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Analysis and Visualization of Scientific Tomography Data with VGSTUDIO MAX

Content

VGSTUDIO MAX is an established and powerful tool for accurately analyzing and visualizing volume data generated for industrial and scientific research. Our software works with data from a wide range of devices, such as industrial X-ray CT, medical X-ray CT, synchrotron tomography, neutron tomography, and MRI. VGSTUDIO MAX also allows users to simultaneously analyze data acquired from various sources. For example, an X-ray and a neutron scan of an object can be easily combined to obtain the most information from both methods.

When analyzing scientific CT data, segmenting and visualizing different inner structures are often key tasks. Apart from providing a visual breakdown of the scanned object, segmentation can also reveal additional details about the scanned specimen. An preliminary advanced multi-material surface determination can significantly facilitate segmentation. It allows an object to be automatically separated into materials based on their different gray values, e.g., bone and soft tissue.

Apart from identifying the inner components of an object, a functional analysis of morphological structures can also be of interest. Especially in the fast-emerging field of biomimetics, analyzing structure-function relationships is a key element. For example, a Digital Volume Correlation (DVC) analysis measures the displacement and strains in time series of volumetric images. This tool makes it possible to detect structural changes in two stages of an object, e.g., before and after mechanical loading. Additionally, DVC allows for a quick identification of specific materials by comparing scans acquired from different methods (e.g., neutron and X-ray computed tomography).

Alternatively, direct structural mechanical simulation on voxel data is not only used to manufacture, for example, the ideal part for an airplane cabin holder but can also be used to simulate stress distribution in biological samples when a static force is applied. Since the simulation runs directly on the voxel data, inner features like voids can be factored into the simulation. By converting the voxel data into a tetrahedral volume mesh, the information on the inner structure can also be transferred to a dedicated simulation software. Furthermore, a precise surface mesh of the scanned object can be exported as a model for 3D printing or for use in other software.

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