

## Principal Research Results

# A Development of Virtual Reality Training System – An Application to Ordinary Missions of Electric Industry –

### Background

Our laboratory has developed the virtual reality training system (VRTS) for emergency response in case of tunnel fire. As a result of development of the system, it was confirmed that VRTS is available for practical use for emergency response in the electric industry, other industries and organizations. However, problems concerning graphics reality, conversion to PC version, development of interface and indication of other workers, were extracted by persons concerned in the electric industry. It is also supposed that a virtual reality training system of ordinary mission is useful for efficient newcomers' training and experts' training concerning human error.

### Objective

The objective of this study is to apply the construction methods of VR training system by CRIEPI to ordinary mission of electric industry for evaluation by electric industry engineers.

### Principal Results

After needs sounding in various fields of the electric industry, a new virtual reality training system of ordinary mission in radioactive materials transport was developed. This system has the following operational and technical characteristics.

- a) Two personal computers connected by Ethernet cable realized the cooperative training in the same virtual reality space. As the result of cooperative virtual reality training, each computer displayed different viewpoints.
- b) Two trainees individually operated each personal computer that played a director or a worker. Each computer program had different scenarios that decided for the director and the worker.
- c) Human error inducing traps were set in the program, while omission errors were warned in the program. Those were also recorded in a file for debriefing.
- d) Before execution of training, an elementary training program of mouse operation and radiation measuring were prepared in a briefing program.
- e) The virtual reality training consisted of preparation of crane handling device, operation in a hold, radiation measuring, crane handling, operation on the transport vehicle and radiation measuring. Those virtual reality scenes except crane handling were executed sequentially or individually.

After development of the training system, engineers concerned with radioactive materials transport executed a practical review. According to their review, the new virtual reality training system was practical in the ordinary mission of radioactive materials transport.

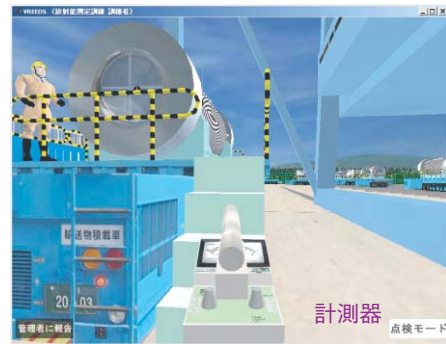
### Future Developments

Maintenance and operation of electric industry was chosen as the following VR training system. The new system will realize additional human error traps by the visual and auditory senses.

**Main Researcher:** Naohito Watabe,  
Senior Research Scientist, Structural Engineering Sector, Civil Engineering Research Laboratory

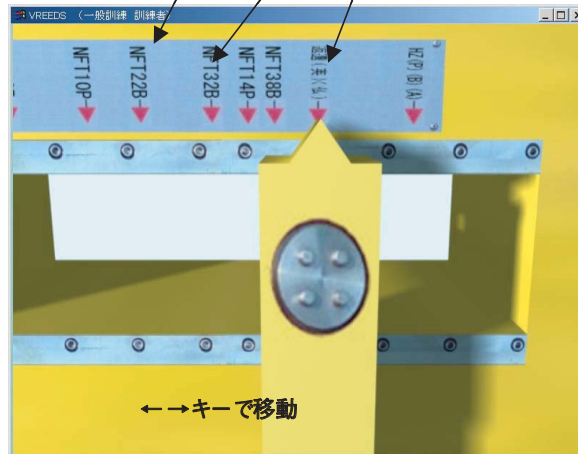


**Fig.1** Check of crane handling device  
This view shows the director's check operation of crane handling device that is painted yellow.

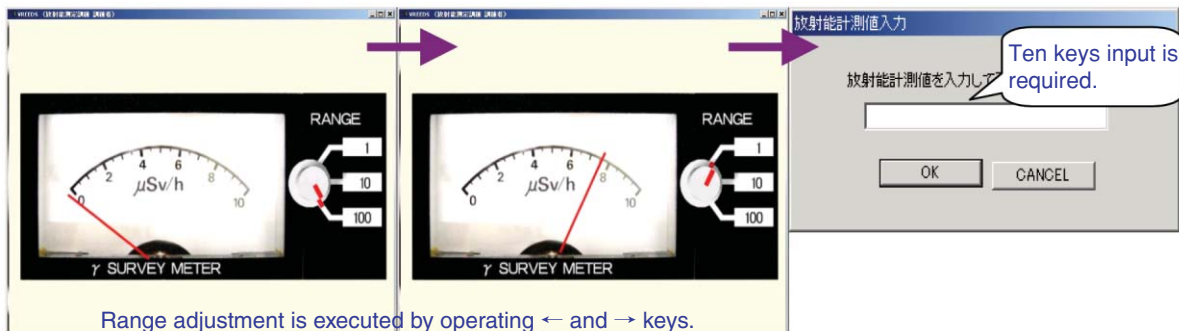


**Fig.2** Start scene of radiation measuring  
The worker carries a radiation measuring instrument and executes measuring mission around the transport package.

Initial radiation value is randomly shown among three patterns.



**Fig.3** Selectable three positions of crane handling device  
A worker can change the position of crane handling device by operating arrow keys so that human errors of omission error, lapse and miss position will be induced.



Range adjustment is executed by operating ← and → keys.

**Fig.4** Representative trap in radiation measuring  
Lapse of range adjustment, read error of scale and key input error are expected in radiation measuring.