

MATERIAL PLUS

Pace Technologies Product

OPERATING MANUAL

About MATERIAL PLUS

It is new generation image analysis software, meant for scientists to do analysis in the simplest way. The system is flexible and independent to adopt any capture cards, camera and microscope.

It can handle both gray monochrome (8bit) and color (24 bit) images. Multiple images of any size can be opened on the screen for analysis or comparison. The software supports most common like BMP, JPEG, TIFF, PNG, GIF and PSD. Live images also can be observed and capture on the same platform. Since the system is made in Windows environment, graphs and charts display on the monitor can be quickly transferred into other Windows based programs like MS-Word, MS-Excel or any other commercial Windows based software for using reports and presentation.



SETTINGS

The Module SETTING 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 report format,

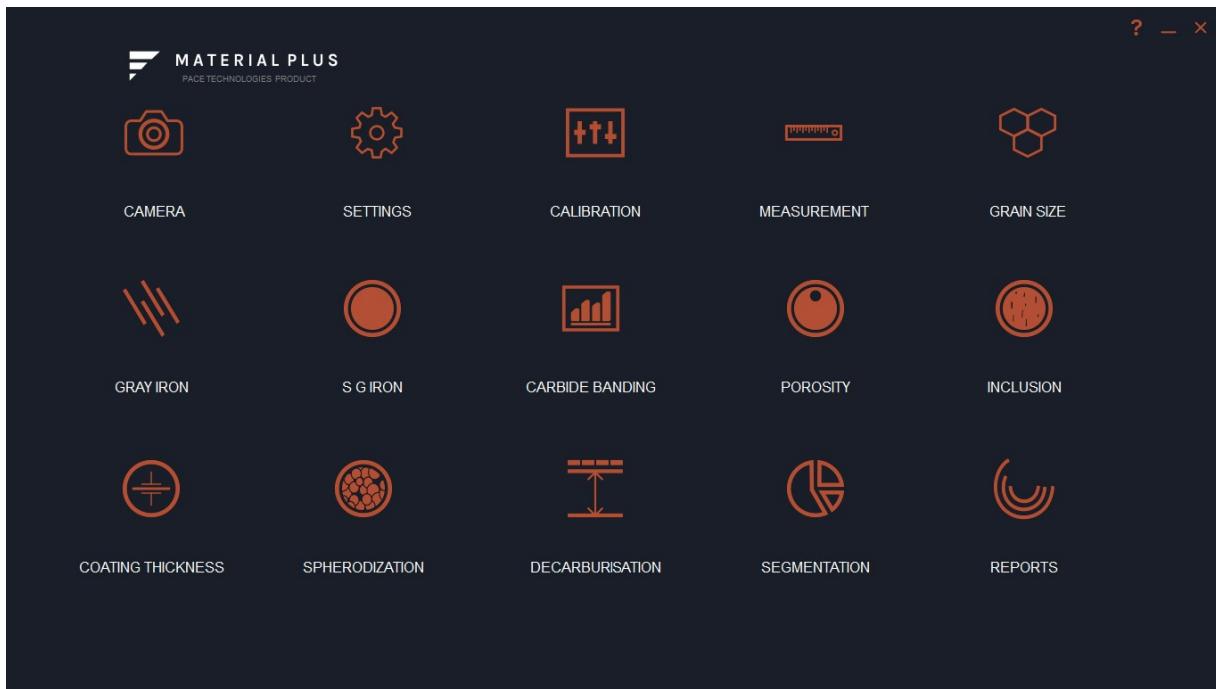
setting of various parameter on printed image in report. Once all settings are done, you need one button click for all Analysis. All settings are stored till you change them in future. Do not change them in routine, it is not necessary.

1st step



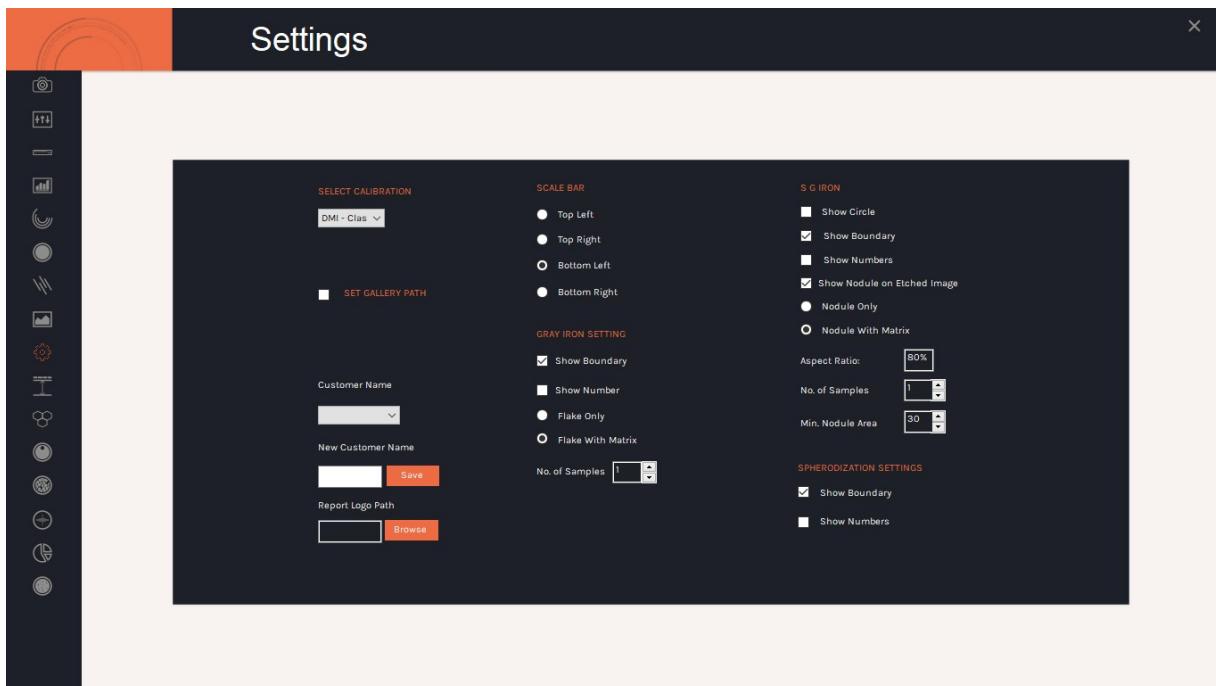
Open a window Click on **Material Plus** Icon

2nd step



This is the first look of UI of Material Plus

3rd step



If click on settings icon, new UI will open.

The platform help you to decide the shortcuts of your working. If you choose any of radio button correctly, your working will have no scope for mistake and software will be one button working.

1. REPORT TYPE

Options are available to get report either in ASTM or ISO formats. Choose any of them, this will be automatically be in default setting till you modify in future. Options are available to get report either in ASTM or ISO formats. Choose any of them, this will be automatically be in default setting till you modify in future.

2. SET DEFAULT USE

Our software give a choice to work either on live display images or you can capture first all images and work on them later.

- It means you want to work on live images.
- This is for working on stored / captured images.

3. SELECT CALIBRATION

Choose calibration which are available in stored data. Usually we do all work on 100X objective in Cast Iron.

4. SET 100 UN LINE

If you need line on image choose the fourth options available

5. SET GREY IRON SETTING

- Show boundary. Click it you want to see contour around the graphite.
- Show Number. Click this radio button it you want to have display of numbers on graphites.

6. SET GALLERY PATH

Gallery path is set by default. But if you need to change this path, you can do necessary changes. Through Gallery path is set by default but if you need to change this path, you can do it.

7. SG Iron

Various options are available to show different parameters on Nodules. Choose it if you require otherwise contour is created by default.

8. ASPECT RATIO

This is usually fixed. But change only if required.

8.1 TWO TEMPLATES ARE AVAILABLE

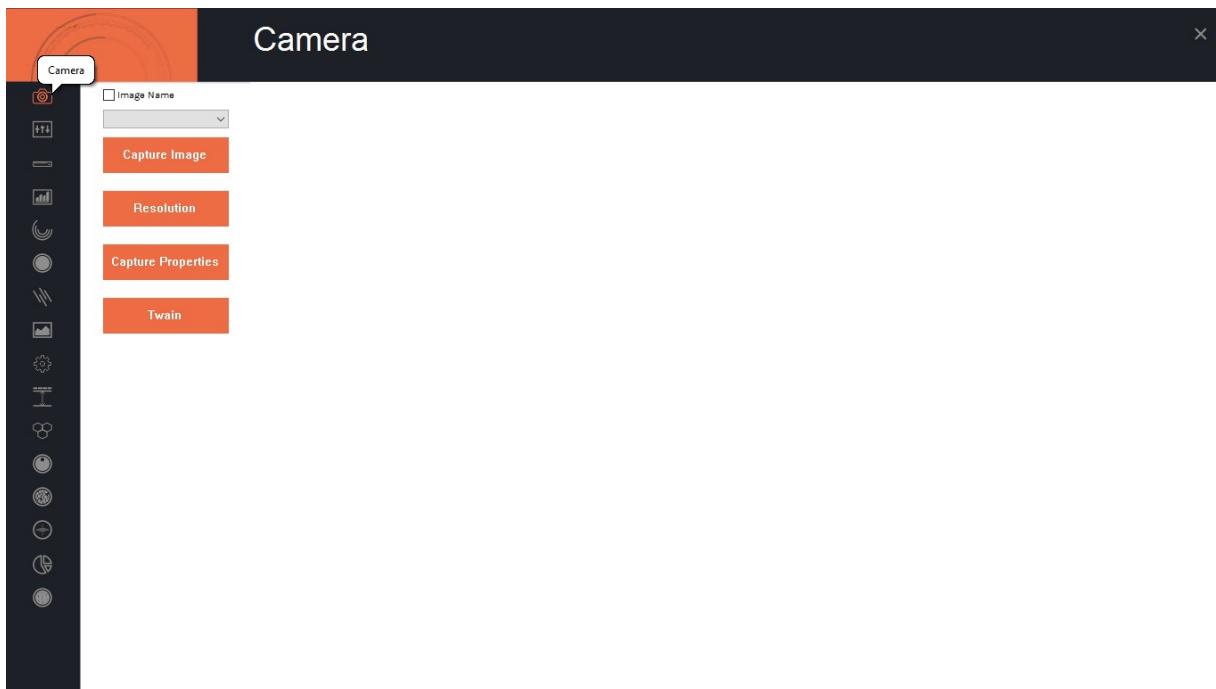
- Report with chemical composition and physical analysis properties composition.
- Report without chemical & physical properties.



CAMERA

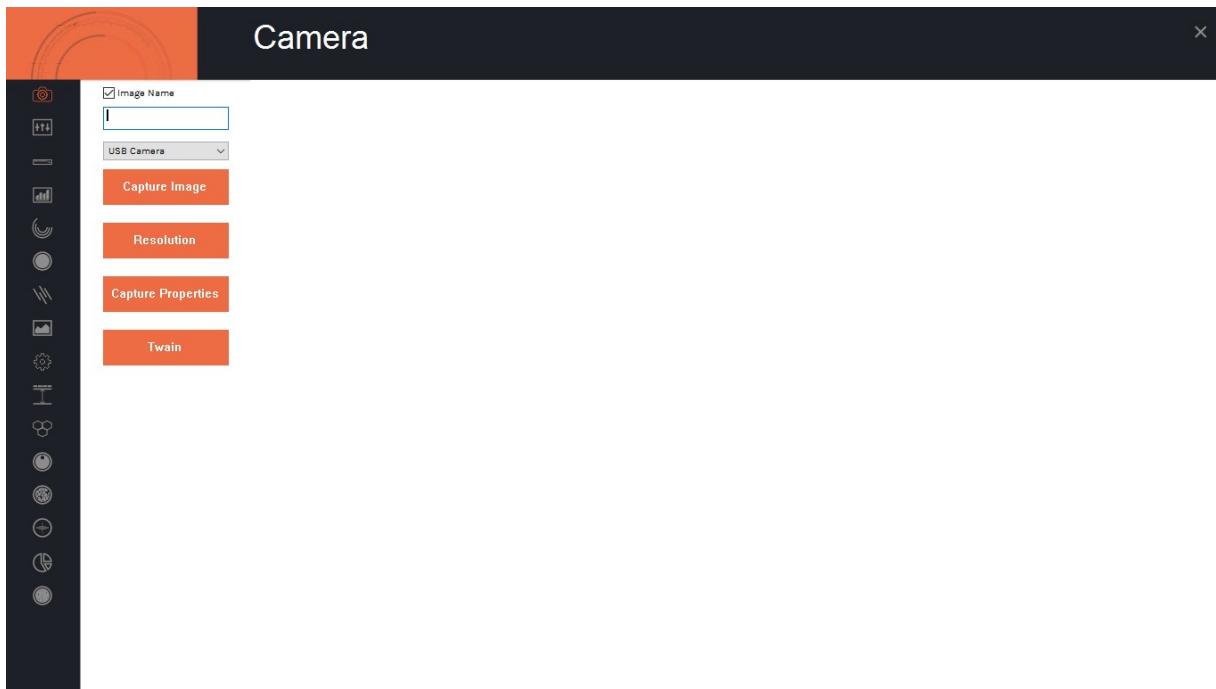
One can select different display/capture sizes along with other setting like white balance, brightness, contrast, Hue, Saturation can be changed on live displayed image. Once all setting are done, image can be captured in appropriate folder for appropriate analysis.

1st step



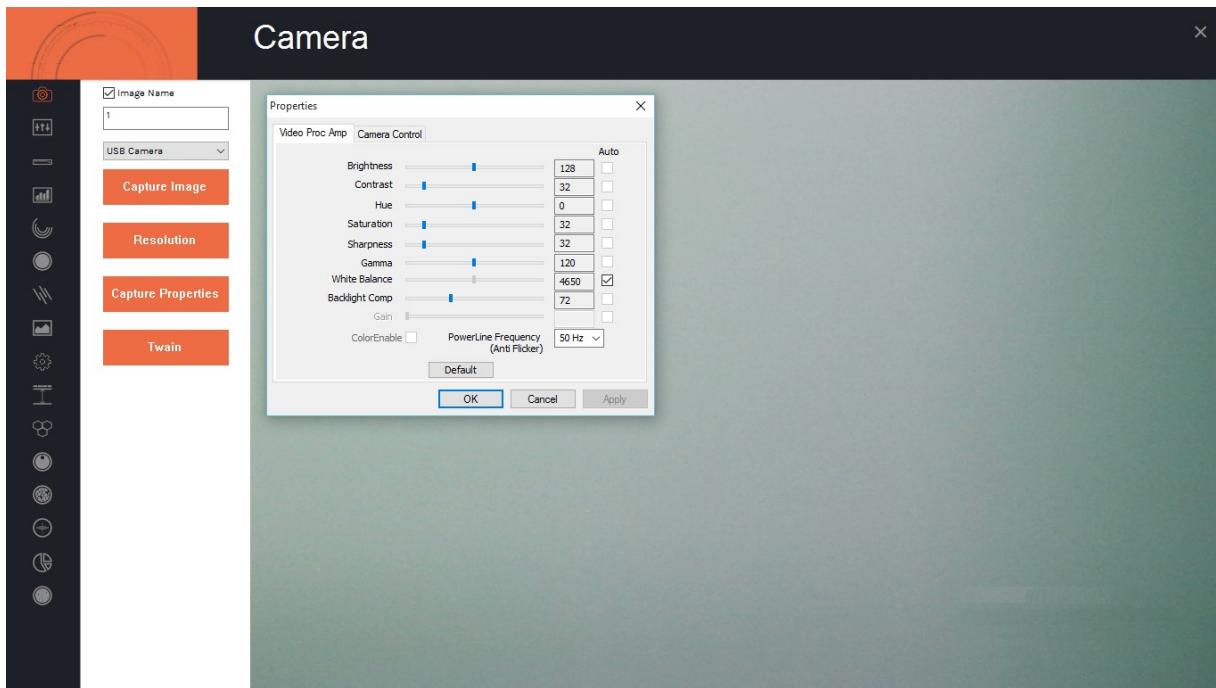
This is the dialogue box to view camera live and capture the sample image for analysis. Click on the combo box and choose option to start camera.

2nd step



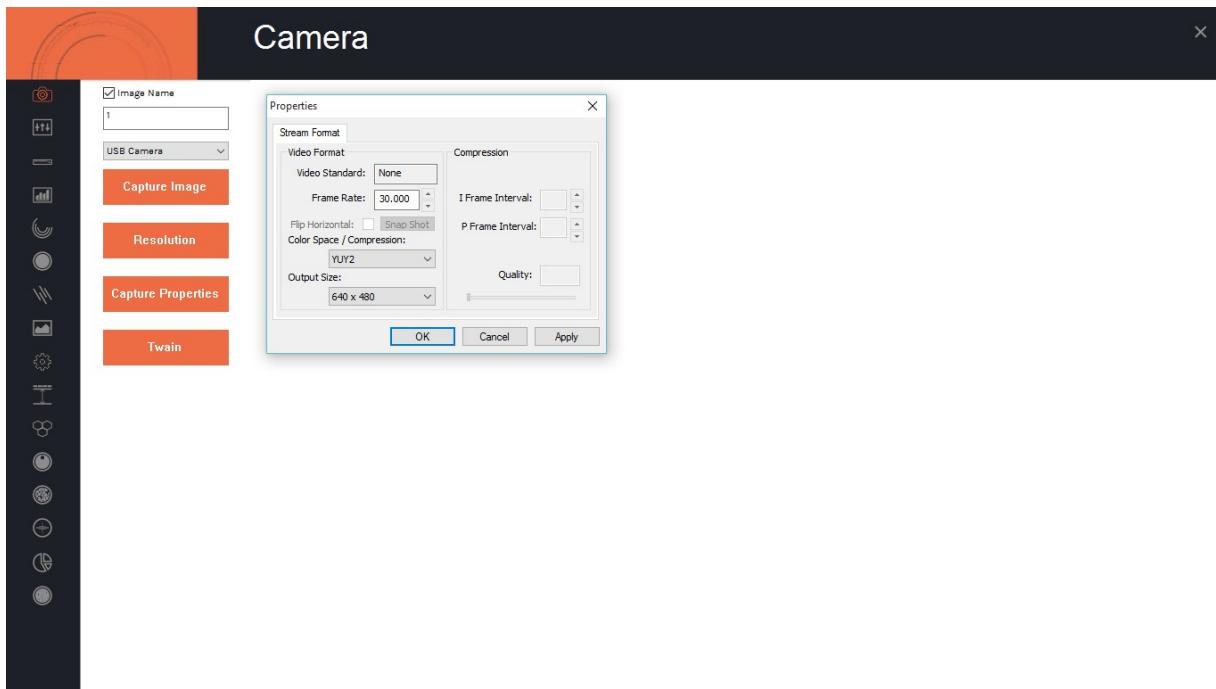
Click on combo box to select a camera and also check Image Name.

