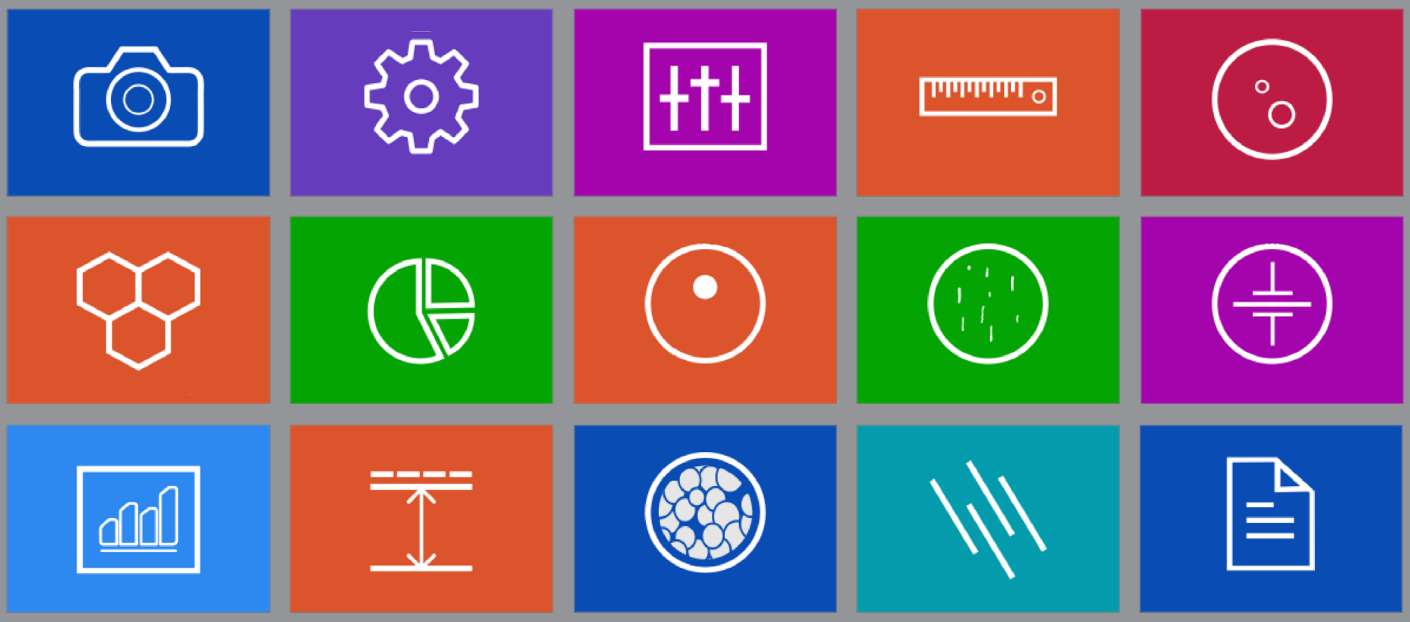
WEST MEDICA

Vision Material

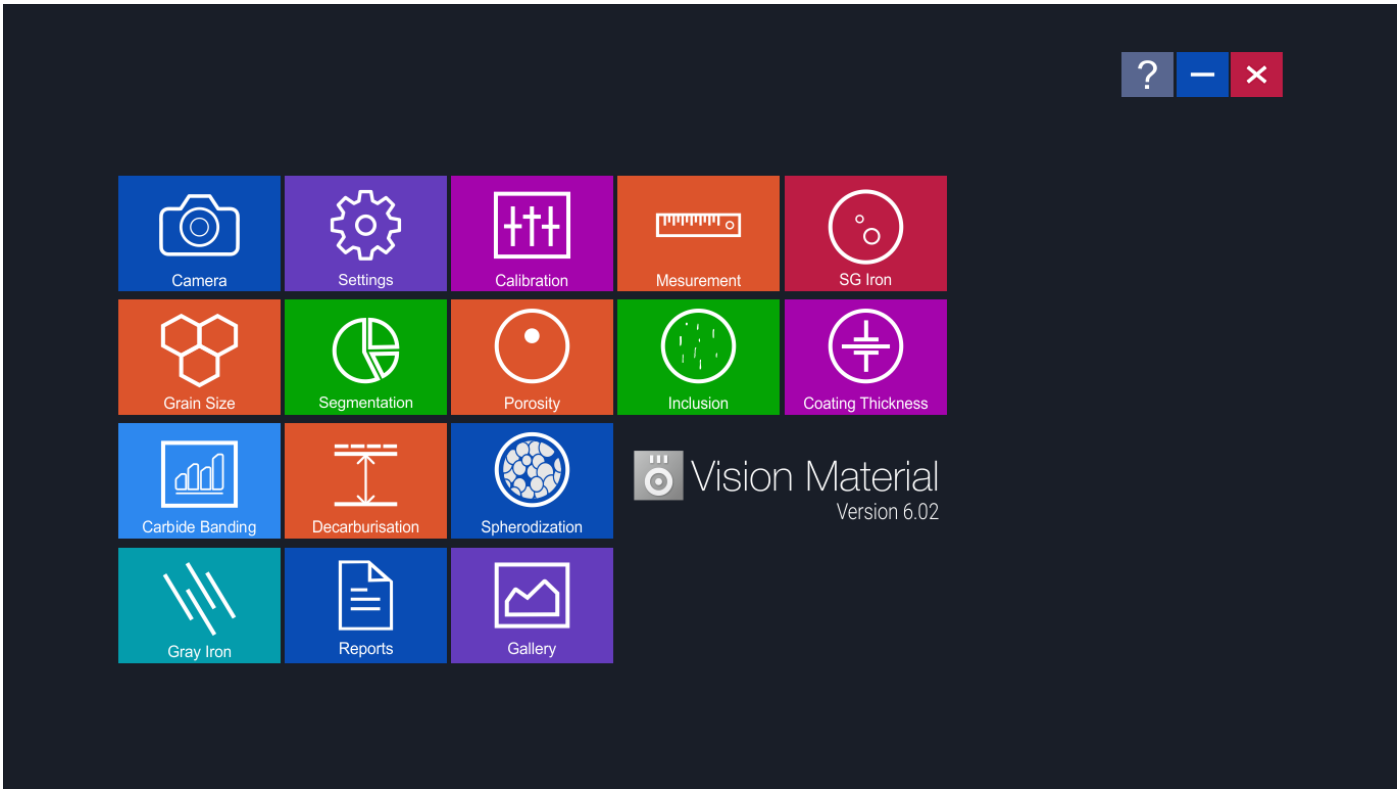


Vision Material

Software for Image Analysis in Metallurgy

Vision Material is a new solution in the Vision product range, designed specifically for metallurgy. The software has a modular structure and performs quantitative analysis of images.

Introduction



Startup page of Vision Material User interface

Vision Material software is intended for scientists, metallurgists, laboratory technicians and research groups conducting work with industrial materials.

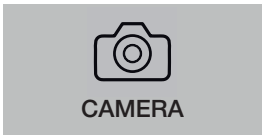
Results are provided in accordance with ISO and ASTM technical standards. This solution is designed to help the engineers working in quality control and product development.

Vision Material supports different image formats like BMP, TIFF, GIF, JPEG etc. Apart from Vision cameras range, it also supports USB cameras from other manufacturers.

The image processing technique includes image capture, measurement and enhancement that improves the accuracy of final results. The live measurement function allows to significantly reduce the working time.

Modules

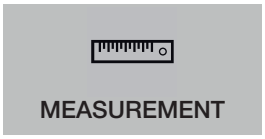
Part 1. General modules



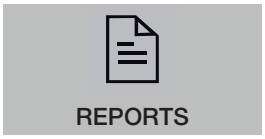
CAMERA
One can select different display/capture sizes along with other setting like white balance, brightness, contrast, hue, saturation can be changed on live displayed image. Once all settings are done, image can be captured in appropriate folder for appropriate analysis.

SETTINGS
This module is designed to set various parameters for first time when software is installed. The setting options are available to choose ISO/ASTM standard calibration, setting in report format, setting of various parameter on printed image in report. Once all settings are done, you need one button click for all Analysis. All settings are stored till you change them in future. Do not change them in routine, it is not necessary.

CALIBRATION
Calibration should be performed on all the objectives of the microscope, where Digital Camera is installed. Calibration should be performed only when all hardware are finally fixed. In case of readjustments or replacement of any part, calibration should be done again.



MEASUREMENT
With the Measurement module one can obtain measurement on manually drawn lines on traces, shapes or by outlining an object, which can be accumulated and logged on to the results worksheet from where they can be stored to a file, printed or transferred to spread sheet for further analysis or statistics.



REPORTS
All reports are saved in the folder and can be viewed anytime. Following points are included in reports: Measurement, Grain Size, Porosity, Decarburization, Segmentation, SG Iron, Gray Iron.

GALLERY
Several folders are available to view any Captured images. The folders are: Nodularity, Flake, Carbide, LineMeasurement, GrainSize, Porosity, Decarburization, Segmentation, SG Iron, Coating Thickness.

Modules

Part 2. Special modules

SG IRON
SG Cast Iron or Nodules are also called DUCTILE IRON or SPHEROIDAL GRAPHITE IRON. These nodules are formed from graphite during Solidification. SG IRON module provides image analysis on the basis of ASTM A-247-67, ISO-945-1.

GRAIN SIZE
This module can quickly perform automatic, objective and repeatable analysis to determine ferritic & austenitic grain size in steel according to industrial standards. International methods ASTM E-112, E-93, E1181 are applicable.

SEGMENTATION
Segmentation is a method of image partition by intensity / grayscale range of its parts. Since a phase is detected and its area is estimated on the basis of its intensity / grayscale, an option for removing phases from the histogram is also provided. Multiple phases are identified by colored overlays and can be simultaneously displayed in the same field of view.

POROSITY
Pores, due to their contrast with the rest of the image, are relatively easy to detect automatically. This module allows to recognize and measure the porosity in the material according to ASTM B276 Standard. Thresholding is accomplished using gray scale techniques.

INCLUSION
Vision Material software allows to identify 4 types of inclusions: Sulfide (A Type), Alumina (B Type), Silicate (C Type), Globular (D Type). Each type is further divided based on the width parameters.

COATING THICKNESS
Plating or coating thickness is determined by cross-sectional microscopy method. The specimen is cross-sectioned, mounted, polished and microscopically evaluated for measuring the plating or coating thickness. Sometimes, etching of the core base metal may be necessary to accurately measure the coating or plating thickness. The test method covers measurements of the local thickness of metal and oxide coatings by the microscopical examination of cross sections using an optical microscope.

CARBIDE
Iron carbide or Cementite is an intermetallic component of iron and Carbon. While iron carbide is present in most steels and iron casts, it is produced as raw material in the iron carbide process, which belongs to the family of alternative iron producing technologies.

