

Dismantlement of Surveillance Capsule for Hanul Unit 3

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1. Introduction

Reactor pressure vessels(RPVs) in nuclear power plants are irradiated by neutrons during reactor operation, which have been hardened and embrittled due to changing the mechanical properties. To evaluate safety and life-time of RPV, surveillance test must be performed with the same specimens as RPV material compositions. At the beginning of reactor operation, a surveillance capsule is installed by RPV, then it is withdrawn at the end of operating cycle [1]

In this paper, dismantling procedure of surveillance capsule in hotcell is introduced and developed for effective working.

2. Dismantlement and Result

Unlike previous manual withdrawal, we developed the automatic specimen withdrawal machine for efficient working process and undamaged specimen. In order to prevent specimen loss, dismantlement of surveillance capsule is performed by 2 members.

2.1 Capsule Preparation

Surveillance capsule is carried into M2 hotcell through the pool in IMEF(Irradiated Material Examination Facility) in KAERI(Korea Atomic Energy Research Institute). Fig. 1 shows Surveillance capsule in M2 hotcell.

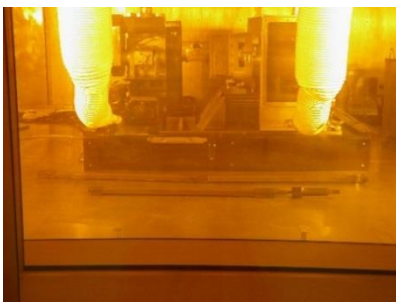


Fig. 1. Surveillance capsule.

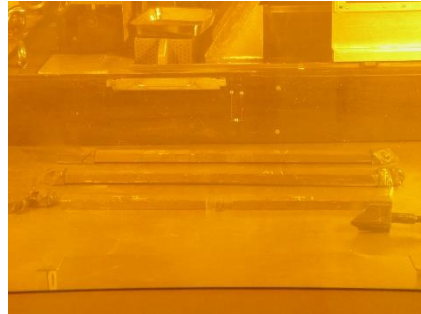


Fig. 2. Marked capsule.



Fig. 3. Wedge plug cutting.

2.2 Marking

Surveillance capsule consist of total 6 sections. In order to specimen traceability, Each section is marked identification number. Fig. 2 shows marked capsule.

2.3 Removal of Wedge Plug

In order to specimens withdrawal, Wedge plugs are removed by universal cutting machine in M2 hotcell. Fig. 3 shows cutting of Wedge plug by universal cutting machine.

2.4 Specimens Withdrawal

The specimens are withdrawn by automatic specimen withdrawal machine. This machine is

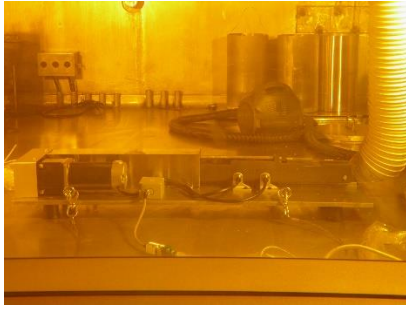


Fig. 4. Automatic specimen withdrawal machine.



Fig. 5. Dismantled capsule and specimens.

operated by DC motor and finish working per 1 section in 30 seconds. Fig. 4 shows installed automatic specimen withdrawal machine in hotcell.

2.5 Result

As a result, we obtained undamaged surveillance test specimen and performed surveillance test successfully. Fig. 5 shows dismantled capsule and surveillance test specimens.

3. Conclusion

Surveillance test is very important to estimate lifetime of RPV in PWR. Neutron bombardment changes mechanical properties of reactor structural components including vessel. Critical point for LBB(Leakage Before Break) must be decided and discussed with various reactor operating conditions. In this paper, dismantlement of surveillance capsule in hotcell is introduced and shown by machines with modifications which were developed to do hotcell work effectively.

Surveillance tests have been performed in every year and done by IMEF in KAERI.

REFERENCES

- [1] B. C. Kim, et al, "FINAL REPORT FOR THE 4TH SURVEILLANCE TEST OF THE REACTOR PRESSURE VESSEL MATERIAL(CAPSULE Y0 OF ULCHIN NUCLEAR POWER PLANT UNIT 2" (2003).