

IAEA Activities Related to Neutron Imaging

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The use of neutron imaging at research reactors (RRs) or spallation neutron sources for industrial applications such as non-destructive examination and testing has already been proven in industrialized countries. This technique allows for studies of a material's characterization, strength, integrity, and durability without inflicting permanent damage to the material itself. The advantage of neutrons, compared to X-rays, is that they are sensitive to many light elements, have deeper penetration length, and are also sensitive to magnetic structures. Furthermore, as neutron imaging technology has advanced, its techniques have become more precise, efficient and much faster, specifically in the incorporation of digital radiography (2D), computed tomography (3D), energy-selective neutron imaging or dynamic (real-time) neutron imaging. These new techniques, in addition to advanced capabilities, also eliminate the need for consumables like films and other potentially hazardous chemical compounds used in film-based radiography. Today the major fields of neutron imaging application include the mining, oil and petroleum industries, car and aviation industries, archaeology, cultural heritage, environment, biology, medicine, physics, including energy sector that ranges from nuclear power industry to new technologies such as hydrogen cells and lithium batteries.

The IAEA RR Database (RRDB, <http://nucleus.iaea.org/RRDB/>) indicates that more than 50 RRs (out of ~240 facilities operational) operate film-based or digital neutron radiography station. In this paper we will present the strategy and concrete actions how the IAEA is assisting its Member States in neutron imaging related activities that certainly has a great potential to contribute to the enhanced and more sustainable RR utilization. Our efforts include but are not limited to organization of Technical Meetings, Workshops and Schools, coordination of Coordinated Research Projects, support of Facility and Users' Networks, collection of facility specifications, facilitation of Round Robin exercises, publication of Technical Documents and promotional brochures. Last but not the least, through technical cooperation assistance, the IAEA provides technical and financial support for modernization of existing or construction of new neutron imaging facilities in the developing countries. It is expected that at least 5 neutron imaging facilities world-wide will receive such assistance in 2012-2013. Since very recently some joint activities are under discussion with the international Society of Neutron Radiology (ISNR).

Primary author: Dr RIDIKAS, Danas (IAEA)

Co-authors: Mr ZEMAN, Andrej (IAEA); Mr ADELFGANG, Pablo (IAEA)

Presenter: Dr RIDIKAS, Danas (IAEA)

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