X-ray Seal Inspection System
Seal Inspection System

For more information, contact our office listed below.
The contents of the specifications are subject to change without prior notice due to continual improvement.

www.system-square.com
What you can do with the X-ray seal inspection system and seal inspection system.

### Packing materials and applicable models

<table>
<thead>
<tr>
<th></th>
<th>SXS</th>
<th>SLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>△</td>
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<tr>
<td>○</td>
<td>○</td>
<td>✗</td>
</tr>
</tbody>
</table>

![Diagram showing the packing materials and models](image)

- **Overall transparent bag including seal parts**
- **Printed bag with transparent seal parts**
- **Bag with pattern even on seal parts**
- **Semi-transparent colored bag with printed seal parts**
- **Aluminum deposition bag (SLS cannot inspect it)**

### Jam NG detection examples

#### Packing material
- **Jam**
- **Foreign object** (with metal detector and SXS)
- **Weight (SXS)**

- **Empty bag**
- **2-piece pack**
- **Too large or too small**

#### Packing material and product
- **Liquid jams**
- **Double-packaged product**
- **Too long or too small**

#### Packing material and product
- **Cup container jams**
- **Individual packs, packed hams, poultices, packed spices, disposable warmers, and instant noodles, etc.**

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- Fragments, broken pieces, or seal faults of the seal parts are detected to reject the product.
- The inspection system equipped with the metal detector can detect metal foreign objects. The SXS inspection system can detect foreign objects, such as metal, bone, glass, and stone. Relative weight inspection based on X-ray images. The weight is measured using the X-ray.
- Faults such as product fracture, chipping, or crack from the outer periphery can be detected.
- Small holes made during production of rice confectioneries or baked confectioneries can be detected.
- Jam, seal fault, or package fault that occurs in the seal part around the cup container can be detected to reject the product.

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- Various jams from liquid to semi-solid in the seal parts can be detected to reject the product.
- Connected packages due to package separation failure can be detected to reject the product.
- Package with an abnormal size due to packing machine failure can be detected to reject the product.

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- Empty bag containing no product can be detected to reject the product.
- 1-piece pack bag product containing a quantity more than the specified level can be detected to reject the product.
- Area, width, and length of the product are measured to detect and reject the product not satisfying the specified size.
About X-ray inspection system

The X-ray inspection system is so designed that the inside of an article can be seen clearly by utilizing the principles that are basically the same as the X-ray radiography. Soft X-ray with small energy among X-rays is used for the X-ray inspection.

X-ray irradiated from the X-ray generation tube reaches the line sensor through a product to be inspected. Images are captured based on the measured transmission amount. X-ray transmission images that have been captured are analyzed to automatically judge foreign objects and others. Shutting down the current will stop the X-ray immediately.

When the tube voltage is increased, the wavelength of the X-ray becomes short to increase the transmission capability. This is effective to detect thick products to be inspected and foreign objects with a high density. Detection of foreign objects with a low density may be improved by decreasing the tube voltage.

Various safety measures are taken by considering work personnel’s safety. The system can be operated safely even without special qualification about X-ray.

- Sufficient safety measures for work personnel are taken based on “Ministerial Ordinance for Prevention of Hazards from Ionizing Radiation”. According to these rules, when the X-ray leak does not exceed 1.3mSv within 3 months, it is not necessary to assign the supervisor in charge of work. The X-ray leak of this system is 1μSv/h or less. Therefore, if the same operator works, 1μSv/h x 16 hrs./day x 6 days/week x 13 weeks (3 months) = 1.25mSv/3 months. This value is within the specified range. The X-ray irradiation amount of this system is 0.1Gy or less based on “Food Sanitation Act”. This level has no problem from a viewpoint of toxicity, nutrition, and microbiology.

- Company that will use the inspection system must submit the plan to the Chief of the Labor Standards Inspection Office in relevant region at least 30 days prior to the installation work of the X-ray inspection system.

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For assuring safety

X-ray belongs to electromagnetic waves

<table>
<thead>
<tr>
<th>Wavelength is long (small energy)</th>
<th>Wavelength is short (large energy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortwave</td>
<td>Ultrashort wave</td>
</tr>
</tbody>
</table>

The X-ray inspection system is so designed that the inside of an article can be seen clearly by utilizing the principles that are basically the same as the X-ray radiography. Soft X-ray with small energy among X-rays is used for the X-ray inspection.

Mechanism of X-ray generation

The X-ray irradiated from the X-ray generation tube reaches the line sensor through a product to be inspected. Images are captured based on the measured transmission amount. X-ray transmission images that have been captured are analyzed to automatically judge foreign objects and others. Shutting down the current will stop the X-ray immediately.

