

Multi-Sack Activity Measurements using Truckscan System

Scope:

- Location: Fukushima Prefecture, close to Daichii NPP area, Japan.
- Japanese government requires many radiological investigations for clearance.
- High volume of soil, requiring quick and precise measurement method in collaboration with Obayashi General Contractor.
- Need to measure the soil of the Fukushima prefecture which was filled in multi-sacks. The average dose rate of the sacks is around 0.4 μ Sv/h.

Key Drivers:

- Measurement must be very quick, accurate and in real-time.
- Authorities require each sack to be measured individually and be sorted out if contamination exceeds the limits. The Truckscan System allows measurement of the activity of several individual sacks at once.
- Sacks may have different fill heights which must be taken into account when assessing the activity of each sack.



Fig. 1: TRUCKSCAN system

* Multi Sack: multi one-cubic-meter big bags

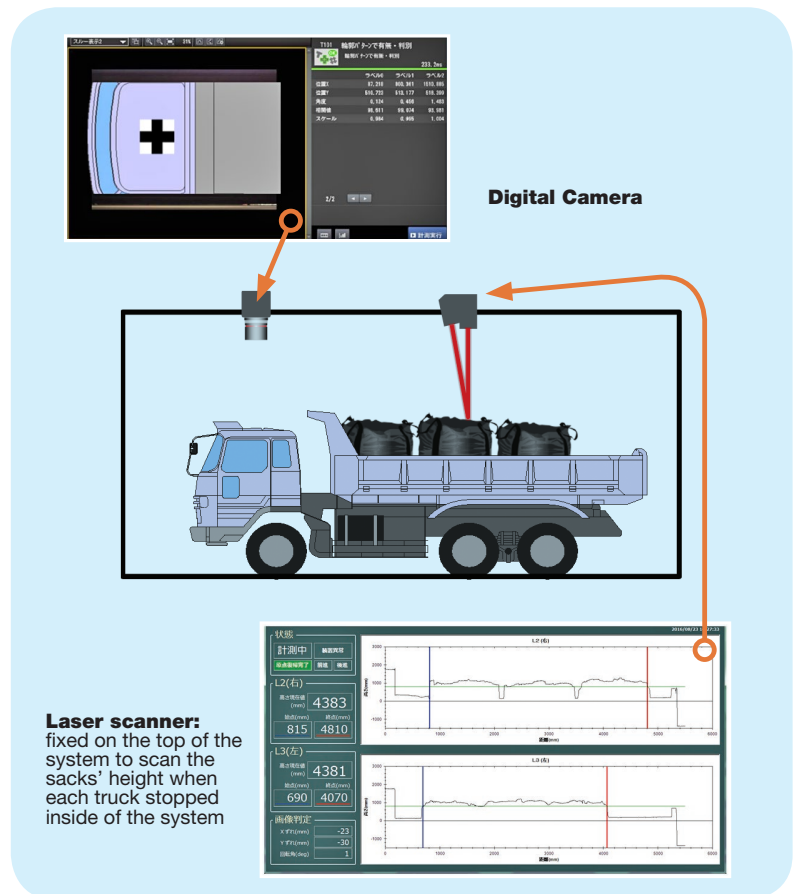


Fig. 2: Sensor system is composed by a digital camera and a laser scanner which are able to position each sack on the truck



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Case Study

Instruments & Techniques Used:

- a** 8 3x3 NaI(Tl) detectors with Osprey® MCA
- b** SUPERISOCS* software deployed by the Measurement & Expertise (M&E) team
- c** A standard Truck

SUPERISOCS System

Truckscan and measurement area

* A special version of the ISOCS™ software, used by CANBERRA™ experts, allowing modeling of complex geometries

CANBERRA Solution:

- The number of sacks was measured before sending them to the Truckscan system (Fig. 1).
- The measurements were carried out with standard trucks (no need to use the identical type of truck).
- A sensor on top of Truckscan gave the position and height of the sacks (Fig. 2).
- 8 NaI detectors were used to measure the activities on both side directions.
- The efficiency calculation of each NaI was carried out with SUPERISOCS software as used by the Measurement & Expertise team (M&E).
- A Maximum Entropy algorithm allows deriving the activity of each sack.

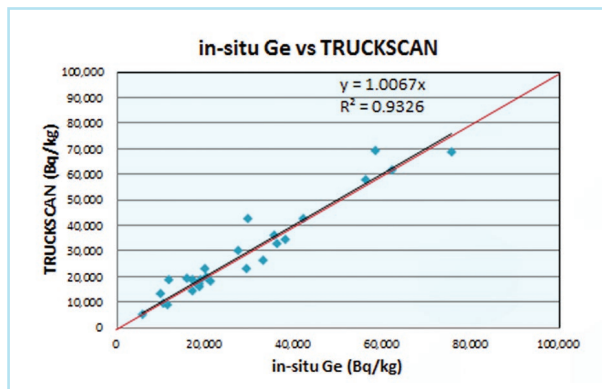


Fig. 3: In-situ Ge vs TRUCKSCAN activity measurement comparison

ACHIEVEMENTS

- ➔ 105 Trucks with 579 sacks were measured during the campaign with the Truckscan System.
- ➔ Comparison of Truckscan and In-Situ measurement results confirmed excellent accuracy of the results as shown in Figure 3.
- ➔ Measurement speed and accuracy drastically reduced cost and waste volumes.
- ➔ The system could handle flexible volume of each truck. 4-10 sacks per truck.
- ➔ Total Measurement Uncertainty (TMU) of the system was less than 20% at one standard deviation (SD).
- ➔ Fast and accurate measurements: measurement time of 90 seconds for each truck. Additional measurement campaigns were requested.

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