Modules

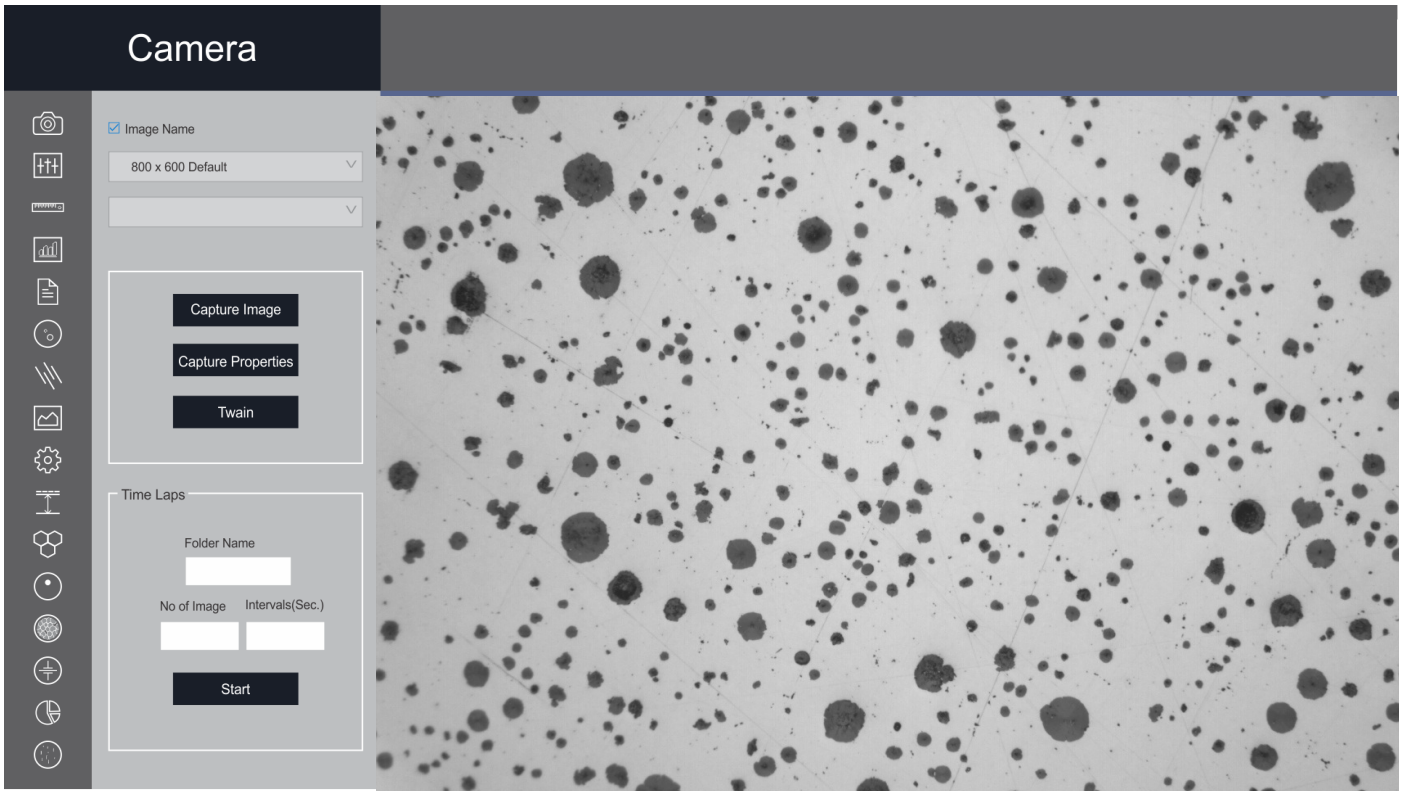
DECARBURIZATION
The module is used to determine the depth of Decarburization in structural quality. Partial decarburization is an area where the carbon content is reduced. Total Decarburization is measured in work piece to the limit of the ferritin layer with complete carbon removal, in compliance ASTM E-1077-91 Standard

SPHERODIZATION
This module is designed to analyze spheroidal graphite (nodules). The nodules are separated from non-nodules on pre-defined spheroidicity. Nodules acquire blue color and non-nodule get red color. Re- port includes: shape (designated from I to VI), size (designated by 1 to 8), number of nodules/mm2.

GRAY IRON
Grey Iron or Grey Cast Iron is an element that has graphitic microstructure. Grey iron analysis module provides image analysis based on ASTM A-247-67, ISO945-1.

Part 1
General modules

Camera



Software Interface

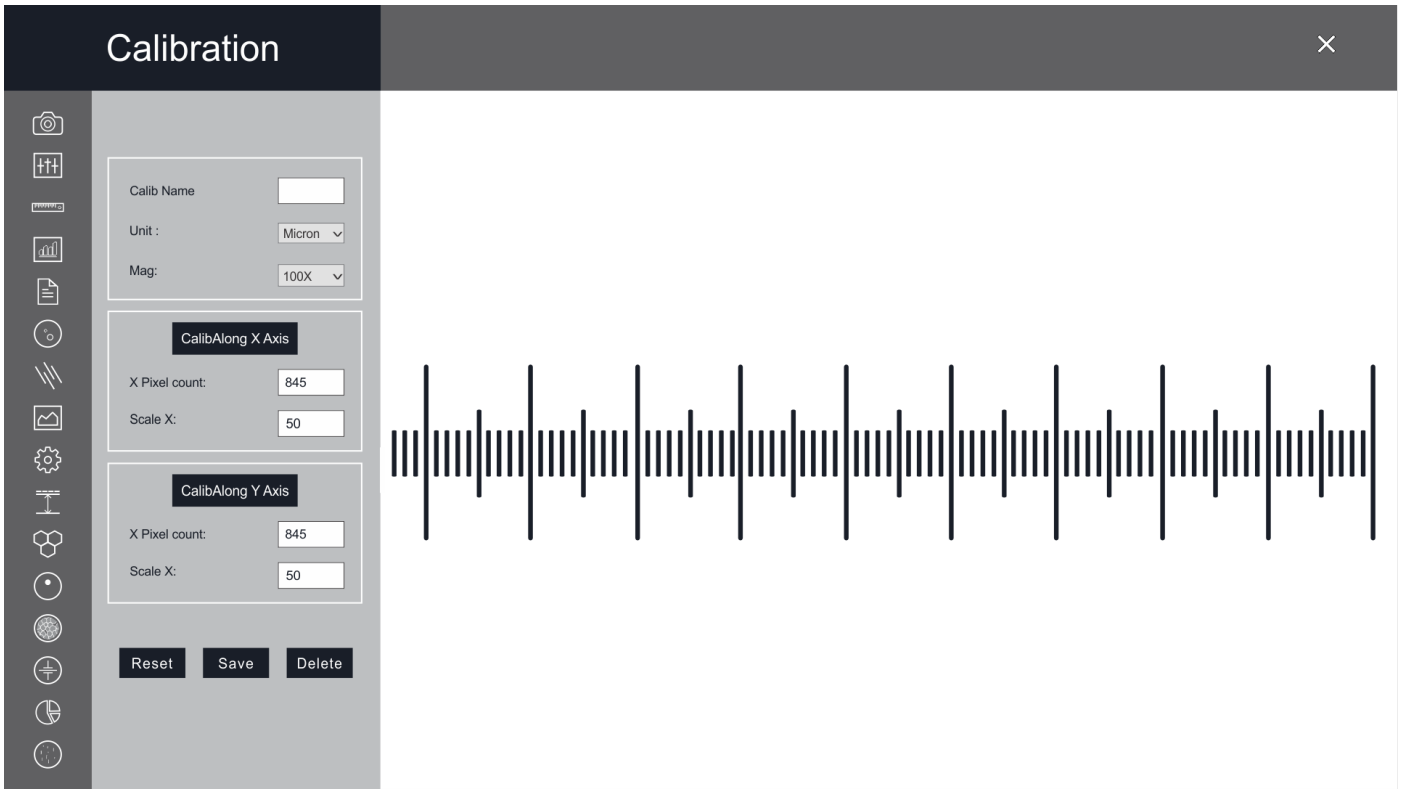
One can select different display/capture sizes along with other setting like white balance, brightness, contrast, hue, saturation can be changed on live displayed image. Images are saved in a folder for further analysis.

Settings

Software Interface

This module is designed to set various parameters for the software. The settings allow to choose ISO/ ASTM standard calibration, report format, scales and other module parameters.

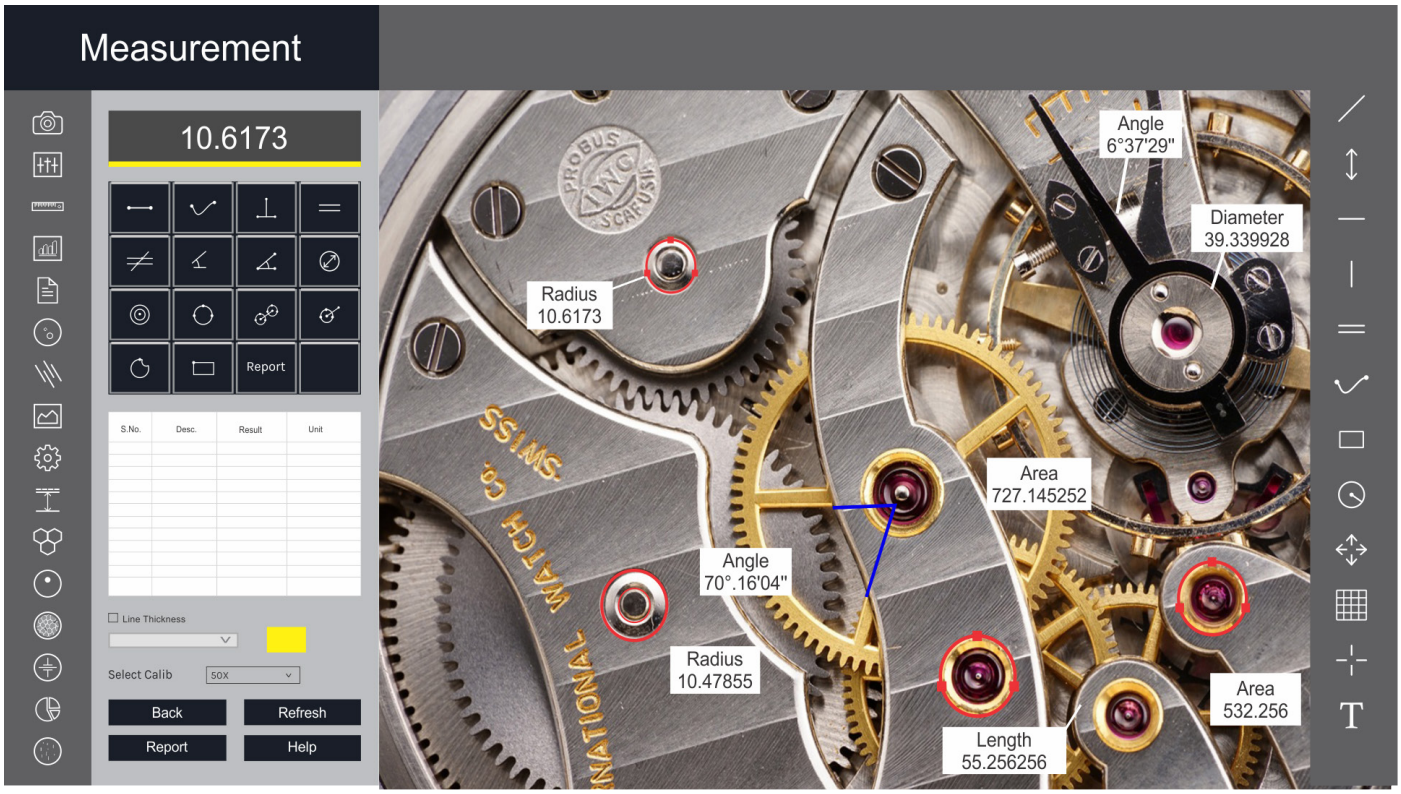
Calibration



Software Interface

Calibration should be performed on the particular objective, where a Digital Camera is installed. Calibration should be performed only when all the hardware are finally installed. In case of readjustments or replacement of any part, calibration should be done again.

