

Avizo[®] Inspect

3D software for digital industrial inspection



LANIKA SOLUTIONS PRIVATE LIMITED

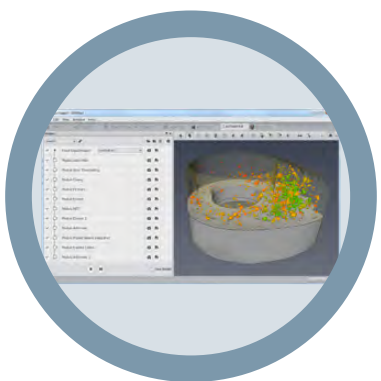
TF-04, Gold Signature, No. 95, Mosque Road, Frazer Town, Bangalore - 560 005, INDIA

Phone: +91 - 80 - 2548 4844 Fax: +91 - 80 - 2548 4846 Email: info@lanikasolutions.com www.lanikasolutions.com

Reduce your design cycle, inspection times, and meet higher-level quality standards at a lower cost.

Avizo® Inspect software streamlines the process of industrial inspection and materials design — off-line, near-line, and in-line.

Avizo Inspect provides dimensional metrology with advanced measurements; an extensive set of programmable automated analysis workflows (recipes) to perform repeatable inspection scenarios for porosity/inclusion, crack, defect, and fibrous materials analysis; reporting & traceability; the ability to do actual/nominal comparison by integrating CAD models, and a fully automated in-line inspection framework.

Avizo® Inspect **FEI 1**

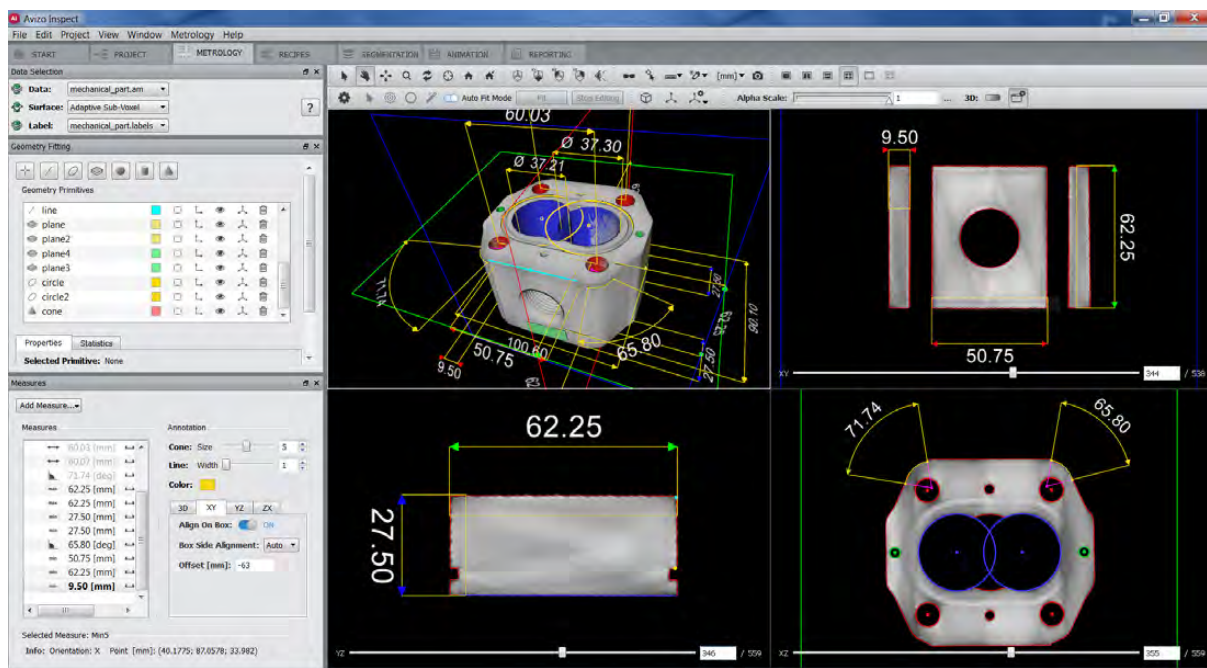
Avizo Inspect

Based on FEI's flagship Avizo software application and integrating expertise acquired over more than 10 years, Avizo Inspect provides a comprehensive set of tools that address the whole research-to-production cycle: from materials research in off-line labs to automated quality control in production environments.