3rd step



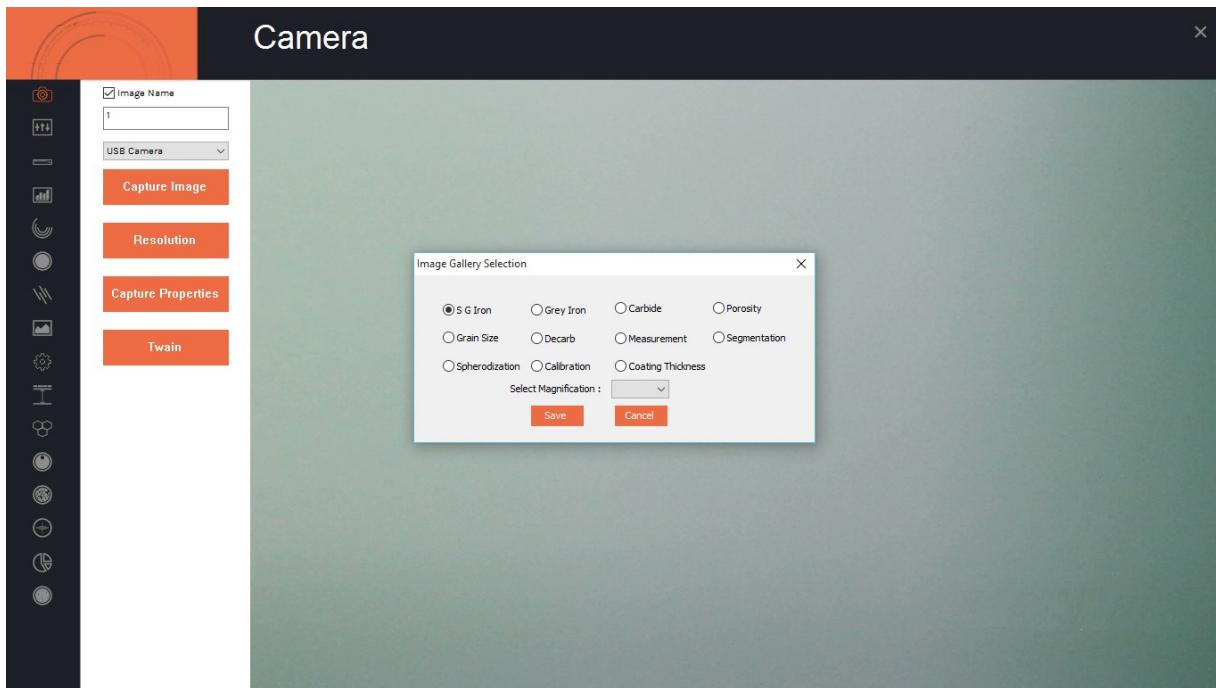
Click on Capture properties and adjust them as required.

4th step



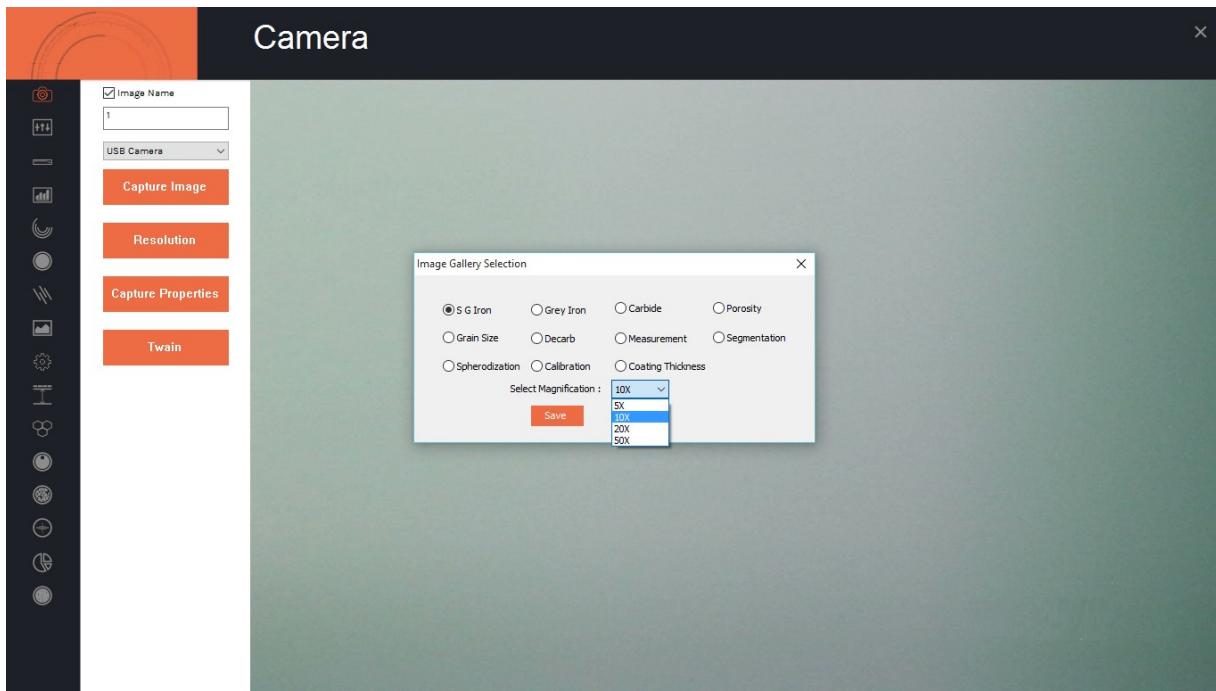
Click on Resolution and adjust it.

5th step



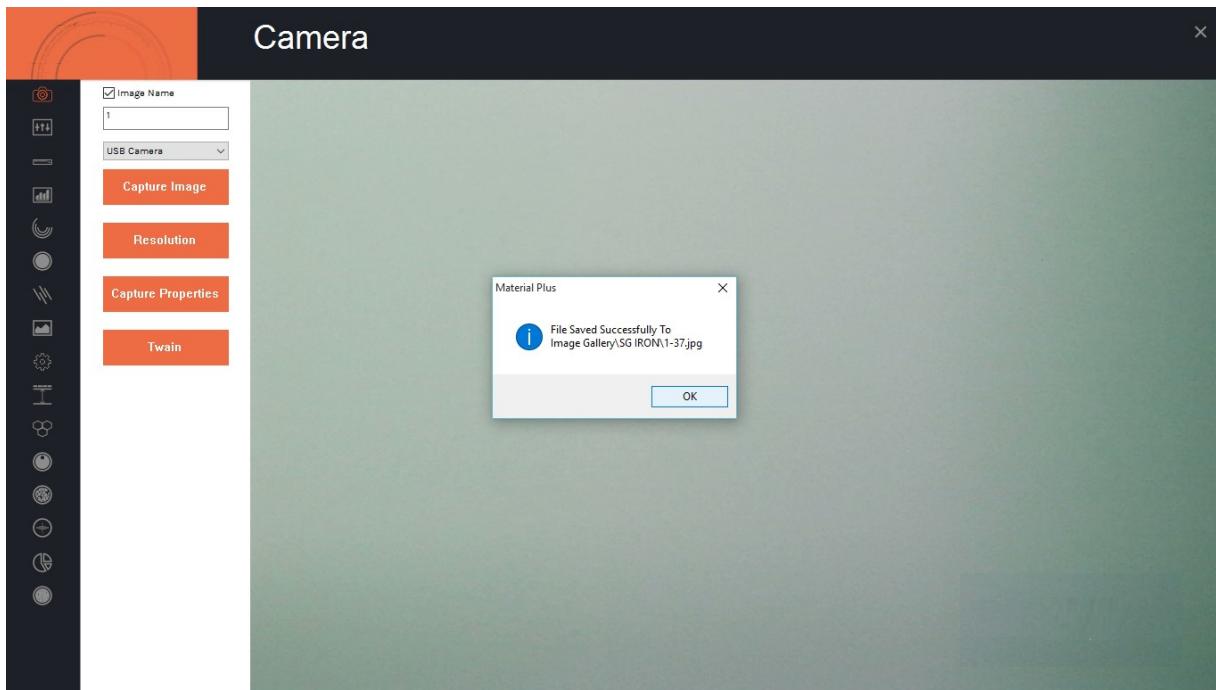
Choose folder where capture image has to be stored.

6th step



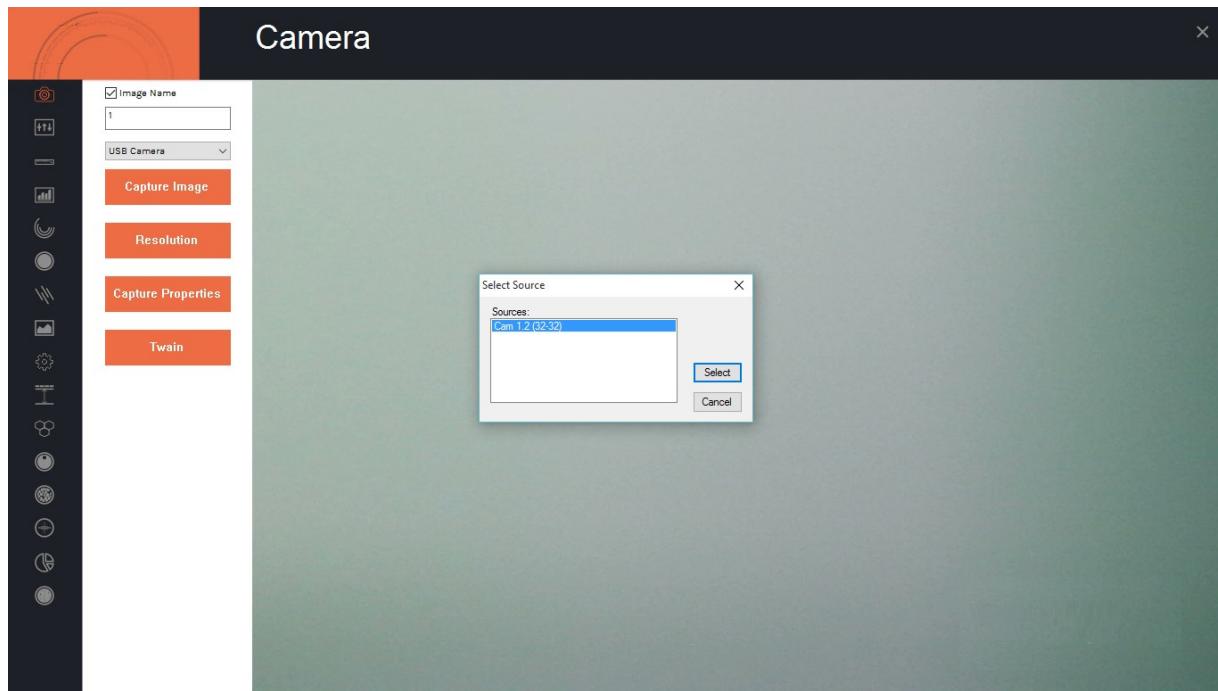
Select magnification value.

7th step



Click OK this will save image in the given folder.

8th step

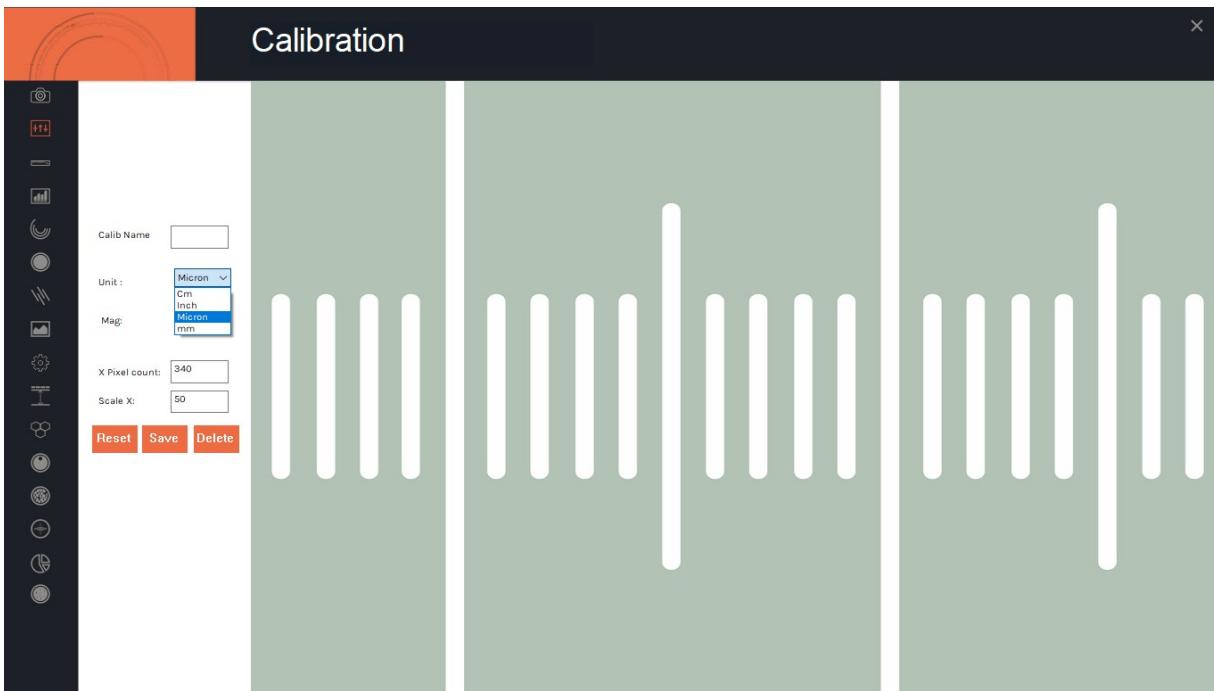


Click on Twain and select a camera.



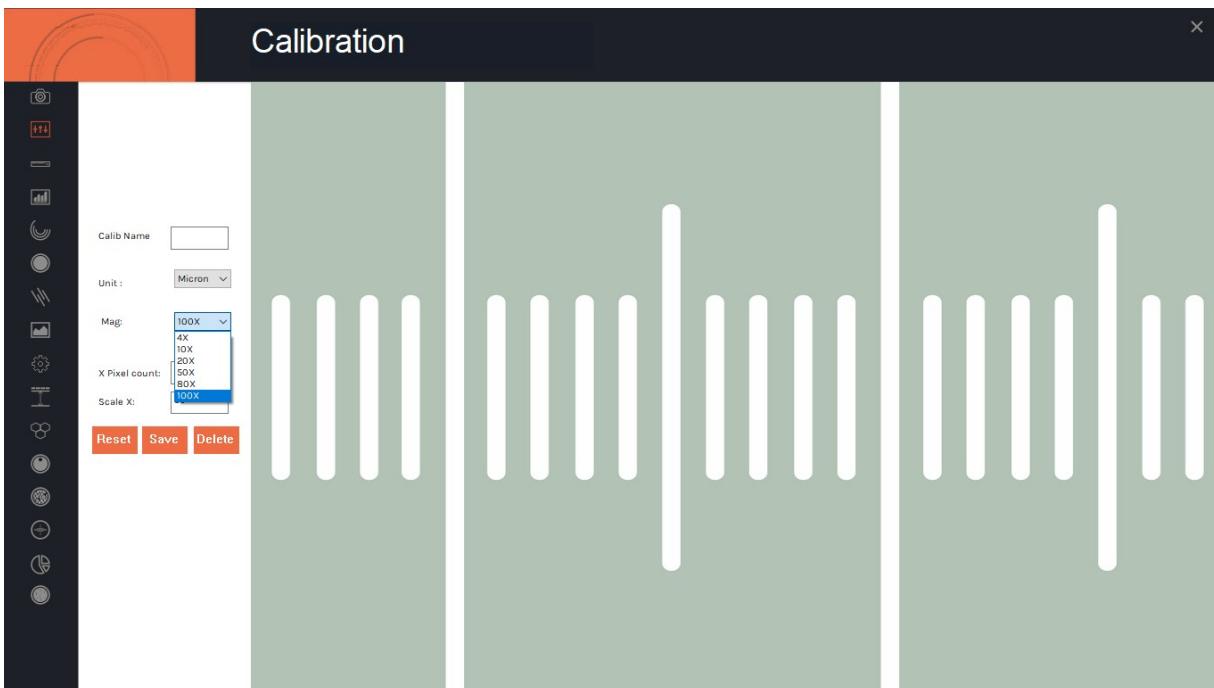
Calibration should be performed on all the objectives of the microscope, where Digital Camera is installed. Calibration should be performed only when all hardwares are finally fixed. In case of readjustments or replacement of any particular calibration can be done again.

1st step



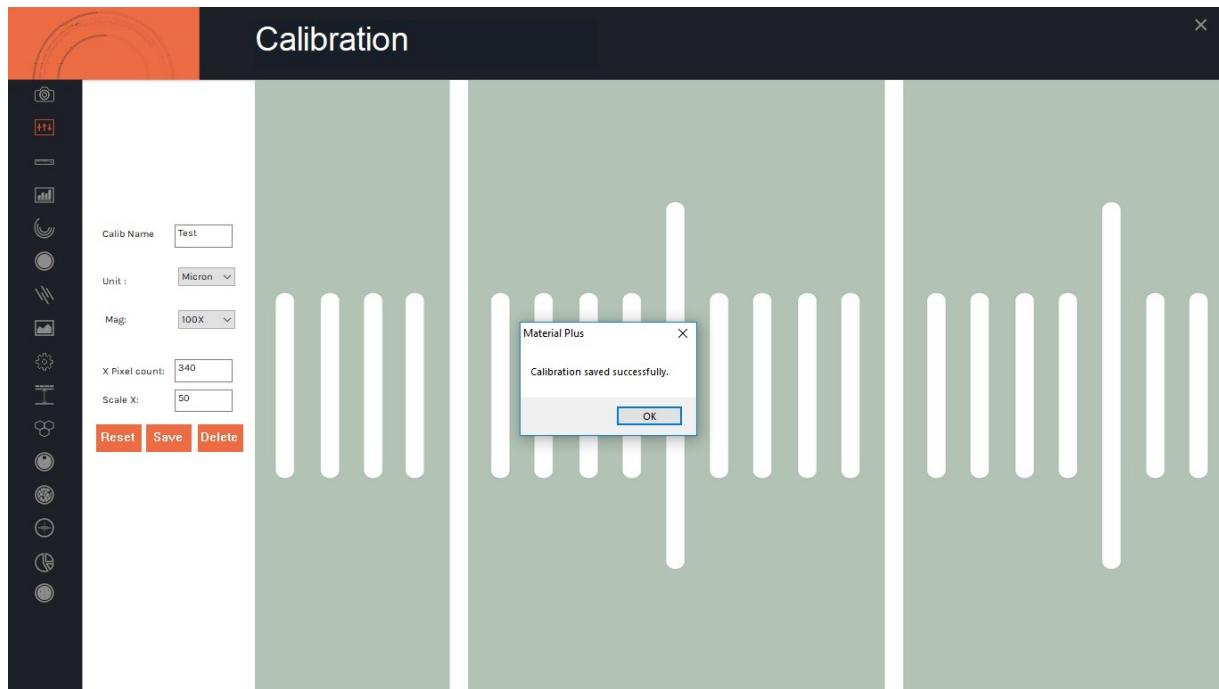
This is the view of calibration module. Provide a name to your calibration and select a measurement unit.

