

Results of Activities at the Upgraded Inspection and Repair Facility in Temelin NPP

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Introduction

In compliance with the contract between JSC “TVEL” and ČEZ a.s., JSC “TVEL” provided additional equipment for the VVantage6 FA inspection and repair facility in Temelin NPP to change it over to TVSA-T inspection and repair facility.

JSC “TVEL” analyzed equipment (modules) of the Temelin NPP inspection and repair facility for compatibility of the existent facility design and modules with the TVSA-T design.

Based on the analysis results, a set of modules and systems was identified, which were developed and manufactured or upgraded to ensure TVSA-T inspection and repair in the Temelin NPP facility.

Set of Modules and Systems

The set of modules and systems for TVSA-T inspection and repair in the Temelin NPP facility incorporates:

1. A guide to point the FA headpiece manipulator at guide thimbles and to point the CIM manipulator (which is part of the Cladding Integrity Monitoring (CIM) System) at upper end plugs
2. A guide grip to install the guide on the facility workstation table
3. An FA headpiece manipulator to detach, remove, install and attach the TVSA-T headpiece
4. A jig to point the upgraded fuel rod extraction tool at the upper end plug of the extracted fuel rod
5. A collet and a locking tube to extract fuel rod and install a displacer using the fuel rod extraction tool, which is part of Temelin NPP facility
6. A CIM system to detect leaky fuel rods

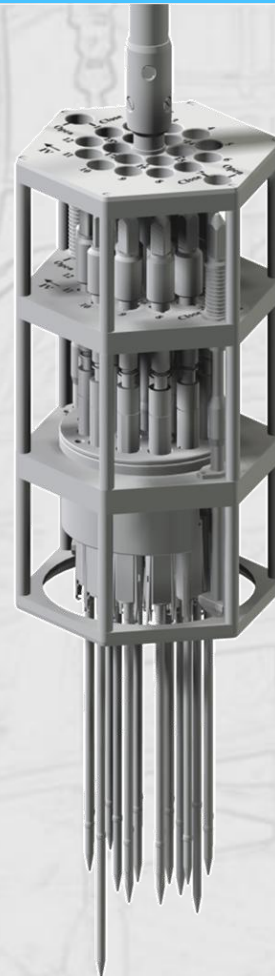
Modules



Guide



Guide grip

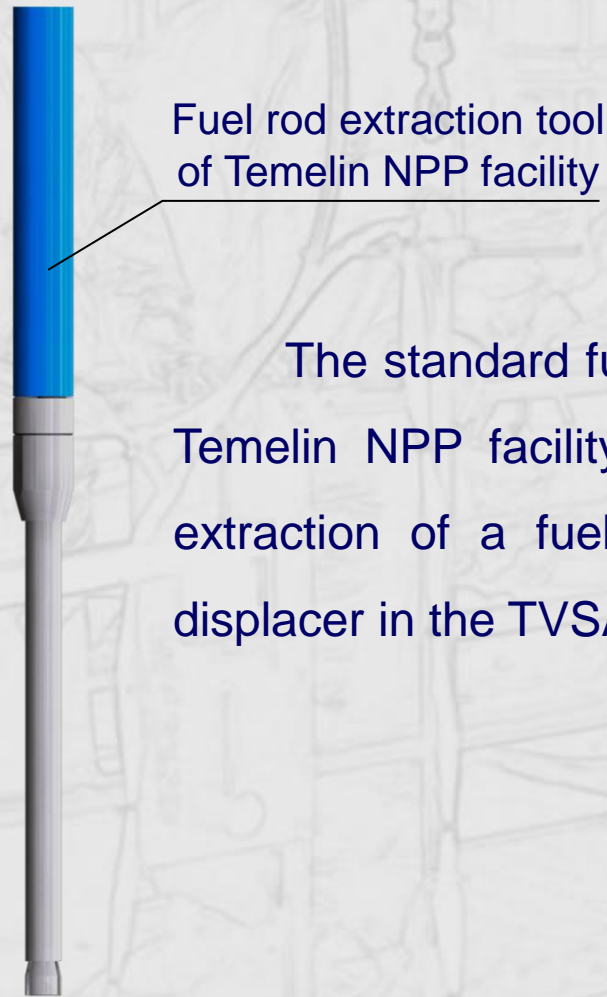
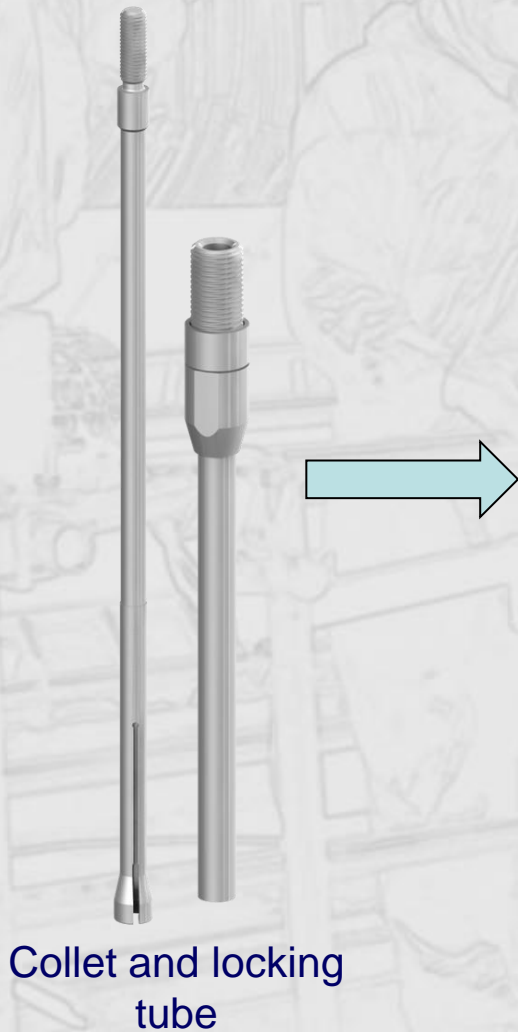


