

# Development of Radiation Emergency Movable Access Control System

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## 1. Introduction

When radiation workers work in radiation emergency situation, it is essential to set radiation controlled area, and control the access [1].

There are several risks, like missing record sheet, write down mistakes when workers misunderstand the record sheet forms, if workers use already printed record sheet. Therefore, it is necessary that access control system has to be taken into account, especially for the emergency time.

Particularly, when radiation emergency happens, it is difficult to use static access control systems due to the changeable condition. In addition, it is more useful that battery backups are equipped for the power dissipation accident.

Furthermore, the access control system in radiation emergency has to be user friendly system used for workers who are not used to handle the system.

The ICRP 103 Recommendation suggests people who work during the radiation emergency, are restricted the radiation exposure [2]. For this occasion, radiation workers use personal dosimeters to be alerted with alarms they set. Sometimes, it is difficult because there are variety of personal dosimeters which have numerous methods of setting alarms and inexperienced workers. Therefore, it is more valuable for workers put alarm setting function in the access control system.

In this study, Radiation Emergency Movable Access Control System (REMACS) has been developed for replacing the record sheet of radiation emergency with Remtech Co.

## 2. Main title

### 2.1 The physical composition of REMACS

The REMACS is consist of a tablet computer which has a program for access control and

manipulating EPD (Electronic Personal Dosimeter, Thermo Fisher Scientific), four adaptors for accessing EPDs, a rechargeable battery backup module, keyboard to input access data, and two USB ports to connect printers and an USB sticks (Table 1).

Table 1. Specification of REMACS

Item	Specification
Tablet	· CPU : Intel dual core · RAM : 4G · HDD : 60GB SSD · Display : 10.4" Touch LCD
Interface	· RJ45 Ethernet · USB Port 2EA
IR Reader	· For EPD 4 EA
Power Source	· AC 220 · DC 12V(Chargeable)

There are under four people can be taken access process with four ports that REMACS has. Furthermore, the rechargeable batteries can be replaced with the other ones if the performance of machine is deteriorated. A TFT LCD touch screen provides simple GUI as long as keyboard it has cannot provide. The Fig. 1 below shows the 3D Design of REMACS

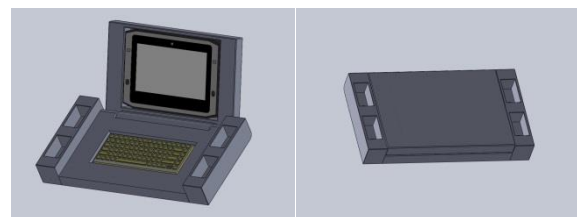


Fig. 1. The 3D Design of REMACS.

## 2.2 Developing REMACS Program

Four personal dosimeter slots can be managed by the REMACS program individually or simultaneously. As a result, under the four people can easily manipulate the personal dosimeters and rapidly check in or check out the active area.

In addition, when radiation workers check out the radiation zone, they can check radiation exposure with graphs which REMACS Program has been made. It can help the workers figure out when or where they have highly got the radiation exposure.

Lastly, after the events, managers can confirm the record of check-in and check-out of workers. Besides, they can save the record, and print it out. Therefore, it is not necessary for managers to prepare the extra forms for recording the access and radiation exposures of workers.

Fig. 2 shows the main screen of REMACS Program. It displays the capacity of a battery, selecting the slots of personal dosimeters, selecting the menu related with the access and the radiation exposure of workers.

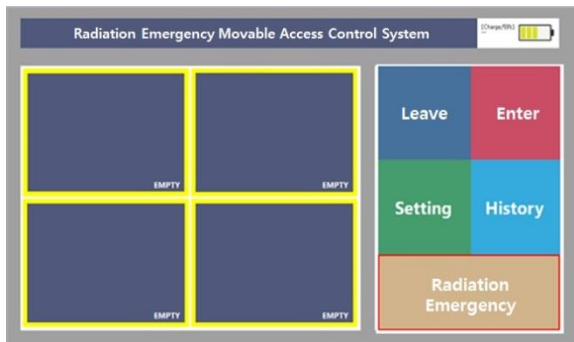


Fig. 2. The Main Screen of REMACS.

## 2.3 The Process of REMACS

**2.3.1 Personal Dosimeter Alarm Setting.** Before workers go into the radiation zone, they set personal dosimeter with REMACS. This function simplified the Electronic Personal Dosimeter (EPD, Mk 2.5, Thermo Fisher Scientific) management system, “Easy EPD” to make user friendly environment.

**2.3.2 Check in and Check out Process.** The record of check-in starts with putting personal dosimeters into the slots, and then workers put personal information on the program. After finishing their works, put personal dosimeters into the slots again and touch the check-out button so that they exit.

**2.3.3 Confirmation of Access records.** Total work hours, maximum and minimum radiation rates which personal dosimeters recorded, total radiation exposure workers got can be founded in access records. Graphs and \*.txt files have been made depending on radiation exposure and work hours. Furthermore, \*.txt files shows exact radiation doses and radiation rates depending on time.

## 3. Conclusion

In this study, Radiation Emergency Movable Access Control System (REMACS) has been developed, and it is assessed whether REMACS can be adoptable in the radiation emergency field.

REMACS can manage entrance and exit in radiation emergency site without continuous electrical power supply. With battery backups, it can be operated for certain period.

In addition, user friendly screen has been made to make utilization handy even when workers are not experienced and the urgent situation.

This equipment is not only managing check-in, check-out process, but also managing radiation dose of workers and personal dosimeters.

Without copying forms, bringing the handy REMACS can produce various documents related with access of workers.

## REFERENCES

- [1] IAEA, “Preparedness and Response for a Nuclear or Radiological Emergency”, pp. 25-27 (2002).
- [2] ICRP, “The 2007 Recommendations of the international Commission on Radiological Protection” (2007).