2nd step



Choose a magnification. Usually all magnification are done in 100X .

3rd step



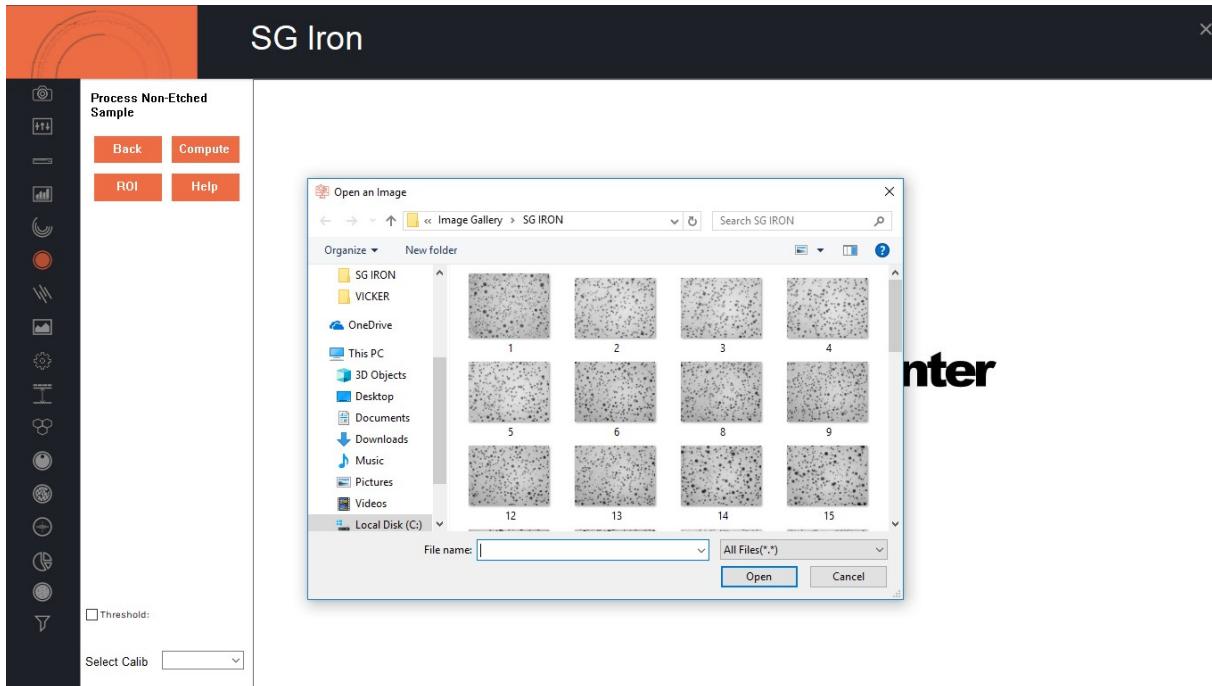
Click on Ok button to save the Calibration.



SG IRON

SG Cast Iron or Nodules are also called Ductile Iron or Spheroidal Graphite Iron. Nodules Cast Iron from graphite during Solidification. Ductile Iron Analysis module provides a chance to analyze an image on the basis of ASTM A-247-67, ISO- 945-1 & JIS G5504.

1st step



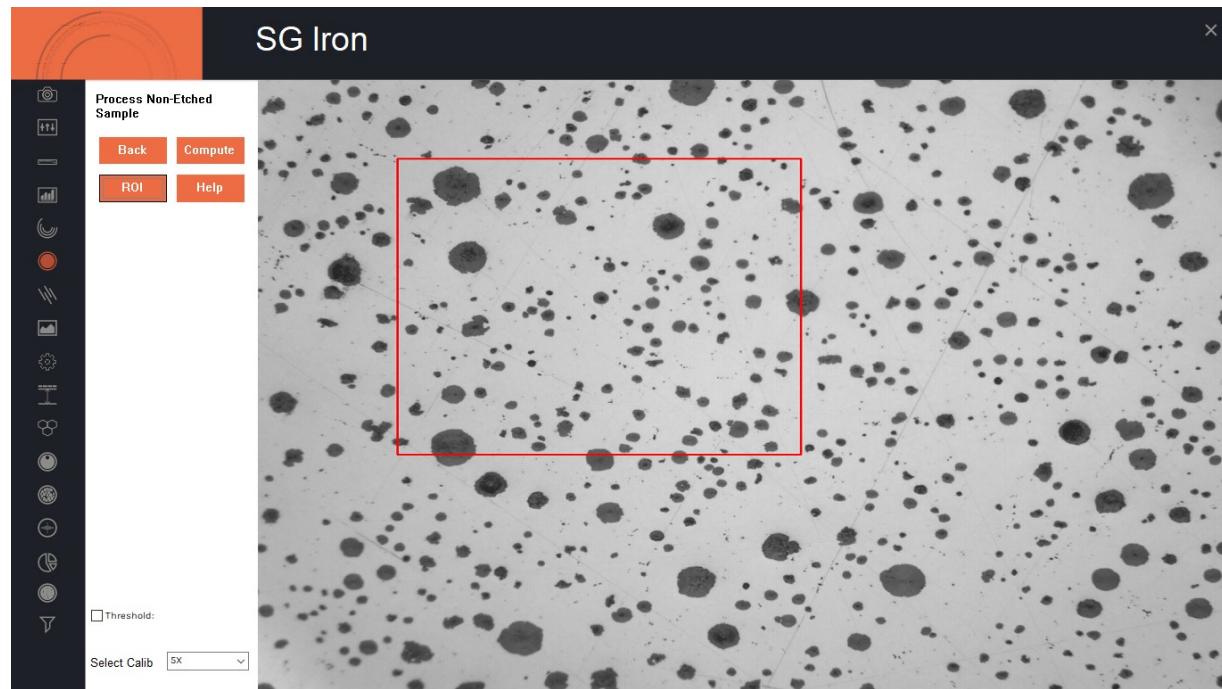
Load an appropriate image which you have to analyse.

2nd step



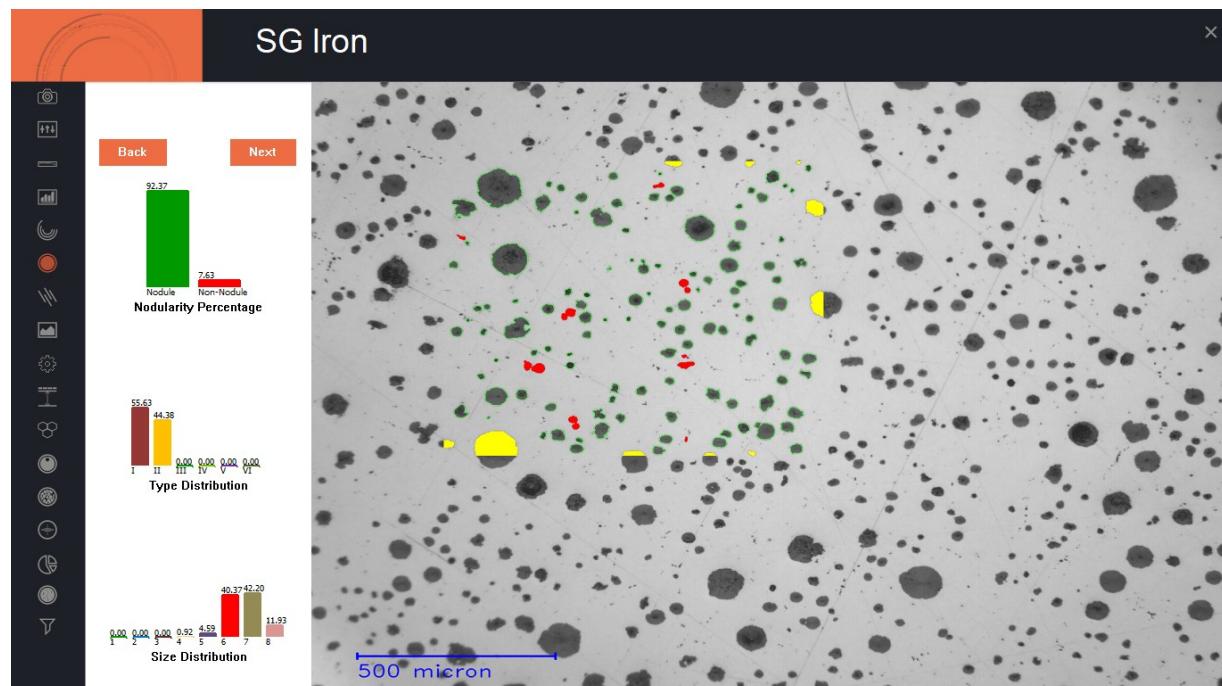
First set a threshold value by Clicking on threshold and adjust it through scroll bar till all nodules are selected properly as shown as above.

3rd step



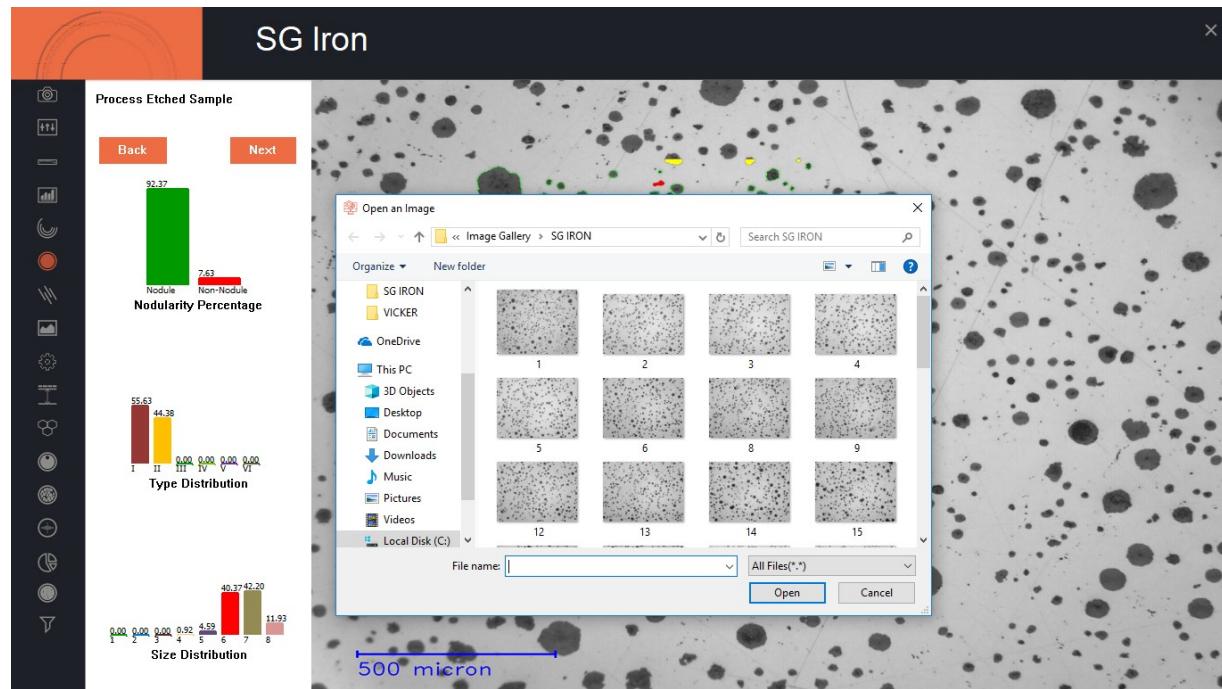
Click on ROI and select a part on image then click on Compute button for analysis. In case you want to analyse whole image then directly click on Compute button.

4th step



Click on Next button for analysis.

5th step



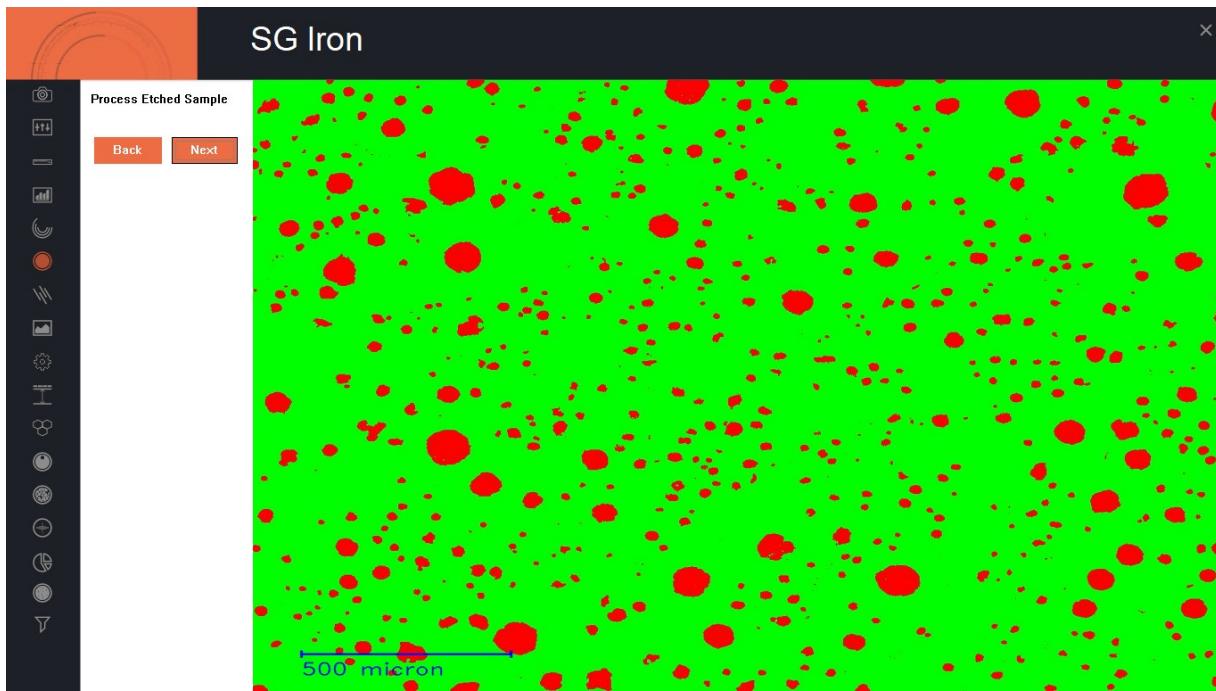
This is next dialogue box to choose etched image of same sample.

6th step



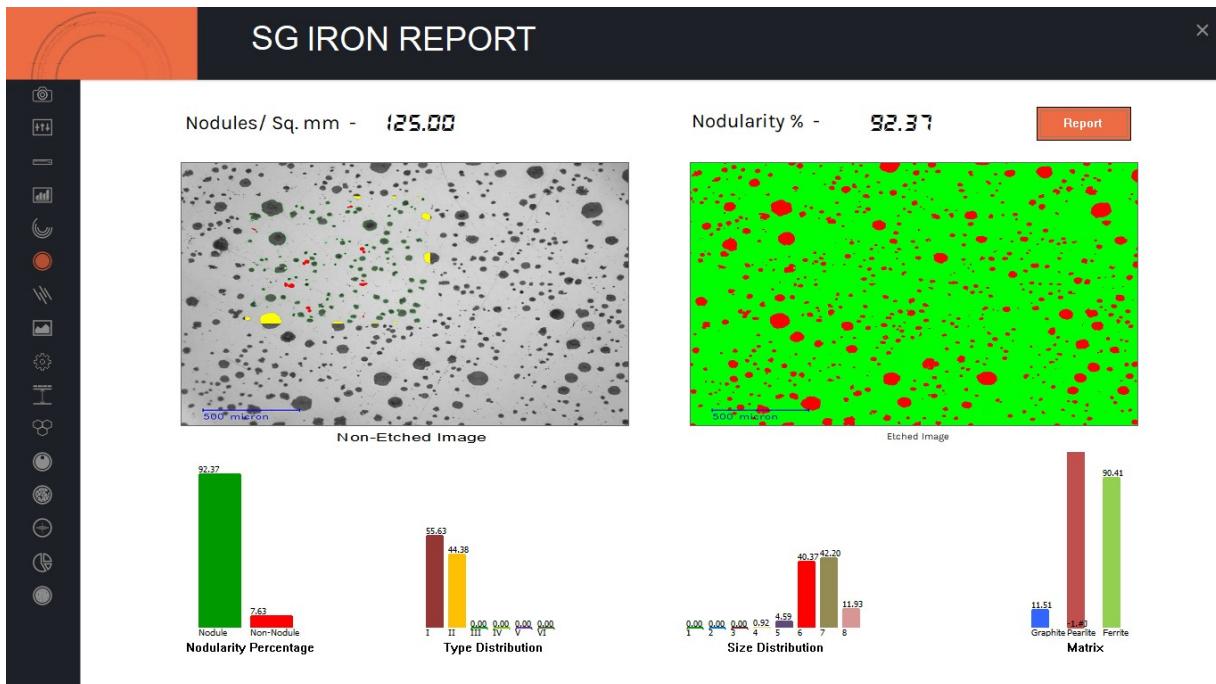
Again check the threshold value and then Click on Compute button to analyze further for ferrite, pearlite and graphite .