Dimensional metrology

The Avizo Inspect Metrology workroom supports advanced measurements of parts. The dimensioning process starts with the definition of an orientation or multiple orientations for the part, which can be used for defining the direction for future measurements and for visualization of the part. This orientation process is based on geometrical shapes that are fitted and later used in performing measurements, such as distance, angle, and diameter/radius; or tolerancing measurements, such as parallelism or perpendicularity. Each of the measures can be assigned a nominal value and a tolerance will be validated according to these parameters.

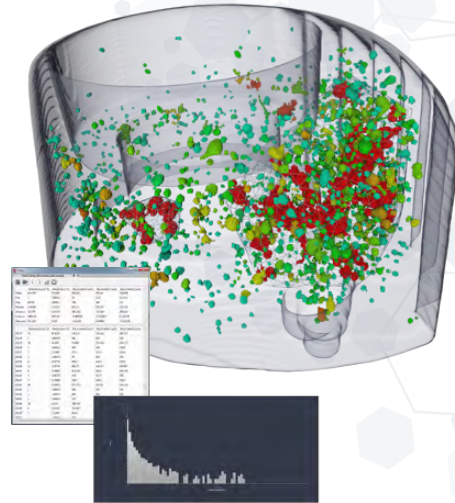
Avizo Inspect achieves sub-resolution precision in its measurements. Most importantly, Avizo Inspect includes an advanced algorithm to accurately determine the surface location when defining the boundary of the part. FEI has developed unique algorithms in collaboration with leading research laboratories in order to provide the best estimation of the interface between material and non-material. Geometric fitting and measurement precision is based primarily on the ability to extract the most accurate surface location. The accuracy of Avizo Inspect's fitting algorithms has been verified with NIST Physical Department Laboratory sample data sets.



Learn more at [Avizo-Inspect.com](https://www.avizo-inspect.com)

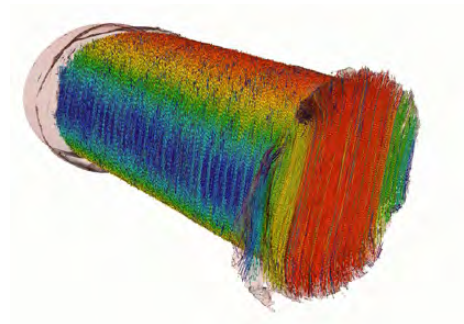
Porosity analysis

3D acquisition techniques, such as CT, DualBeam FIB/SEM, and TEM, allow detection of structural defects in the interior of a part or a material. Avizo Inspect includes advanced detection and quantification modules for defect detection and, in particular, pore analysis that can detect and measure closed or open pores. Results of the quantification process permit characterization of pore shape, pore distribution, distance from pore to surface, distance to neighbors, clustering of pores and pore connectivity.



Fiber analysis

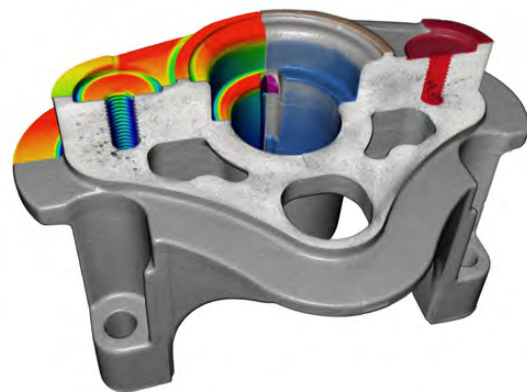
Avizo Inspect provides specific support for analyzing fibers, filaments, tunnels, and other networks or tree-like structures. Avizo Inspect provides a range of automatic, semi-automatic, and interactive tools to assist in the segmentation and analysis process. In this example, tube-like fibers are first extracted from the sample material, then quantified by measurements such as length and orientation.



Courtesy of School of Engineering,
ANU, Australian National University

Actual/nominal comparison by integrating CAD models

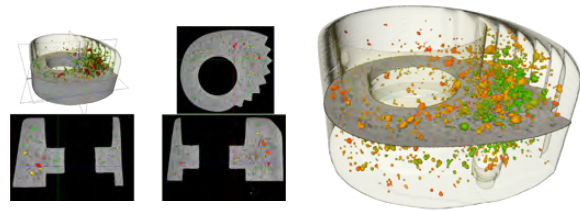
Avizo Inspect supports the comparison of a 3D image (CT or other) with a corresponding CAD model. CAD models from all major vendors can be imported and registered to the 3D image, and the deviation between the model and the 3D image can then be computed.



Easy creation and customization of inspection recipes

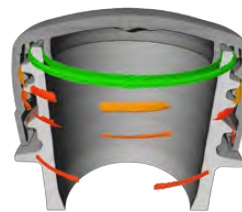
Avizo Inspect has been designed as an open framework, where “recipes” can be created, customized, and tuned to accommodate part configuration, material properties and characteristics of the acquisition system, thereby achieving the most accurate measurements. Users can create their own recipes and integrate their own expertise and proprietary knowledge into the Avizo Inspect open framework. Simply reapplying the recipes to a set of parts or materials can fully automate the measurement process.

