RIMAX, AN AUTOMATED X-RAY MAPPING TOOL TO SURFACE CHARACTERIZATION

Luigi Lepore¹,*, Giuseppe A. Marzo², Giacomo Manessi³, Luca Ferrante³, Giuliano Mini³

¹ENEA, NUC-IRAD-CRGR, Nuclear Material Characterization Laboratory and Nuclear Waste Management, ENEA Casaccia Research Centre, Via Anguillarese301, 00123 Rome, Italy ²NUClear Department, ENEA Casaccia Research Centre, Via Anguillarese301, 00123 Rome, Italy

³ELSE NUCLEAR S.r.I., via Sacro Monte, 3/12 - 21052 Busto Arsizio (VA), Italy

Radiological characterization of those materials derived from dismantling and decommissioning of a nuclear site is a challenging task. Materials have to be sorted according to their radiological content, among other parameters, and some of them may be recycled if no significant residual radiological contamination is present. Surface characterizations, i.e. to determine the activity of radionuclides per unit area, is part of the control routines to be applied to those materials as reported in EU Guidance RP122 "Practical Use of Concepts of Clearance and Exemption". Surface characterization methodologies are particularly time-consuming tasks, depending on the overall dimension of the area to be explored and the desired sampling size of the surface unit to be investigated. Since decommissioning of nuclear sites produces tons of materials that must be radiologically characterized and can be potentially cleared, such surface characterization phase in a potentially fast, accurate and automated way can be a significant improvement. Here, a prototype system for performing automated X-ray and gamma-ray spectrometry mapping of surfaces is described. It is named RIMAX (Robot Intelligente MAppatura X) stems from a collaboration between ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development), and the industrial partner ELSE NUCLEAR. Expert from both sides are developing a standing robotic arm equipped with 3D-virtual-reconstruction system and suitable radiation detectors. The goal is to demonstrate that the developed system is able to 1) performs an automated 3D digital twin reconstruction of the scenario, 2) establishes a mesh-grid to analyse the area, 3) gets the detector in place and command the acquisition, 4) summarize all data in virtual 3D explorable tool. In this work, the initial steps of this research are described and first results presented

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