7th step



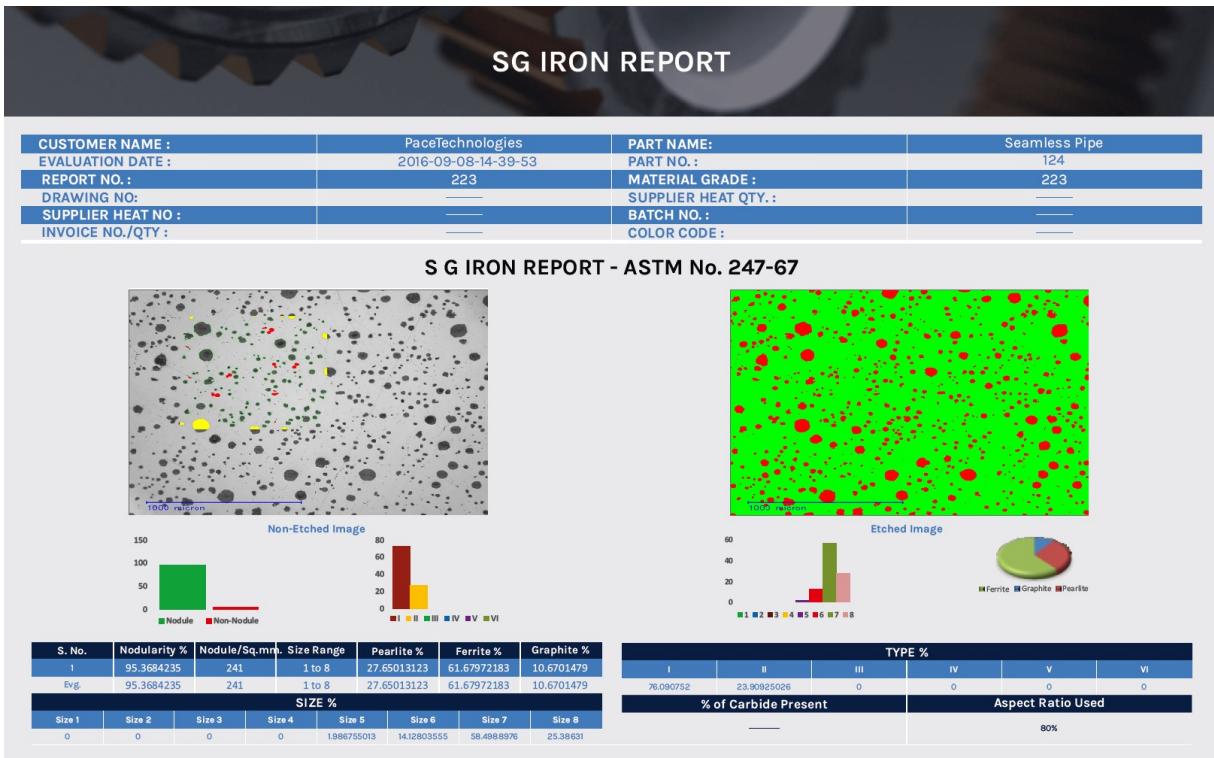
Ferrite, Pearlite and Graphite analysis is complete. Click on **Next** button to see all results.

8th step



Result are available for view. Click on **Report** button to take report on excel.

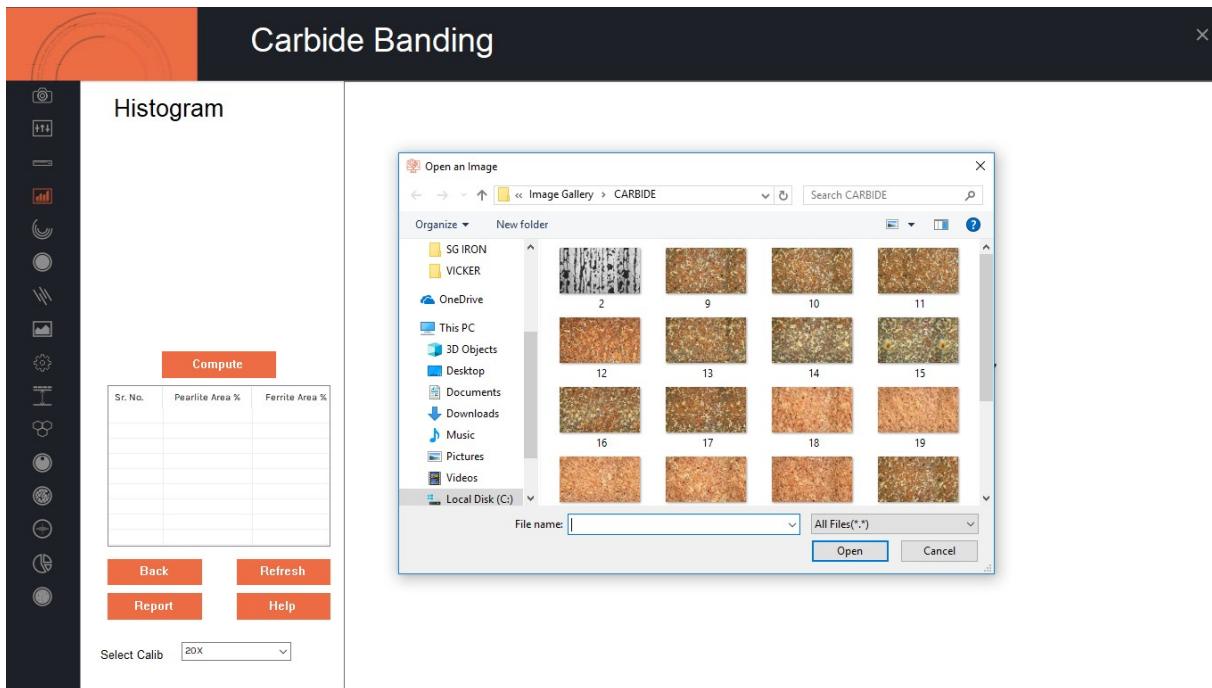
Result are available in excel in A-4 size



CARBIDE

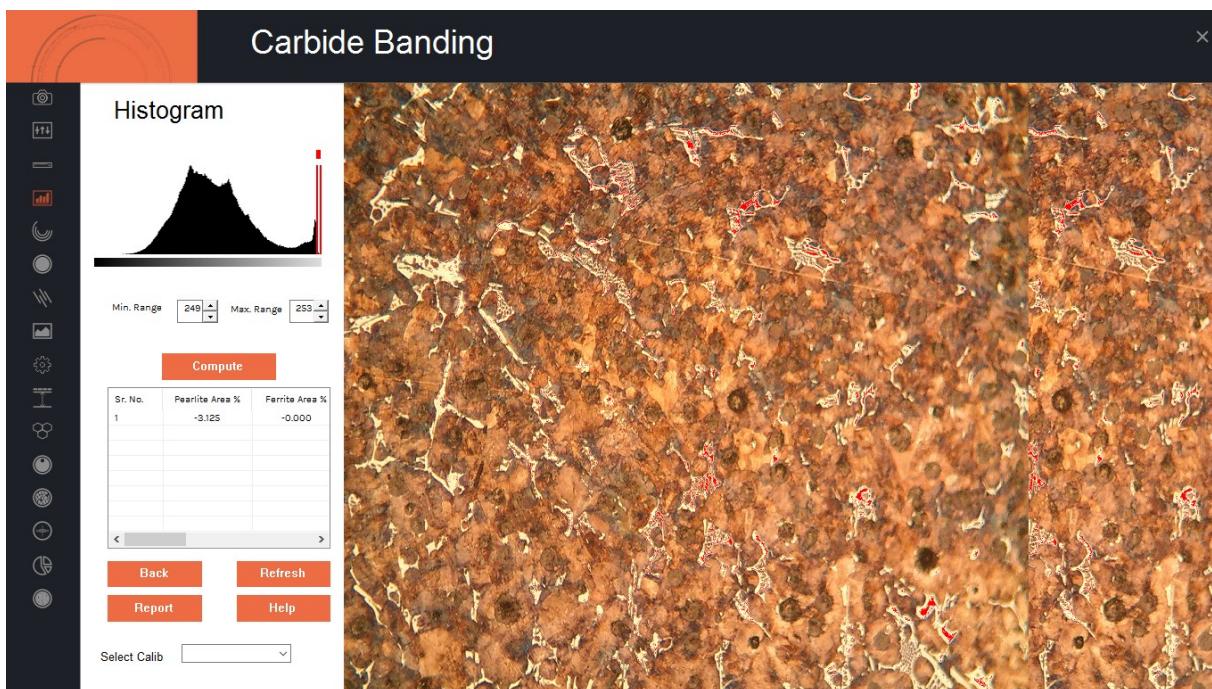
Iron carbide or Cementite is an intermetallic component of iron and Carbon. While iron Carbide as present in most steels and Cast Iron, it is produced as raw material in the iron carbide process, which belongs to the family of alternative iron making technology.

1st step



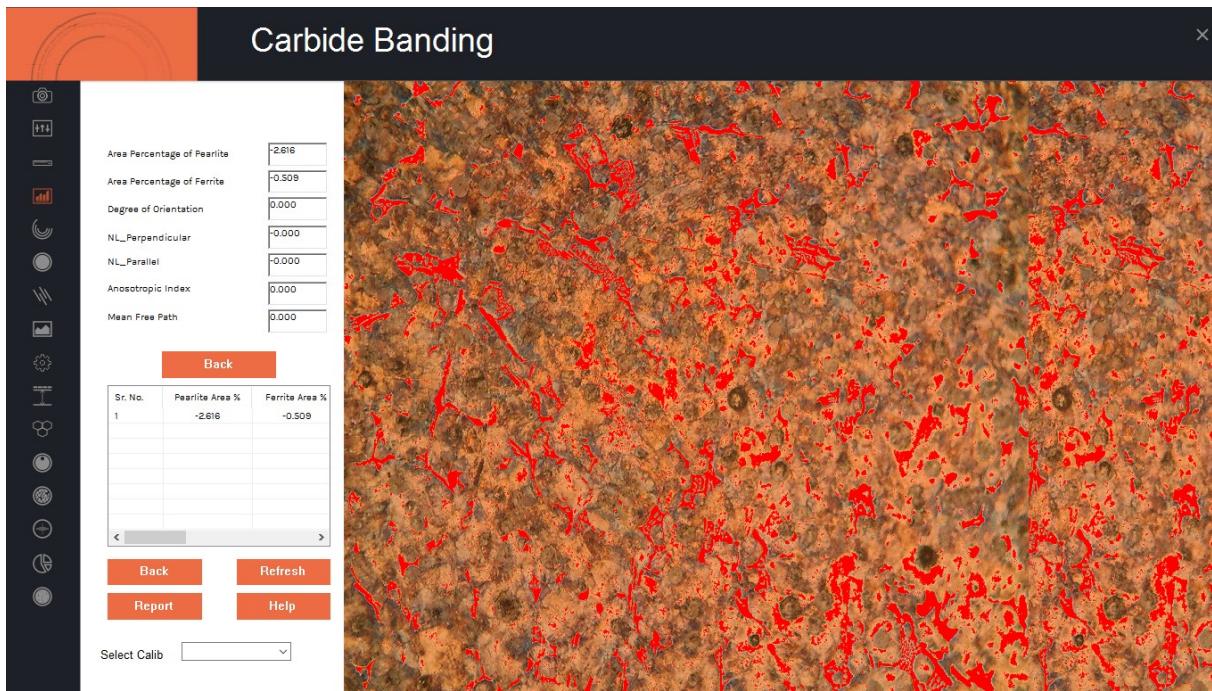
Load an appropriate image which you want to analyse.

2nd step



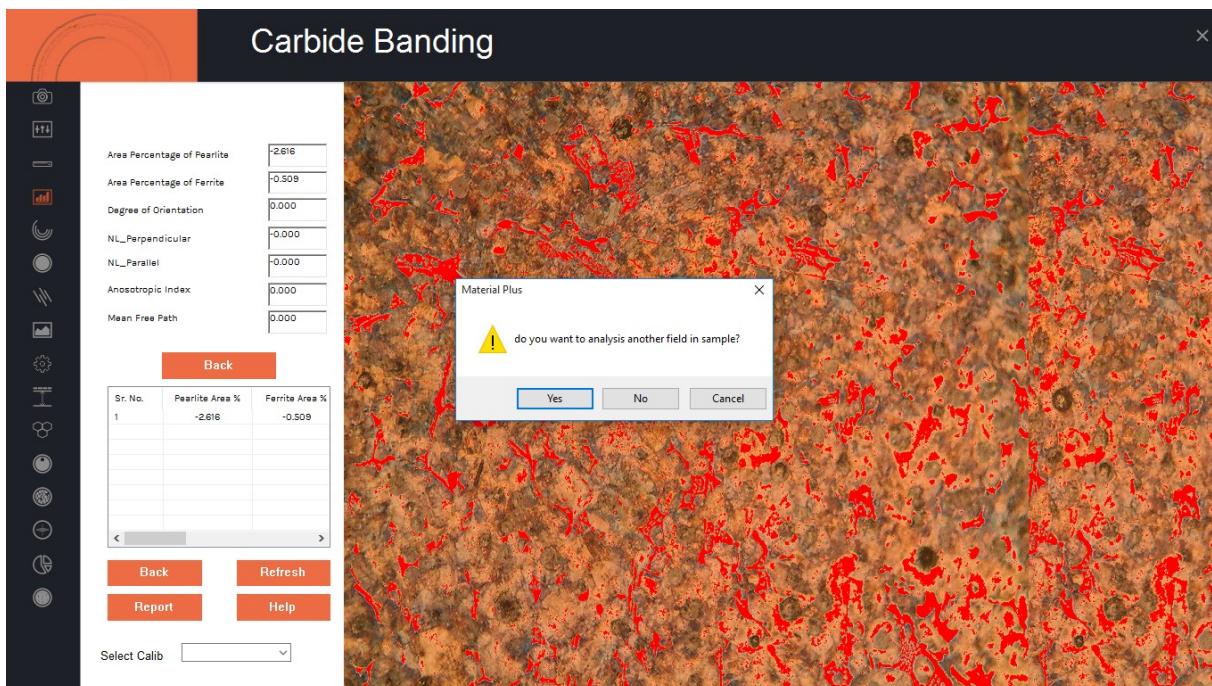
Select minimum and maximum range and click on compute button.

3rd step



Once you click on **compute** button this window will appear on screen.

4th step



Click on **Report** if you want to analyse another field click **Yes** or if not click **No**. Click on **Back** to do threshold.

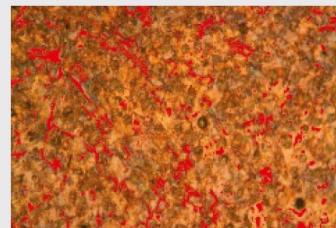
CARBIDE REPORT

CUSTOMER NAME :	PaceTechnologies	PART NAME:	Seamless Pipe
EVALUATION DATE :	2016-09-08-14-39-53	PART NO.:	124
REPORT NO.:	223	MATERIAL GRADE:	223
DRAWING NO:	—	SUPPLIER HEAT QTY.:	—
SUPPLIER HEAT NO :	—	BATCH NO.:	—
INVOICE NO./QTY :	—	COLOR CODE :	—

CARBIDE REPORT - ASTM E562 & E1245



Etched Image



Processed-Etched Image

Phase Name	Area (Micro Sqr.)	Area Percentage
Carbide 1	473454.861	7.802

Remarks

Approved By

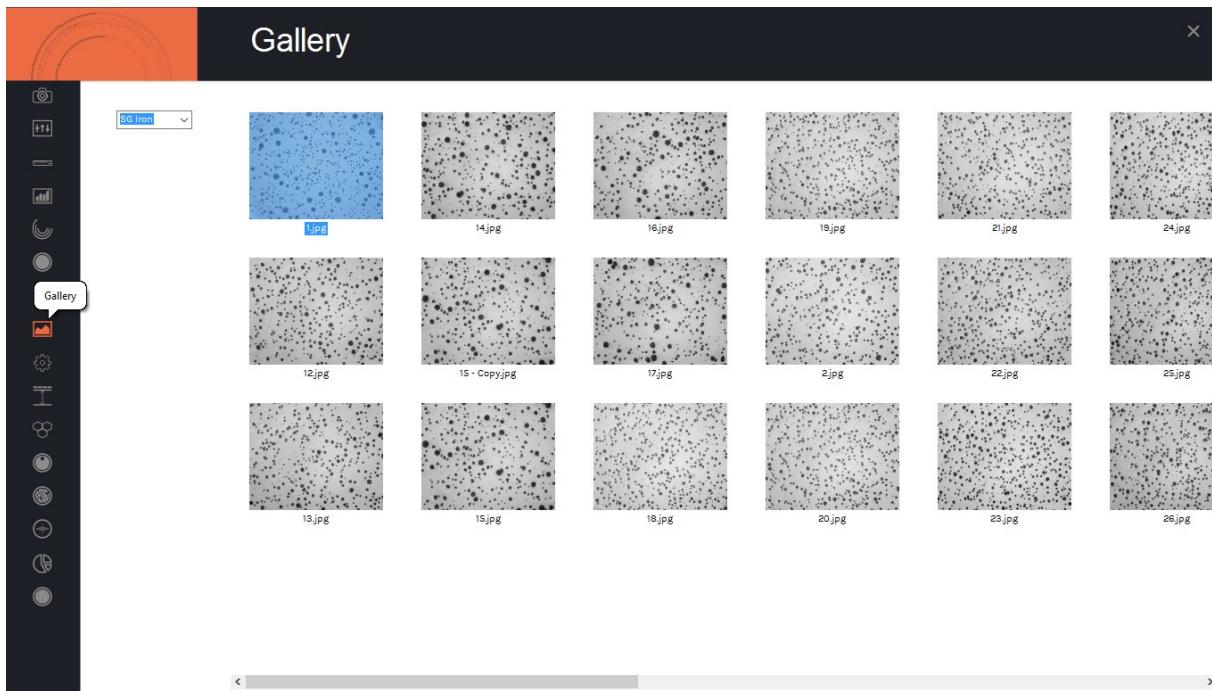


GALLERY

Four Folders are available to review any Captured images.The folders are:

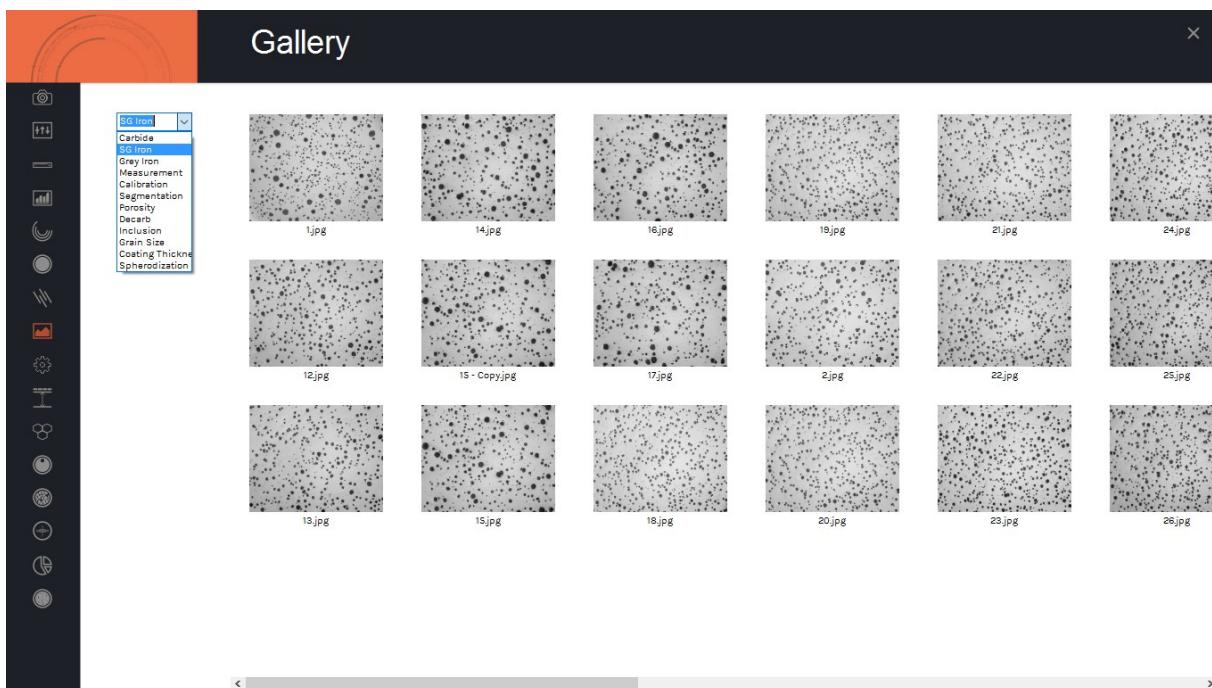
1. Segmentation
2. Decarburisation
3. Spherodization
4. Gray Iron
5. Carbide
6. Porosity
7. Inclusion
8. Calibration
9. Measurement
11. Coating Thickness
10. SG Iron

1st step



To open gallery first select the module from combo box.

