

Target system maintenance experience in hot cell at J-PARC

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At the Japan Proton Accelerator Research Complex (J-PARC), a mercury target system has been in operation as a neutron production target of the spallation neutron source driven by 3-GeV protons. It is loaded on a big target trolley that has a dimension of 12.2 m in length, 2.6 m in width and 4 m in height and moves horizontally on a rail in a hot cell. The volume of the hot cell is as large as L43 × W12 × H15 m. Half area of the hot cell is used for the maintenance of the mercury target system and the floor is covered by a stainless lining considering a leak of liquid mercury. The other half area is used for the replacement of the proton beam window and moderators. Target vessel replacement is performed with full-remote handling devices such as a 6-axis power manipulator, 3 pairs of master/slave manipulators, an in-cell overhead 20 t crane and radiation resistant cameras. Since a large amount of radioactive gaseous nuclides are generated in mercury via the spallation reactions, they should be transferred from the surge tank of the mercury circulation system to an off-gas processing system before removing the used target vessel. The off-gas processing system is installed in a room nearby the hot cell. It is also operated during target replacement work to suppress the release of tritium in the mercury target system to open air. The used target vessel is contained in a stainless steel container and moved to a storage room on the basement floor with the overhead crane. More detailed design of hot cell and experiences on the target system maintenance will be presented.

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