Avizo Inspect comes with a collection of recipes, and our experts can work with you to create specially-customized recipes for a particular inspection process or analysis.

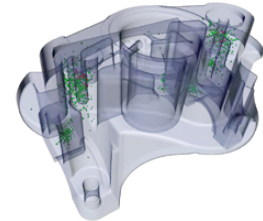


Measure of minimum distance between defects

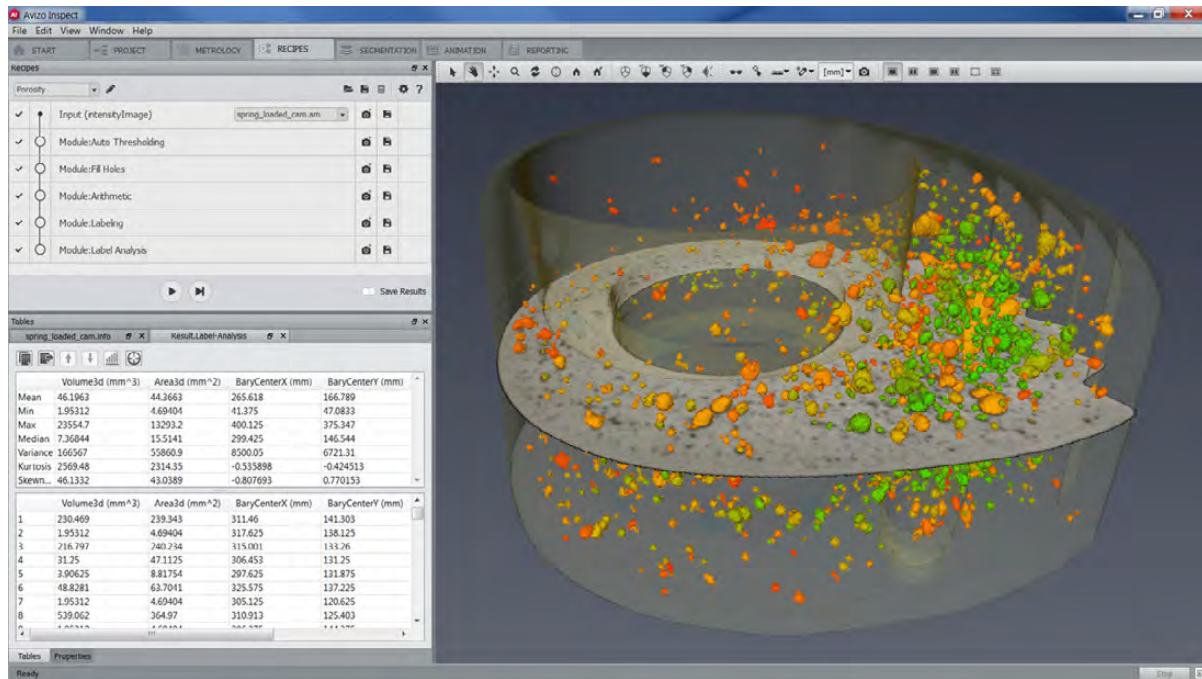
Measure of defect distance to surface of the part



