

Improvement of Remote Control of Storage Vault Lid O-Ring Replacement in ACPF

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1. Introduction

When performing a pyroprocessing experiment, Uranium / molten salt ingot which are by-products are generated and need a place to store them. We have called this place a Storage Vault which is located in the ACPF (Advanced spent fuel Conditioning Process Facility). The O-ring inserted in the lid, one of the components of the storage vault was designed without considering the replacement at the time of first production. However, insertion and replacement of the O-ring is necessary for the continuous and safe use of the storage vault. And in a special environment called a hot cell, there should be a way to replace the O-ring with MSM (Master and Slave Manipulator). Therefore, the purpose of this research is to improve the remote control of storage vault lid O-ring replacement.

2. Experimental Procedure

2.1 Improvement of SV lid

The storage vault is divided into vault A and Vault B, and their specifications are shown in Fig. 1.

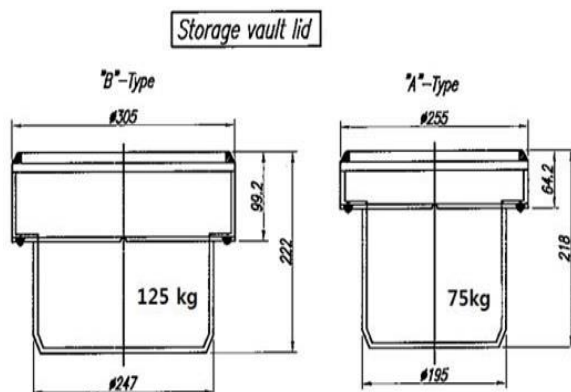


Fig. 1. Specification of storage vault.

The existing O-ring groove of storage vault was manufactured to standard size. However, Continuous use has resulted in damage to the interface surface of the O-ring/storage vault container, requiring measures to maintain airtightness. Due to the specificity of the hot cell, the surface of the vault couldn't be processed directly so the O-ring grooves were machined. Therefore, a part of side surface of the O-ring grooves were cut and proceed so that 3.2 to 3.5 mm the O-ring protrudes out of the O-ring grooves. Four remote change holes ($\varnothing 8$) were drilled at 90° intervals in the storage vault circular O-ring groove and O-ring replacement tool was manufactured (Fig. 2).



Fig. 2. O-ring holes and changing tool.

2.2 Design of storage vault lid rotator

In order to replace the O-ring of the storage vault lid, the storage vault lid must be rotated but it is impossible to operate with MSM because storage vault lid weight is about 125kg (B type). Therefore, a device which can rotate the storage vault lid was required and designed.

The M8 cell in ACPF where this rotating device is to be installed is very narrow. To make 'a' type and 'B' type lids available at the same time, a space ring which has difference of height is created on the bottom of storage vault lid, so that it can be conveniently replaced with a MSM. In addition, the

bottom surface is equipped with a 'slip pad' to prevent the slipping of storage vault lid. In the upper fixture and bolts of the rotating structural part, the hexagonal part was 19mm and vox socket was used a standard product of dodecagon. And it could be made operable with ratchet wrench. The base plate of the rotating device was made rigid so that the lid didn't move when it rotates, and the center of gravity was considered. The rotating part was configured at a worm/screw method and the ratio was about 40:1. The screw was assembled by inserting a thrust bearing and the hex 19mm was machined on the upper/lower part of the screw.

3. Conclusions

In the past, the O-ring inserted in the lid, one of the components of the storage vault was designed without considering the replacement. However, the remote control of the O-ring replacement was required for continued use. The following two parts are improved to give the remote control to the replacement of the O-ring.

- (1) Improvement of SV lid
- (2) Design of storage vault lid rotator and make a dedicated tool

We able to test the remote control of the replacement of the O-ring and replace the O-ring without any difficulty.

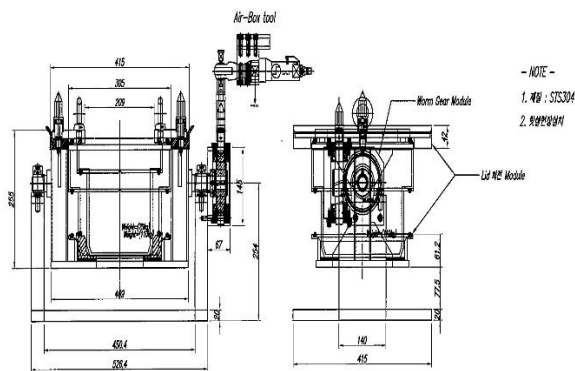


Fig. 3. Drawing of the rotator.