

## **Kazakhstani material testing Tokamak KTM. project status**

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Creation of cost-efficient and safe fusion reactor will require the development of special structural materials for first wall, blanket, reactor components, which will be operated under conditions of the high heat fluxes, superconducting magnets, plasma heating systems and other elements. The existing tokamaks and other fusion facilities do not currently allow for conduction of specialized researches of plasma-facing structural materials. Kazakhstani Material Testing Tokamak (hereinafter - KTM) provides for a unique opportunity to conduct materials research and testing of separate units and components of fusion reactors.

Tokamak KTM is being constructed in Kurchatov, East Kazakhstan region, at the National Nuclear Center of the Republic of Kazakhstan in accordance with the decision of the Government of the Republic of Kazakhstan in support of the ITER program, as well as for the development of modern science and technology, and training of scientific engineering and highly qualified personnel in the country. The main distinctive feature of the tokamak KTM in comparison with similar facilities is the presence of the movable divertor and transport-sluice device, which allows for prompt replacement of the investigated samples without loss of vacuum in the vacuum chamber. KTM facility is meant for research and testing of the materials, technologies and separate units of future fusion reactors, as well as for working out the operation scenarios of the fusion neutron sources for hybrid reactors. Putting of tokamak KTM into operation long before completion of construction and full-scale experimental researches at ITER reactor will be a basis for wide international cooperation in the field of fusion material science, including the studies of both new materials, and technological solutions and designs. Moreover, tokamak KTM is the only mega-ampere facility in the world, which allows for replenishment of the databases on physics of the processes of plasma confinement in the border area between the spherical

tokamaks and classical ones, and will be a prototype for future compact energy fusion reactor.

Parameters of energy loads, wide range of used methods and diagnostics allow for high level studies and tests in divertor volume, which is highly important for studies of plasma facing materials in ITER and DEMO programs and for other experimental and power fusion reactors. Trial start-up of Tokamak KTM was done on September, 5, 2010. Now the number of the experiments has been carried out on the tokamak KTM with the use of capacitor battery as the power source. KTM project design documentation was re-developed according new requirements and has passed the State Expertise. At the moment, the Government of Kazakhstan allocated funding to complete the construction of the complex KTM. The physical start-up of KTM tokamak is expected in 2017, commissioning – in 2018. The joint work program with the participation of Russian specialists is implemented to prepare for the KTM physical start-up.

Tokamak KTM will be the object of EXPO-2017, which will be held in Astana.