Measurement

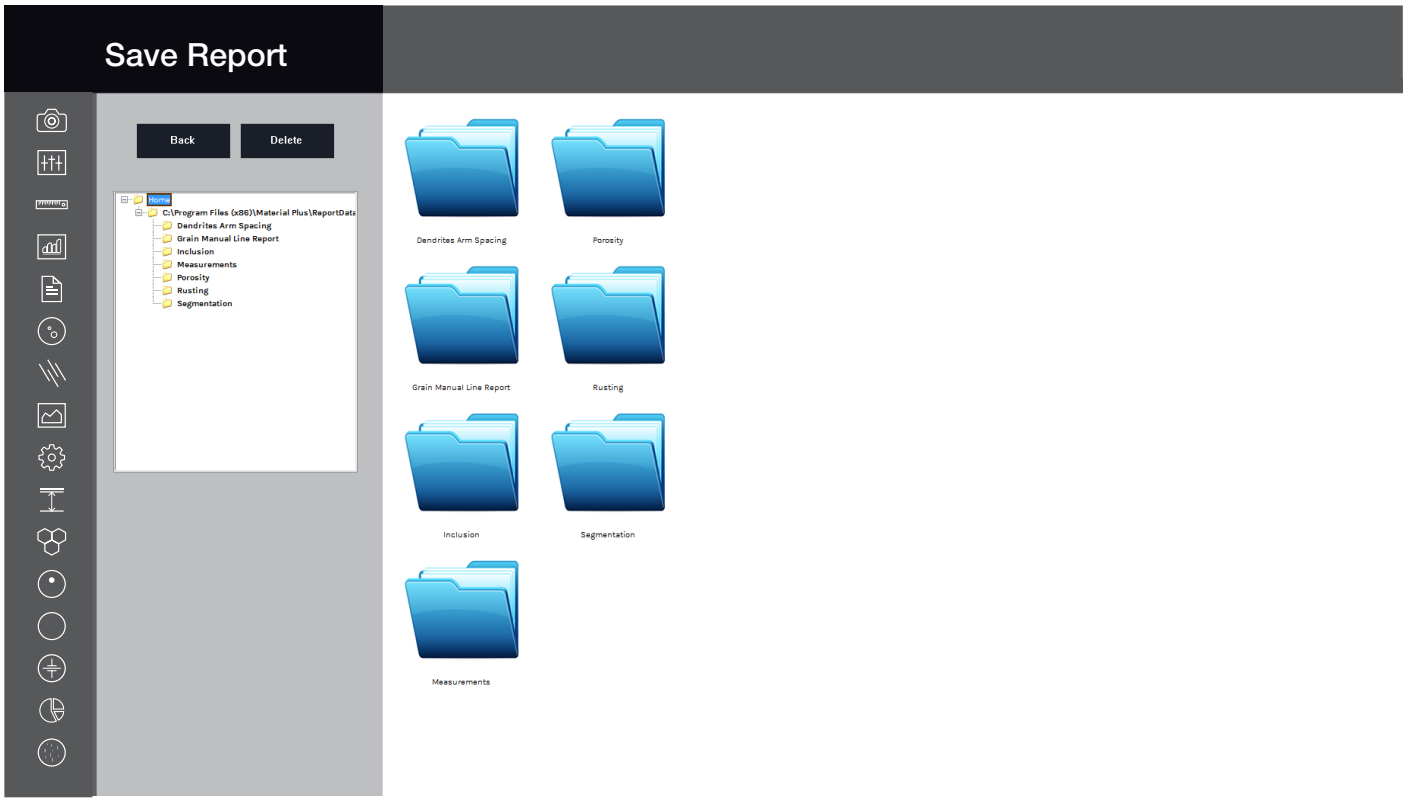


Software Interface

This module allows you to measure various objects. The measurement results are entered in the report, saved as a file, and exported in the form of a table for further analysis and statistical processing.

Line	Freehand	Perpendicular line	Parallel lines
Intersecting point	Line angle	3 Point angle	Circle diameter
Annulus circle	3 Point circle	2 Circle distance	Line from center
Freehand area	Rectangle	Report	

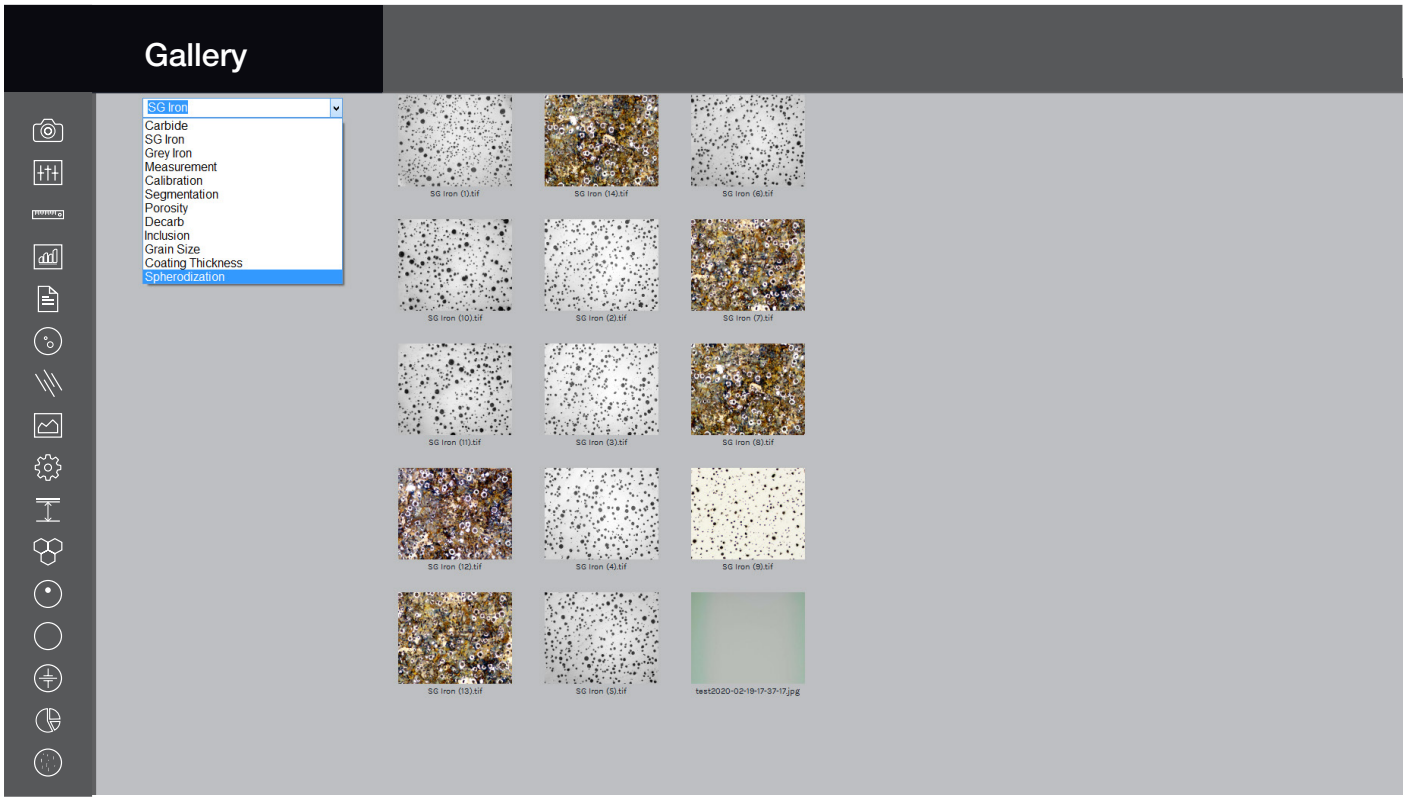
Report



Software Interface

All reports are saved in a folder and can be retrieved anytime. Following points are included in reports: 1. Measurement
2. Grain Size
3. Porosity
4. Decarburization
5. Segmentation
6. SG Iron
7. Gray Iron