TVSA headpiece
manipulator



Fuel rod jig

Upgrading the Fuel Rod Extraction Tool



The standard fuel rod extraction tool of the Temelin NPP facility was upgraded to ensure extraction of a fuel rod and installation of a displacer in the TVSA-T.

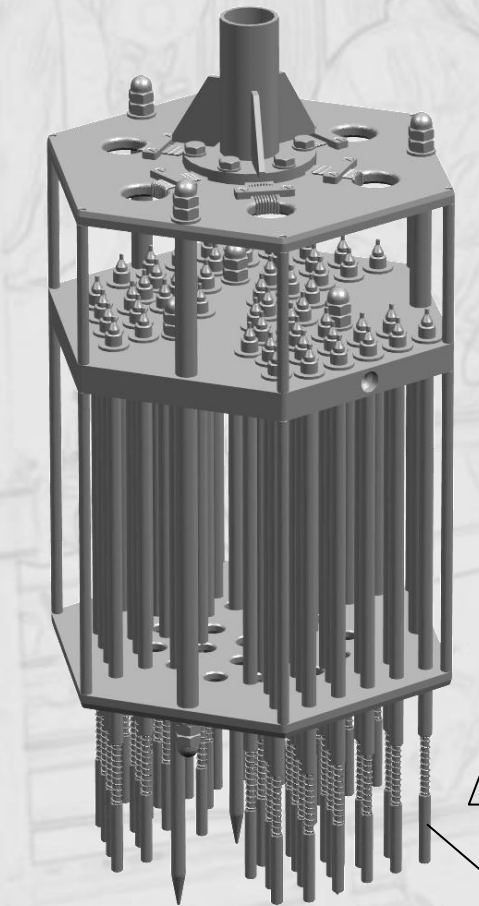
CIM System

The Cladding Integrity Monitoring (CIM) System consists of the following elements:

- CIM manipulator
- electronic instrumentation

The CIM manipulator is a device with a set of ultrasonic sensors (52) that monitor the integrity of fuel rod cladding using the ultrasonic method to detect water under fuel rod cladding.

