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# Application News

# No.N125

Industrial X-Ray Inspection System

## Observations of a Resin Cable Clamp Using the inspeXio SMX-90CT Plus Benchtop Micro Focus X-Ray CT System

Industrial X-ray CT systems have been widely used for inspections and structural analyses of a variety of products including electronic parts, automobile parts, and resin molded products. More recently, such systems have also proven useful for observing the internal structure and form of resin molded products.
In Application News No. N119, we introduced an example of the measurement of a resin connector using the inspeXio SMX-100CT. Here, we introduce an example of the observation and analysis of a resin cable clamp using a newer, smaller benchtop X-ray CT system.


Fig. 2 Appearance of a Resin Cable Clamp

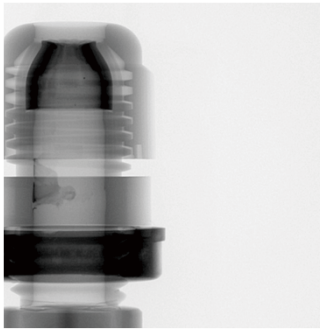

Fig. 3 Fluoroscopic Image of a Resin Cable Clamp

### Benchtop Micro Focus X-Ray CT System

The instrument used for imaging is the inspeXio SMX-90CT Plus Benchtop Micro Focus X-Ray CT System (Fig. 1). Although it is compact, this benchtop CT system can accommodate samples up to 160 mm in diameter and 100 mm high (with a maximum imaging region of 50 mm in diameter and 50 mm high), enabling high magnification 3D observations of resin molded products, pharmaceuticals, bones and other soft materials.

Fig. 1 Appearance of the inspeXio SMX-90CT Plus Benchtop Micro Focus X-Ray CT System

### Observations of a Resin Cable Clamp

Fluoroscopic imaging of the resin cable clamp in Fig. 2 as is results in the image in Fig. 3. It is evident that it is a combination of several parts.

CT imaging as is of the cable clamp shown in Fig. 2 results in the MPR image in Fig. 4. The obtained fluoroscopic image (Fig. 3) shows a transparent view of the cable clamp from the side. With CT imaging however, cross-sectional images can be obtained so as to section the cable clamp vertically and horizontally, enabling 2D observations. From these images, it is evident that the cable clamp consists of four parts.

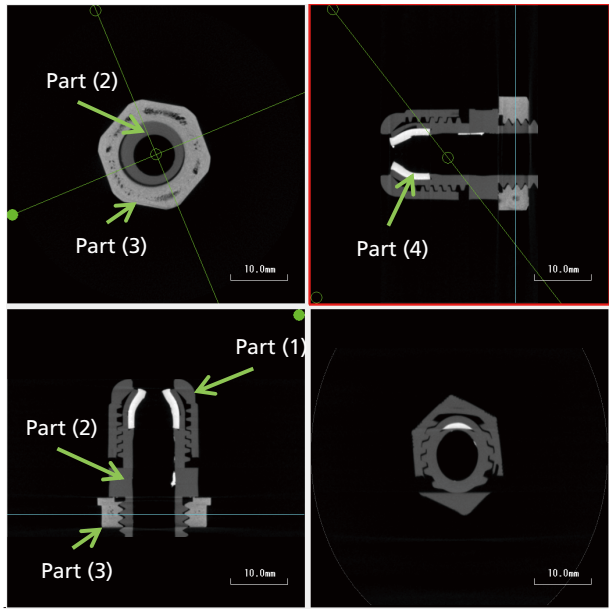


Fig. 4 MPR Images of a Resin Cable Clamp

Fig. 5 is a 3D representation of data from these CT images. This sort of 3D representation enables observations of internal structure under conditions closer to that of the actual sample.

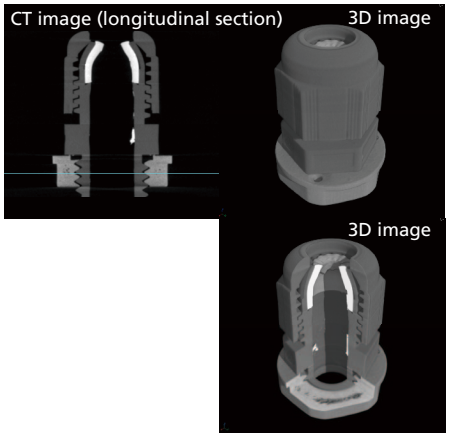


**Fig. 5 2D and 3D Images of a Resin Cable Clamp**

Also, in breaking down the parts comprising this cable clamp, it is possible to further enlarge the images. Enlarged observations make it possible to clearly visualize the voids (bubbles) in the resin, and even the direction (orientation) of the glass fibers mixed in to strengthen the resin.

