Technological Innovation of Inspection Equipment for Effective Border Control in Japan

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Topics

1. Overview of Central Customs Laboratory (Regional Customs Laboratory) and development of inspection equipment

(1) Overview of Central Customs Laboratory

(2) Strategy for new challenges

2. Efforts made so far and requirements to be considered in developing inspection equipment

(1) Necessity, effectiveness and requirements

(2) Non-Intrusive Inspection Equipment

(3) Pursuit of reliability(false-proof identification) and wider application of established chemical analytical method

3. New challenges for the future

(1) Scope of technological innovation and inspection equipments under development

(2) Establishing a human network as an infrastructure supporting research and development of inspection

1. Overview of Central Customs Laboratory and development of inspection equipment

(1) Overview of Central Customs Laboratory

- Trade promotion and improvement of ability of detecting illicitness -

i) Standardizing Customs analysis methods (development of new methods, review/update of existing methods) and providing technical guidance to local Customs laboratories.

ii) Supporting local Customs to ensure proper Customs clearance by providing chemical analysis services requiring advanced technology

iii) Activities as Regional Customs Laboratory (RCL)

(1) Information exchange and sharing about analysis methods and good practices.
(2) Support to establish laboratories and human resource development.

iv) Research and development of inspection equipment

(2) Strategy for new challenges

Pursuing the contradicting two goals of trade facilitation and securing international trade supply chains

i) Research and development of inspection equipment for promoting trade facilitation

(WCO has been intensifying its activities such as improving security programs.)

ii) Development of inspection equipment from the viewpoint of security measures

The promotion of using technologies in the development of inspection equipment in Japan Customs

⟶ Topics 2. and 3.

2. Efforts made so far and requirements to be considered in developing inspection equipment

(1) Necessity, effectiveness and requirements

① Two pillars supporting expansion of trade and effective border control

i) Use of inspection equipment with high technology enabling non-intrusive inspection

ii) Activity of information gathering and analysis, precise risk assessment and effective targeting to be enhanced by partnerships and close communication with the private sector

2. Efforts made so far and requirements to be considered in developing inspection equipment

(1) Necessity, effectiveness and requirements

② Efforts focusing on the prevention of smuggling illicit drugs

A. Recently facing challenges

i) Small-scale cases using packages divided in a small amount

ii) Diversification of concealing techniques (concealed in a solution, a liquid form of methamphetamine, concealed in consumer goods)

iii) Wider scope of contraband drugs (“designer drugs”)

B. Requirements

i) Non-intrusiveness, no needs for physical examination of cargo

ii) Reliability, false-proof detections

iii) Safe and quick response, easy handling

iv) Sturdy and durable, portable

③ Efforts to strengthen security measures and challenges

Pressing needs for non-intrusive/contact, reliable and highly safe equipments

(2) Non-Intrusive Inspection Equipment

i) X-ray inspection system in Japan Customs

ii) Portable Raman Spectrometer

(2)(A) X-ray inspection system in Japan Customs

Type	Target	X-ray energy
Container cargo x-ray	Container, large cargo	5 & 9 MeV
Middling cargo x-ray	Cargo and Baggage	80-300 keV
Low potential difference x-ray	Mail (envelope and parcel)	15- 75 keV
Backscatter x-ray	Container, large Cargo	225 keV

(2)(A-1) Deployment of container cargo X-ray systems

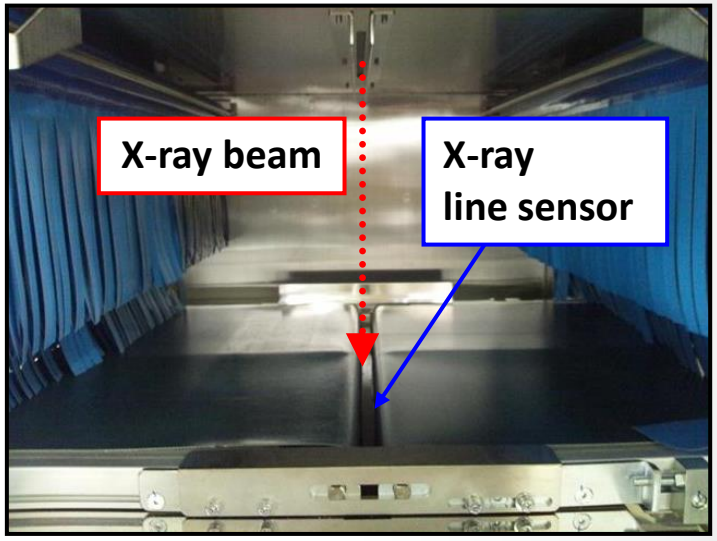
16 container cargo X-ray systems are deployed in Japan (13 Ports)

(2)(A-2) Low potential difference X-ray inspection system

(a)Outline

- Japan Customs and a private sector company jointly developed the low potential difference x-ray inspection system in 2011 because potential difference of then existing x-ray inspection system (80-300 keV) was too strong for mail inspection.

