System for monitoring Cyclotron CV-28 safety parameters

M. S. Farias[1], G. D. G. Jaime[2], F. Lacerda[1], S. C. Augusto[2]
E-mail: msantana@ien.gov.br, gdjaime@ien.gov.br, flacerda@ien.gov.br, silas@ien.gov.br

[1]*SEINS, IEN;* [2]*SEESC, IEN*

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Cyclotron CV-28 is a circular multi-particle accelerator in operation at Instituto de Engenharia Nuclear (IEN). Originally dedicated to nuclear physics science, CV-28 has increasingly shifted its focus to commercial radioisotope manufacturing, owing to the demand for radiopharmaceuticals with short half-lives in nuclear medicine over the decades. The CV-28 has required several updates over the years in order to remain operational for so long. One of these updates was to ensure that the cyclotron control panel could display all safety-related parameters. This report summarizes the framework for monitoring safety parameters that is currently being developed. Two 32-inch video monitors were installed on the cyclotron operating console. Human-system interfaces make safety information available, following human factor requirements. Figure 1 shows the studies for the installation of these screens in the cyclotron operating room.

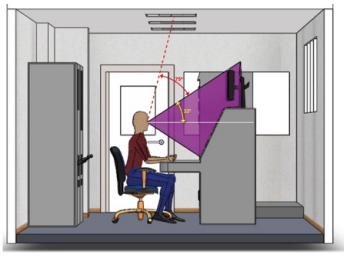

Figure 1. Sketch for the positioning of screens.

The following are the safety-related parameters and information that are already available on the monitors in the control room of the CV-28 cyclotron:
1. Confirmation that the round at the designated locations was completed: this subsystem captures the information of the round carried out, before the start of the operation, and records in file the time when each round button was pressed, as well as the time when the tour was completed. Figure 2 shows this information on the application screen.

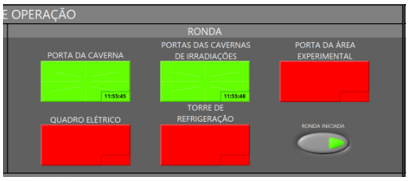

Figure 2. Information about the round.

2. Details on the opening of fluorine processing cells [1]: a magnetic lock has been mounted on the cell's door that is directly controlled by a radiation monitor. If dose rate measurement surpasses its alarm threshold, the lock is instantly energized. Such threshold is set by the supervisory computer.
3. Data on the status of material transfer from the cyclotron to the hot cells.
This information is displayed on video monitors in the control room and is also accessible remotely via cloud computing, as shown in Figure 3.

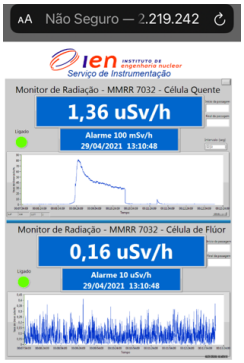

Figure 3. Data in cloud computing.

Figure 4 shows the video monitors of the system for viewing the safety-related parameters mounted on the CV-28 cyclotron console. Other monitoring subsystems will be installed soon.

Figure 4. Video monitors on the CV-28 console.

References

[1] DE LACERDA, F.; FARIAS, M.S.; NUNES, R.C.E.; SUITA, J.C.; DE SANT'ANNA, C.R. Safety and control improvements in fluorine-18 production at CV-28 cyclotron, Proceedings of the INAC 2019, ABEN.