Gallery

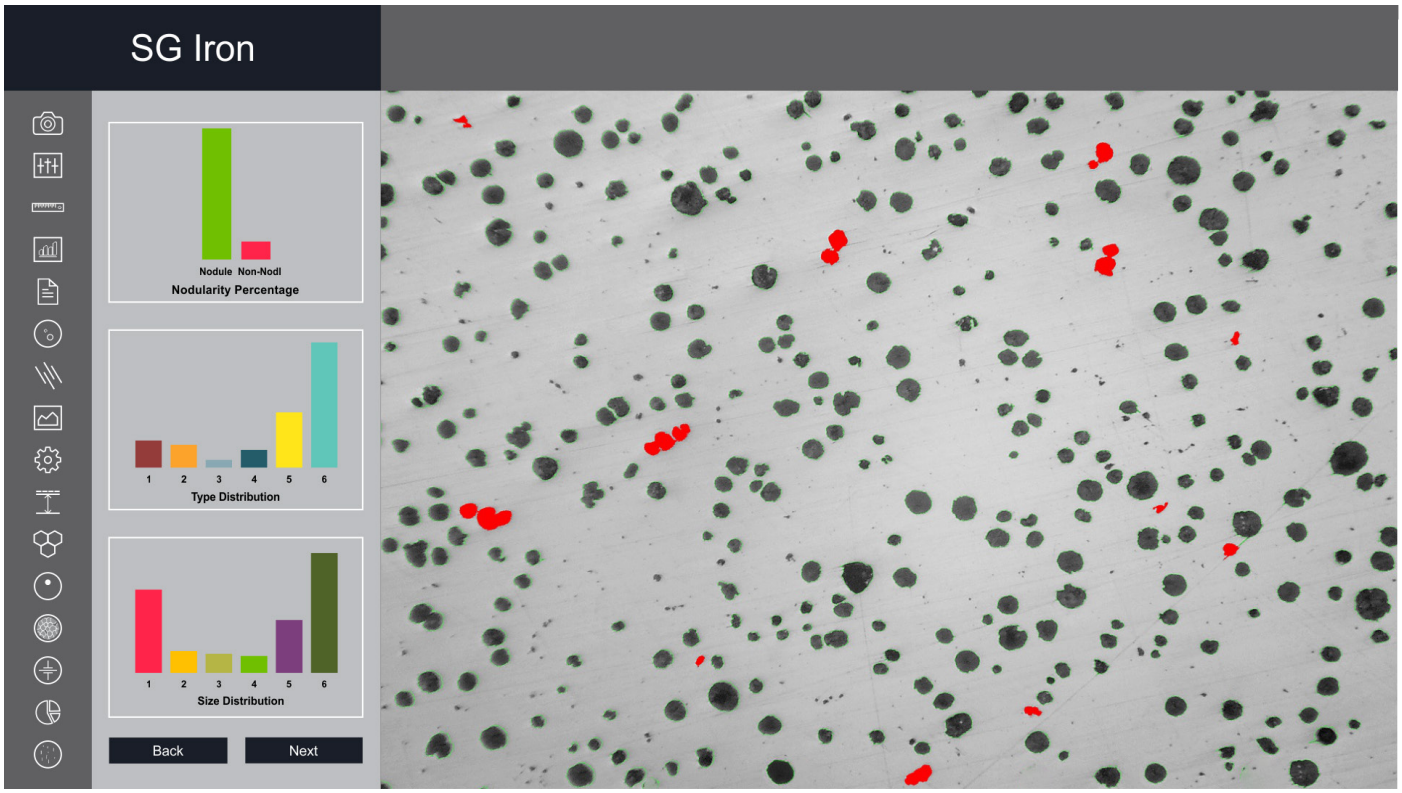


Software Interface

Several folders are available to view any Captured images. The folders are: 1. Nodularity
2. Flake
3. Carbide
4. Line Measurement
5. Grain Size
6. Porosity
7. Decarburization
8. Segmentation
9. SG Iron
10. Coating Thickness

Part 2
Special modules

SG Iron (Ductile Iron/Nodularity)

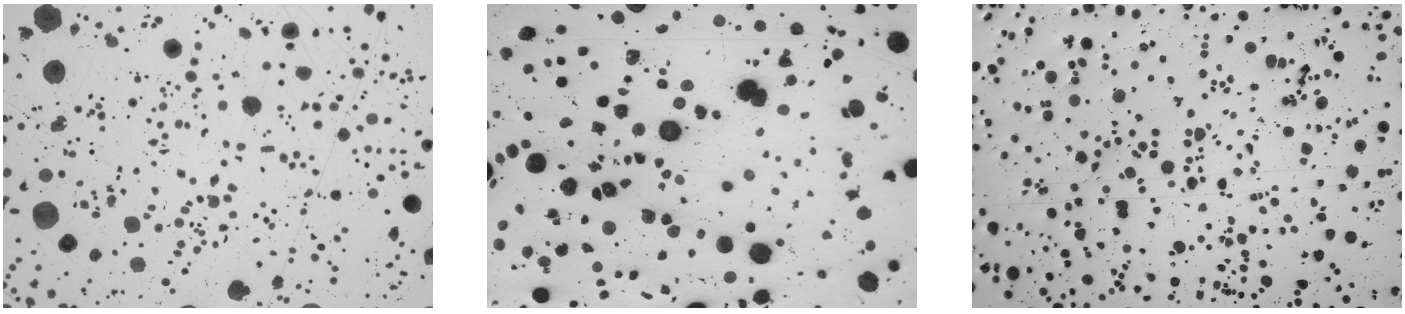


Software Interface

Ductile Iron, also known as ductile cast Iron, Nodular Cast Iron, Spheriodal Graphite Iron & SG Iron is a type of Graphite rich cast Iron. We use image processing algorithms like segmentation using Global thresholding, Boundary detection and Artificial Neural Network. Nodules touching boundaries are excluded in analysis. Artifacts less than 10 microns are excluded.

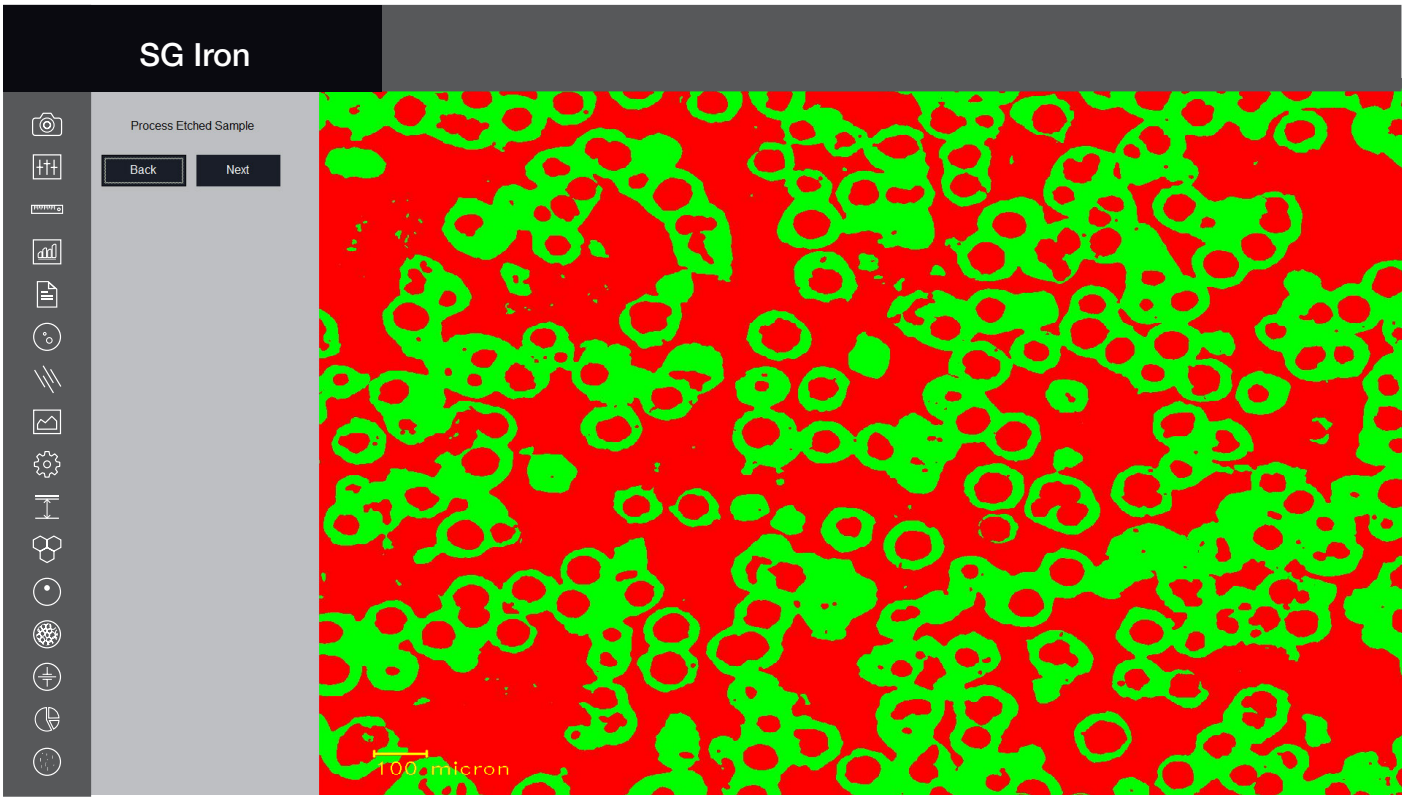
Nodules are identified based on predefined spherodicity. For analysis of SG Iron, we compute quality parameters such as Nodules counts, Nodule Size (designated by Arabic no. 1 to 8), Nodule shape (designated by roman number I to VI).

In the second step, etched samples are analyzed. The software automatically calculates the percentage Graphite, Pearlite once the analysis completed. All data of Non-etched and etched sample is appended into a results spreadsheet directly with in the image analysis software.

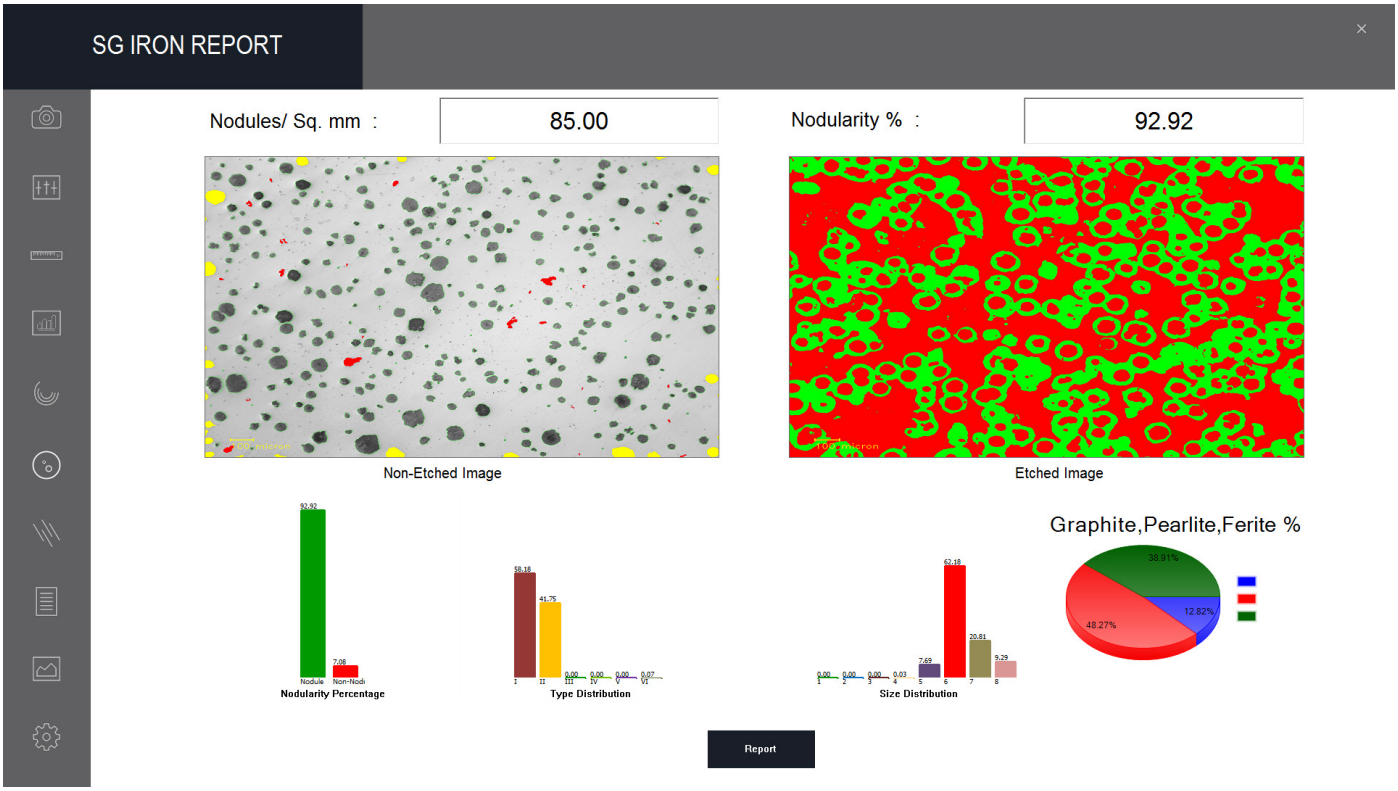


Sample Image

SG Iron (Ductile Iron/Nodularity)

