

**Tacis Project U1.02/94H**  
**Modernization of the Inspection System for Reactor Vessel (SK187) and Ultrasonic Testing System in Immersion Tank,**

Nuclear power plant	South Ukraine NPP, Ukraine
Project reference	U1.02/94H and U1.02/97B -
Project name	Modernization of the Inspection System for Reactor Vessel (SK187) and Ultrasonic Testing System in Immersion Tank, stage 1 and stage 2
IAEA safety issue	CI 2 Non destructive testing
Safety rank	III
Additional IAEA safety issue	Radiation Protection 01
Safety rank	N.A.
Budget year	1994; 1997
Contract amount, Euro	550,041.00 for U1.02/94H and 425,000.00 for U1.02/97B -
Contract status	Completed
EC endorsement of the contract	09.10.1998 for 94H, September 2005 for 97B
Supplier	NIKIMT
Date of provisional Acceptance Certificate	30.07.1999 for 94H, for U1.02/97B - for the project U1.02/94H- June 2006
Date of final acceptance certificate	20.07.2000 for 94H , for U1.02/97B -June 2006
Current status of the project	Completed

**1. Background: Safety significance of non destructive testing of reactor pressure vessel.**

The reactor pressure vessel (RPV) is the most responsible and most loaded element of nuclear power plant. Owing to the utmost care in RPV production and multiple control performed before the NPP start up and later on during NPP operation the high safety margins built into the RPV are maintained throughout the whole lifetime of the RPV. However, in view of various possible loads which can act on the RPV it is necessary to exercise periodic non destructive control.

In WWER reactors the periodic non-destructive TV monitoring and ultrasonic testing of the reactor vessel base metals and welds is performed with inspection system SK-187MU during the outage. This testing provides information on the conditions of the reactor vessel base metals and welds needed to ensure safe and efficient operation of the RPV.

**2. Project impact on safety**

The objective of the project was to upgrade Ultrasonic Testing System (SK 187), modernize mechanical manipulator and corresponding data acquisition and processing system in order to perform high quality inspection of the reactor vessel.

**3. History of project implementation**

There was no tender launched for the project U1.02/94H.

The contract for the project U1.02/94H with the equipment supplier, NIKIMT (Russia), chosen on the basis of the direct agreement was signed in 1998.

Tecnom (Spain) became a subcontractor for the project U1.02/94H.

The equipment was delivered to SUNPP in 1999.

Provisional Acceptance for goods and services was declared in July 1999.

Final Acceptance for goods and services for the project U1.02/94H was declared in July 2000.

At request of EA (04/2000), the second stage of this project was started called "Modernisation of manipulator SK-187 phase II'. Although the stage I had been successfully completed, the manipulator could not be used effectively until the SK-187 modernisation was completed. Thus the second stage was necessary to make good use of the money already spent under stage I project. For this reason, the Commission Services (CS) agreed to conclude a direct agreement with the same supplier, though with derogation from the contract procedures. On 25/06/02 the new version of ST-TOR 2 was approved.

No tender was launched for this stage II of the project.

The contract with the equipment supplier, NIKIMT (Russia), chosen on the basis of the direct agreement was signed in September 2005.

The equipment was delivered to SUNPP at the end of June 2006.

Provisional and Final Acceptance for goods was declared at the end of June 2006.

Provisional and Final Acceptance for services was declared in September 2006.

#### **4. Main Benefits of the project**

Completion of the first stage of SK 187 system modernization enabled:

- to modernize mechanical manipulator for ultrasonic testing of the reactor vessel cylindrical and bottom parts with adaptation of electrical drives to new equipment in control and software;
- to increase the number of channels from 16 to 32. That enables to carry out ultrasonic testing of the base metals and welds in the wall part of the reactor vessel, including the bottom joint welds, in one step.

Completion of the second stage of SK 187 system modernization enabled:

- to implement an advanced TV equipment and software for testing of the reactor vessel cylindrical and bottom parts;
- to implement an advanced mechanical equipment for ultrasonic testing of the reactor vessel base metals and nozzles;
- to increase accuracy in testing system positioning due to new computer technologies;
- to improve sensitivity of ultrasonic testing after upgrading flaw detector functions;
- to create electronic archive of TV and ultrasonic data on optical information carriers;
- to obtain a full-scope system of TV monitoring and ultrasonic testing for reactor vessel external part.