When the tube voltage is increased, the wavelength of the X-ray becomes short to increase the transmission capability. This is effective to detect thick products to be inspected and foreign objects with a high density. Detection of foreign objects with a low density may be improved by decreasing the tube voltage.

Example of X-ray exposure level comparisons

<table>
<thead>
<tr>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-ray inspection system (0.001mSv/h or less)</td>
<td>Overseas travel (U.S.A.) (0.04mSv/travel)</td>
<td>Chest X-ray examination (0.3mSv/examination)</td>
</tr>
<tr>
<td>Stomach X-ray examination (4.1mSv/examination)</td>
<td>Natural world (1.1mSv/year)</td>
<td>X-ray shielding front door</td>
</tr>
</tbody>
</table>

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Hazardous work is prevented.

Various safety measures are taken by considering work personnel’s safety. The system can be operated safely even without special qualification about X-ray.

1. X-ray irradiation key switch
   - If this key is turned to the OFF position, the X-ray irradiation is stopped completely.

2. EMERGENCY STOP switch (Main POWER switch)
   - This button is intended to immediately stop the X-ray irradiation and conveyor in case of an emergency.

3. X-ray shielding curtain
   - This curtain prevents the X-ray from leaking through the opening of the conveyor.

4. Door safety switch
   - This sensor checks if the door is open.

5. X-ray shielding front door
   - The X-ray irradiation is stopped completely while the door is opened.

Trapezoidal inspection port prevents incorrect inspection. Illumination of the whole inspection port calls attention to operators during X-ray irradiation. (Already patented.)
X-ray Seal Inspection System

For packaged products  SXS1554C1D / SXS2154C1D / SXS3474C1D

Features of hybrid inspection
- X-ray inspection and inspection with optical camera are performed at the same time to achieve merits that are not available conventionally.
- All of jam, foreign object, and weight can be inspected with a high sensitivity!
- Jam inspection of various packing materials including aluminum packing material is achieved!
- Packing seal part can be identified securely!

Various packing materials
- Jam
- Foreign object
- Weight
- Shape

Image of packing material until its edge can be captured clearly. This identifies the seal portion securely.

X-ray image only
- Jam inspection of various packing materials including aluminum packing material is achieved!

Optical system image only
- Whether seal part is faulty is unclear.

Contents inside the aluminum packing material are not seen.

Deep drawing package
- Tray package
- 4-side sealed package
- Pillow package
- Pillow package
- Package with zip
Uncertainty of the inspection is high. Missing occurs and judgment criteria are ambiguous. It is difficult to detect soft packing materials. Difference in small jam cannot be detected. Packing materials cannot be detected. Jam fault cannot be detected since seal parts cannot be detected. This system is limited to transparent packing materials. Aluminum packing materials with pattern cannot be detected. This system is limited to detection immediately after sealing. The system cannot perform the detection if the temperature decreases.

Various inspection problems are solved.

Unlike the X-ray inspection system, all of jam, foreign object, and weight can be inspected with a high sensitivity. Inclination correction during transportation achieves accurate inspection. Everyone can set an inspection range easily. Inclination correction during transportation ensures a high sensitivity.

Different inspection problems are solved. Even aluminum evaporation packing bags or packing bags with patterns that were conventionally difficult to inspect are inspected with a high sensitivity.

Areas

Aluminum deposition

Transparent packing material

X-ray seal inspection system

X-ray inspection system

Seal inspection system (SLS)

Inspection range setting screen on the X-ray side

Inspection range setting screen on the jam side

Clean images and high sensitivity

X-ray seal inspection system

The system obtains clean images without being adversely affected by the transport belt. This ensures less incorrect detection and stable high sensitivity.

Conventional X-ray inspection system

As the transport belt is projected, the images are unclear and the sensitivity becomes poor.

Jam inspection examples

Example of aluminum packing material jammed product

Example of poultice jamming
**Seal inspection system**

*VisionHawk* SLS1000-C2

**Inspection with a set of camera and light source**

Light source and optical camera for the inspection are used to perform the inspection by passing the light through the product from the lower surface.

**Inspection of 1-piece pack product**

- "Crack and chipping" and "shape" of the 1-piece pack product can be inspected.
- "Jam" only
- Inspection possible ✍️ Inspection impossible ✗

**Inspection of 2-piece pack product**

- "Crack and chipping" and "shape" of the 2-piece pack product can be inspected.
- "Crack and chipping" and "shape" of the second product can also be inspected.
- "Jam"
- Inspection possible ✍️ Inspection impossible ✗

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**Seal inspection system**

*VisionHawk* SLS1000-C3

**Inspection with two sets of cameras and light sources**

Two sets of light sources and optical cameras for the inspection of the upper and lower sides are installed. Top and bottom of the 2-piece pack product can be inspected.