CIM System



CIM manipulator

Flaw detector

Control unit

Industrial computer

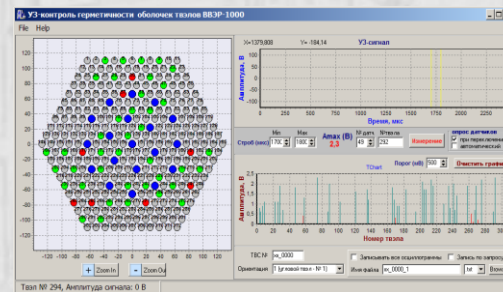


Connection and switchgear unit for sensors

CIM sensor

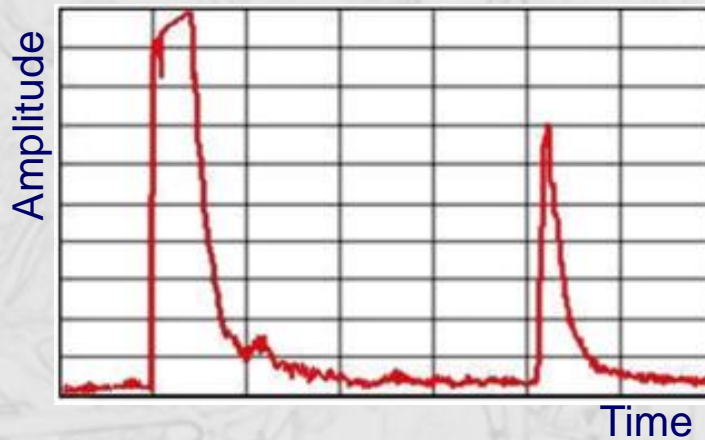
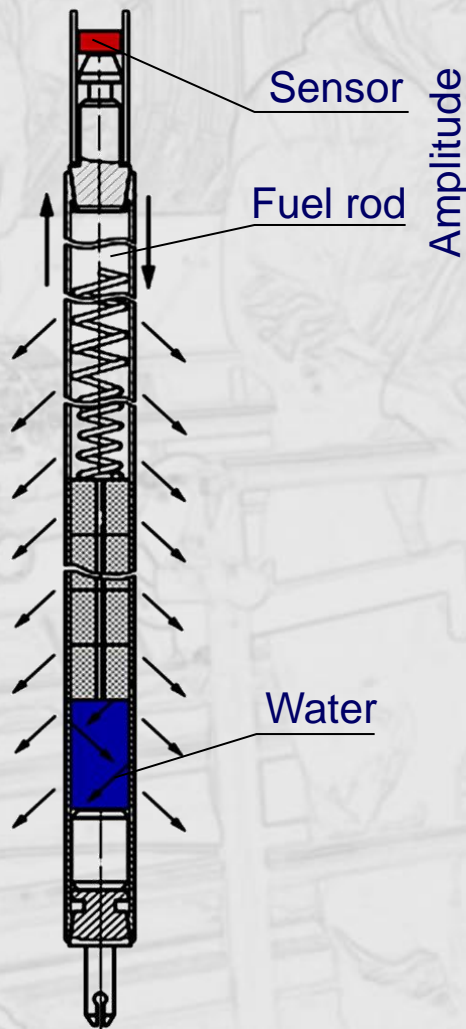


Electronic instrumentation

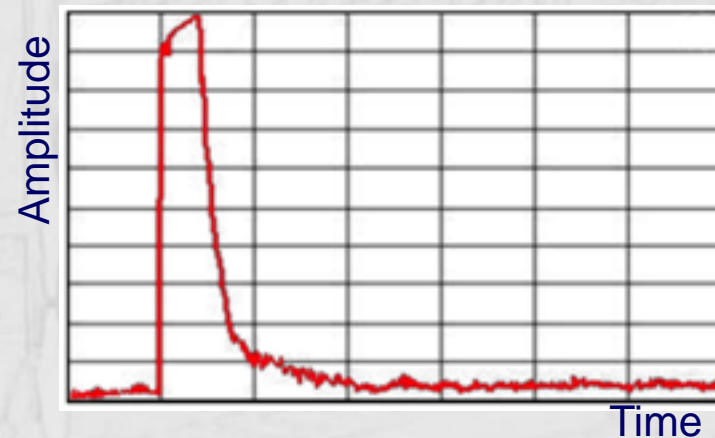


Working window of fuel rod CIM software

Principle to Detect Leaky Fuel Rods in FA



Oscillogram of leak-tight fuel rod



Oscillogram of leaky fuel rod

Tests

In 2010, TVSA-T mockup repair tests were conducted in the Temelin NPP facility using earlier manufactured modules and systems.

The following operations were performed during the tests:

- detaching and removal of the TVSA-T headpiece
- detection of leaky fuel rod mockups
- extraction of the fuel rod mockup and installation of the displacer in its place
- installation and attaching of the TVSA-T headpiece

The tests substantiated operability of facility modules and systems.

TV Systems

JSC “ТВЭЛ” plans to additionally provide two TV systems for the facility in 2011:

- color non-radiation-resistant overview TV system to ensure visual monitoring of process operations in the facility and surveillance of safe handling of modules within the facility boundaries
- black-and-white radiation-resistant TV system to monitor operations of TVSA-T headpiece removal / installation, fuel rod extraction and displacer installation in the fuel rod place

A detailed line-art illustration of a control room with several operators at consoles. A solid blue horizontal line is positioned above the main text.

Thank you for your attention