

The Radiological Assessment System Based on Virtual Networked Environment for Decommissioning of Nuclear Facilities

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1. Introduction

Decommissioning of nuclear facilities has to be accomplished by assuring the safety of workers because decommissioning activities of nuclear facilities are under high radioactivity and work difficulty. It is necessary that before decommissioning, the radiation exposure dose of workers has to be analyzed and assessed under the principle of ALARA.

This paper is intended to suggest the method and assess the exposure dose to workers in virtual decommissioning environments. To simulate a lot of decommissioning scenarios, decommissioning environments were designed in virtual reality. To simulate and assess the exposure dose to workers, human model also was designed in virtual environments. These virtual decommissioning environments made it possible to real-time simulate and assess the exposure dose to workers.

2. Development of The Radiological Assessment System Based on Virtual Networked Environment

2.1 Configuration of the Assessment System

The safety assessment system based on virtual networked environment is show in Fig. 1. The system was developed with several modules. The modules are made up of five modules such as a module of database, a module of multi-subjects, a module of multi-subjects control, a module of multi-subjects evaluation, and a module of optimal evaluation. The module of database is to manage all data from the system. The module of multi-subjects is to carry out decommissioning activities in a virtual workplace under networked environment. The module of multi-subjects control is to real-time monitor with one-person mode and third-person mode. The module of multi-subjects evaluation is to

evaluate the working time, exposure dose, and wastes from decommissioning activities. The module of optimal evaluation is to suggest a working route to reduce the exposure dose and working time.

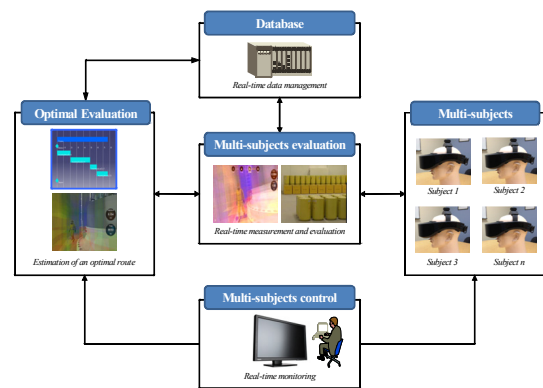


Fig. 1. Configuration of the assessment system.

2.2 The Innovative Feature of the Developed System

The assessment is based on virtual networked environment. So, several subjects can at the same time enter into a virtual decommissioning workplace. This function enables the subjects to take parts in several roles of a workplace as shown in Fig. 2. The number of the subjects and roles is no limit under virtual networked environment. Fig. 3 shows that the system provides subjects with one worker (a crane operator role) and another worker (a working role). And a monitoring mode is the basic mode which works as the system is in operation.



Fig. 2. The virtual networked environment in the system.

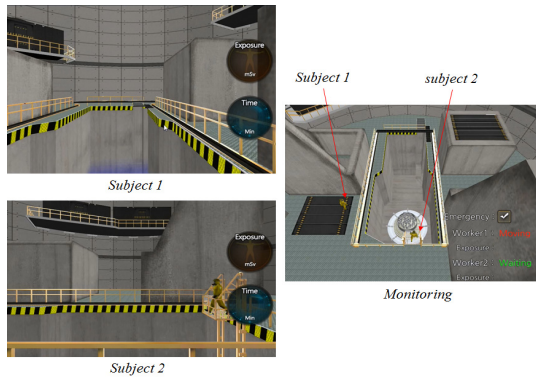


Fig. 3. Multi-subjects operation in the system.

2.3 Real-time Measurement and Evaluation under Virtual Networked Environment

The occupational dose is measured and evaluated when a subject moves and an incident occurs in virtual decommissioning environment. Fig. 4 depicts that a subject enter into a workplace and the subject collides with dose distribution in the workplace. The occupational dose can be measured and calculated by every one second with dose distribution and duration time in a virtual decommissioning environment.

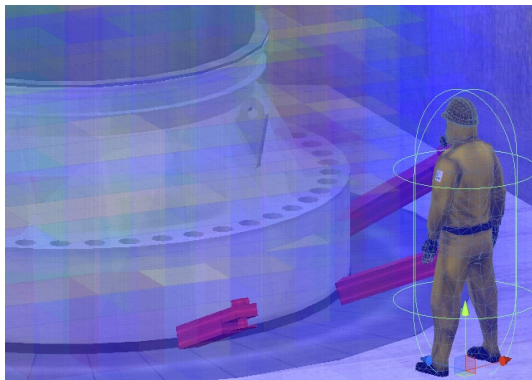


Fig. 4. A subject into the virtual system.

3. Conclusion

The radiological assessment system was developed under virtual networked environment to measure and to evaluate on hazards during decommissioning of nuclear facilities. The system has the features of arbitrarily changing direction in a workplace and of real-time measuring personal dose and collective dose in a workplace.

It can be concluded that the developed system enables workers to improve familiarization of a workplace prior to entering into a workplace and

can be utilized as a training tool for preventing workers from accidents during decommissioning of nuclear facilities.

4. Acknowledgements

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