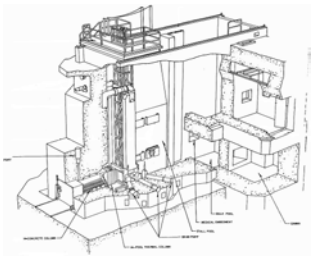
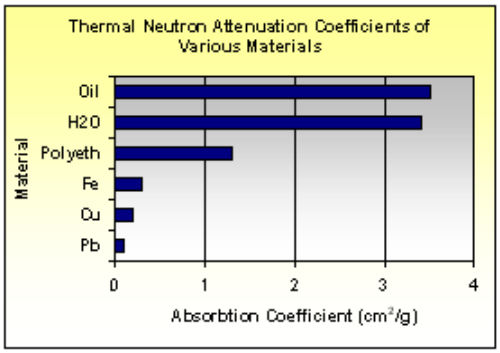


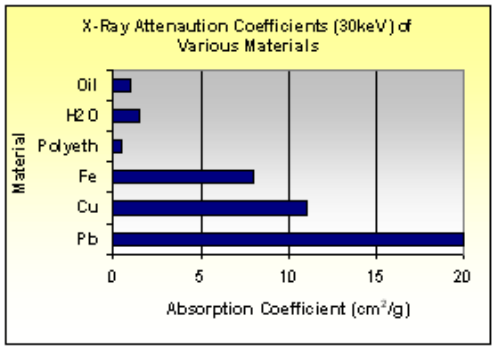
NEUTRON RADIOGRAPHY at UMLRR

Neutron radiography is an excellent quality assurance and R&D tool for non-destructive inspection of mechanical parts, electronics, and assemblies. Similar to x-ray techniques, the neutron beam is attenuated by materials in an object. The transmitted portion of the beam registers an image on a film or other medium, with the image density being proportional to the transmitted beam. X-ray and neutron imaging are considered complementary techniques. However, neutrons interact with matter in a different way (see figures below), allowing unique applications.

Uses

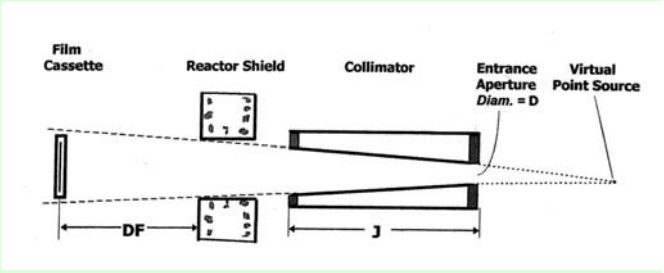
Imaging using neutron radiography can reveal: gaps, voids, small internal cracks, foreign material, density variations, misalignment of parts, and hydrogenous materials. Specifically: epoxy or potting voids; missing or misplaced O-rings; hydrogenous foreign substances in sealed units; detection of corrosion in sealed units; delaminations of bonded plastics and other adhesive bonding flaws; blockages in small channels; water behavior in soils and plant roots; evaluation of moisture repellants on materials; distribution of neutron absorbers in materials for nuclear applications.





UMLRR Neutron Radiography Facility

The UMLRR Neutron Radiography Facility (NRF) makes use of the UMLRR graphite thermal column designed to provide thermal energy neutrons. In the center of this column is a conically shaped collimator made of polyester/epoxy containing lithium carbonate. The collimator is designed to mimic the divergent beam characteristics of a point source.



Imaging System

The NRF imaging system provides researchers with an industrial neutron radiographic service meeting ASTM standards. Vacuum cassettes, Lanex (gadolinium oxysulfide) conversion screens, and an automated developer are available for radiographic film processing in several sizes, most commonly 14 in. x 17 in. Image quality indicators meeting ASTM E545 are available, along with a film densitometer. The L/D ratio (length to image plane divided by the inlet aperture) of the neutron beam is variable by adjusting the location of the image plane along the beam axis. A typical value for the UMLRR NRF is 120. The high thermal neutron content and low content of contaminating radiations in the beam allow radiographs to meet ASTM E545 Category I specifications. Typical radiographs take less than one hour to produce.

Developments are now underway to establish a digital system, with real-time and remote imaging capability.

For Further Information about NAA

Call (978)-934-3365, email radlab@uml.edu, or write: Radiation Services c/o Radiation Laboratory, UMASS Lowell, Lowell, MA 01854