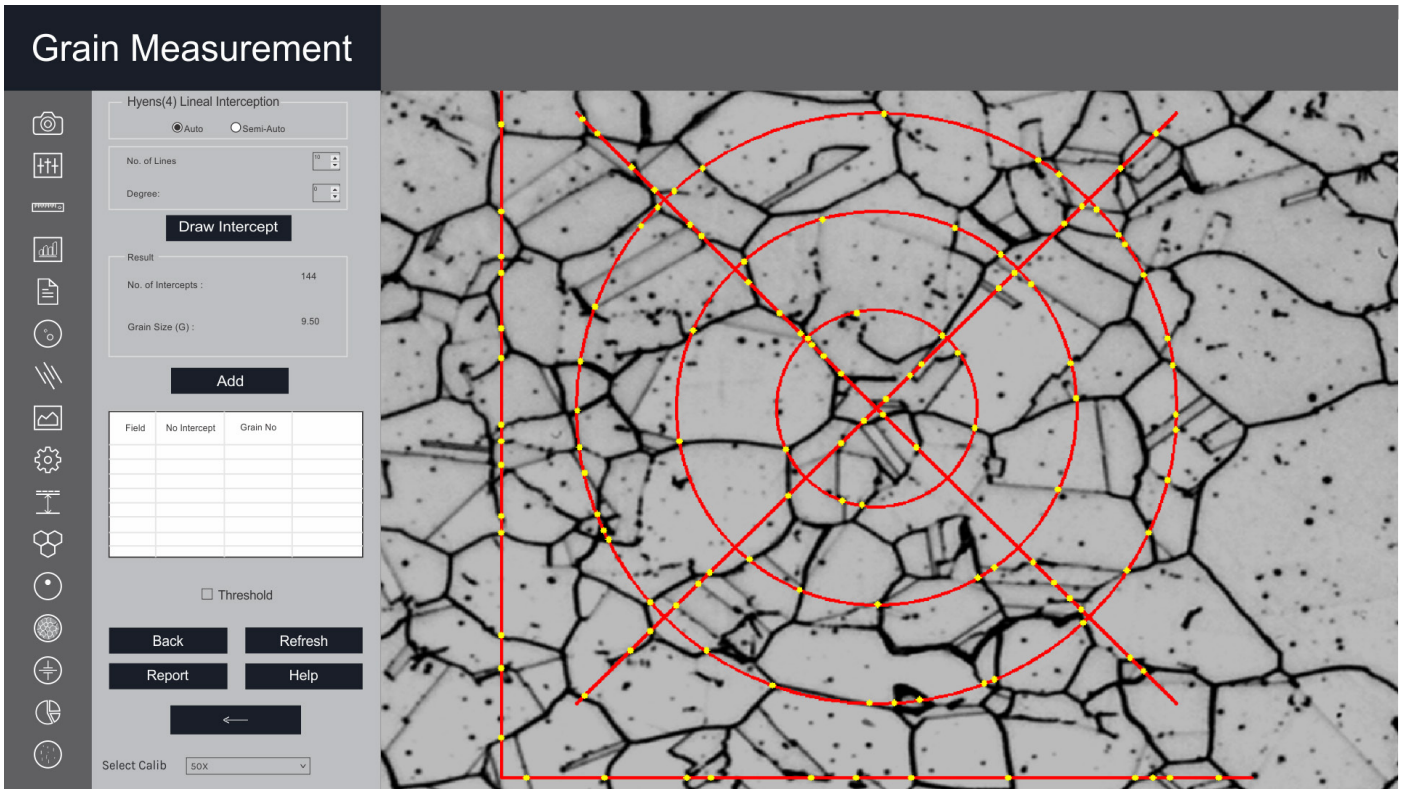


Software Interface



Final Report

Grain Size

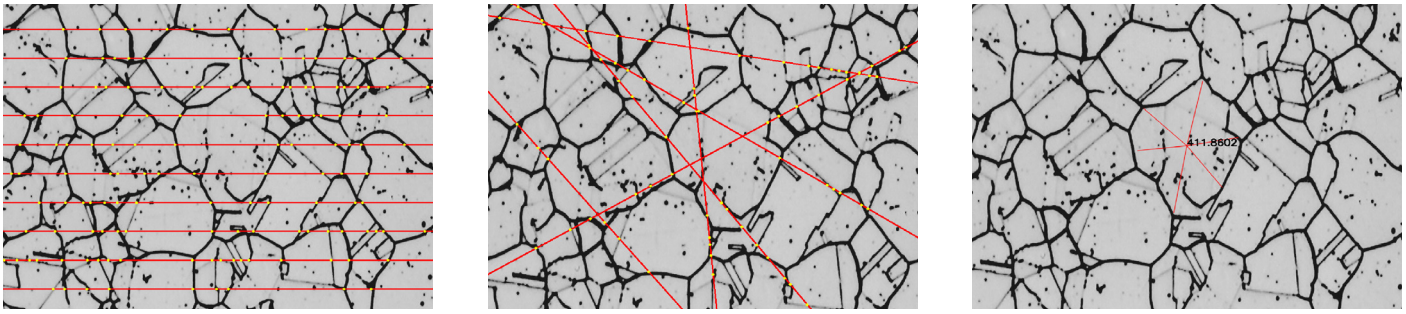


Software Interface

This module can quickly perform automatic, objective and repeatable analysis to determine ferritic & austenitic grain size in steel according to industrial standards. International methods ASTM E-112, E-93, E1181 are applicable.

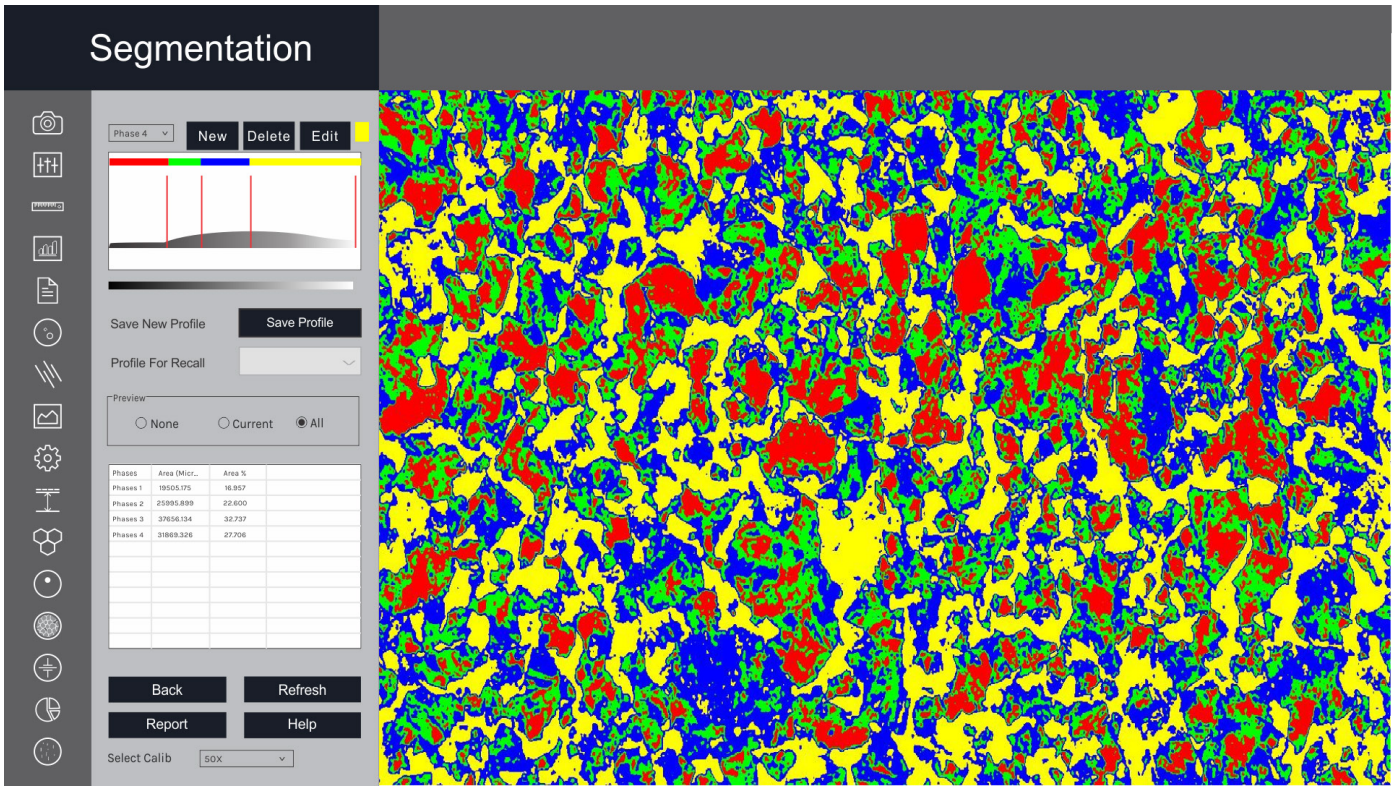
Comprehensive selection of analysis techniques: Lineal intercept method, Abrams three circle method, Snyder & graft method, Comparison method, Random intercept method, Manual grain size

This wizard measures the Grain number, the mean area, mean intercept length, at high speed according to selected method.



