

# **Implementation of the REGATA-2 pneumatic transport system at the IREN research facility**

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The REGATA-2 pneumatic transport system (PTS) was set into operation at the IREN research facility, Frank laboratory of neutron physics (FLNP), Joint Institute for Nuclear Research, Russia. PTS was created in the Laboratory for technical development in physics, Bulgarian academy of sciences. The PTS includes two neutron channels that are used to irradiate samples with neutrons when doing neutron activation analysis (NAA). The samples were placed manually on the surface of the IREN moderator before the implementation of this system. REGATA-2 can automatically deliver containers with samples to irradiation positions and back without stopping the facility operation. PTS significantly expands the capabilities of NAA: now researchers have access to the determination of the elemental content in samples using short-lived isotopes, in addition to the previously carried out experiments on medium- and long-lived isotopes. REGATA-2 allows seriously simplify the process of irradiation, to reduce the negative effects of radiation on a human body.

Also, a module for placing a sensor signaling the presence of a container at the irradiation position was developed and successfully implemented during collaboration of the Design engineering bureau and the NAA group FLNP. It became possible to automatically notify the experimenter about the arrival of the container at the irradiation position thanks to this module. The optical sensor placed in this module shows stable radiation resistance: the sensor remains in full working condition for more than three months since placed in service. The program for the controller that operate the movement of the container was significantly improved, which made it possible to adapt the PTS to the peculiarities of the IREN facility.

Using the PTS, the first experiment was carried out: the elemental composition of archaeological ceramics from Kazakhstan was studied by short-lived isotopes. The mass fractions of 7 elements are calculated.