- The system equipped with a lower potential difference variable x-ray generator (15 – 75 kV) and a specially developed x-ray line sensor for detection of low-power X-ray.



Specification

- Anode voltage: 15 – 75 kV
- Tunnel Size: 450 mm (W) x 210 mm (H)
- Resolution: up to 0.05 mm (44 AWG)
- Image presentation: B/W

(2)(A-2) Low potential difference x-ray mail inspection system

(b)X-ray images of marker pen sets (Demo samples in which drug is concealed)

Usual condition

A drug concealed

Visible image

X-ray image
- X-ray tube with potential differences of 180 kV -

X-ray image
- X-ray tube with potential differences of 75 kV -

(2)(B) Narcotics inspection system using Raman Spectroscopy

Portable Raman Spectrometers

- It is applicable for detecting and identifying powder, tablet or liquid types of narcotics in packages or bottles without opening them.
- By pointing laser beam on substance, Raman scattering unique to the substance is emitted, enabling to identify the substance.
- Measurement time : several minutes from several seconds
- About 100 reference spectra (drug standard data) registered (as of 2015)

(3) Pursuit of reliability(false-proof identification) and wider application of established chemical analytical method

(A) Mass Spectrometry

On-site mass spectrometer for cargo screening to detect contraband residue with high reliability

(B) Utilization of Infrared Spectroscopy

Portable FT-IR

(Portable Fourier Transform Infrared Spectrosmeter)

(3)(B) Utilization of Infrared Spectroscopy

Portable FT-IR
(Portable Fourier Transform Infrared Spectrometer)

- It measures infrared red (IR) spectra by irradiating infrared light to such samples as in a powder or tablet forms. IR spectra show characteristic absorption patterns depending on chemical structures of substances and it enables to identify unknown samples.
- Expandable database (reference spectra of new drugs can be added)
- 917 reference spectra (drug standard data) registered (as of 2015)

3. New challenges for the future

(1) Scope of technological innovation and inspection equipments under development

i) Pursuit of non-intrusiveness and safety, expanding the range of technologies to be considered as counter measures against diversified concealing method in such as cargoes and human body

ii) Improvement of existing inspection equipment

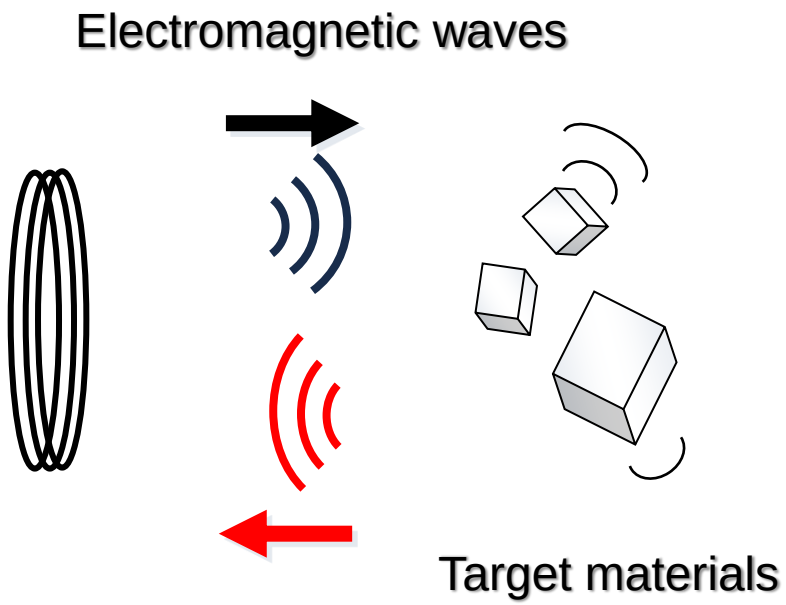
(A) Improvement of X-ray systems and their image analysis technology

(B) Increase the number of standard data of library in existing equipment

(2) Establishing a network as an infrastructure supporting research and development of inspection equipment

(1) Scope of technological innovations

- Radio waves
- Millimeter waves
- Terahertz waves



3. New challenges for the future

(2) Establishing a human network as an infrastructure supporting research and development of inspection equipment

i) Cooperation with academics, seeking their expertise and researching capacity

- Development of new equipment in cooperation with universities
- Pre- and post-evaluation meetings by persons with relevant knowledge and experience, such as professors (once a year)

ii) To establish a developmental network of tripartite groups enforcement agencies, businesses and academics

Objects:

Exchanging information about medium- and long-term direction of technological development of inspection equipment

Participants :

Persons with relevant knowledge and experience, manufacturers of equipment, etc.