

Development and Simulation of Operational Procedures in the Physical Security of Nuclear Installations with the Assistance of Ergonomics Techniques

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Ergonomic Work Analysis consists of thorough analysis about the overall performance of sociotechnical systems to improve conditions and / or safety at work. However, during Ergonomic Work Analysis the presence of ergonomists in the workplace may interfere with the progress of work, which may limit the observation period [1]. Organizations that have risk areas has already used simulated exercises to train their professionals. With the powerful simulation technologies available (e.g. Virtual Reality), it becomes increasingly necessary to develop methods and techniques that allow how to perform such training, as close as possible to the actual work activities. It is especially important in the case of simulators for training Emergency situations.

In this context, the objective of this article was to verify the potential use of Virtual Reality, with the aid of Ergonomic Analysis (EA), in developing scenarios and virtual environments for simulation and training of Physical Security procedures. After the EA in the work environment of the security guards, several problems were encountered, and recommendations were proposed to improve the working condition of professionals who perform security at the institution. The game engine Unity 3D was used to implement new features to the Virtual Environment of the Instituto de Engenharia Nuclear - IEN [2]. Figure 1 shows the surveillance booth where the EA was performed.



Figure 1. Surveillance booth

It is possible to observe that the workplace was precarious, the chair was not suitable for the

type of work because it did not have wheels this made it difficult for the watchman to rotate to observe around the workstation. On sunny days, the cabin (fiberglass) became extremely hot which made it impossible to stay inside it. Thus, the vigilante ended up staying outside the cabin to perform his work, which was not recommended by the management.

Figure 2 shows recommendations for improvements that have been modeled and inserted into the virtual environment to be tested before deploying to the actual environment. It is possible to observe the masonry surveillance post to reduce the heat and a swivel chair to better accommodate the guard. Virtual security cameras have been inserted to assist in surveillance.



Figure 2. Improvement Recommendations

This work sought, through Ergonomic Analysis, to identify risk situations in the work environment of the security guards of the Instituto de Engenharia Nuclear. Problems related to the workplace were perceived such as: inadequate furniture, lack of drinking fountain and bathroom, absence of artificial lighting. This can create a risk to the safety of the institution because if the guards are not fully focused on their work and are worn out by the problems mentioned, they were not able to perform their activity in the best way, which may lead to a security failure and consequently compromise the installation.

References

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