2nd step



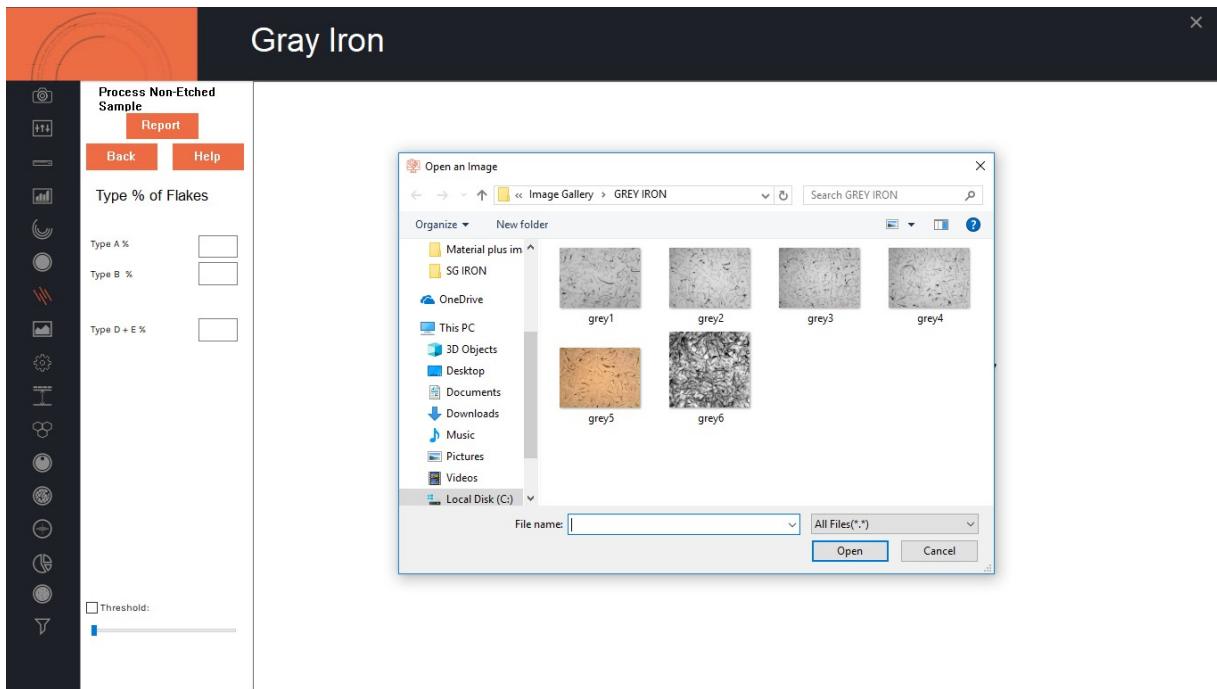
Now click on the Image.



GRAY IRON

Gray Iron or grey Cast Iron is a type of Cast iron that has a graphitic microstructure. Gray iron analysis module provides a chance to analyze an image on the basis of ASTM A-247-67, ISO 945-1 & JIS 65504.

1st step



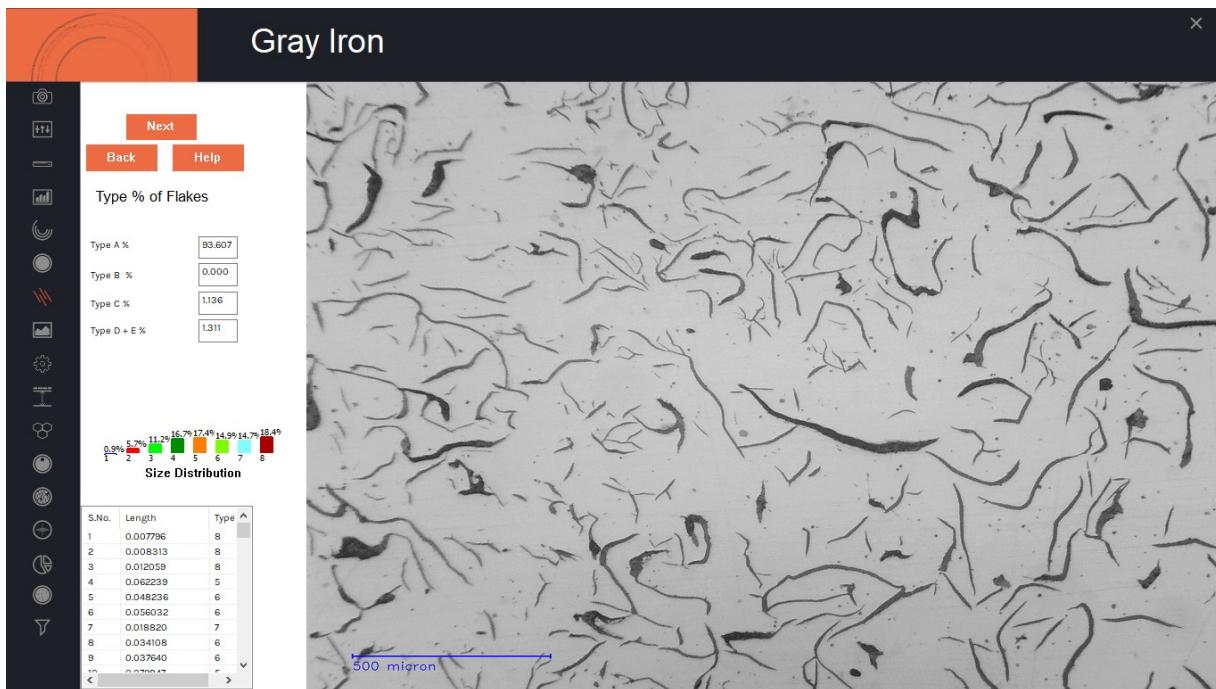
Load an appropriate image which you have to analyse for Flake.

2nd step



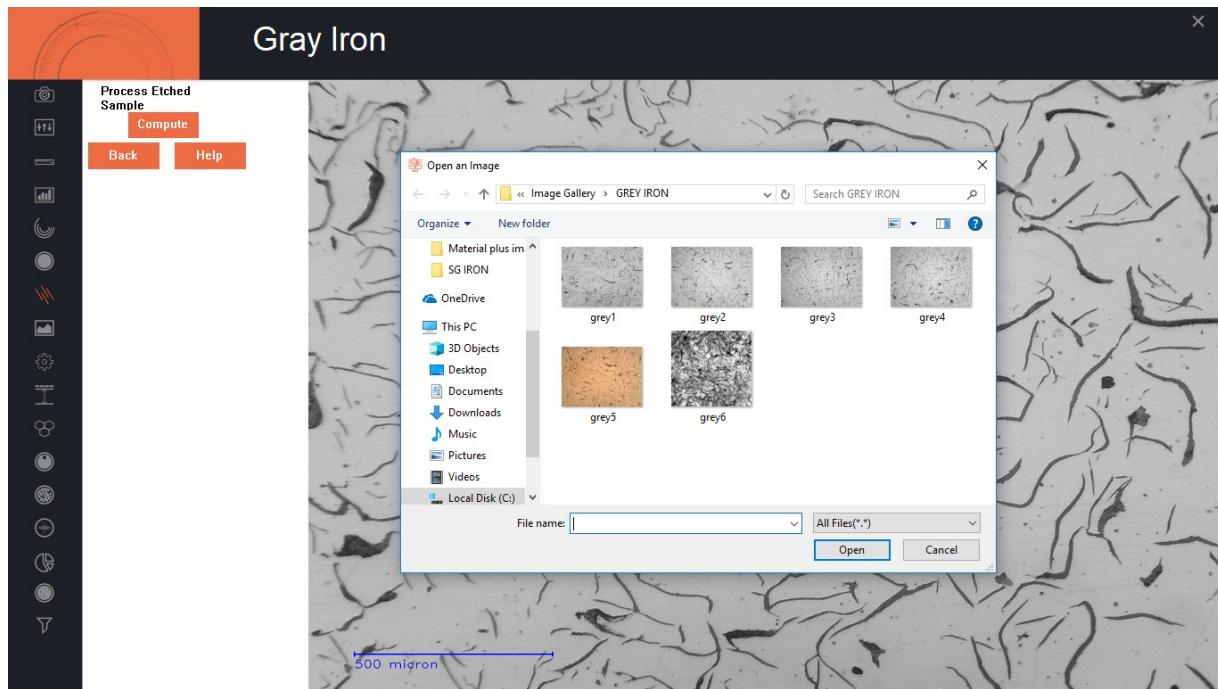
If you are using software for the first time, Click on threshold and adjust it through scroll bar till all Flakes are selected properly as shown as above. The image is available for next step now click on Compute button for analysis.

3rd step



Click on Next for next step.

4th step



Load an appropriate image which you have to analyse for Flake.

5th step



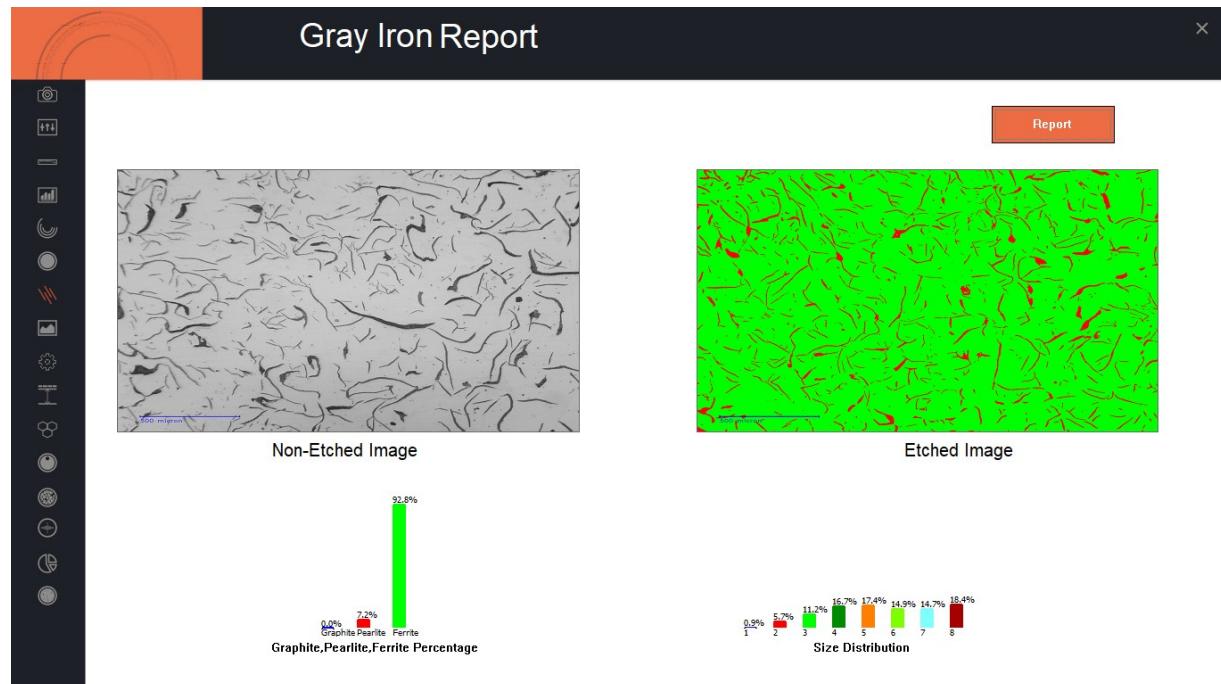
Adjust threshold value if required and then click on **Compute** button for analysis..

6th step



Click on Next button.

7th step

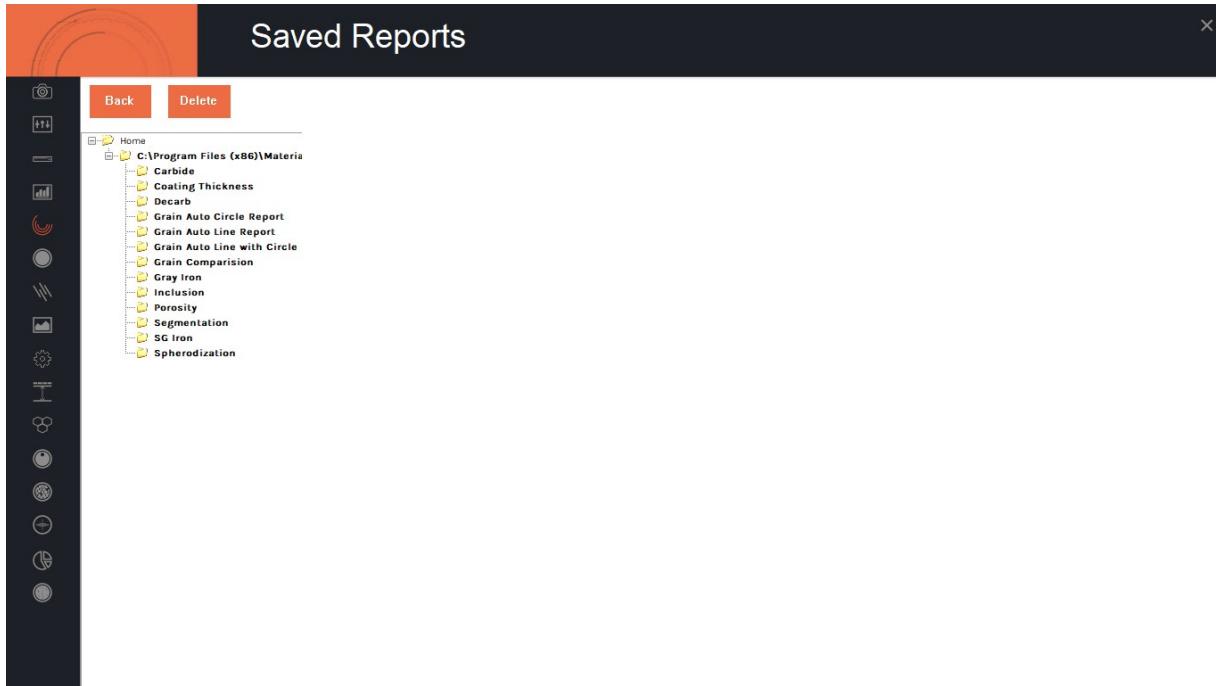


Click on Report and the report will generate.



SAVE REPORT

All reports are saved in the folder and can be retrieve anytime in future.



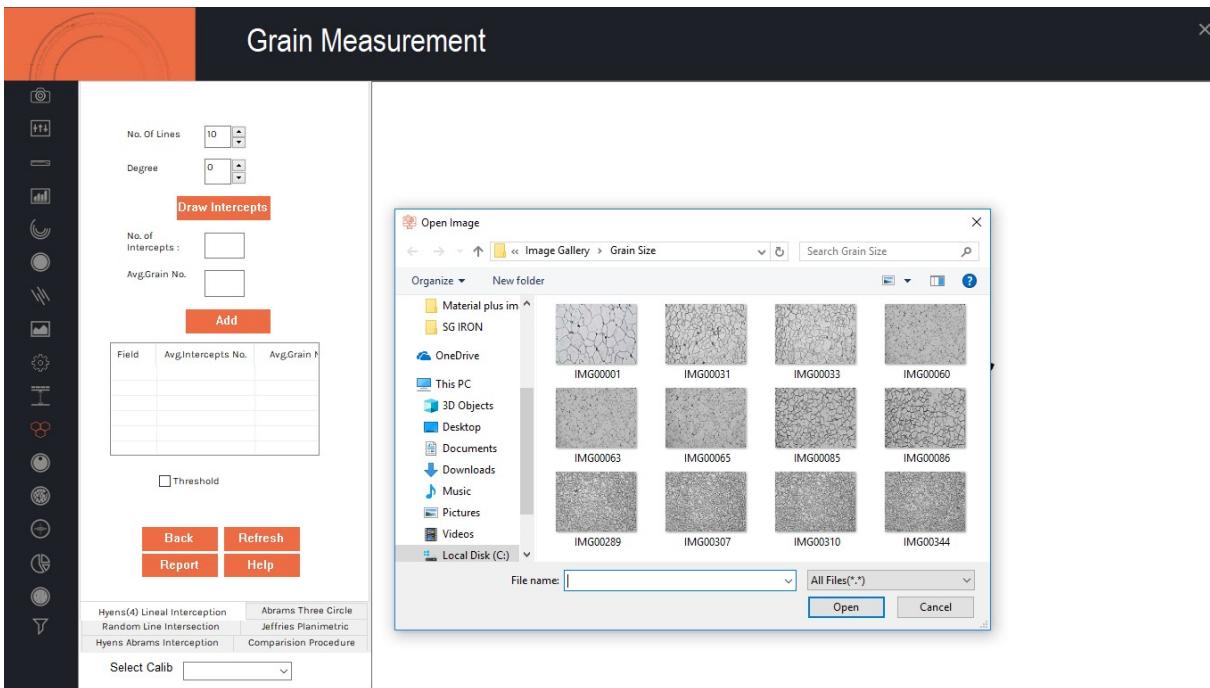
To retrieve data from your previous operation click on Reporting icon and select the path.



