Avizo Fire for Industrial Inspection and NDT
Advanced 3D visualization and analysis software

Avizo® Fire provides powerful tools for visualizing and analyzing multi-modal 3D data. From defect/flaw detection and analysis, in-line inspection automation or single parts inspection, to performance and process evaluation, and materials characterization, Avizo Fire is used in many ways throughout all the research, design and development phases of materials or products. Its 2D/3D image review software tools and workflow offer high-performance capabilities to NDT specialists across a wide range of fields – in aviation and aerospace, automotive, electronics, construction, and manufacturing.

† Exhaust part of a diesel engine. Courtesy of North Star Imaging, Inc.
Understanding the internal structure of materials and manufactured products is critical for materials research & development and industrial inspection. Nowadays, a variety of non-invasive methods are employed in these areas, including tomography, radiography, ultrasonics or electromagnetics, some of which are familiar from other fields such as medicine or geophysical prospecting.

3D computer imaging has become an essential tool to fully understand the data generated using non-invasive technologies, enabling researchers and engineers to visually explore and understand complex data sets.

Avizo Fire provides powerful tools for visualizing and analyzing multi-modal 3D data. It is used in many ways throughout all the research, design and development phases of a material/product, and its 2D/3D image review software tools and workflow offer high-performance capabilities to NDT specialists.

All-in-one software application. Avizo Fire is a comprehensive, integrated software tool for material and object structures analysis. It provides all the visualization and analysis features required at each stage of your prototyping, production and control processes: 3D data exploration, segmentation, quantitative analysis, measurement, porosity study, wall thickness analysis or comparison with CAD models.

Interactive 3D visualization. Avizo Fire allows the import and fusion of 2D and 3D image data from multiple sources, enabling direct interactive 3D visualization and exploration.

High-end interactive visualization techniques, including slicing and volume or surface rendering, provide detailed insights into material and object 3D structures at any scale.

Integrate your know-how. Avizo Fire is much more than a ready-to-use software application. Avizo Fire is actually an extensible 3D analysis software framework that can be customized using the built-in scripting language and can be extended by developing custom add-ons and modules, to implement specific tasks and workflows.

Integrate your own algorithms, customize information workflow (interface with other applications, routing to data storage, etc.), create new file readers/writers and visualization modules, and create interfaces between operator-machine-Avizo.
Avizo Fire
Key Features

Import and process
Handle any modality, at any scale, of any size:
- X-ray tomography: Industrial CT, Nano- and micro-CT
- Microscopy: electron and optical
- Other techniques (ultrasonics, radiography, MRI, etc.)

Visualize and explore
- Interactive high-quality volume visualization
- Direct surface and volume rendering with real-time color/opacity mapping
- Orthogonal, oblique, cylindrical, and curved slicing
- Contouring and iso-surface extraction
- Multi view support
- View several data sets simultaneously

Segment
- Thresholding and auto-segmentation, object separation, automatic labeling
- Region growing, snakes, interpolation, wrapping, smoothing
- Morphological processing including watershed, basins

Analyze and measure
- Properties extraction from experimental or simulated data, image voxel or geometry data
- Extensive measurements: counts, distributions, areas, volumes, thickness, orientation, shape factor, and more
- Analysis of porous materials and multiphase systems at any scale
- Defects detection and measurement: porosity, voids, inclusions, cracks
- Fibers characterization
- Measurement tools
- Wall thickness analysis
- Advanced query, plotting and export capabilities through the built-in spreadsheet tool or MS Excel®
- Bridge with Matlab®, LabView
- Comparison with CAD model

Simulate
Image-to-simulation workflows:
- 3D image-based meshing for Finite Element and CFD simulations, export to FEA/CFD solvers* and advanced post-processing of simulation results* (*with Avizo Wind).
- Porosity / pore connectivity analysis and skeletonization for Pore Network Modeling.
- Direct 3D image-based simulation: absolute permeability, molecular diffusivity, electrical resistivity, and thermal conductivity computation with Avizo XLab.

Custom applications for high-volume inspection.
Avizo Fire open framework enables the implementation of custom applications for the automation of specific tasks in high-volume inspection processes. Avizo-based solutions provide users with dedicated assistance at each step of the inspection process.

In the below example, each processing operation has been automated using the Avizo Fire framework in order to provide NDE operators with a straightforward workflow, from image server to inspection scenarios and automated test report generation, for a highly efficient quality control cycle.

Avizo Fire

SCENARIO DESIGN TOOL

CREATE YOUR INSPECTION SCENARIOS

PARTS ARE SCANNED

3D IMAGE ACQUISITION DEVICE

3D IMAGE PRE-PROCESSING SERVICE

REGISTRATION VS. REFERENCE MODEL

INSPECTION TOOL

INSPECTION USING YOUR TEST SCENARIOS

OK NOK

↑ Example of tasks automation in high-volume inspection process.
Image nr. 2 is courtesy of GE Inspection Technologies.

Tuned for optimal performance
- Automatically takes advantage of the latest graphics hardware features
- Optimized hardware resource management
- High-performance processing and visualization for very large data sets
- Advanced tools for presentation of results and communication
Avizo Fire, the 3D analysis framework. Avizo Fire high-end visualization and analysis software offers a flexible, configurable analysis studio. More than just a ready-to-use software, Avizo Fire is the ideal software framework for custom 2D and 3D analysis applications.

Customize and expand Avizo Fire. Avizo's expandability makes it the ideal open framework for organizations that require rapid software customization to address their specific 2D/3D data visualization and analysis needs.

Use the built-in scripting language to customize Avizo and easily automate tasks and workflows.

Use the Avizo XPand extensions to create new customer components such as file readers and writers, to integrate custom computation routines, and even to develop new visualization modules.

Cooperative expertise and development. FEI Visualization Sciences Group is your partner in creating solutions using Avizo. We can help you quickly and effectively master all of Avizo's capabilities through focused training.

Our consultants can help you analyze your specific tasks and workflows, and leverage your know-how and specific expertise to get them implemented in Avizo using scripted modules or XPand-developed modules.

Avizo Fire is available for Windows®, Mac OS®, and Linux.