

Ergonomic evaluations using virtual reality.

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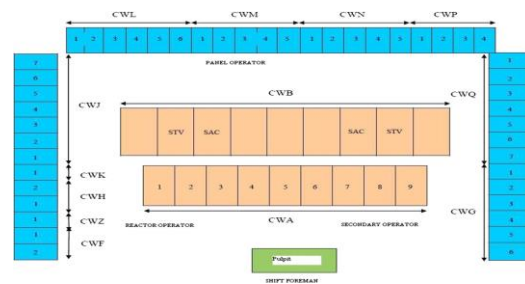
This work proposes the use of virtual simulations to aid the ergonomic evaluations of the operational tasks carried out in the NPPs' control rooms. As the results obtained from simulations in virtual environments agree with those carried out in the real environment - showing a good degree of accuracy - ergonomic evaluations may be previously performed in these virtual environments (VEs), without having to interrupt the work routine in the environment under consideration.

of NPP control rooms and desks is emphasized. The operation of NPPs, or industrial plants in general, take place in control rooms, where personnel should run the operation of such plants safely either to keep plants in normal conditions or to bring them back to this status during the occurrence of any abnormal situations. These issues should be carefully considered, as any possible abnormal condition could have potentially hazardous effects for nuclear plants. The existing interfaces in control rooms enable operators to track variables' status online through indicators located at different control desks in the whole control room. There are alarms indicators too, which indicate the occurrence of any abnormal conditions in one or more of the subsystem's modules. In addition, operators should be able to change the plant's operational conditions at anytime using actuator controls. Therefore, all these interfaces indicators or controls must be adequately located in the control desks and room, so that the personnel are able to operate the plant safely under normal conditions, identify all the variables' and alarm indications easily and execute control actions. The adequate location of the interfaces is very important, mainly because it is important to identify any abnormality promptly and act appropriately in

the occurrence of such unwanted conditions. In severe situations, the plant should be shut down (trip) readily. Control rooms must enable all these conditions to operators [1]. Thus, this work aims at describing the use of a virtual simulation platform, based on a computer game engine that is freely available for educational and research purposes. Previous work has been done in reusing this platform for similar applications, as described in the next section. The current paper describes its reuse to reproduce an existing pressurized water reactor (PWR) NPP control room and aims at performing a comparative analysis between a previous ergonomic evaluation carried out in a real environment and another using the corresponding VE. This paper, thus, emphasizes the VR technology use for nuclear engineering field application. Figure 1 shows a schematic diagram of this PWR NPP control room where: CWA is the Main Control Console; CWB is the Auxiliary Control Console; CWF is the Core Monitoring; CWG is the Ventilation; CWH is the Core Instrumentation; CWJ is the Reactor Protection; CWK is the Isolation of Contention; CWL are the Security Systems; CWM are the Primary Auxiliary Systems; CWN are the Individuals Controls and CWP are the Secondary Systems.

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Fig. 1 diagram of this PWR NPP control room



References

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