GRAIN MEASUREMENT

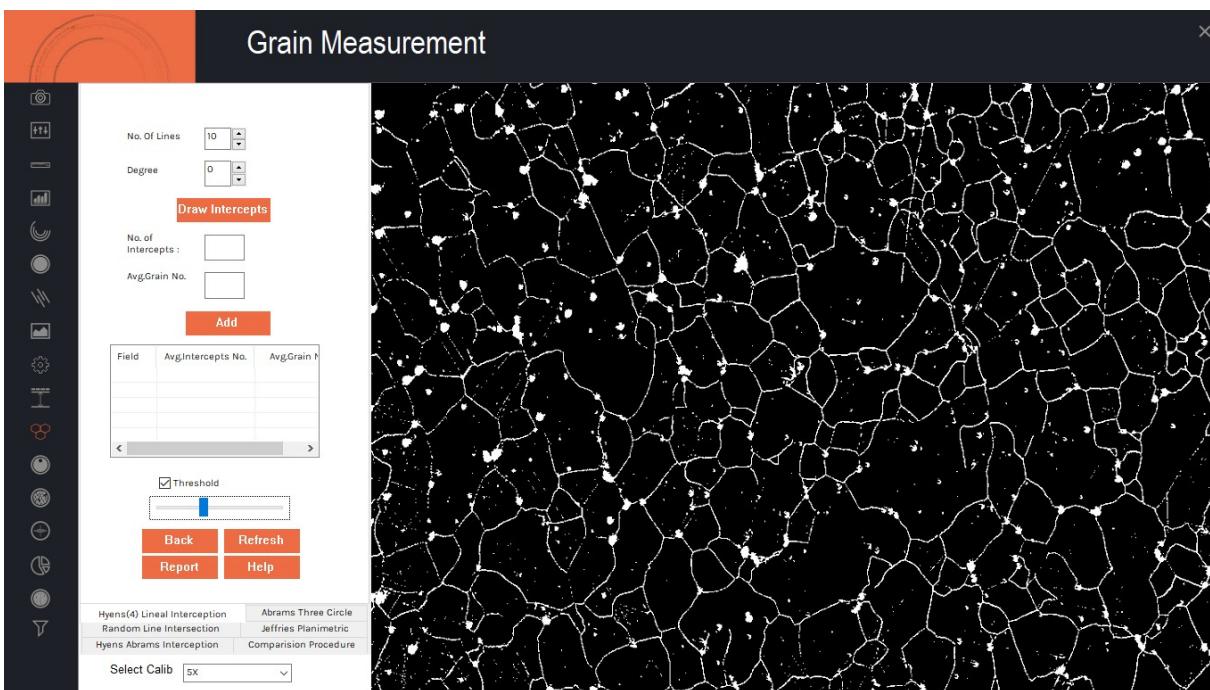
This method is suitable for poorly etched samples which do not have defined boundaries are unsuitable for Automatic Line Interception Method.

1st step



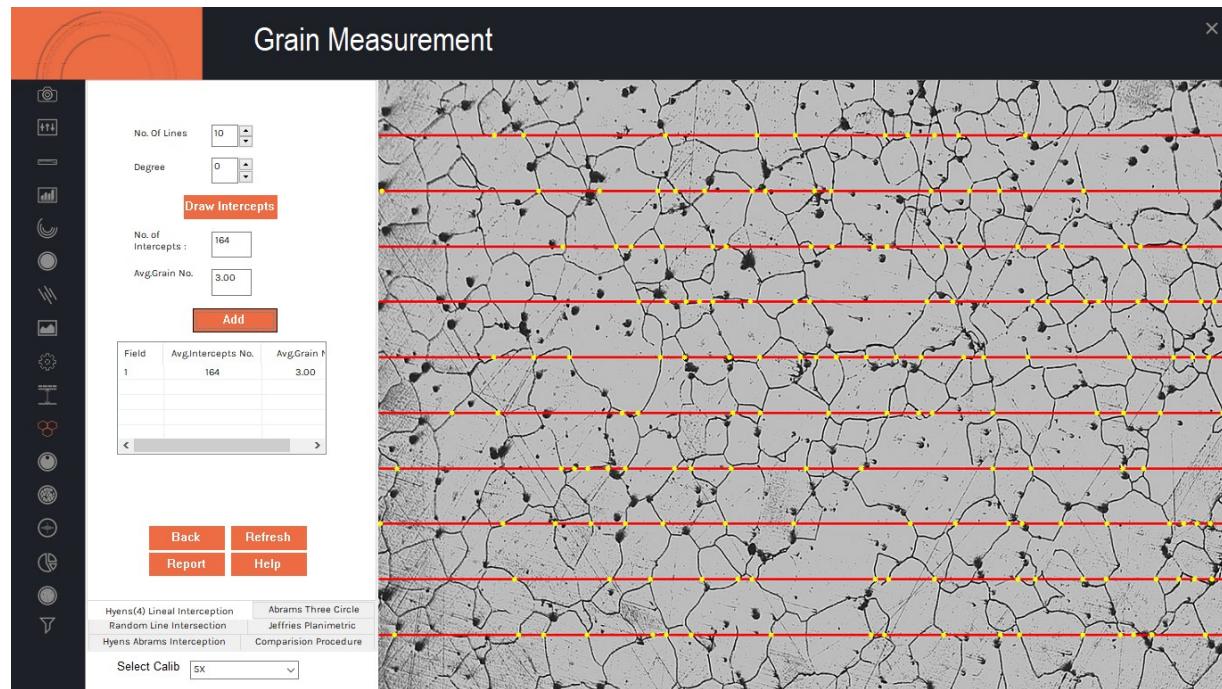
Load an appropriate image which you have to analyse .

2nd step



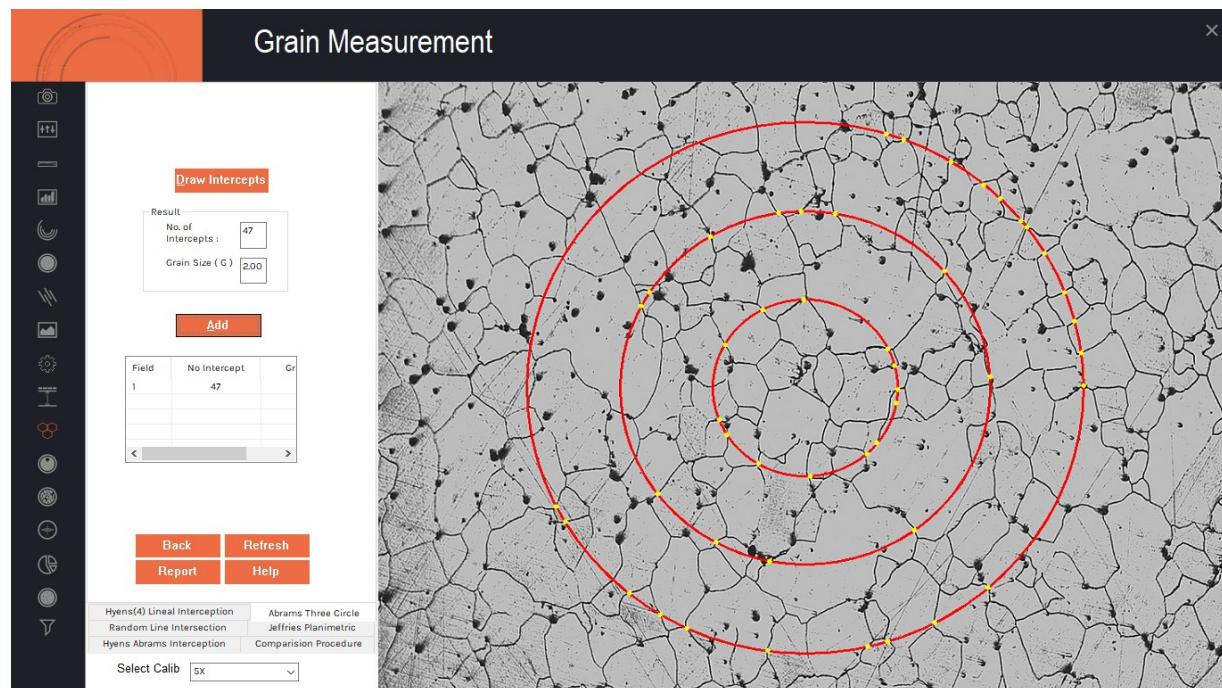
Click on Threshold and move the Scroll Bar.

3rd step



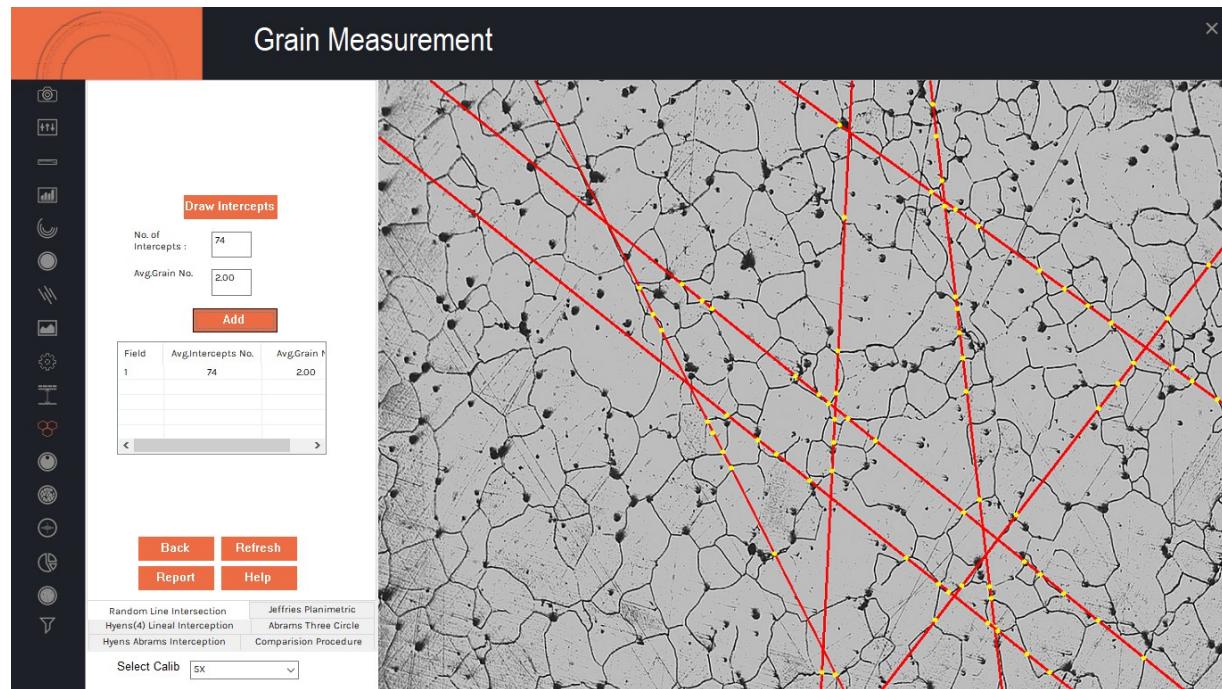
HYNES(4) LINEAL INTERCEPTION Method

4th step



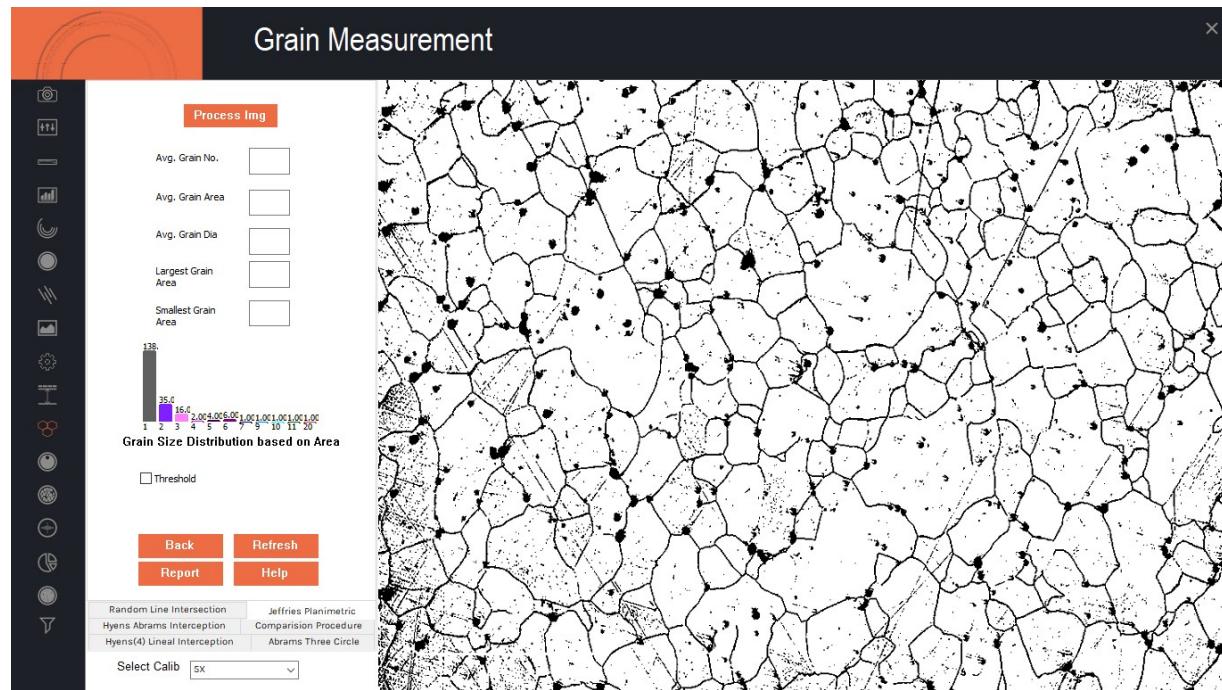
ABRAMS THREE CIRCLE METHOD. Click on Draw Intercepts button to calculate Average grain number. Click on Report button, message box will ask whether you want to study another field or analysis another captured image. Press Yes for next picture. Otherwise press No .

5th step



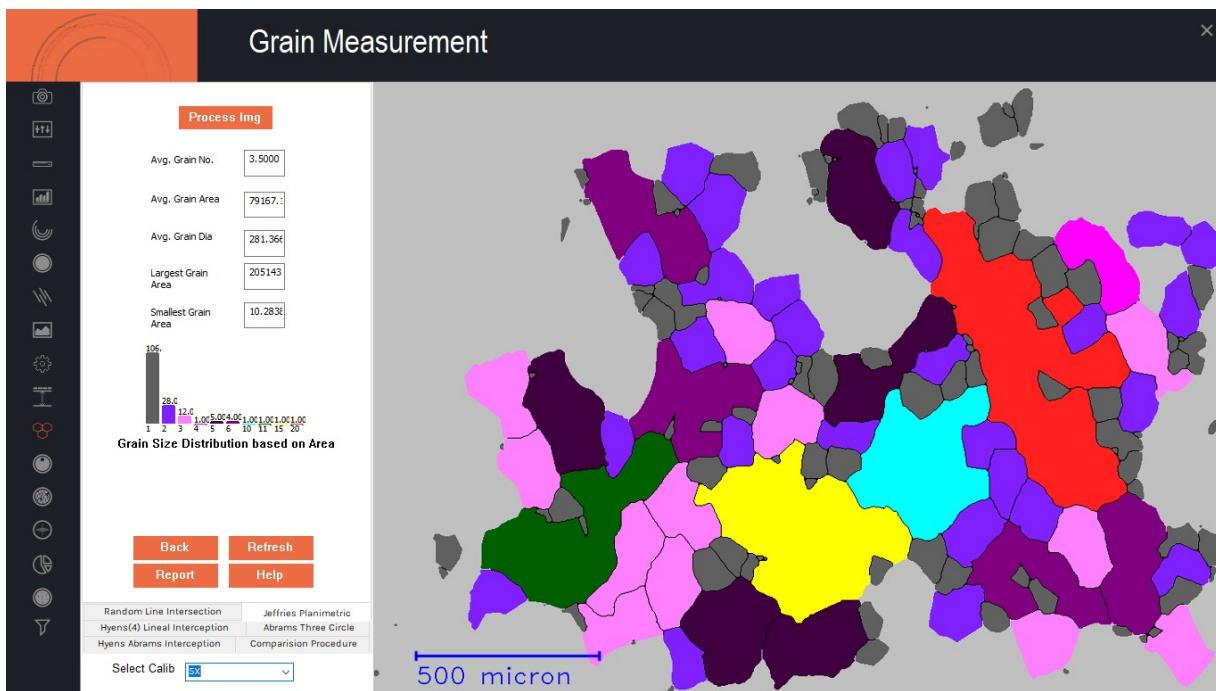
RANDOM LINE INTERSECTION METHOD

6th step



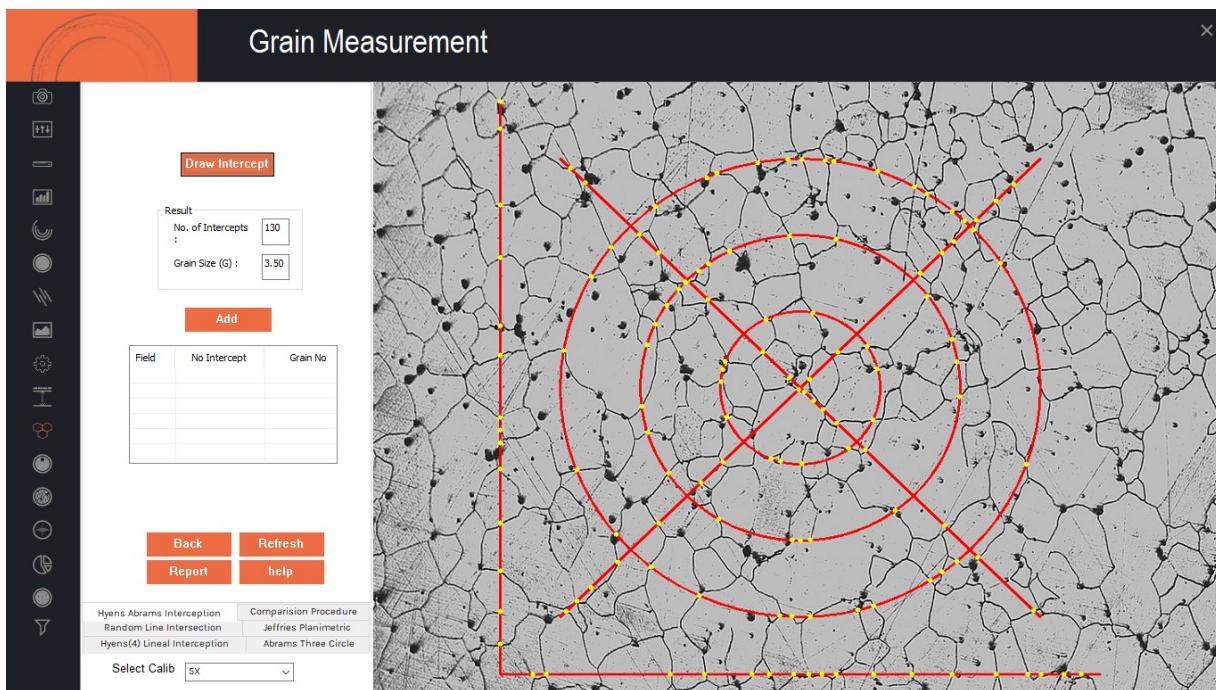
Choose an image from Gallery and Click on Process Img