Multi-parts contact areas



Defect prediction before machining



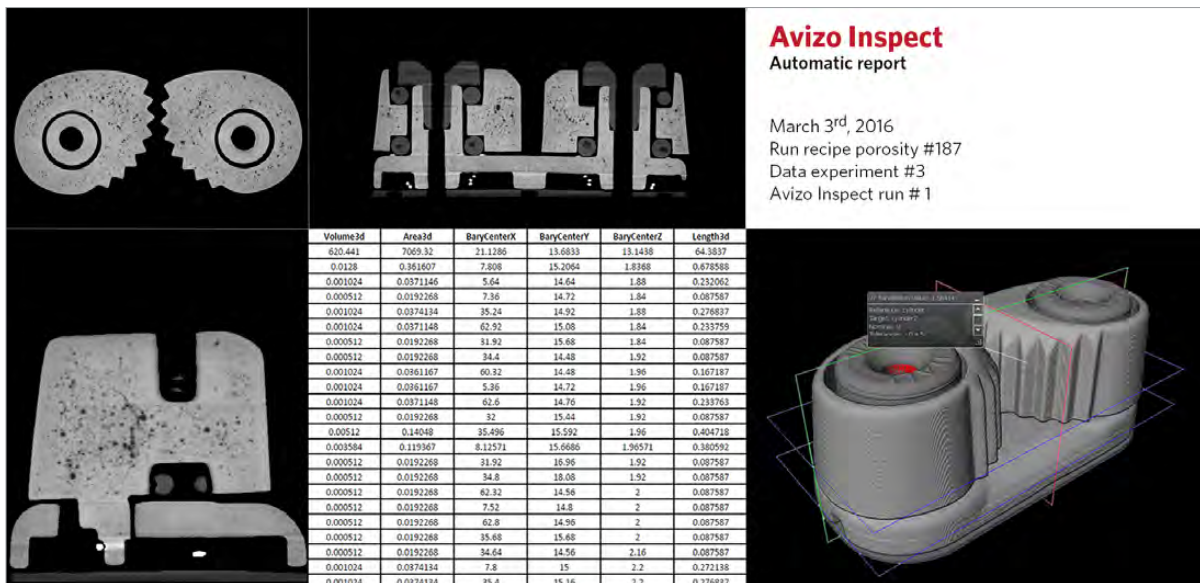
Example of custom recipe



Learn more at [Avizo-Inspect.com](https://www.avizo-inspect.com)

Reporting & traceability

Avizo Inspect includes a reporting workflow that allows the user to populate a template report with analysis results coming from the execution of a recipe or performance of measurements. This permits efficient delivery, sharing, and archiving of documented results. The HTML templates are easily created or customized and automatically or manually populated and archived. Snapshots and spreadsheets can be exported to the reporting workflow. A history log containing the metadata for each result is also created, making it possible to trace the entire life cycle of the data.

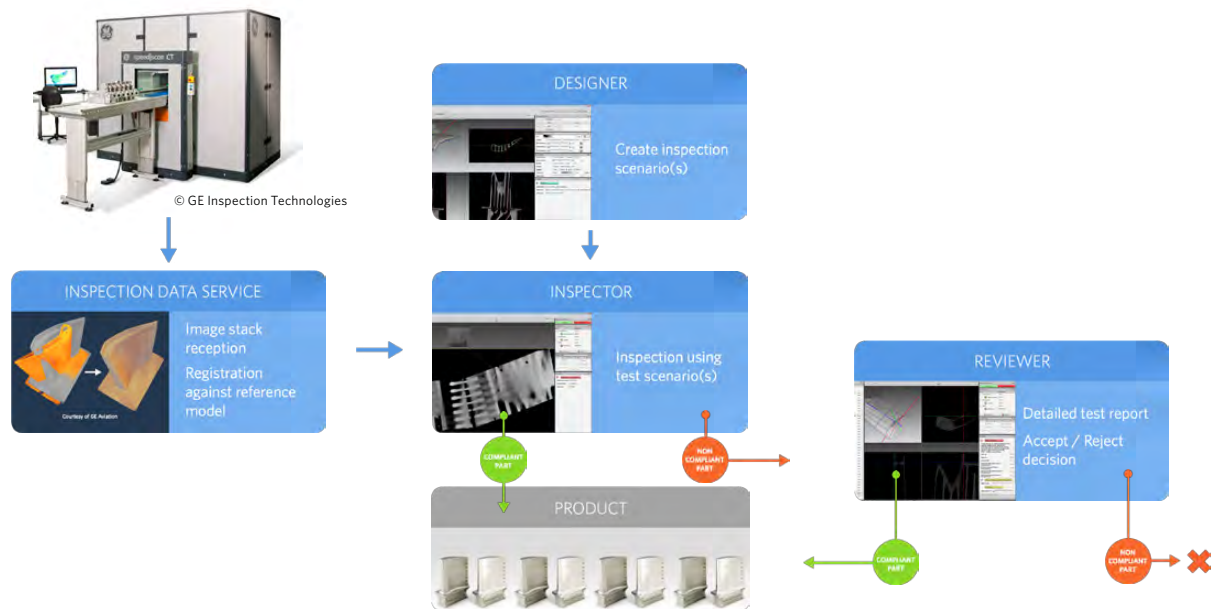


Automation and full in-line integration

Complex inspection scenarios, combining multiple recipes on different sub-regions of the part or material, can be created using Avizo Inspect Designer. Scenarios can combine multiple steps of visual inspection and automatic or manual measurements.

Inspector services run scenarios created with Avizo Inspect Designer and will accept or reject a part according to automated or interactive acceptance and/or tolerance values associated with automatic and/or manual measurements.

