Pneumatic Transport System REGATA-2 for Neutron and Gamma-Activation Analysis at the IREN Facility at FLNP JINR: Implementation and First Results

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The IREN facility at the Frank Laboratory of Neutron Physics (FLNP) JINR is a source of neutrons or gamma-quanta fluxes. The fluxes are used for carrying out experiments on neutron activation (NAA) and gamma activation analysis (GAA). The pneumatic transport system (PTS) REGATA-2 was developed in the Bulgarian Academy of Sciences for the automation of NAA and GAA. The project was adapted and modified taking into account the features of the IREN facility, and then was successfully implemented. Later, the PTS was modernized by introducing a touch control panel that completely replaced the electromechanical one, and by establishing information exchange with the activation analysis database.

PTS provides the automated delivery of samples to the irradiation position and back for the analysis of the elemental composition of samples of various origins, including by short-lived isotopes with a half-life of about one minute or more. The study of samples intended for IAEA Proficiency tests was carried out using NAA and showed good agreement with passport data. Archaeological ceramics were studied using NAA by short-lived isotopes, which significantly complemented the previously obtained picture of the elemental composition of samples by medium- and long-lived isotopes. The first experiments were carried out using GAA, some isotopes of elements of irradiated samples were qualitatively determined.

The report will provide an overview of the functional blocks for the PTS, their modification, and implementation on the IREN facility. Furthermore, the results of experiments on NAA and GAA, outcomes of the PTS modernization and implementation of new options, as well as plans for the future will be presented.