

# Mechanical Control Rod Drive Shaft Unlatching Tool

## Background

An earlier control rod drive shaft (CRDS) unlatching tool design served the needs of the nuclear industry well for many years but it became increasingly apparent that several tool features could be improved. For instance, a feature to prevent an operator from inadvertently dropping a CRDS while using the tool was needed. In addition, the need for frequent replacement of underwater air cylinders on the tool was a maintenance issue that needed to be addressed.

## Description

The new latch mechanism on the mechanical CRDS unlatching tool prevents operators from inadvertently dropping the CRDS during latching, unlatching or drive shaft movement activities. Further improvements resolve the underwater air cylinder reliability issues. The fail-safe feature of the latch mechanism employs the weight of the tool and CRDS to keep the tool in a latched condition until the CRDS is resting on or in a supporting surface, such as the control rod hub or CRDS storage stand, and the latch pin is removed. Only then can the mechanism be used to unlatch the CRDS from the tool. In addition, the button cylinder has been relocated to the top of the tool where it is easily accessible for maintenance or adjustment. A further improvement in reliability is gained because the valve operating station is reduced from two valves to one.

## Benefits

- As described, the mechanical CRDS unlatching tool significantly increases the likelihood that a CRDS will not be inadvertently dropped, resulting in costly repairs and/or replacement of plant components.
- A mechanical latch mechanism that replaces the earlier pneumatic design improves the reliability of the tool.
- A reduction of pneumatic components results in reduced maintenance.
- A reduction in operating valves simplifies tool operation.



Mechanical CRDS unlatching tool

## Deliverables

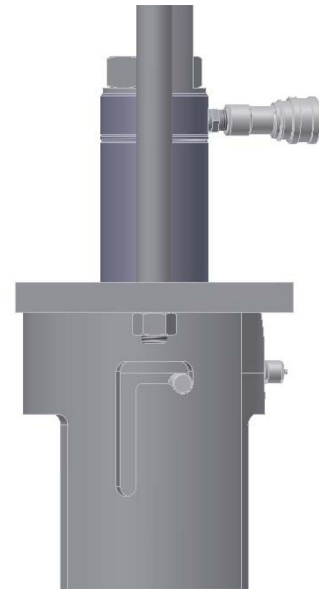
- Mechanical CRDS unlatching tool
- Valve station and hoses
- Documentation package
- Replacement calibration fixture

## Experience

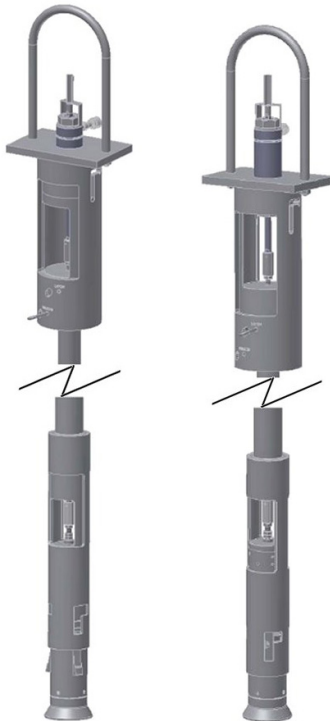
The mechanical CRDS unlatching tool is currently used at Westinghouse pressurized water reactor plants and in training use at our Waltz Mill Service Center in Madison, Pennsylvania (USA).

Five production tools have been fabricated and delivered for the lead Westinghouse **AP1000**<sup>®</sup> plants. Delivery lead-time is approximately six months.

Currently, the mechanical CRDS unlatching tool is protected by U.S. and international patents.

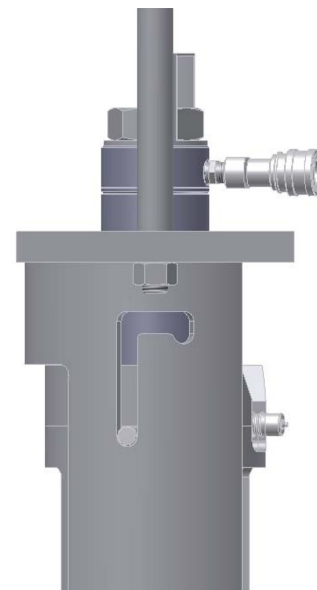


Mechanical CRDS unlatching tool  
(shown latched)



Unlatched

Latched



Mechanical CRDS unlatching tool  
(shown unlatched)

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