7th step



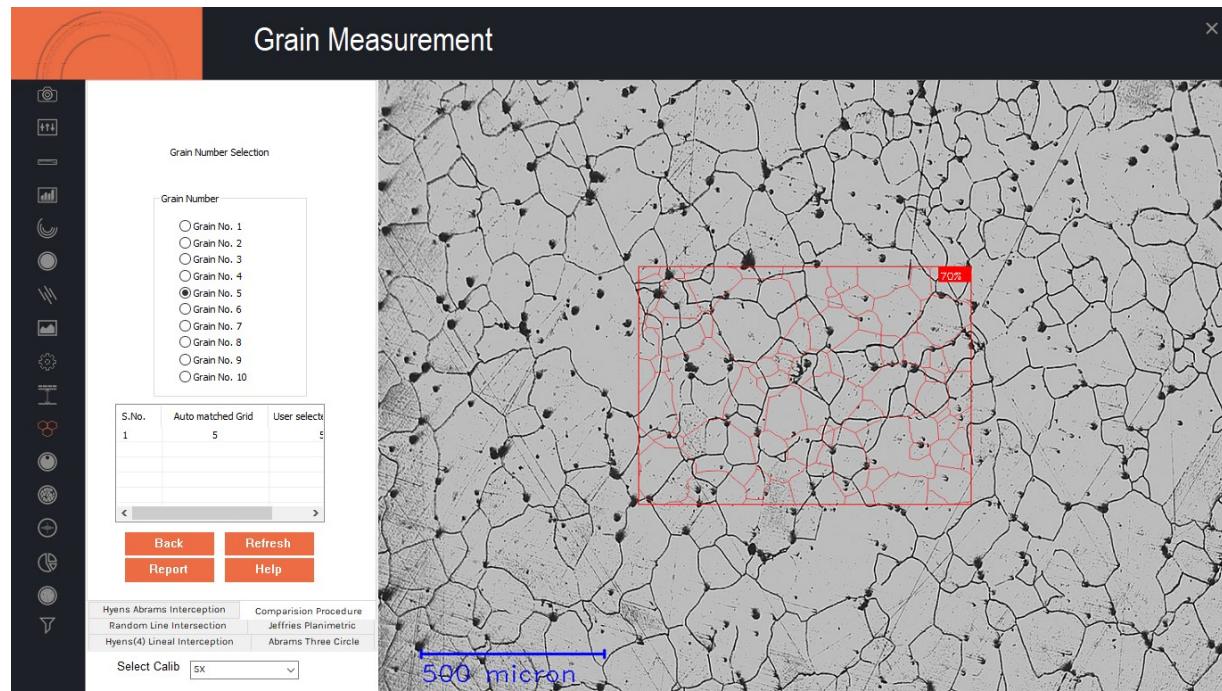
JEFFRIES PLANIMETRIC METHOD

8th step



HYENS ABRAMS INTERCEPTION METHOD

9th step



COMPARISON PROCEDURE METHOD. Click on Report button, message box will ask whether you want to study another field or analysis another captured image. Press Yes for next picture. Otherwise press No .

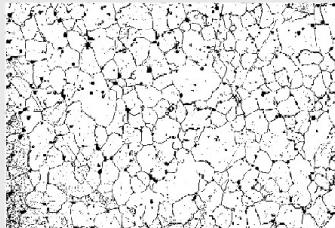
10th step

RESULT ARE AVAILABLE IN EXCEL IN A-4 SIZE

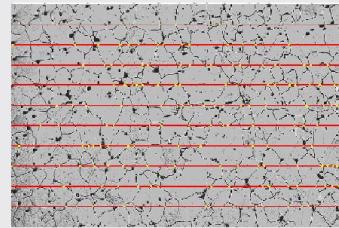
GRAIN MEASUREMENT REPORT

CUSTOMER NAME :	PaceTechnologies	PART NAME:	Seamless Pipe
EVALUATION DATE :	2016-09-08-14-39-53	PART NO.:	124
REPORT NO.:	223	MATERIAL GRADE:	223
DRAWING NO.:	—	SUPPLIER HEAT QTY.:	—
SUPPLIER HEAT NO.:	—	BATCH NO.:	—
INVOICE NO./QTY.:	—	COLOR CODE :	—

GRAIN MEASUREMENT - ASTM E562 & E1245



Etched Image



Processed-Etched Image

Field	Average Intercept Number	Average Grain Number
1	73	1.50
2	124	3.00

Remarks

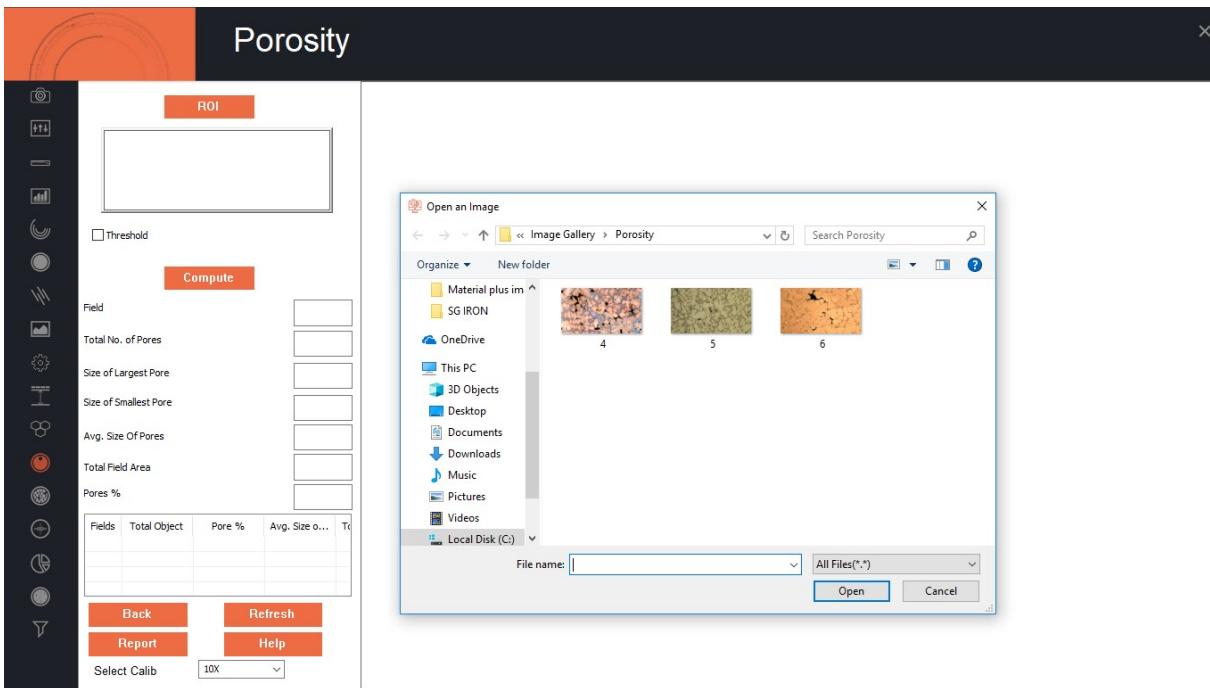
Approved By



POROSITY

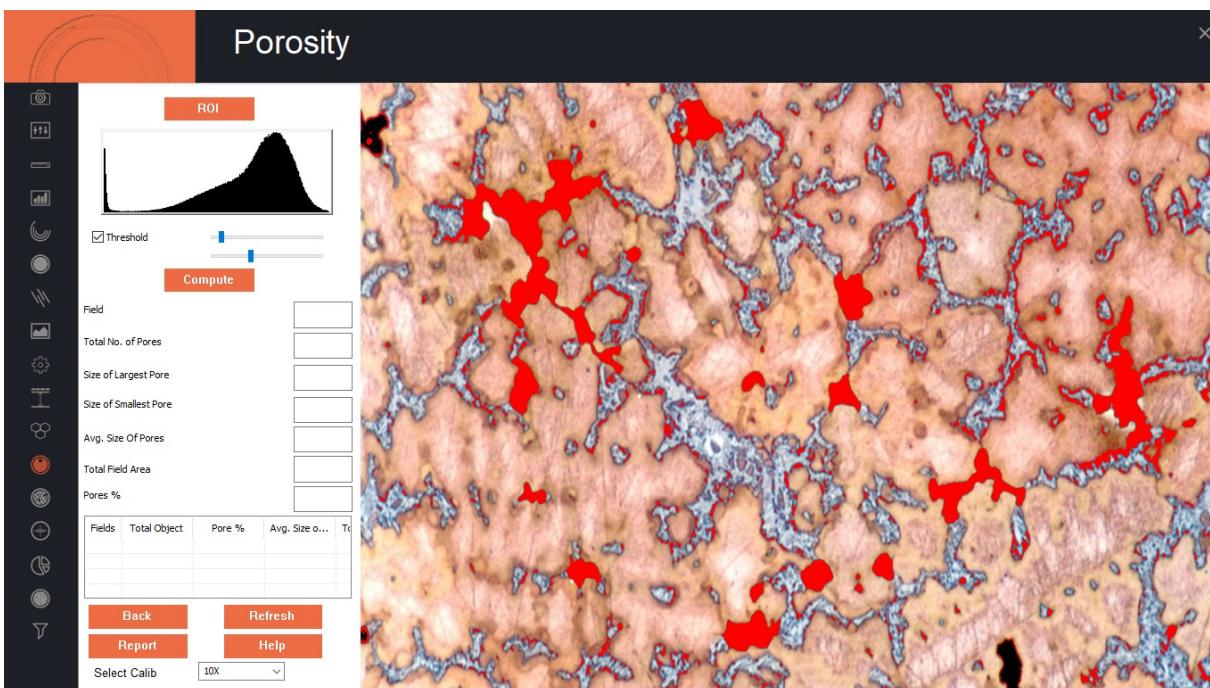
The module allows a user to recognize and measure the porosity of the material according to the ASTM B276 standard. The total number of pores is counted along with their percentage and min/max perimeter and area of each pore.

1st step



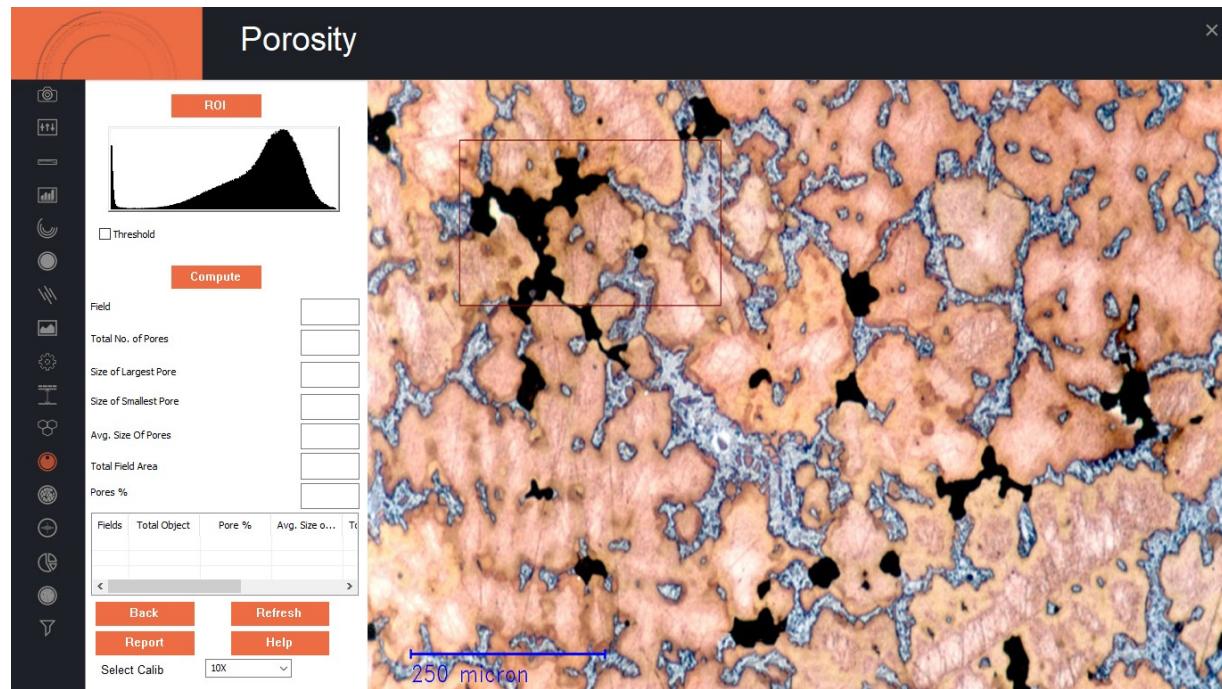
Click two times on an image to load it for analysis of percentage.

2nd step



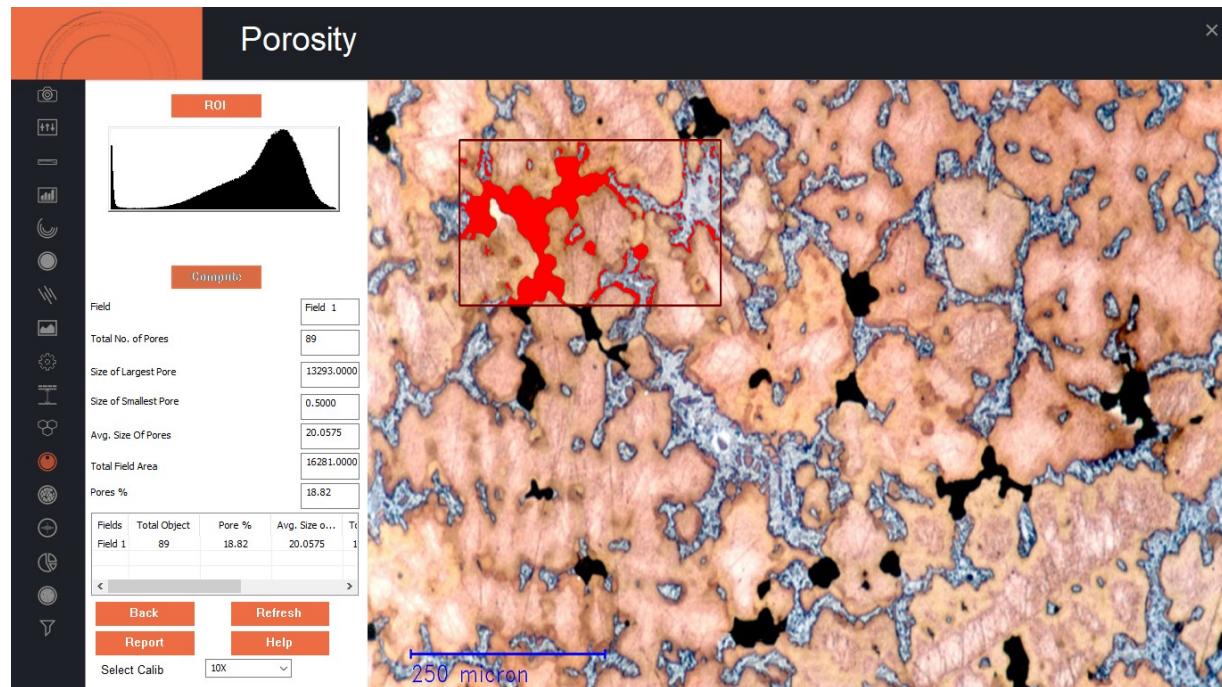
Click on threshold and adjust it through scroll bar.

3rd step



Click on **Selected Part** button to compute porosity percentage in the selected parts.

4th step



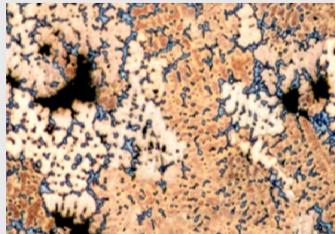
Click on **Porosity Analysis** button to compute the percentage.

