

Control Rod Drive Shaft

Mechanical Latching/Unlatching Tool

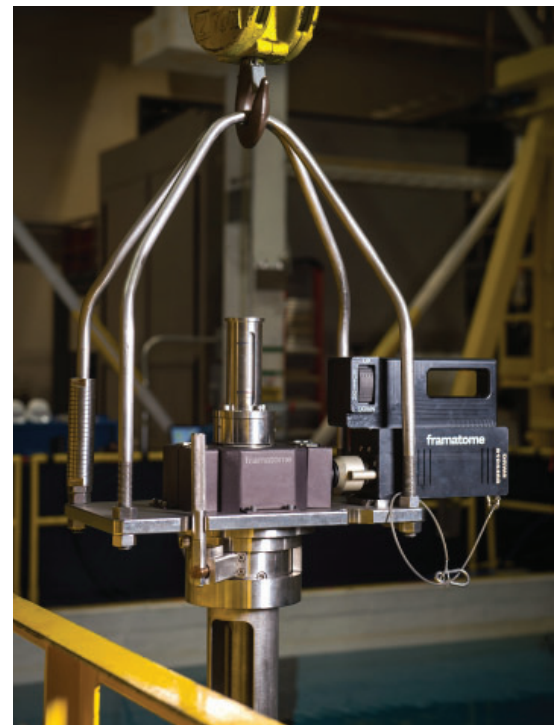
Simplified latching and unlatching for easier operation and increased reliability

Challenge

Control rod drive shaft (CRDS) latching and unlatching is a critical path activity that occurs during every refueling outage. Recent industry operating experience has unveiled a significant flaw in the legacy CRDS tool leading to major outage delays, rework and damage to plant components. The legacy CRDS tool is susceptible to pin failures, possibly leading to a foreign material intrusion (FMI) event. In addition to pin failures, the legacy tool utilizes pneumatic cylinders to perform the latching and button functions, which often fail. The lines fill with water or the button fingers start to slip and miss the button, resulting in tool maintenance during critical path. All of these failure mechanisms result in a high-risk, unreliable tool requiring frequent maintenance and refurbishment.

Solution

Introducing the new Framatome CRDS tool: simple, reliable, robust. The newly designed tool utilizes a patented rotational mechanical lock for the latching and unlatching functions. This eliminates the problematic small pneumatic cylinders and air lines found within the legacy tool. The Framatome CRDS tool also eliminates the pneumatic button cylinder, replacing it with a mechanical jack screw operated by a simple 120V power pack with an integrated slip clutch. This is the only non-pneumatic CRDS tool — there are no airlines, nitrogen bottles, valves, or manifold to run. This equates to a tool much easier and quicker to set-up, and can be operated by a single technician. The mechanical latch actuation incorporates a two-stage positive lock to prevent inadvertent operation. The button up/down indicators are located at eye-level with the operator, easily seen by the technician and Senior Refuel Operator (SRO). The tool is fully stainless steel, with an option for electro-polishing to further reduce contamination. It is substantially more robust than the legacy tool, resulting in worry-free transport. Furthermore, because the latching/unlatching process is still the same, the new Framatome CRDS tool can still be calibrated using the legacy calibration fixture.



Customer benefits

Increased Reliability

- No pneumatic cylinders or air lines to fail
- Not susceptible to pin failures leading to FMI
- Cannot slip on the button fingers

Simplified Operation & Reduced Dose

- Single reactor technician operation
- Reduced set-up time
- No nitrogen bottles or manifolds required
- Positive mechanical actuation with visual indications
- Utilizes current calibration fixture

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

Field proven to save critical path time

Site	Activity	Non-Framatome Tooling in Previous Outage	With Framatome CRDS Tool	Total Critical Path Time Saved
Utility 1	Unlatch/Latch RCCA's	Total Hours 19	Total Hours 10	9 Hours Saved
Utility 2	Unlatch/Latch RCCA's	Total Hours 11.5	Total Hours 7	4.5 Hours Saved



The innovation is in the simplicity

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