The improvements from the standpoint of safety in SUNPP:

- Increase the scope of the inspections and credibility of the results obtained, ultimately ensuring better follow-up of the reactor vessel status.
- Decrease of the radiation doses of the personnel during the reactor vessel inspections.

Realization of the project has enhanced NPP safety as a whole.



Fig. 1 SK-187 manipulator in SU NPP (stage 1)

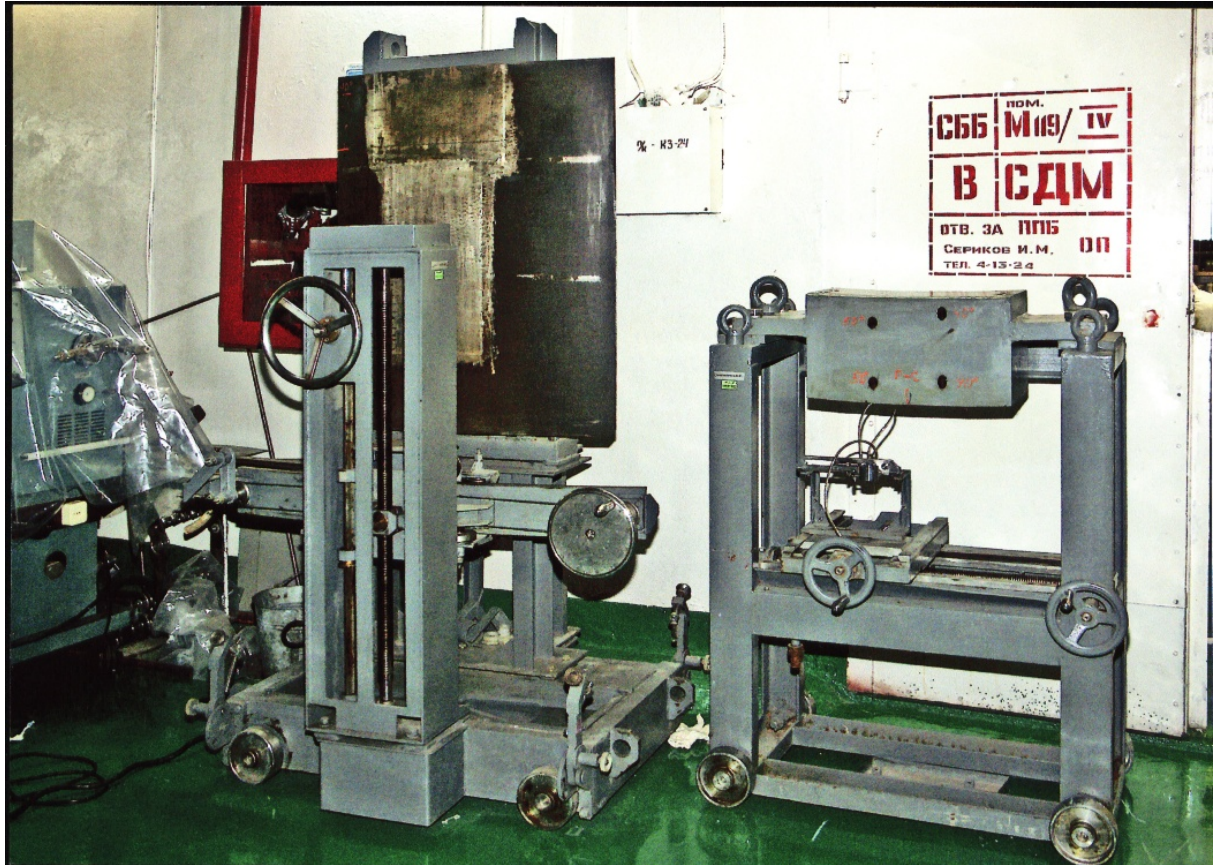


Fig. 2 SK-187 manipulator calibration unit in SU NPP (stage 1)



Fig. 3 SK-187 manipulator in SU NPP (stage 2)