

Application News

Industrial X-ray Inspection System

No.N114

X-Ray CT Observation of Seals of Food Product Packaging

■ Introduction

The various types of commercial food product packaging are designed for ease of use and superior aesthetic design, while at the same time trying to reduce environmental impact and ensure or improve safety.

Given these design constraints, the seal portion of packaging is one of the most technically important areas, where ensuring a reliable tight seal is extremely important in terms of safety and quality assurance.

Since X-ray CT systems are able to nondestructively observe the internal structure of packaging, it is a popular method of observing the seal status. Therefore, this issue describes several examples of observing the seal area.

In this case, an SMX-100CT-SV3 Shimadzu Microfocus X-Ray CT System, which is suitable for objects with relatively low density, was used for observations (see Figure 1).



Fig. 1 SMX-100CT Shimadzu Microfocus X-Ray CT system

■ Observation of Plastic Bottle

Figure 3 shows CT images of a plastic bottle before and after it was opened (photos of the bottle exterior are shown in Figure 2) and Figure 4 shows 3D images reconstructed from CT data.

These figures show that even after it had been opened once, the bottle was securely sealed (in two locations) when the cap was closed.



Fig. 2 Plastic Bottle and Cap

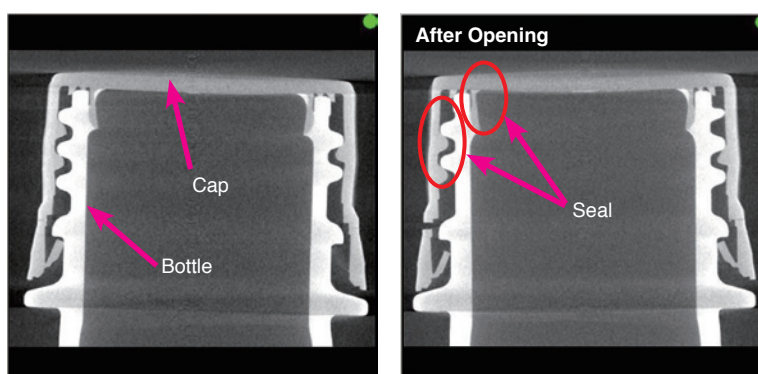


Fig. 3 CT Image of Plastic Bottle and Cap

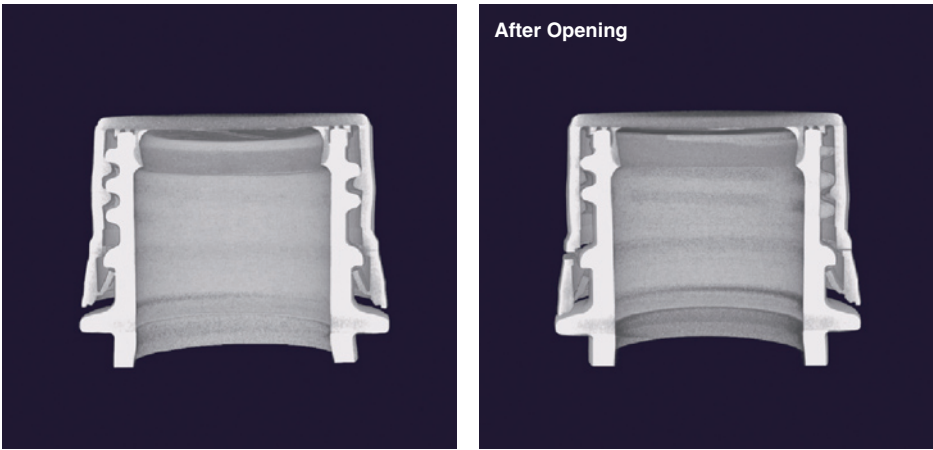


Fig. 4 3D Image of Plastic Bottle and Cap

■ Observation of Food Packaging (1)

As an example of observing packaging seals, CT cross section images and a 3D image of the seal between a cylindrical paper container and its aluminum lid (see diagram in Figure 5) are shown in Figure 6. These images show that the paper is applied to the outside of container to improve its strength. It also shows that it is securely sealed although the aluminum lid is adhered along the curved surface.