**Inspection of 1-piece pack product**

- "Jam" and "shape" of the 1-piece pack product can be inspected.
- "Crack and chipping" and "shape"
- Inspection possible ✍️ Inspection impossible ✗

**Inspection of 2-piece pack product**

- "Jam" only
- First product "Crack and chipping" and "shape"
- Second product "Crack and chipping" and "shape" of the second product can also be inspected.
- Inspection possible ✍️ Inspection impossible ✗
Features of seal inspection system

**Inspection images are clear.**

- **SLS1000-series**
  - The SLS1000-series uses an originally developed system to ensure the inspection with clear images. Misoperation is also reduced!

- **Other system**
  - Images are disturbed due to exposure of fluorescent light.
  - Color is not even and is dirty.

The other system cannot perform the inspection with clear images due to effects of illumination at site, causing misoperation to increase.

**Color touch panel**

- Operation can be made intuitively with the touch panel.

**Easy sensitivity setting**

- Difficult sensitivity setting can be performed by following the instructions that appear on the screen.

**Processing amount is large.**

- Up to 700 pcs./min. can be inspected. (This processing amount may vary depending on the inspection product and operating environment.)

**Examples of inspection images**

- **Example of jam fault**
  - Enlarged photo of actual product

- **Example of crack fault**
  - Photo of actual product

**Sensitivity varies depending on the packing bag.**

- Overall transparent bag including seal parts
- Printed bag with transparent seal parts
- Semi-transparent colored bag with printed seal parts
- Aluminum deposition bag

The sensitivity may vary depending on the packing material. For details, contact System Square.

**Automatic sorting**

- Jam fault product is rejected. (Except for back affixing portion)
- Cracked or chipped product is rejected.
- Product without contents is rejected.

**Processing amount is large.**

- Up to 700 pcs./min. can be inspected. (This processing amount may vary depending on the inspection product and operating environment.)

**Example of air sorting machine**

- Example of the integration of the seal inspection system with the metal detector that detects metal foreign objects, such as screws or rusts

**Bag width and length measurement**

- **Width**
- **Length**

**Foreign object is found.** (Integration with the foreign object inspection system)

- For inspection of products packed in small bags:
  - Individual packed snacks
  - Packed spices
  - Packed hams
  - Disposable warmers

For details, contact System Square.
Dimensional Drawings and Specifications

**Model**: SX5154C1D

- **Maximum passage width**: 150mm, **Maximum passage height**: 30mm (25mm no curtain type)
- **Transport weight**: 1kg
- **Belt speed**: 50mm/min
- **Max. transport width**: 210mm
- **Detection sensitivity**: φ0.3mm iron or stainless ball, stone, glass, hard bone, and high density plastic pieces, etc. *4
- **Power supply**: AC100V ± 10% / AC200V ± 10% 1.0kVA 50/60Hz

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**Model**: SX5347C1D (Trapezoid)

- **Maximum passage width**: 340mm, **Maximum passage height**: 120mm (40mm no curtain type)
- **Transport weight**: 150kg
- **Belt speed**: 75km/min
- **Max. transport width**: 340mm
- **Detection sensitivity**: φ0.3mm iron or stainless ball, stone, glass, hard bone, and high density plastic pieces, etc. *4
- **Power supply**: AC100V ± 10% / AC200V ± 10% 1.6kVA 50/60Hz

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**Model**: SX5415C1D

- **Maximum passage width**: 210mm, **Maximum passage height**: 50mm (25mm no curtain type)
- **Transport weight**: 1kg
- **Belt speed**: 200mm/min
- **Max. transport width**: 250mm
- **Detection sensitivity**: φ0.3mm iron or stainless ball, stone, glass, hard bone, and high density plastic pieces, etc. *4
- **Power supply**: AC100V ± 10% / AC200V ± 10% 0.9kVA 50/60Hz

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**Model**: SX5417C1D

- **Maximum passage width**: 340mm, **Maximum passage height**: 120mm (40mm no curtain type)
- **Transport weight**: 190kg
- **Belt speed**: 75km/min
- **Max. transport width**: 340mm
- **Detection sensitivity**: φ0.3mm iron or stainless ball, stone, glass, hard bone, and high density plastic pieces, etc. *4
- **Power supply**: AC100V ± 10% / AC200V ± 10% 1.6kVA 50/60Hz

