

—New 3D Workstation Features for Shorter Procedure Times—

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IVR procedures are becoming increasingly complex and sophisticated, and require angiography systems that can achieve lower radiation doses, less contrast media use, and shorter examination times. Shimadzu's latest Trinias™ series angiography system comes with various features that support minimally invasive procedures.

This article presents new features* added to Shimadzu's SCORE 3D Workstation, a workstation used for 3D image analysis.

* New features are available to customers who upgrade to the paid version of SCORE 3D Workstation.

1 Improved Automated Path Creation Function

3D images are often used to measure distance and degree of stenosis during procedures, but simpler procedures are needed for these measurements.

VR (volume rendering) Tracking was an essential function for taking measurements with the SCORE 3D Workstation that has now been relaunched as Vessel Tracking. As the name suggests, VR Tracking generated a path along a blood vessel of interest from a user-specified start point and end point on a VR image of that blood vessel. Although VR Tracking was simple to use, there were also some limitations, such as not generating satisfactory paths along branched vessels and being unsuitable for CTO (chronic total occluded) lesions, which VR Tracking had difficulty showing on the VR image. The new function, called Vessel Tracking, resolves these limitations. Vessel Tracking now (1) generates paths from any type of view (VR, axial, coronal, and sagittal), (2) tracks based on pixel values in cross-section views, allowing it to track objects not visible on VR images (such as blood vessels), and (3) allows the user to set not only a start and end point, but also multiple intermediate tracking points if needed. Tracking points are also displayed correctly across the different views, hence tracking point positions can be verified across four image views (VR, axial, coronal, and sagittal) (**Fig. 1**). **Fig. 2** shows examples of this function being used with a branched vessel and a CTO lesion.

Vessel Tracking can reduce the time spent on measuring blood vessels during a variety of procedures.

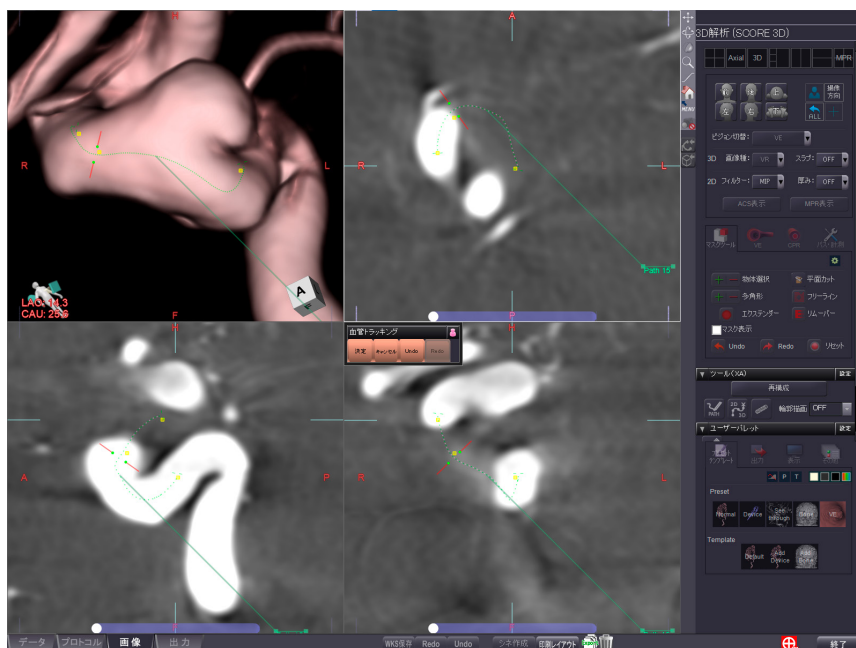


Fig. 1 Operation Screen after Applying Vessel Tracking to Axial Section View

(Yellow squares are tracking points. Tracking points are also displayed correctly across VR, coronal, and sagittal images.)

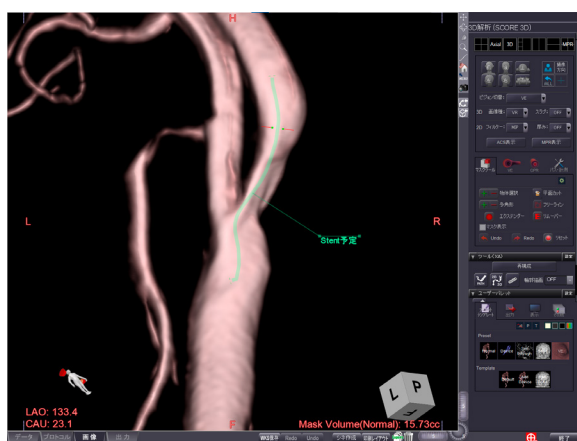


Fig. 2-a Path Generation on Branched Vessel

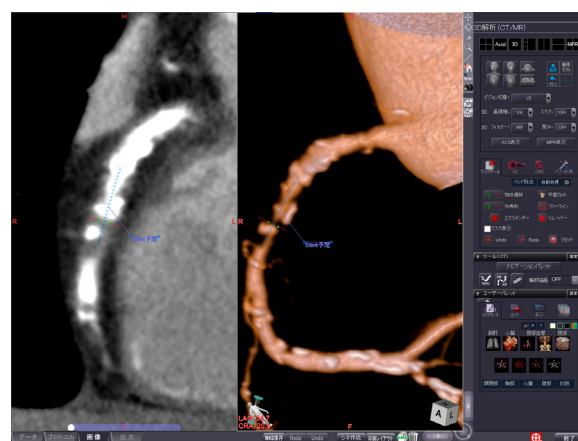


Fig. 2-b Path Generation at CTO Lesion

2 C-Arm Range of Motion Displayed on VR Image

3D-reconstructed VR images can display the complete vessel and a target region from any direction, making them an essential tool when determining the C-arm working angle for intervention. Nevertheless, users often evaluate a target region only to arrive at a C-arm working angle that is physically incompatible with the actual system C-arm, prompting the need for a way of showing this incompatibility earlier in the process.

A newly added feature shows when the current VR image angle is inside or outside the range of motion of the actual C-arm (Fig. 3). The user can confirm at any time whether a given view is within the C-arm range of motion without having to navigate to a separate pop-up screen that transmits the angle to the C-arm. This allows the C-arm working angle to be determined quickly while simply rotating the VR image and observing the target region*.

(* An icon displayed on an image may not show the actual range of motion depending on table height, position, and peripheral equipment.)



Fig. 3 Software Feature Showing C-Arm Range of Motion

Left: Angle within range of motion (green icon) Right: Angle not within range of motion (red icon)

3 Additional Features to Improve Ease of Use

3.1 MRI Image Support

As well as including support for MRI images, support has been added for roadmap images created by superimposing MRI images and fluoroscopy images**. When a preoperative CT is not feasible or is not performed, existing MRI images can be used in IVR procedures.

3.2 Support for Shortcut Keys

Frequently used features can now be summoned with ease via shortcut keys on the keyboard. It is possible to summon frequently used features such as creating cyclic movie images, rotating the VR image (in 8 directions vertically/laterally/longitudinally), and measuring 2D distances with a single key press.

** Optional feature

4 Final Comments

Shimadzu has been developing image-guided applications that offer real-time performance and unique procedure-supporting features to assist minimally invasive procedures. Shimadzu continues to value the viewpoints of all stakeholders in the interventional radiology field and strives to achieve increasingly minimally invasive procedures.