Contribution ID: **187** Type: **Poster**

#6-187 An Overview of the MULTISCAN 3D Project: An Advanced Inspection System Integrating Cutting-Edge Technologies to Improve Cargo Container Security Checks at European Borders

Wednesday, June 11, 2025 4:40 PM (5 minutes)

The European MULTISCAN 3D project addresses the urgent need for enhanced container inspection technologies for customs border checks, especially in high-throughput seaports such as Rotterdam and Antwerp. Current 2D X-ray systems : suffer from limitation when threat have not well defined shape . This is the case of drugs for example.. Customs agencies typically select containers for inspection based on risk analysis or surveillance information. Inspections generally involve scanning the entire cargo using large, high-energy systems, either in single or dual views, from a centralized fixed or mobile inspection facility. With projected increases in cargo volume, customs administrations require advanced solutions to maintain or improve border control efficiency without additional resources.

The MULTISCAN 3D project aims to achieve a significant technological breakthrough by developing a user-friendly, flexible, and relocatable all-in-one inspection system. This system will provide high-quality information via fast, high-energy 3D X-ray tomography, making it suitable as a first-line inspection tool (https://multiscan3d-h2020.eu/).

Leading European customs authorities have identified specific needs and requirements in a technologically-neutral way, which have been translated into detailed technical specifications. The core research focuses on three main areas: laser-plasma-based accelerators for X-ray sources, 3D reconstruction for multi-view configurations with advanced data processing, and detector and source monitoring systems.

A primary challenge is leveraging laser-plasma acceleration technology. Enhancing the average power of the laser system is essential for achieving the desired multisource X-ray production performance. The number of sources distributed around the container is also being optimized, along with the development of advanced algorithms for 3D reconstruction from multi-view X-ray data—essential for accurately interpreting complex cargo contents. Reliable and precise dosimetry and beam monitoring from multiple X-ray sources are crucial to the safe and effective operation of the inspection system. : complementary technics are also investigated including chemical and special nuclear material (SNM) identification to provide comprehensive inspection capabilities

At this stage, the various technological components have been developed and tested at the laboratory scale. Realistic environmental trials with containers provided by customs teams will be conducted toward the project' s conclusion to assess system performance.

The MULTISCAN 3D project seeks to revolutionize customs border checks by creating an advanced inspection system that meets the evolving demands of global trade and security. This system promises to enhance the efficiency and effectiveness of container inspections, offering customs administrations a powerful tool for ensuring compliance and safety in international logistics. This work is carried out as part of the MULTISCAN 3D Project (101020100), funded by the European Commission (H2020-SU-SEC-2020).

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Session Classification: #06 - Nuclear Safeguards, Homeland Security and CBRN

Track Classification: 06 Nuclear Safeguards, Homeland Security and CBRN