PRELIMINARY ENGINEERING DESIGN OF PIE FACILITIES IN IFMIF/EVEDA

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The International Fusion Materials Irradiation Facility (IFMIF) is as an accelerator-based intense 14 MeV neutron source for testing fusion reactor materials [1]. Under Broader Approach (BA) Agreement between EURATOM and Japan, the Engineering Validation and Engineering Design Activity (EVEDA) were started from 2007. The IFMIF needs the post irradiation examination (PIE) facilities to generate a materials irradiation database for the design and licensing of fusion DEMO reactors. Also in the PIE facilities, the small size specimen reloading in the capsule of High Flux Test Module (HFTM) is required to obtain high doses up to about 150 dpa. The main purpose of this paper is to prepare the rationalized preliminary engineering design of PIE facilities of IFMIF. In this study, the evaluation of the functional analysis of some work processes at hot cells of PIE facilities was also performed.

We have designed about the hot cells and layout of PIE facilities to obtain materials database for the DEMO design. In figure 1, the basic structure of hot cell is shown. The hot cells was designed to handle a irradiated capsule and to transport a irradiation capsule and specimens for testing of the database. In the functional analysis of the work process for handling of specimens inserted in capsule, we were mainly evaluated that transportation system, process of reloading specimens in hot cells and layout of PIE facilities.



Figure 1: A model of concrete hot cells



Outer size (inside dimension)	830 × 820 × 580 cm (550 × 540 × 300 cm)
Thickness of radiation shielding wall	140 cm
Materials	Ordinary concrete
Transportation system Case size (Transportation weight)	(i) Pneumatic tube $60 \phi \times 22.5 \text{ cm} (200 \text{ g})$ $\sim 110 \phi \times 37 \text{ cm} (650 \text{g})$
	(ii) Self-propelled container Basic type; 48 × 38 × 13.5 cm (10 kg)

[1] IFMIF International Team, IFMIF Comprehensive Design Report, IEA Report, 2004.