

Application News

inspeXio™ SMX™-225CT FPD HR Plus Microfocus X-Ray CT System

Example of Observing Resin Bottle Containing Hair Coloring Agent Using a Microfocus X-Ray CT System

T. Hashimoto

User Benefits

- ◆ The three-dimensional shape of resin bottles and hair coloring agents can be visualized non-destructively and easily.
- ◆ It is possible to check whether there is any abnormality in the product by observing the leakage condition of resin bottles.

■ Introduction

Resin bottles are widely used as packaging containers for various liquids because they are lightweight, inexpensive to manufacture, and strong enough for use. The required strength, chemical resistance, weather resistance, flame resistance, and other properties vary depending on the contents. However, it is important for all applications to ensure that the contents do not leak through the gap between the bottle and the cap.

There are various methods of checking the leakage of liquid from the gap between the bottle and the cap, such as visual inspection, inspection using coloring with dye or developer, and inspection of gas pressure and flow rate. However, even if these tests reveal the presence of a leak, it is often difficult to determine the details of where the leak occurred, or it is often necessary to destroy the bottle in the inspection.

Therefore, the Microfocus X-ray CT system is a useful tool for non-destructively observing the presence of defects that cause liquid leakage from resin bottles. This article introduces an example of a resin bottle containing a hair coloring agent that was observed using a microfocus X-ray CT system, the inspeXio SMX-225 CT FPD HR Plus (Fig. 1).



Fig. 1 inspeXio™ SMX™-225CT FPD HR Plus microfocus X-ray CT system

■ Observation of Resin Bottle

Fig. 2-A and Fig. 2-B are images of the entire resin bottle and the vicinity of the cap, scanned with the resin bottle upside down. Areas absorbing less X-rays due to low density or thickness, appear white, and areas that absorb more X-rays due to high density or thickness appear black. Fig. 2-B, which is focused on the cap, shows the shape of the cap and bottle, and the gap between them.

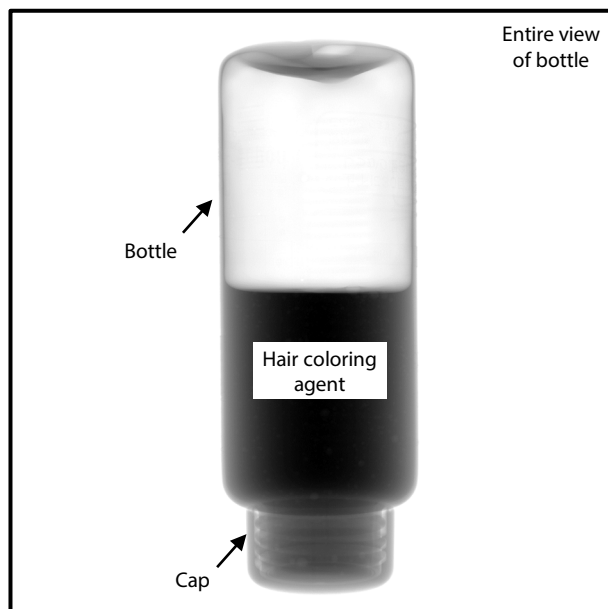


Fig. 2-A Fluoroscopic image of the entire resin bottle

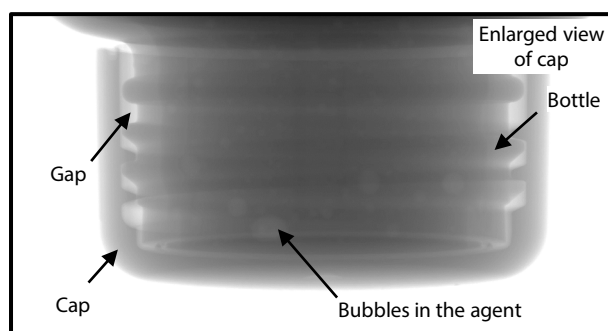


Fig. 2-B Fluoroscopic image of the cap

Fig. 3-A is a three-dimensional representation obtained by CT scanning of the entire resin bottle, and Fig. 3-B is a cross-sectional image obtained by CT scanning in the same manner. Unlike fluoroscopic images, areas with less X-ray absorption appear black, and areas with more X-ray absorption appear white. Compared with the fluoroscopic image in Fig. 2, the cross-sectional image provides a detailed view of the gap between the cap and bottle and the filling of the hair coloring agent.

Fig. 4 shows the vertical and cross-sectional images obtained by CT scanning of the cap. The three cross-sectional images in Fig. 4 indicate that in the section far from the spout, the hair coloring agent is observed between the bottle and the cap, but in the section close to the spout, the cap and the bottle adhere to each other without any gap, and in the section closest to the spout, no hair coloring agent is observed between the cap and the bottle and there is no liquid leakage from the bottle.

