

## Development of the Design Concept for Dismantling the Irradiated Specimen Block of TEM in IMEF

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### 1. Introduction

Since 1999 total seventeen(17) irradiated non-instrumented and instrumented capsules, irradiated at HANARO, were cut and dismantled for specimen classification including specimen block of TEM. Up to date, any kinds of problems were not occurred during cut and dismantling process[1,2,3,4].

Especially to dismantle the specimen block of TEM, some equipments, such a specimen holder pressing machine, an air tweezers, a metal tool with a pointed end, a pair of G-HDE master slave manipulators and etc., are used in M5a hot cell of IMEF.

In spite of difficulties as well as inefficiencies while dismantling the specimen block of TEM, it was succeeded without meeting a serious problem until now. But it required many days and man-power for dismantling.

To have a better techniques and technologies for dismantling the specimen block of TEM, an advanced design concept was reflected and developed. This concept is described herein, from a sliding door to a plugging door, and representative results of the test results are presented.

### 2. Methods and Results

In this section the design change from sliding door to plugging door of irradiated specimen block of TEM are described.

#### 2.1 Present Used Design Concept

The present used design concept of the irradiated specimen block of TEM is shown in Fig. 1. As shown in Fig. 1, the type of door is a sliding door. The dimension of the irradiated specimen block of TEM is 10 mm x 10 mm, so it is very difficult to handle by a G-HDE master-slave manipulators equipped with large jaws.

In addition to, it is easily jammed in the specimen holder of capsule or while dismantling the specimen holder by specimen holder pressing machine. And the width of sliding door is less than 2 mm, so it is very hard to focus on the center of sliding door and to push the sliding door by a metal tool with a pointed end through the radiation shielding window with master-slave manipulators.

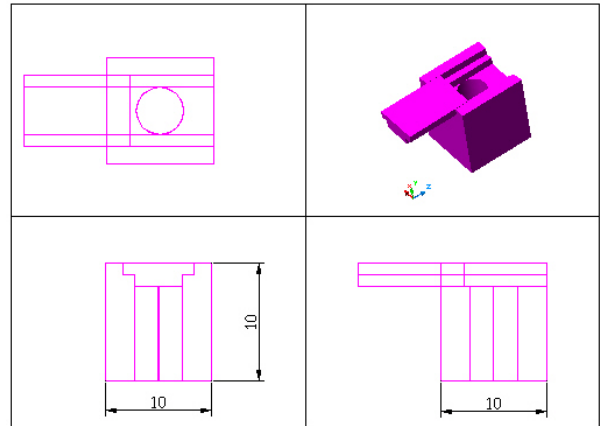


Fig. 1 A drawing of present used irradiated specimen block of TEM.

#### 2.2 Advanced Design Concept

The advanced design concept of the irradiated specimen block of TEM is shown in Fig. 2. As shown in Fig. 2, the type of door is a plugging door. The main idea is to be easy dismantling and to save working days and man-powers. Comparing to the weak point of an old type, the new one was improved the dismantling method from pushing a door to rotate and pull a door by master-slave manipulators.

If the door is jammed while irradiating at HANARO or dismantling in IMEF, it is very easy and simple for dismantling just only do rotating and pulling the door by master-slave manipulators, which are holding a specimen block both a main body and a plugging door without losing very small irradiated TEM specimens.

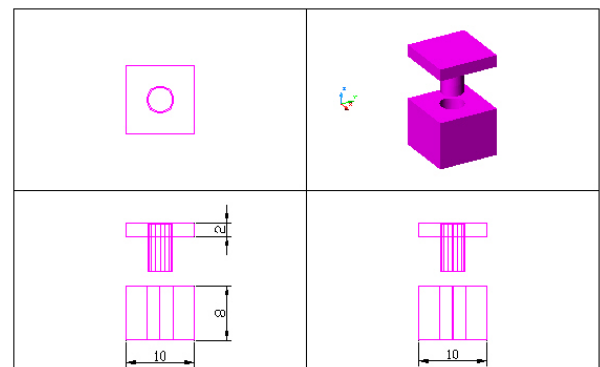


Fig. 2 A drawing of advanced design concept of irradiated specimen block of TEM.

### 2.3 Test Results

The test of dismantling a irradiated specimen block of TEM, which is adapted a advanced design concept, was carried out at M5a hot cell of IMEF as shown in Fig. 3.

The working time was less than 1 hour due to smooth work for rotating and pulling a plugging door and no anxiety for losing a very thin specimen which thickness is approximately 1  $\mu\text{m}$ , including sample distribution with an air tweezers as shown in Fig. 4. Although the specimen block is too small, no problem was met while rotating and pulling a plugging door by a pair of master-slave manipulators.

During unplugging a door, no need to change a position of specimen block to carry out next process for distributing TEM specimens into vial.

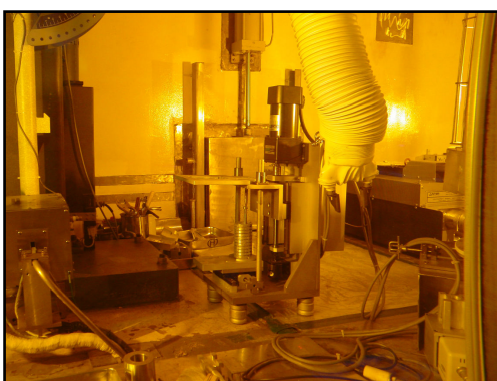


Fig. 3 A photograph for specimen holder press machine installed at M5a hot cell of IMEF.

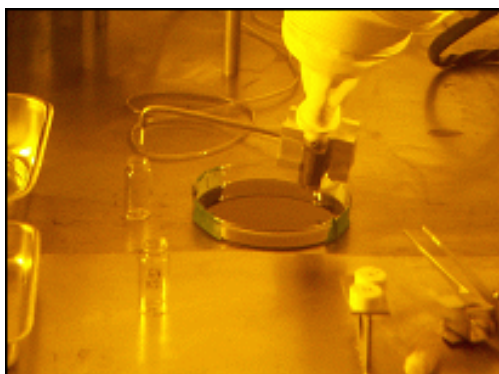


Fig. 4 A photograph for distributing a TEM specimen into vial at M5a hot cell.

### 3. Conclusion

The advanced design concept was applied to HANARO irradiated instrumented capsule (05M-07U), and carried out the performance test to confirm a workability and efficiency.

By changing a door type from sliding door to plugging door, the strong point was achieved as follows.

1) The work time for dismantling and distributing can be reduced less than one(1) hour per one(1).

2) Although the door of specimen block was jammed while irradiating at HANARO as well as dismantling in IMEF, no problem was met while rotating and pulling a plugging door by a pair of master-slave manipulators.

### 5. Acknowledgment

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