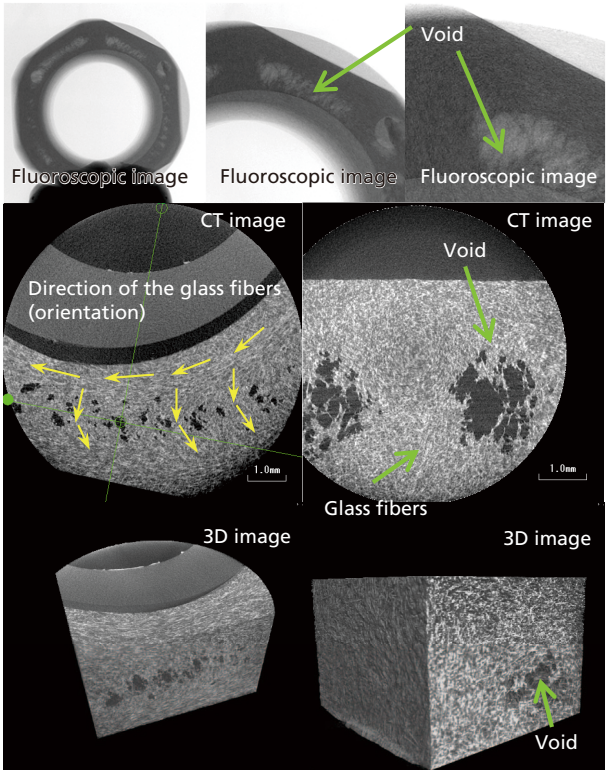


**Fig. 6 Observational Images of Resin Part (3)**

## Image Analysis Example of the Resin Cable Clamp

X-ray CT imaging enables not just observations of the internal structure of resin molded products, but also a variety of types of analysis. Here, we introduce a sample analysis using VGStudio MAX 3D image processing software.

Using this 3D image processing software makes it possible to export the 3D data constructed from the CT images, into STL format. STL data represents the surface of a sample as a series of polygons. This data can then be read into CAD software or output with a 3D printer.

If the defect analysis module is used, not only is it possible to visualize voids inside samples, but also to measure the void positioning and volume.

Further, if the coordinate measurement function is used, the size of the sample interior, which cannot be measured from the outside, can be calculated by approximating the shape with level surfaces, spheres, and cylinders.

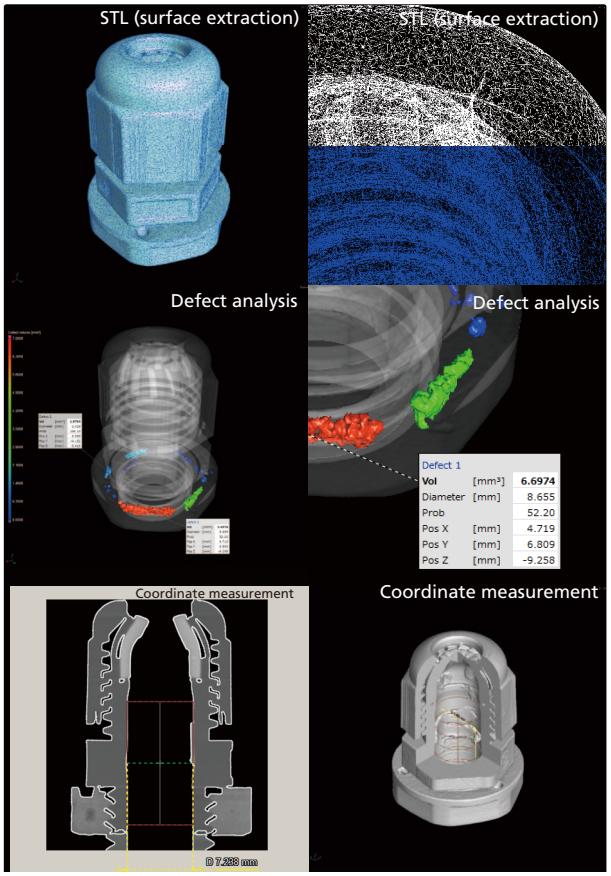


**Fig. 7 Image Analysis of a Resin Cable Clamp**

## Conclusion

As shown here, the newly released inspeXio SMX-90CT Plus enables the nondestructive observation and analysis of everything from the overall shape of a resin cable clamp to its internal voids and glass fiber orientation. This compact benchtop system will be very useful for obtaining information about the interior of products faster and more easily.

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