Sample Image

Segmentation



Software Interface

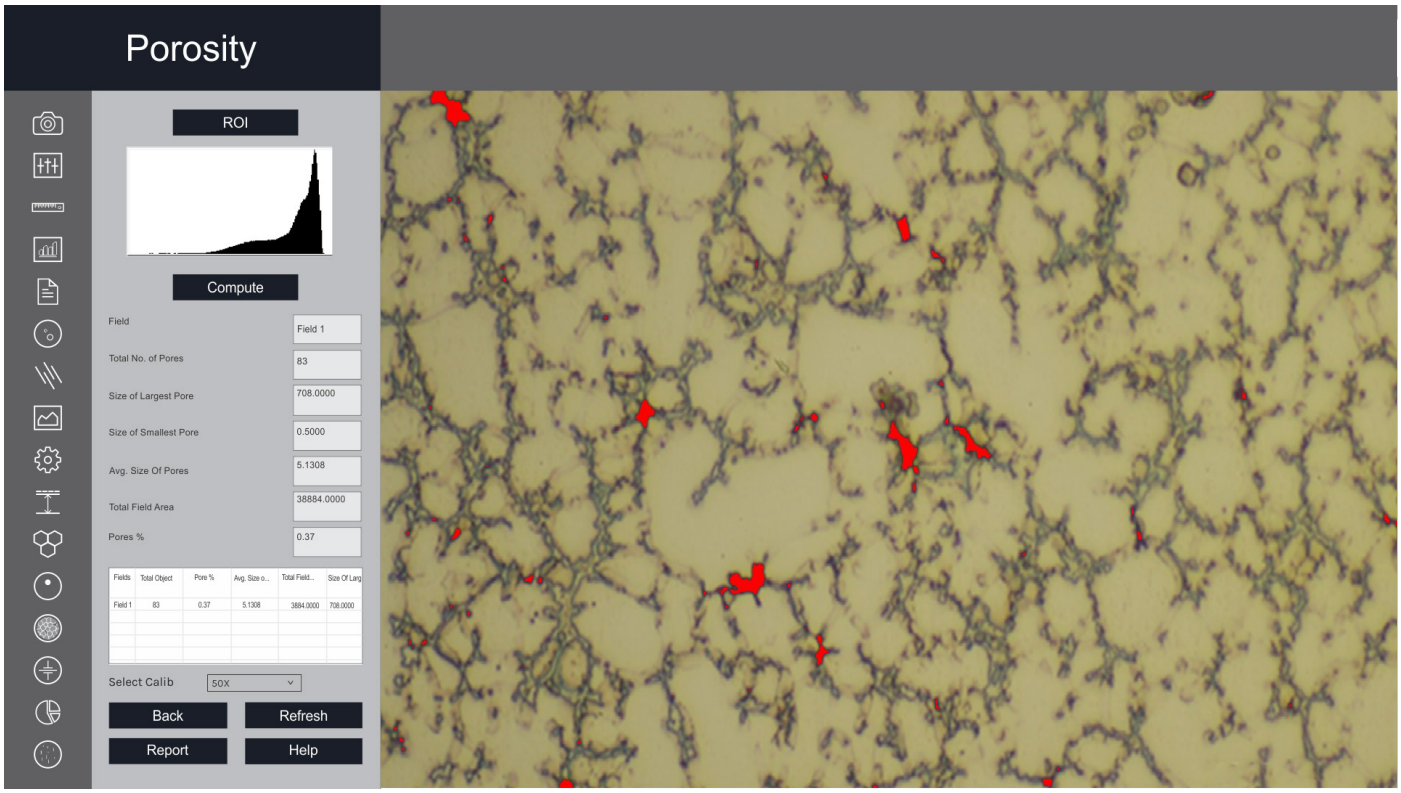
Segmentation is a method of image partitioning on the intensity / grayscale range of its parts. Since a phase is detected and its area is estimated on the basis of its intensity / grayscale, an option for delineating phases from the histogram is also provided. Multiple phases are identified by colored overlays and can be simultaneously displayed in the same field of view.

A histogram for gray scale images is created once you open the Segmentation Module. The X-axis represents intensity scale between 0–255. The Y-axis represents number of pixels in the image. HISTOGRAM: Phase allows the user to designate up to ten different threshold settings to identify material phases and name each of these phases. The color between two lines signifies a particular phase.

INTENSITY: The Gray Intensity range of the current phase gets display continuously in the dialogue box.

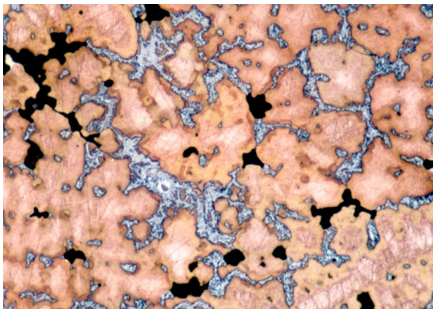
SELECTED PHASE: This property enables the user to know the percentage area of a specific range of intensity just by clicking the mouse. All previous operations have to be deleted and Preview should be on None.

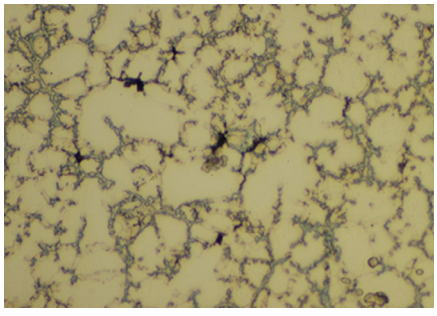
Porosity

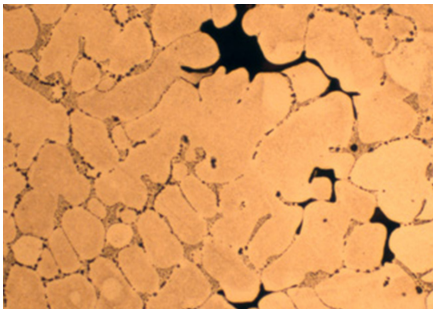


Software Interface

Pores, due to their contrast with the rest of the image. This module allows the user to recognize and measure the porosity in the material according to ASTM B276 Standard. The threshold values are determined using the grayscale scale.







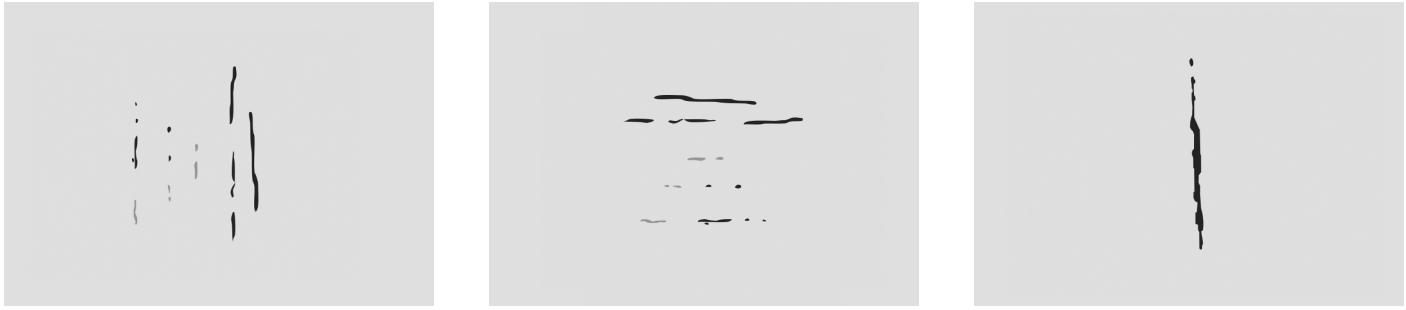
Sample Image

Non Metallic Inclusion

Software Interface

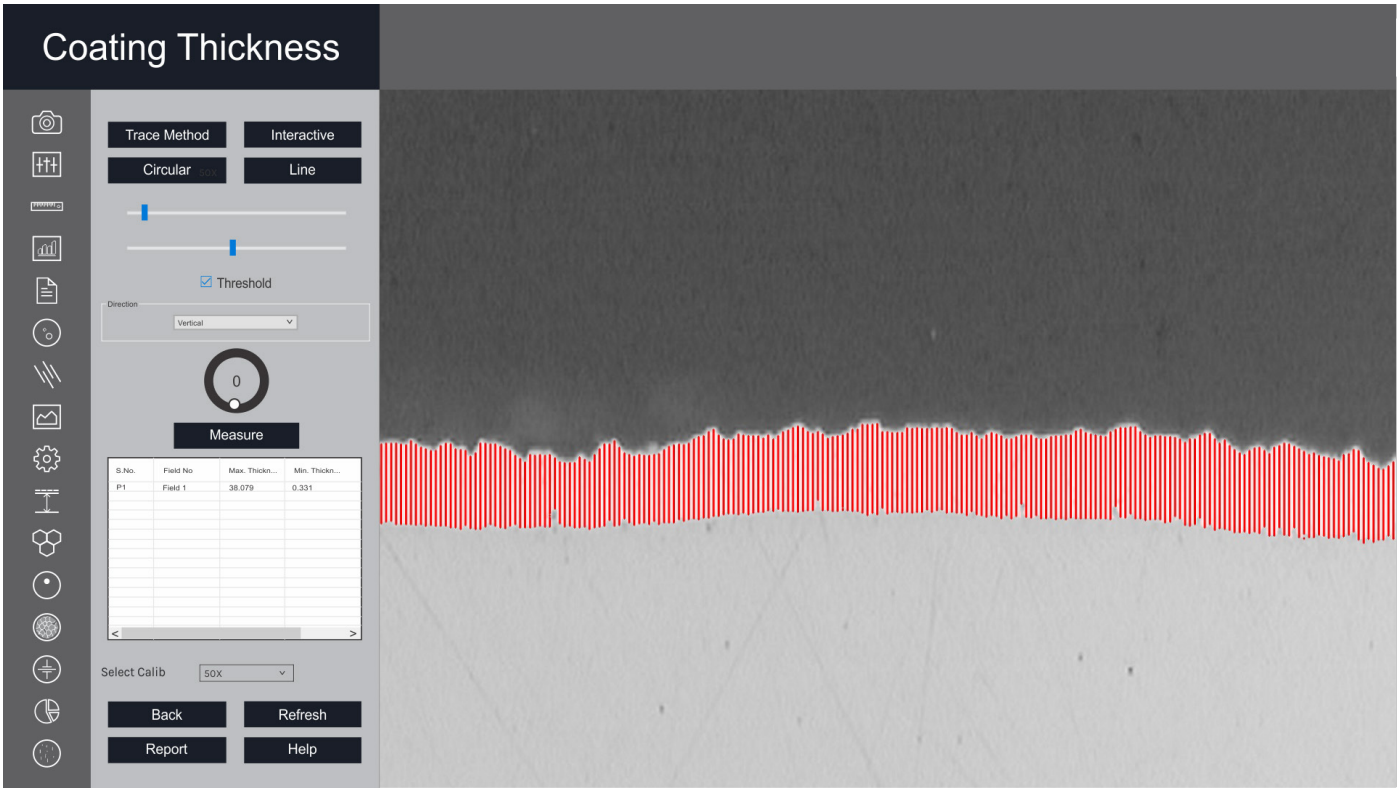
Vision Material software allows to identify 4 types of inclusions:
- Sulfide (A Type)
- Alumina (B Type)
- Silicate (C Type)
- Globular (D Type)

Each type is further divided into Thin and Heavy, based on the width parameters.