Avizo Inspect In-line directly connects Inspector services with the acquisition system, streamlining the inspection process. Avizo Inspect Service, included with In-line, pre-processes data pushed to a DICOM/DICONDE server; performs pre-processing, such as multi-part splitting, part registration to reference model, and acquisition artifact reduction; then dispatches the pre-processed part to a scalable collection of Inspector services. At any time, the results of inspection scenarios can be accessed with Reviewer services, where each step of the scenario can be reviewed and a final decision on part acceptance made. Avizo In-line also includes user administration, allowing assignment and management of different permission levels.



In-line implementation example

Key features

Import and process

- Handle any modality, at any scale, of any size:
 - X-ray tomography: CT, micro-/nano-CT, synchrotron
 - Microscopy: electron and optical
 - Other acquisition techniques (MRI, radiography, etc.)
- Support for multi-data/multi-view, multi-channel, time series, very large data
- Scaling, calibration, conversion, re-sampling
- Image enhancement, comprehensive filtering and convolution, Fourier frequency transforms
- Artifact reduction algorithms
- Advanced multi-mode 2D/3D automatic registration
- Image stack alignment, arithmetic, correlation, fusion

Visualize and explore

- Interactive high-quality volume visualization
- Orthogonal, oblique, cylindrical, and curved slicing
- Contouring and iso-surface extraction
- Data features highlighted on-the-fly with image filtering (contrast control, histogram equalization, dynamic colormap and opacity on slices or volumes, etc.)

Segment

- Thresholding and auto-segmentation, object separation, automatic labeling
- Region growing, snakes, interpolation, wrapping, smoothing
- Morphological processing, including watershed and basins
- 3D surface reconstruction and tetrahedral grid generation
- Skeletonization

Measure

- Accurate surface extraction for sub-resolution precision
- Geometry fitting (point, line, plane, cylinder, sphere, cone)
- Measures (direct and secondary measures on data and fitted geometry)
- Automatic test plan creation and replay

Analyze and quantify

- Recipe creation, customization, automated replay
- History log of results
- Report generation
- Built-in measurements, including counts, volumes, areas, perimeters, aspect ratios, and orientations
- User-defined measures
- Results viewer with spreadsheet tool and charting

- Automatic individual feature measurements, 3D localization, and spreadsheet selection
- Automated statistics, distribution graphs
- Feature filtering using any measurement criterion
- Geometry registration, measurements and comparison
- Porosity detection and measurement
- Fiber analysis
- Bridge with MATLAB® and LabView
- Pre-processing for structural and flow simulations

In-line

- Multiple acquisition systems
- Acquisition service
 - DICOM/DICONDE connection
 - Multi-part (pallet) split
 - Automatic registration to reference
 - Pre-processing
- Designer
 - Definition of inspection/analysis scenario
- Inspector
 - Manual or automated run of scenario
 - Acceptance/Rejection of part
- Reviewer
 - Final rejected part review

Present

- Video generation
- Advanced key frame and object animation
- Mix images, geometric models, measurements, and simulations
- Annotations, measures legends, histograms, and curve plots
- Export spreadsheets, 3D models, high-quality images

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
- 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

Professional Services

FEI offers a comprehensive set of professional services. From training to consulting or custom development, FEI Professional Services experts are dedicated to helping you be the most productive with Avizo Inspect.

Training

FEI custom training is designed to provide you with immediate and practical skills while keeping your specific goals in sight. We can help you quickly and effectively master all of Avizo Inspect's capabilities through focused training.

Various courses can be arranged with typical durations ranging from 1 to 3 days. We can customize our training to best fit your needs. The training can be arranged on-site at your location or may also be delivered at one of FEI's facilities.

Consulting

FEI experts will help you get the best out of the constant innovations introduced in Avizo Inspect software so you can benefit from them in your daily work.

FEI is your partner in creating solutions using Avizo Inspect. Custom-made consulting sessions can be performed at your facilities or remotely, depending on your needs. Our consultants can help you analyze your specific tasks and workflows, and leverage your knowledge and specific expertise, to get them implemented in Avizo Inspect.

Custom development

With over 25 years of experience in 3D and image processing and hundreds of projects delivered to organizations small and large, FEI can provide you with a solution tailored to fit your specific needs.

We have the ability to customize and expand our software solutions at various levels, including but not limited to:

- Building simple push-button solutions from entire workflows
- Integrating specific algorithms
- Implementing our solutions into an existing process
- Creating support for custom file formats

LANIKA SOLUTIONS PRIVATE LIMITED

TF-04, Gold Signature, No. 95, Mosque Road, Frazer Town, Bangalore - 560 005, INDIA

Phone: +91 – 80 – 2548 4844 Fax: +91 – 80 – 2548 4846 Email: info@lanikasolutions.com www.lanikasolutions.com