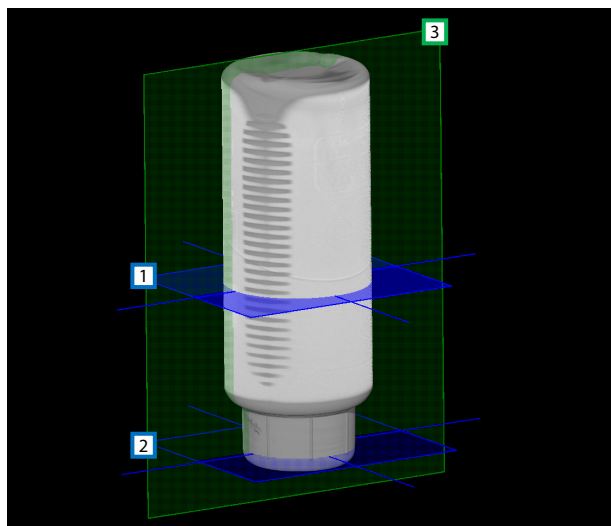


Fig. 3-A Three-dimensional representation of the resin bottle

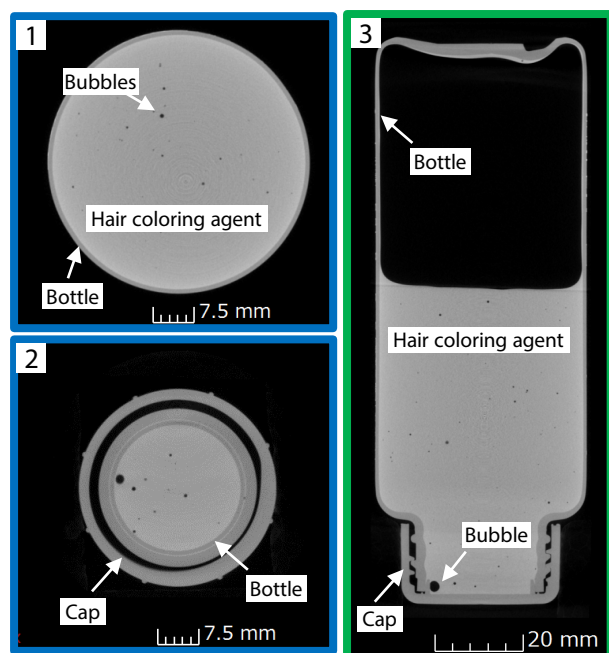


Fig. 3-B Cross-sectional images of the resin bottle

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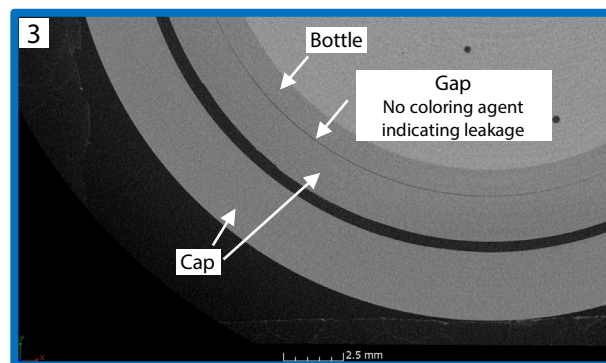
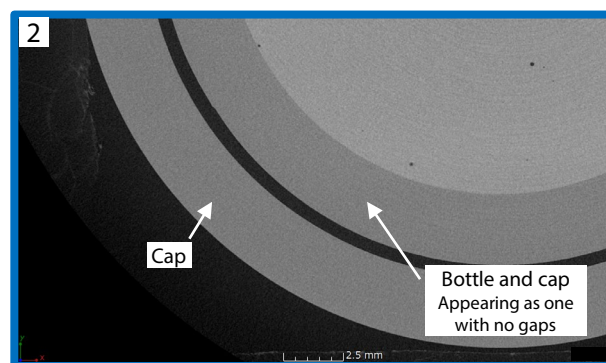
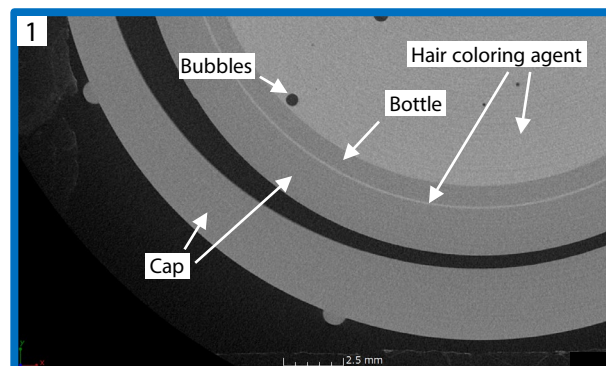
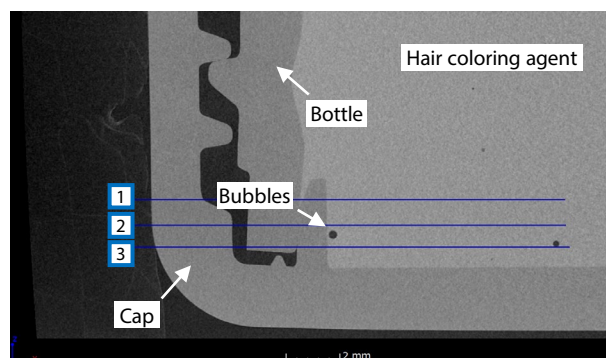


Fig. 4 Cross-sectional images of the cap

Conclusion

As demonstrated in this example, the microfocus X-ray CT system can visualize the three-dimensional structure of the plastic container and its contents. It is great use in product quality control and research and development, observing the leakage condition of the container in detail.



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