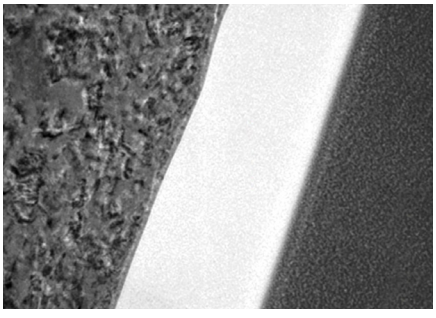
Sample Image

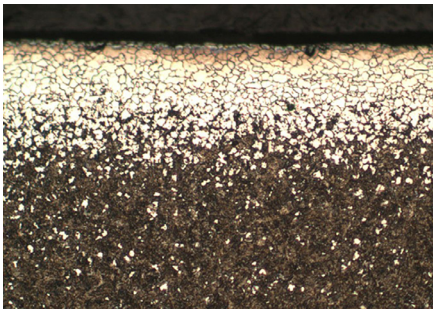
Coating Thickness



Software Interface

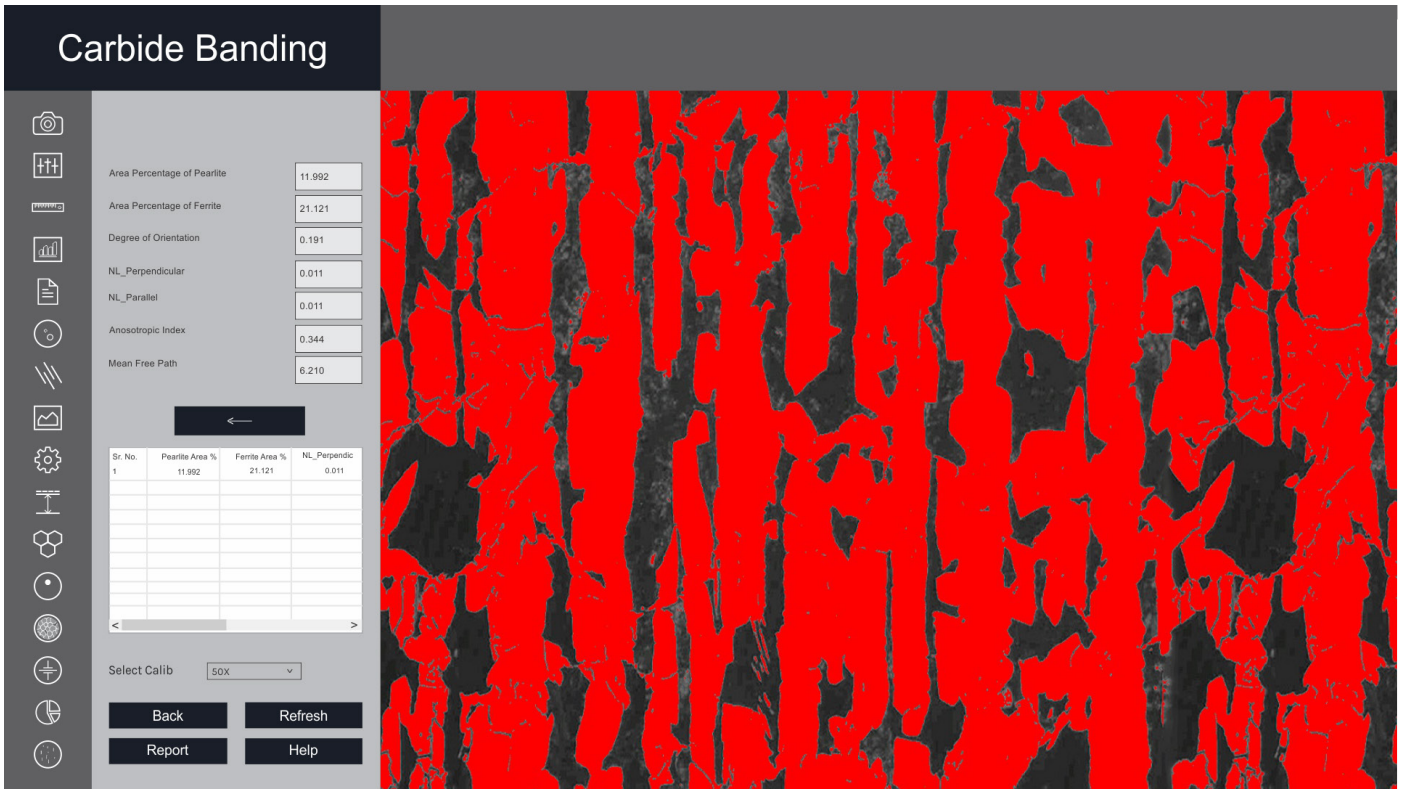
Plating or coating thickness is determined by cross-sectional microscopy method. The specimen is cross—sectioned, mounted, polished and microscopically evaluated for measuring the plating or coating thickness, sometimes, etching of the core base metal may be necessary to accurately measure the coating or plating thickness. The test method covers measurements of the local thickness of metal and oxide coatings by the microscopic examination of cross sections using an optical microscope.





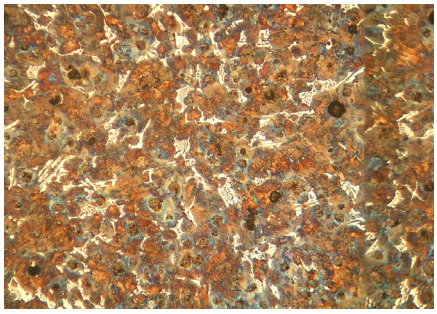
Sample Image

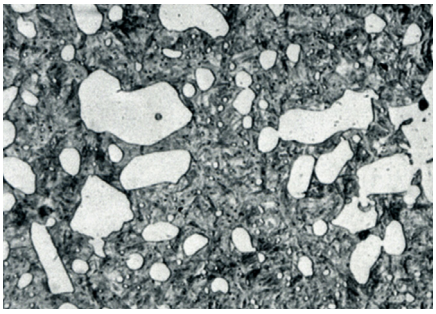
Carbide Banding



Software Interface

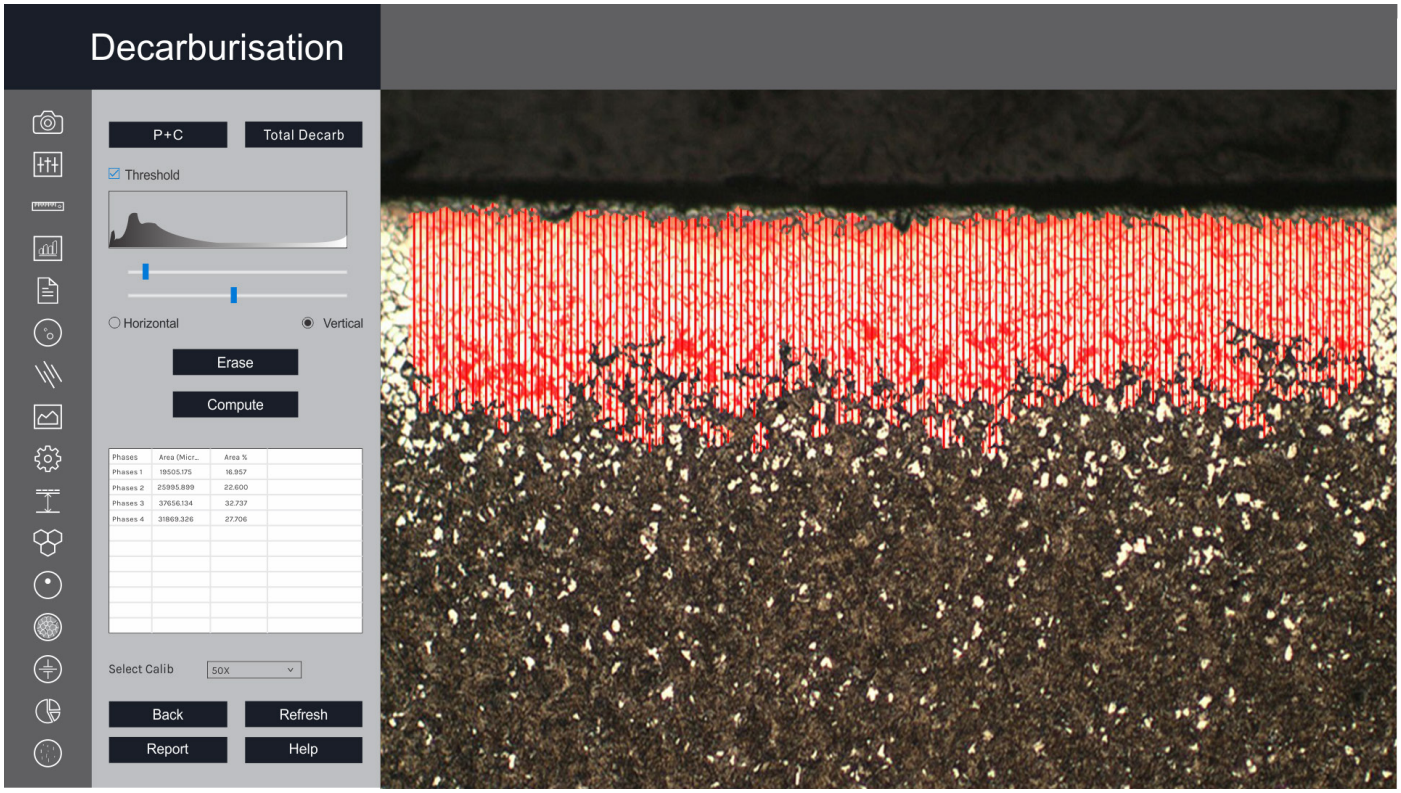
Iron carbide or Cementite is an intermetallic component of iron and Carbon. While iron carbide is present in most steels and iron casts, it is produced as raw material in the iron carbide process, which belongs to the family of alternative iron producing technologies.





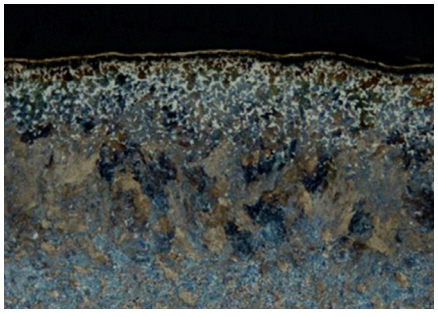
Sample Image

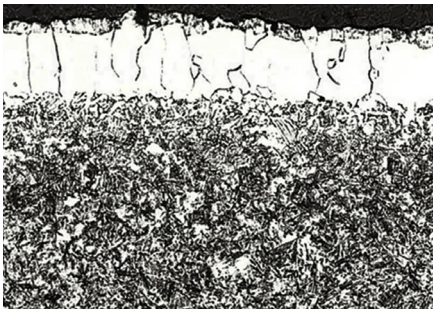
Decarburization

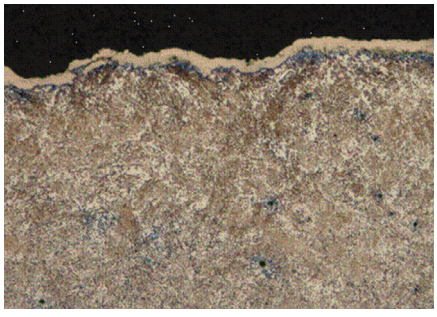


Software Interface

The module is used to determine the depth of Decarburization in structural quality. Partial decarburization is an area where the carbon content is reduced. Total Decarburization is measured in work piece to the limit of the ferritin layer with complete carbon removal, in compliance with ASTM E-1077-91 Standard.

