

Radioactivity Measurement System

The **R**adioactivity **M**easurement **S**ystem (RMS) is an industrial monitoring tool developed to check cast samples for radioactive contaminants emitting gamma radiation with an energy between 40 keV and 2 MeV.



Features

- a robust floor standing aluminum structure with adjustable working height
 - NaI(Tl) scintillation detector + Multi Channel Analyzer
 - 7 cm lead shielding with extra shielding over the MCA to improve detection limits
 - electrically driven conveyor belt with two slides (option) to sort contaminated/non contaminated samples
- OR
- pneumatic drawer for sample input/output
 - mechanical design adjustable according to customer's specifications
 - human interface for alarm visualization and resetting
 - PC based version with spectrum visualization and isotope recognition
 - all measurement parameters and results are stored in a MS Access compatible database
 - serial interface for communicating sample ID and measurements results
 - dynamic background subtraction
 - DL < 0,1 Bq/g Co60-equivalent for a 100g sample and a measurement time of 60 seconds
 - a mixed nuclide (Am-241/Cs-137/Co-60) standard included to check the system at regular times

Operating principle

The RMS is equipped with a NaI(Tl) scintillation crystal that is connected to a photomultiplier tube (PMT) that converts the scintillation pulses into electrical pulses of which the amplitude is proportional to the energy that the photon deposited into the detector.

The electrical pulses are amplified and sent to a Multi Channel Analyzer (MCA) converting them into a spectrum of counts versus energy. As gamma radiation is mono-energetic and each isotope disintegrates in its own specific manner, the spectrum gives information on the isotope being measured. However, the resolution of a scintillation detector is limited, and therefore it is not possible to perform a real isotope analysis, merely isotope recognition.

The measurement is performed on the entire energy range so that all radiation photons within the range of 40 keV to 2 MeV will be detected. The operator can setup different regions of interest for the isotopes he anticipates to find.



During the measurement the operator can analyze the current spectrum. All spectrums are stored in the database and available for the operator to analyze at any time.

After the measurement, the background value is subtracted from the measurement value and the result is evaluated against the alarm threshold.

The result is put into the results database and is sent to the master PC over the serial line.

A full energy calibration is done by the manufacturer. A mixed nuclide source is included for the customer to check the initial energy calibration at regular times.



Cast samples



Aluminum Samples

A large number of these Radioactivity Measurement Systems have been integrated in the most important steel and aluminum producing factories all over the world.