Advanced Risk Management and Monitoring System, ARMMS

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1. Introduction

Many risk informed regulation & applications (RIR&A) are approved and used for the nuclear power plants(NPPs), and more RIR&A will be actively applied in Korea. Also, since Korean NPPs are recently exported to other country such as UAE, RIR&A would be applied to the exported NPPs. Thus, a tool which will help the user apply RIR&A is required. KAERI is being developing a tool, called ARMMS (Advanced Risk Management and Monitoring System), for this purpose.

The design plan of ARMMS was introduced in the Ref.[1], and in this paper, the actual implementation of ARMMS is introduced, and the performance monitoring module is introduced.

2. Functions of ARMMS

2.1 Risk Management of ARMMS

ARMMS has two functions. One function of ARMMS is the risk management. ARMMS was implemented for many RIR&A such as risk-informed in-service test (RI-IST), risk-informed ISI (RI-ISI), risk-informed tech spec.(RI-TS), Option 2, on-line maintenance(OLM). The decision makings of RIR&A are made with all modes all hazard PSA models in ARMMS. The PSA tool used in ARMMS is AIMS[2].

Fig. 1-3, which are example screens for RI-TS, OLM, and RI-ISI, respectively. The adapted RI-ISI method is the Westinghouse approach.

2.2 Performance Monitoring of ARMMS

Another function of ARMMS is the performance monitoring even though this function is not yet implemented. The function is required to support the risk management function of ARMMS. The function is developed through the Mitigating Systems Performance Index(MSPI)[3] and Maintenance Rule(MR)[4] concepts which will be differently implemented from the original MSPI and MR. as discussed in Ref.[5]. The new performance monitoring approach is shown in Fig. 4. In Fig. 4, PSA data are updated with operating history, and from which MR performance criteria(PC) and MSPI are derived by a simple algorithm. The benefit of new approach in the performance monitoring is it reflects the added BOP model better than the conventional approach. In the simple algorithm, the gate unavailabilities are used, which are derived by using the SIMA command " TopEvent xxxx"

In addition, the PSA model used in ARMMS will contain enough BOP models which can show the change of trip frequencies to help a plant manager make better decision making in some RIR&A such as OLM.

3. Conclusions

ARMMS is being developed to be used in RIR&A. The risk management function of ARMMS is implemented, and performance monitoring function is

designed using PSA based integrated framework for MR and MSPI. ARMMS has BOP model which can offers a trip frequency and more accurate CDF.

Acknowledgement

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REFERENCES

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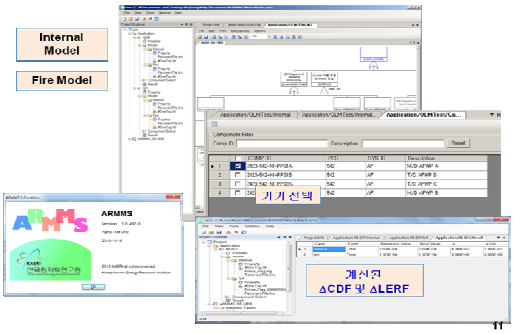

Fig. 1. An example screen of OLM in ARMMS

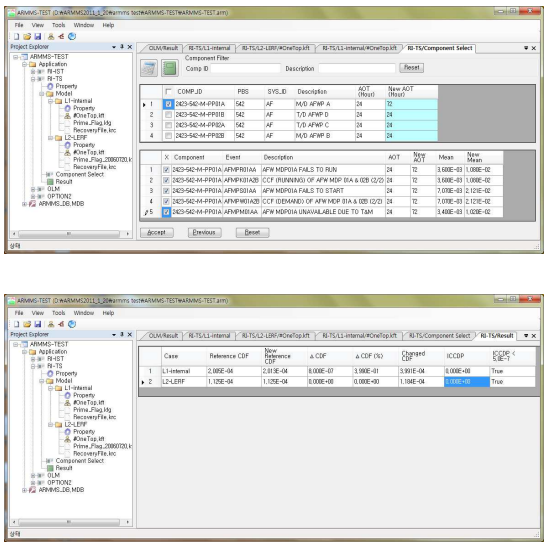

Fig. 2. An example screen of RI-TS in ARMMS

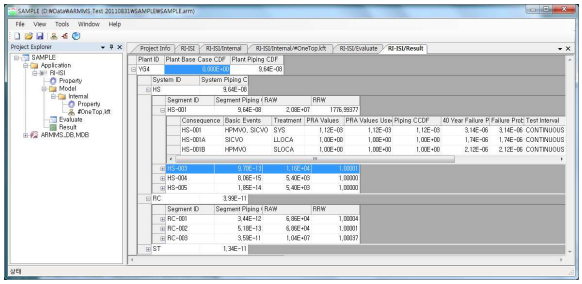

Fig. 3. An example screen of RI-ISI in ARMMS

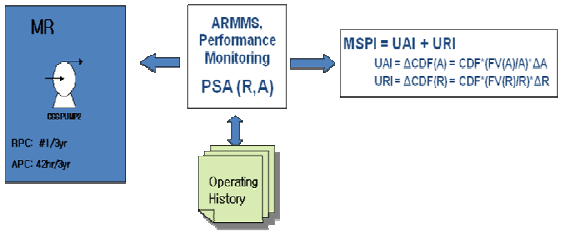

Fig. 4. PSA based Performance Monitoring