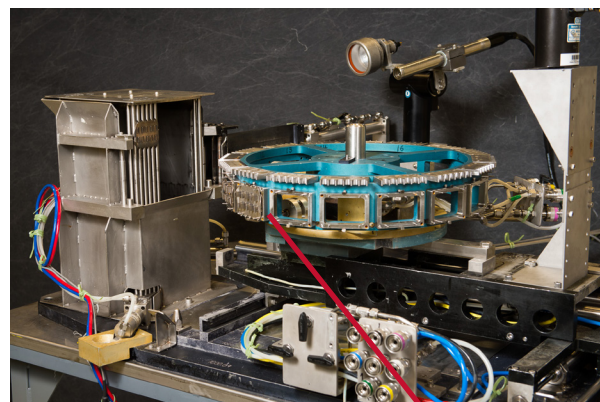
- Anti-Fretting Clips first installed in 1983
- Proven performance
- Can be installed on fresh or irradiated fuel assemblies
- Reliable remote tooling



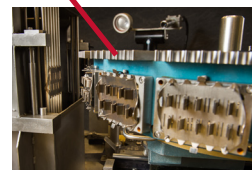
Anti-Fretting Clips are designed to couple six fuel rods at the corner / face locations of the potential baffle jetting locations and placed on multiple spans.



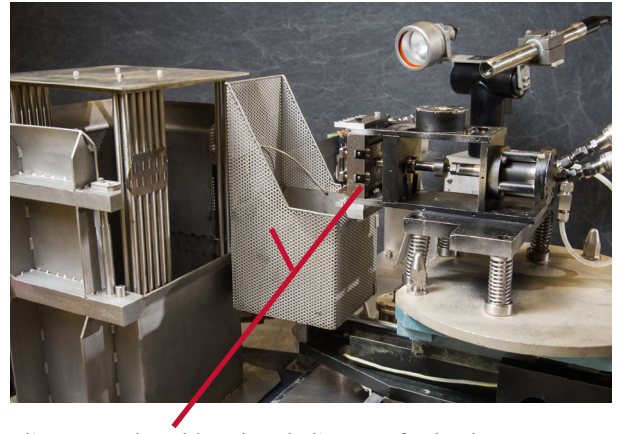
Installed Clip



The carousel holds up to 16 clips and incorporates fuel rod guide combs that align the clips during installation. A reaction backing plate is inserted behind the peripheral row receiving the clip during installation.

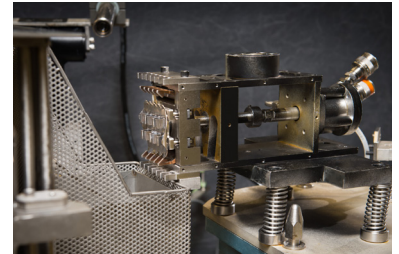


Tooling for clip removal utilizes the same base plate and is modified to exchange the clip insertion carousel with the clip removal tool heads. The clip removal tool incorporates gripper fingers that engage the clip with reaction combs that support and cradle the fuel rods during removal to prevent fuel rod damage. Clips that are removed or ejected from the tool head into a transfer basket can then be deposited into a permanent storage container.



Clip removal tool head and clip transfer basket

Removed clips are deposited into a transfer basket which can then be deposited into a permanent storage container.



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