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*1 For details, see the drawing of the possible inspection range.
*2 For other weight levels, contact System Square.
*3 For other transport speed models, contact System Square.
*4 The detection capacity may vary depending on the type of inspection product and the operating environment.
* The detection sensitivity to be used actually may vary depending on the physical properties (contents and shape, etc.) of product to be inspected and/or the operating environment.
* The cover to prevent the X-ray leak may be required at the inlet and outlet according to the length of inspection product.
### Dimensional Drawings and Specifications

#### SLS1000-C1

<table>
<thead>
<tr>
<th>Model</th>
<th>SLS1000-C1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension</td>
<td>Maximum passage with 220mm, Maximum passage height 60mm</td>
<td></td>
</tr>
<tr>
<td>Transport weight</td>
<td>154 kg</td>
<td></td>
</tr>
<tr>
<td>Belt width</td>
<td>200mm</td>
<td></td>
</tr>
<tr>
<td>Camera</td>
<td>Monochrome CCD camera</td>
<td></td>
</tr>
<tr>
<td>Air jet system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dropout system (with belt)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-sorting system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>AC100-240V 50/60Hz</td>
<td></td>
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</tbody>
</table>

#### SLS1000-C2

<table>
<thead>
<tr>
<th>Model</th>
<th>SLS1000-C2</th>
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</tr>
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<tbody>
<tr>
<td>Dimension</td>
<td>Maximum passage with 220mm, Maximum passage height 60mm</td>
<td></td>
</tr>
<tr>
<td>Transport weight</td>
<td>84 kg</td>
<td></td>
</tr>
<tr>
<td>Belt width</td>
<td>200mm</td>
<td></td>
</tr>
<tr>
<td>Camera</td>
<td>Monochrome CCD camera</td>
<td></td>
</tr>
<tr>
<td>Air jet system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dropout system (with belt)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-sorting system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>AC100-240V 50/60Hz</td>
<td></td>
</tr>
</tbody>
</table>

#### SLS1000-C3

<table>
<thead>
<tr>
<th>Model</th>
<th>SLS1000-C3</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Dimension</td>
<td>Maximum passage with 125mm, Maximum passage height 40mm</td>
<td></td>
</tr>
<tr>
<td>Transport weight</td>
<td>42 kg</td>
<td></td>
</tr>
<tr>
<td>Belt width</td>
<td>12 oversize</td>
<td></td>
</tr>
<tr>
<td>Camera</td>
<td>Monochrome CCD camera</td>
<td></td>
</tr>
<tr>
<td>Air jet system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dropout system (with belt)</td>
<td></td>
<td></td>
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<tr>
<td>Multi-sorting system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>AC100-240V 50/60Hz</td>
<td></td>
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</tbody>
</table>

### Sorting machines

#### Air jet system

<table>
<thead>
<tr>
<th>Model</th>
<th>Wide type</th>
<th>Narrow type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLS1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimension</td>
<td>Maximum passage with 220mm, Maximum passage height 60mm</td>
<td></td>
</tr>
<tr>
<td>Transport weight</td>
<td>154 kg</td>
<td></td>
</tr>
<tr>
<td>Belt width</td>
<td>200mm</td>
<td></td>
</tr>
<tr>
<td>Camera</td>
<td>Monochrome CCD camera</td>
<td></td>
</tr>
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<td>Dropout system (with belt)</td>
<td></td>
<td></td>
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<tr>
<td>Multi-sorting system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>AC100-240V 50/60Hz</td>
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</tbody>
</table>

#### Dropout system (with belt)

<table>
<thead>
<tr>
<th>Model</th>
<th>D4WDW</th>
<th>D4DHW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension</td>
<td>Maximum passage with 220mm, Maximum passage height 60mm</td>
<td></td>
</tr>
<tr>
<td>Transport weight</td>
<td>84 kg at Max.</td>
<td></td>
</tr>
<tr>
<td>Compressed air</td>
<td>6.0L/time (ANR)</td>
<td></td>
</tr>
<tr>
<td>Air consumption</td>
<td>1.0L/time (ANR)</td>
<td></td>
</tr>
<tr>
<td>Transport belt speed</td>
<td>1.0L/time (ANR)</td>
<td></td>
</tr>
<tr>
<td>Belt width</td>
<td>21 oversize</td>
<td></td>
</tr>
<tr>
<td>Camera</td>
<td>Monochrome CCD camera</td>
<td></td>
</tr>
<tr>
<td>Air jet system</td>
<td></td>
<td></td>
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<tr>
<td>Power supply</td>
<td>AC100-240V 50/60Hz</td>
<td></td>
</tr>
</tbody>
</table>

#### Multi-sorting system

NG products can be sorted in multiple directions. Compact line can be configured since NG products can be rejected to a portion under this machine. For details, contact System Square.