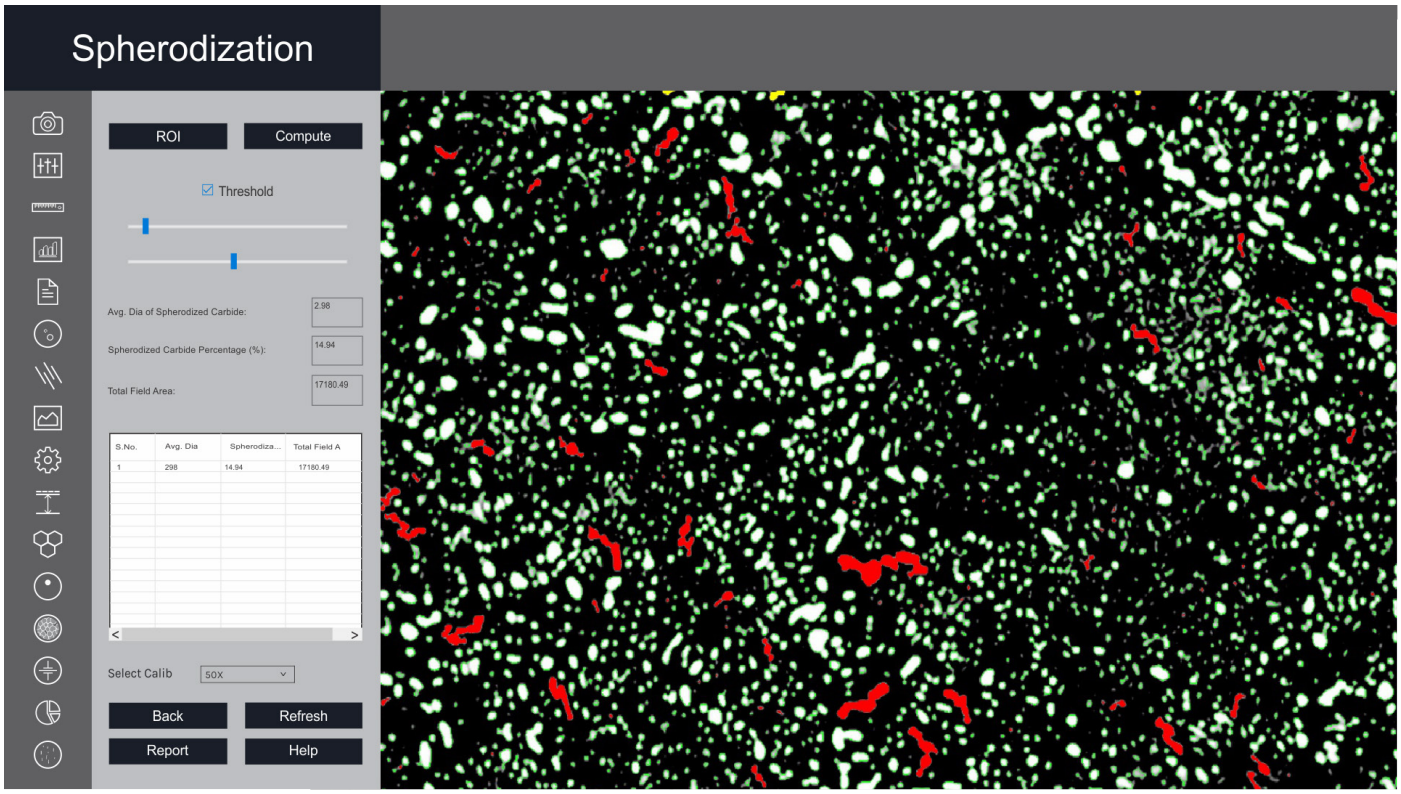






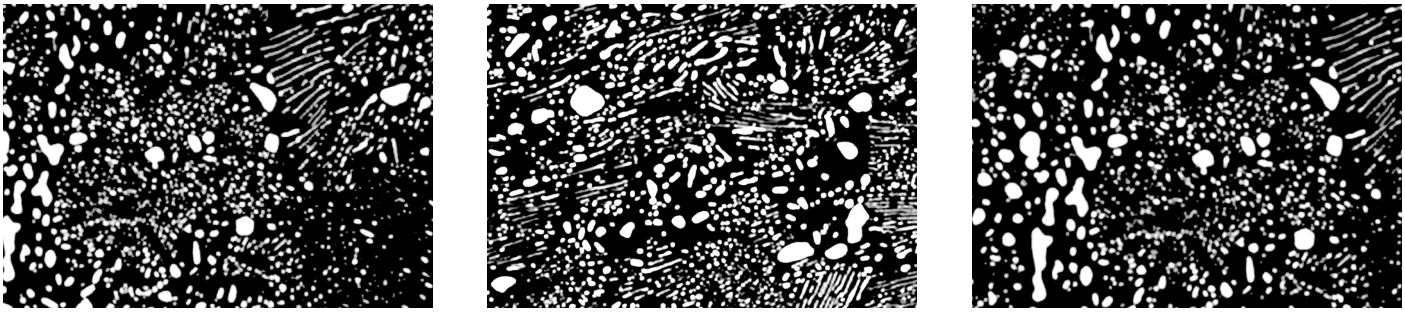
Sample Image

Spherodization



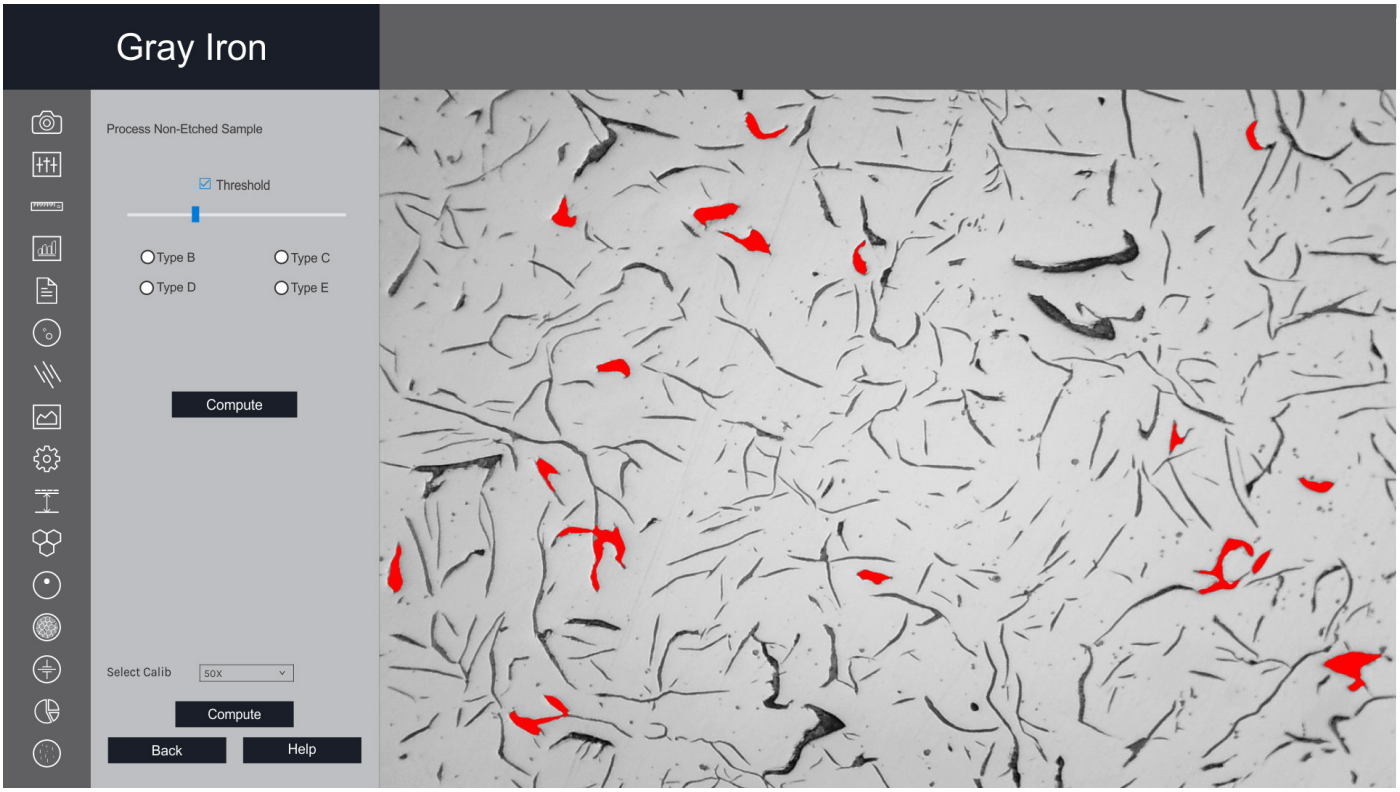
Software Interface

This module is designed to analyze spheroidal graphite (nodules). The nodules are separated from non-nodules on pre-defined spheroidicity. Nodules acquire blue color and non-nodule get red color. Re- port includes: form (designated from I to VI), size (designated by 1 to 8), number of nodules/mm^2.



Sample Image

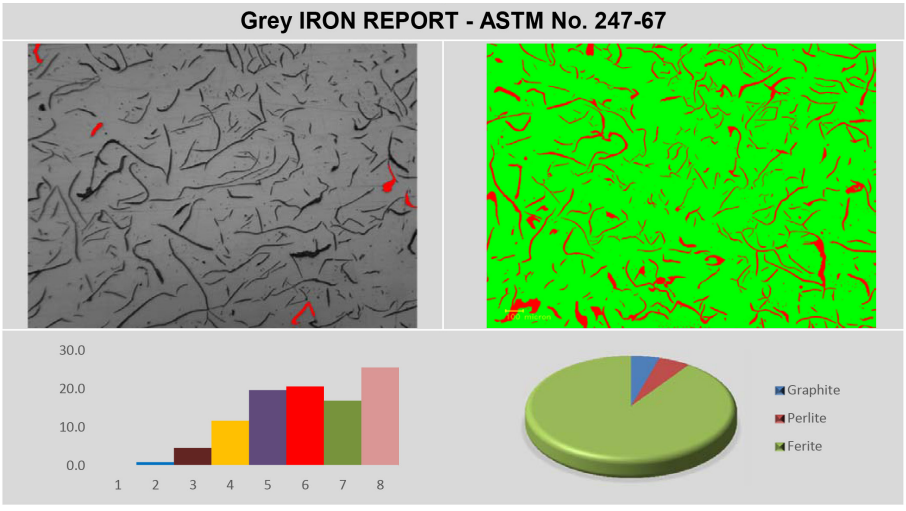
Gray Iron/Graphite Flakes



Software Interface

Gray Iron or Gray Cast Iron is the graphite flakes structure that is created during the cooling process. The Gray iron analysis module performs image analysis based on ASTM A-247-67 and ISO 945-1.

The module categorizes graphite flakes by types A, B, C, D & E in microstructure sample based on orientation. The percentage of pearlite is calculated by excluding the B-type graphite. The etched sample contains matrices of perlite, ferrite, and graphite. Report is generated with specific international standards chosen by the user.



Notes

Notes

Vision Material

We reserve the right to change specification without notice.

WEST MEDICA

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