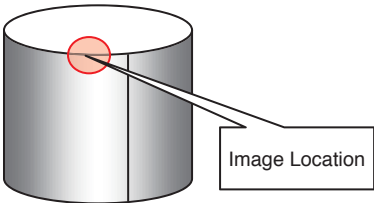


Fig. 5 Image Location

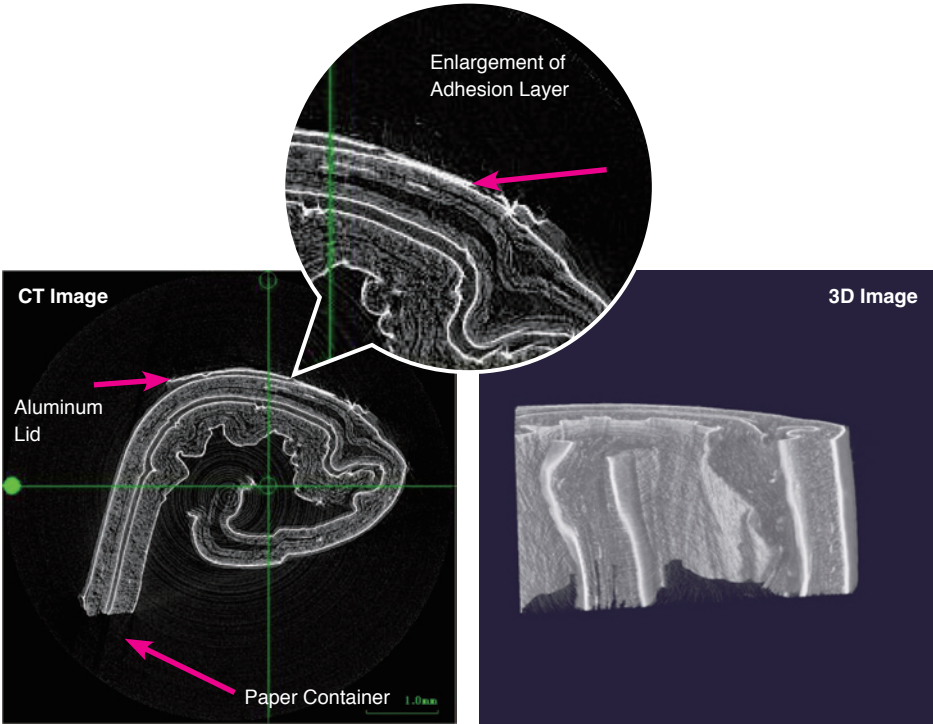


Fig. 6 Images of Food Packaging

■ Observation of Food Packaging (2)

In addition, the joint area was observed on two types of containers (cylindrical) similar to the one above (see diagram in Figure 7).

The observation example in Figure 8 shows how the container is joined by gluing 3 or 4 layers of paper together.

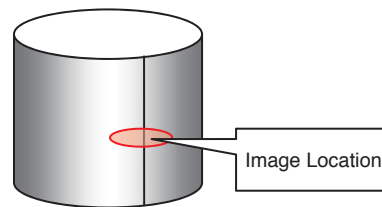


Fig. 7 Image Location

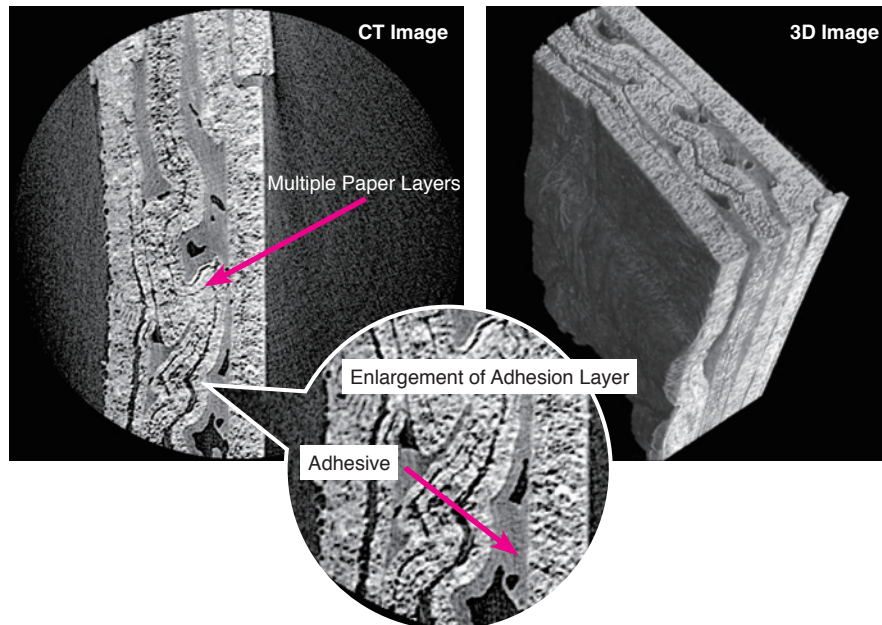


Fig. 8 Images of Food Packaging

The example in Figure 9 is packaging for food products with a high moisture content. The images show in detail how there is aluminum foil between

layers of paper and how the container surface is coated with polymer.

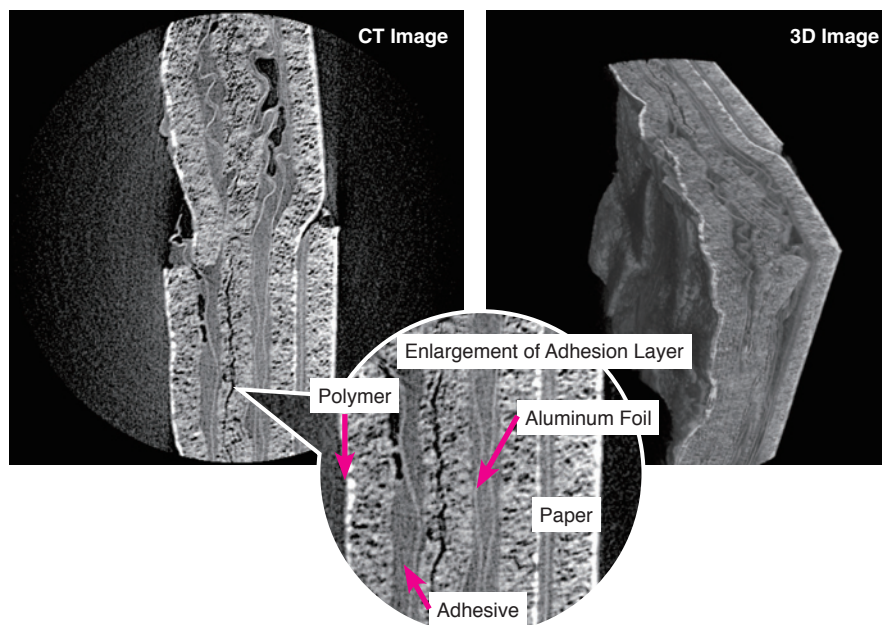


Fig. 9 Images of Food Packaging



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