PROLOG LLC

EXPERIENCE IN EQUIPMENT DEVELOPMENT FOR CONTROL AND REPAIR OF RBMK-1000 AND IN RADIOACTIVE GRAPHITE HANDLING

PRESENTATION AT A TECHNICAL MEETING EXPERTISE IN REACTOR DISMANTLING VISAGINAS INPP. 25/10/2018
About Prolog LLC

- Located in Obninsk (Russia, Kaluga region)
- Established in 1998
- Focus on design and manufacture of measuring instruments, minirobots for inspection of hard-to-reach places and special equipment for nuclear power plants
- 120 employees (engineers: 50, administration staff: 10, production staff: 40, maintenance department: 20)
About Prolog LLC

- pre-project survey of the facility;
- development of design documentation;
- manufacturing and testing of equipment prototypes;
- equipment manufacture, testing, adjustment and set-up;
- metrological support;
- development of operational and safety documentation for equipment supplied;
- assembly and adjustment of equipment at the facility;
- non-destructive testing of the facility;
- equipment maintenance and repair at the facility.

The enterprise has a metrological laboratory accredited for instrument calibration.
Prolog LLC specialists are certified for non-destructive testing: 22-VIC, 17-USC, 2-ECC, 2-LPC.
All equipment to be constructed and manufactured passes a full cycle of tests on full-scale stands.

For testing equipment (including long-length and underwater), Prolog has its own bench-test facilities, including a universal tower with a 20 m hoisting machine, a 22 m deep mine and a 5 m deep pool.
Experience in equipment development for nuclear power plants with RBMK

Systems for measuring the geometric parameters of graphite columns have been developed and manufactured since 1999 and are applied to all nuclear power plants with RBMK-1000 and EGP-6.

The developed systems operate on different physical principles and use different methods of measurement.
Tools for sampling graphite from graphite columns have been developed and manufactured since 2006, are applied at all NPPs with RBMK-1000.

**Probe sampler**

- Sampling time: 3 min
- Coring time: 40 seconds

**Control unit**

**Graphite sample**

- Diameter of graphite core: 10 mm
- A graphite core is 37 to 68 mm long
A set of equipment for RRC (restoration of the resource characteristics of the graphite stack) operations, including tools for mechanical processing of graphite, collection of graphite cutting products, measuring systems, was used during 6 repairs at the 1st and 2nd power units of KuNPP since 2013.
Experience in equipment development for nuclear power plants with RBMK

A system for collecting graphite cutting products and packaging them in a protective container.

In the course of RRC, about 36 tonnes of reactor graphite were crushed, extracted from the reactor space and packed into containers.
Experience in equipment development for nuclear power plants with RBMK

A robotic complex for remote cutting of the corners of graphite columns and withdrawal of graphite fragments from the reactor core.

Working conditions:
Temperature: + up to 50 °C
Dose rate: up to 1000 r/hr

Robot dimensions: 572 x 94 x 93 mm
Weight: 7 kg
Magnetic suspension: 40 to 90 kg
Electric drive
Saw blade extension beyond the robot dimensions:
235 mm
Elevation of saw blade:
50 to 70 mm
Experience in equipment development for nuclear power plants with RBMK

A robotic complex for remote cutting of the corners of graphite columns and withdrawal of graphite fragments from the reactor core on the power unit No. 1 of KuNPP, 2018
Experience in equipment development for nuclear power plants with RBMK

Cable manipulator MT-65

• Mounted and actively used in the CH of power units No. 1 and No. 2 of KuNPP
• Supply and installation projects for power units No. 3 of KuNPP, No. 1 and No. 2 of SNPP
• Completely replace a gantry crane
• Divisions of KuNPP (DNSS, CRS) and KuNER have been trained and used independently

Area of operation
In the central hall of 1,2 KuNPP
Experience in equipment development for nuclear power plants with RBMK

A robotic system of autonomous withdrawal of RBMK-1000 process channels

- Withdrawal of PCs without human intervention in the automatic mode with least effort
- The operator sets the maximum withdrawal force in the range of up to 10 tf
- No need in a central hall crane: fork lifting of PCs without using it
- Simultaneous use of several plants to accelerate the withdrawal of PCs
- Automatic recording of the withdrawal force throughout the withdrawal process

Applied at Smolensk NPP since 2011 and at Kursk NPP since 2012
Experience in equipment development for nuclear power plants with RBMK

Equipment for TV visual and instrumental control
Experience in equipment development for nuclear power plants with RBMK

Inspection of metalwork with an E-37 Photo Endoscope
Thank you for your attention