NUKEM Technologies

Belt Conveyor Free Release Measurement System (FREMES)

Clearance of bulk materials (up to 100 to/h) contaminated with an unknown amount of nuclides

Purpose of the belt conveyor scanning system:

Radiological characterization of bulk material

Large quantities of excavated soil, concrete rubble or salt grit are fed into a crusher in batches for material sorting and controllable, continuous material flow for measurement.

Classification of contaminated bulk material

Continuous measurement (Gamma spectroscopy, Total-Alpha and Total-Beta) to provide all information for radiological characterization, in order to optimize efforts in disposal, e.g. towards

- free release
- limited release / utilization on site (backfilling)
- radioactive waste.

Subsequent segregation and filling of containers

According to the classification of the measured material, segregation as well as subsequent filling of containers are performed.

Generation of licensing documentation and comparison to regulatory limits

The derived characteristics of the measured material are gathered automatically to create documentation in the desired format, which contains all necessary information on limits and thresholds.

From study to operation:

Study – Solution development

- Analysis of the site/ client waste inventory
- Determination of performance parameters and system boundaries
- Development of a concept according to the site requirements

Study – Planning

- Support towards authorities
- Determination of all key data for optimal implementation
- Planning of peripheral equipment and system integration

Production, Commissioning, Training

- Construction of a new or modification of existing equipment
- Delivery of a plant according to the customer´s requirements
- On site commissioning and training of operating team

Operation

- Measurement operation and material segregation
- Remote support and maintenance activities
- Optimization based on operational experience feedback

Decommissioning

- Dismantling of system components
- Removal of the equipment
- Site clearance (to brown-field status)

Most important advantages of the Belt Conveyor Free Release Measurement System:

- Characterisation of 100% of the examined material
- Volume reduction to limit the need for expensive disposal routes
- Precise examination of bulk material
  - Detection of high- and low energy gamma emitters
  - Detection of Alpha- and Beta-emitters (optional)
  - Verification of the expected nuclide vector
- No need for process media
- No secondary waste generation
- Proven toughness for construction site suitability
- Customized solution with standardized components
- Evaluation of spatial activity distribution by connecting the radiological characterization results with the excavation map

FREMES provides:

- Radiological characterization of bulk materials (concrete rubble, soil or salt grit)
- High throughput: up to 100 to/h possible
- Modular design ensures optimal results for 5 to/h to 100 to/h throughput by providing precise measurement for given nuclide vectors

Optimization for:	Sorting accuracy	Balanced	Throughput
Throughput*	~ 3 to/h	10 to/h	100 to/h
Sorting Size*	~ 30 kg	100 kg	1000 kg
Detection limit*	~ 20 Bq/kg for Uranium or comparable		

**Exact values are to be determined via study implementation planning*

Measurement inputs

- Measured gamma spectrum
- Total Alpha and Total Beta count rate (optional)
- Expected nuclide vector

Information outputs

- Radiological inventory for each batch: Specific activity, mass etc., with confirmed nuclide vector
- Highest precision achievable (dependant on actual throughput)

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