RESULT ARE AVAILABLE IN EXCEL IN A-4 SIZE

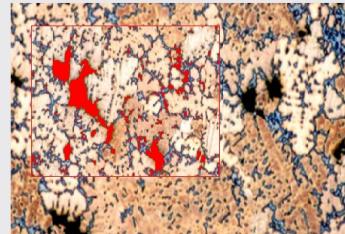
POROSITY REPORT

CUSTOMER NAME :	PaceTechnologies	PART NAME:	Seamless Pipe
EVALUATION DATE :	2016-09-08-14-39-53	PART NO.:	124
REPORT NO.:	223	MATERIAL GRADE:	223
DRAWING NO:	_____	SUPPLIER HEAT QTY.:	_____
SUPPLIER HEAT NO :	_____	BATCH NO.:	_____
INVOICE NO./QTY :	_____	COLOR CODE:	_____

POROSITY - ASTM D276



Etched Image



Processed-Etched Image

Field	No. Of Pores	Porosity %	Avg. Size Of Pore	Total Field Area	Max. Pore Size	Min. Pore Size
Field 1	124	0	14188.500	128463.5	2850.5	0.5
Field 2	148	0	279.1268	21415.5	1511.5	0.5

Remarks

Approved By



INCLUSION

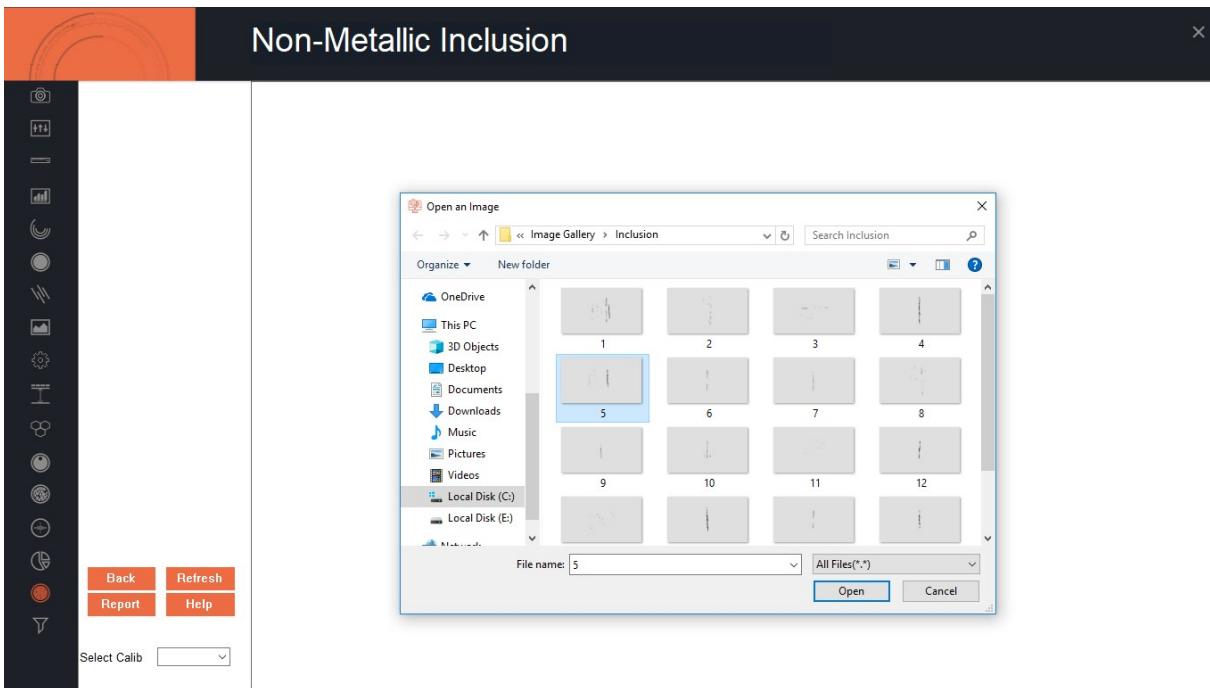
Using Material Plus software a user can identify four types of inclusion.

SULFIDE TYPE (A TYPE), ALUMINA TYPE (B TYPE)

SILICATE TYPE (C TYPE), GLOBULAR TYPE (D TYPE)

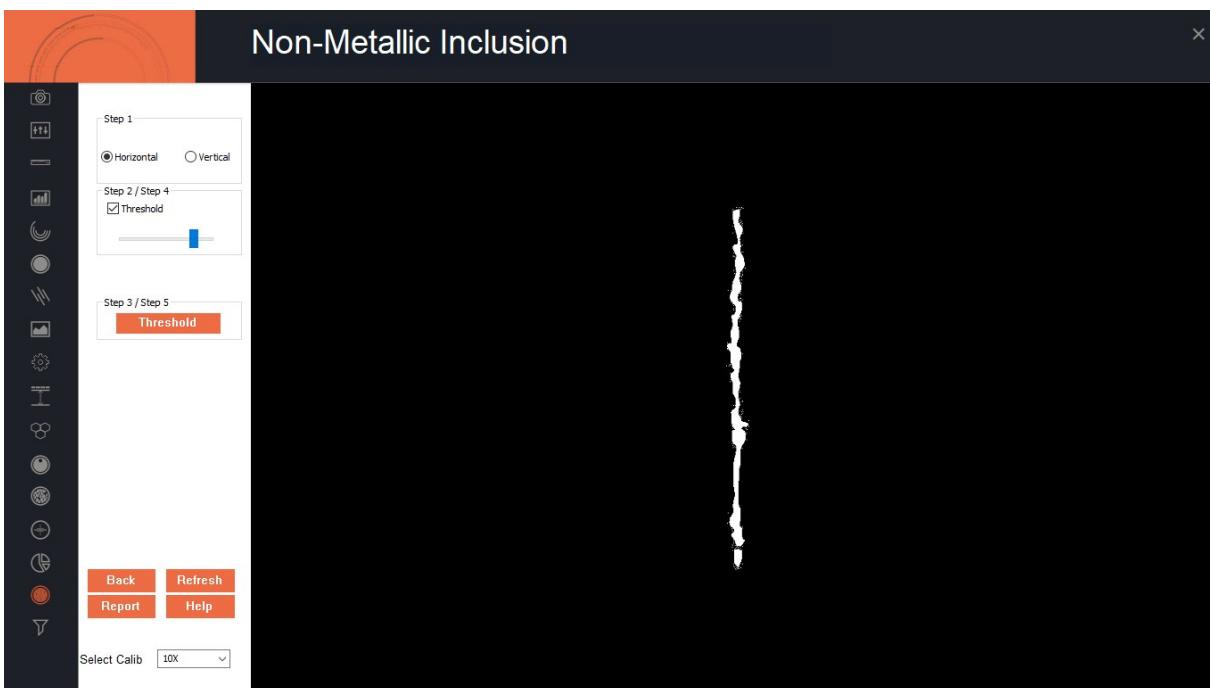
Each type is further divided into Thin and Heavy, based on the width parameters.

1st step



Click two times on an appropriate image to open it for analysis.

2nd step



Select direction , set the threshold by moving cursor till all inclusions (sulphide + oxides) are selected or click on Threshold

3rd step



Click on **Compute** button to measure the inclusion.

4th step



Click on **REPORT** button to see the analyzed report.

RESULT ARE AVAILABLE IN EXCEL IN A-4 SIZE

INCLUSION REPORT

CUSTOMER NAME :	PaceTechnologies	PART NAME:	Seamless Pipe
EVALUATION DATE :	2016-09-08-14-39-53	PART NO.:	124
REPORT NO.:	223	MATERIAL GRADE :	223
DRAWING NO.:	_____	SUPPLIER HEAT QTY.:	_____
SUPPLIER HEAT NO.:	_____	BATCH NO.:	_____
INVOICE NO./QTY.:	_____	COLOR CODE :	_____

INCLUSION ANALYSIS



Inclusion Type	Fine	Thick
Type A Analysis	0	4.50 S(W)
Type B Analysis	0	0
Type C Analysis	0	0
Type D Analysis	0	10.00
Type DS Analysis	0.50	0

Remarks

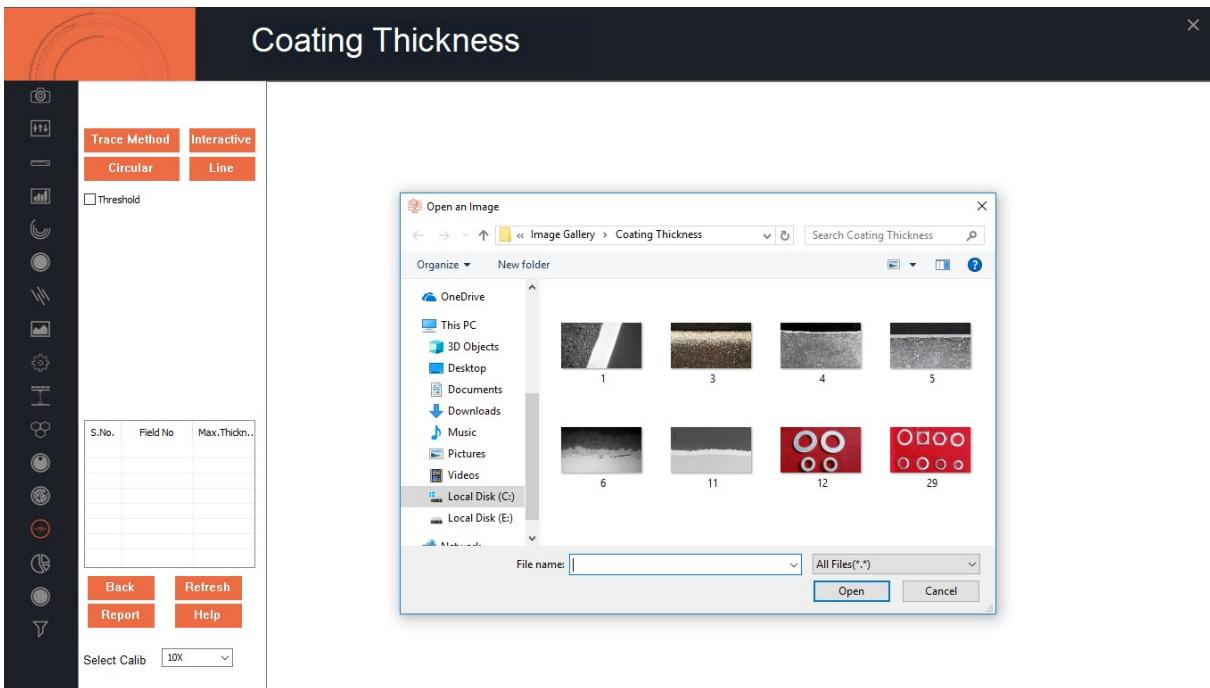
Approved By



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. Under good condition, when using an optical microscope, the method is capable of giving an absolute measuring accuracy of 0.8 m. this will determine the suitability of the method for measuring the thickness of thin coating.

1st step



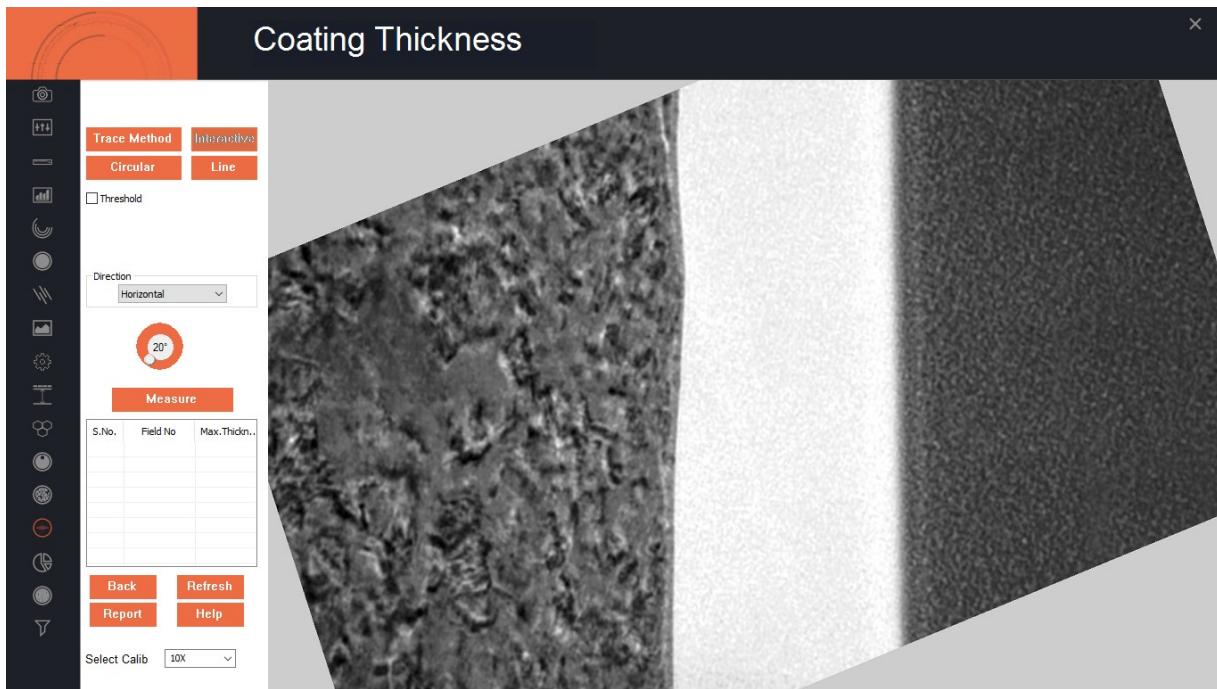
Click two times on appropriate image for analysis of Pores.

2nd step



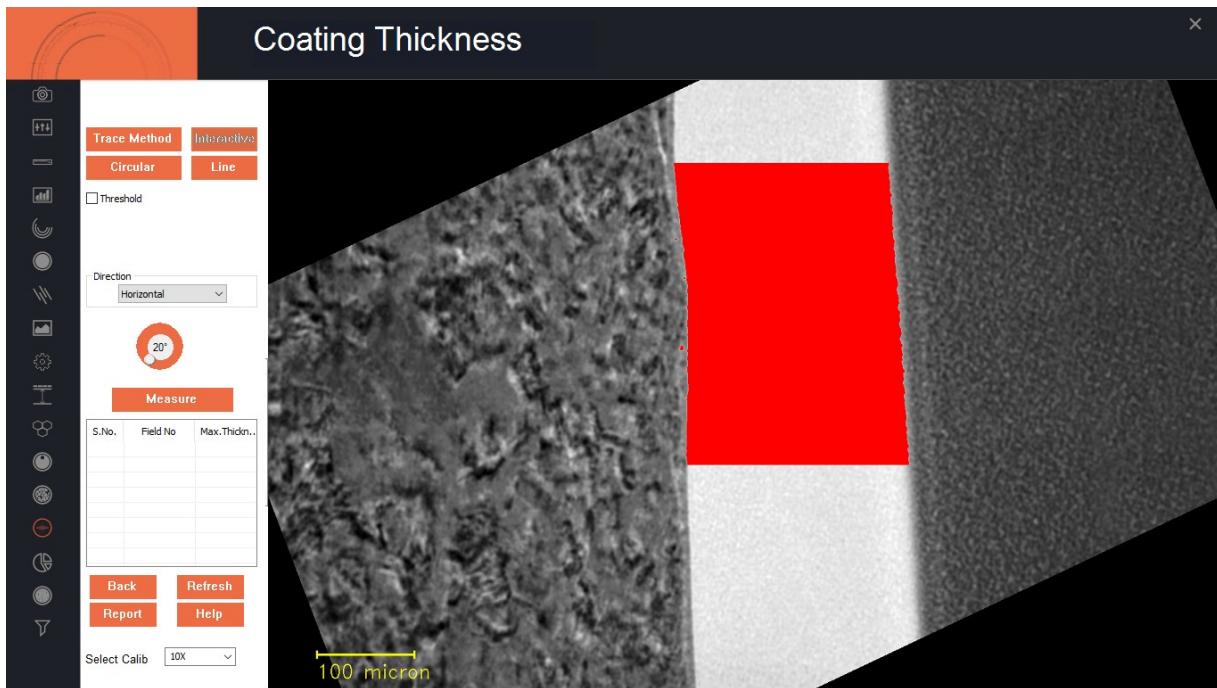
First select direction.

3rd step



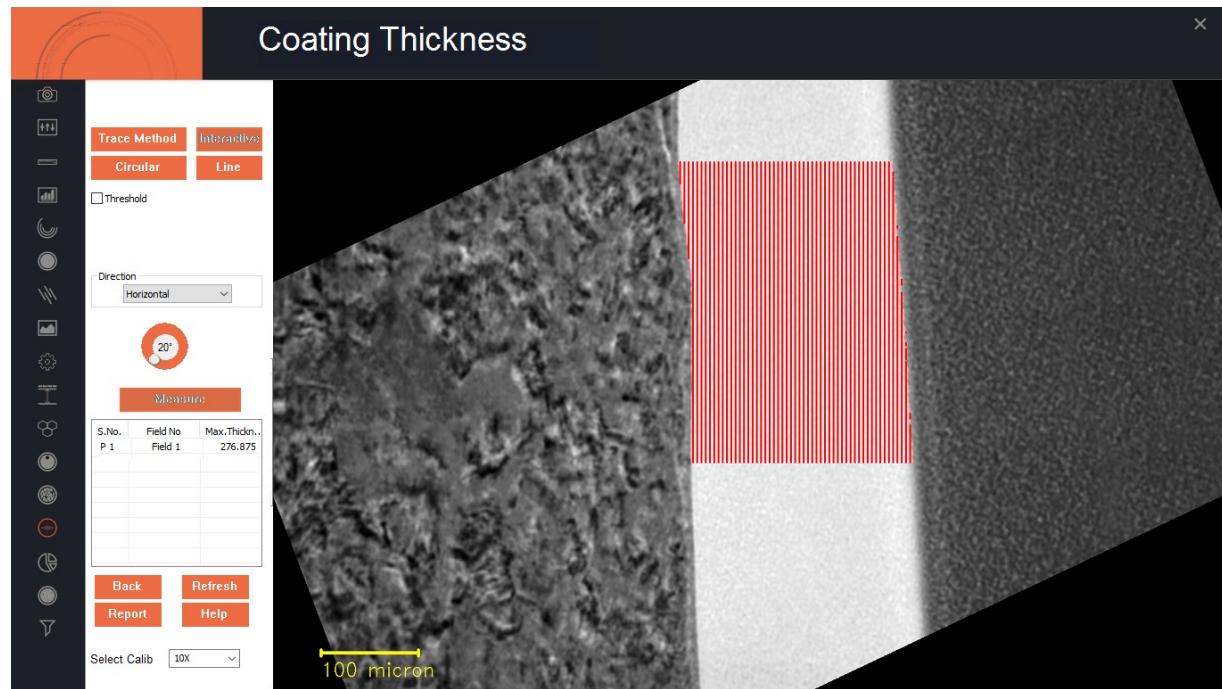
Rotate image if required.

4th step



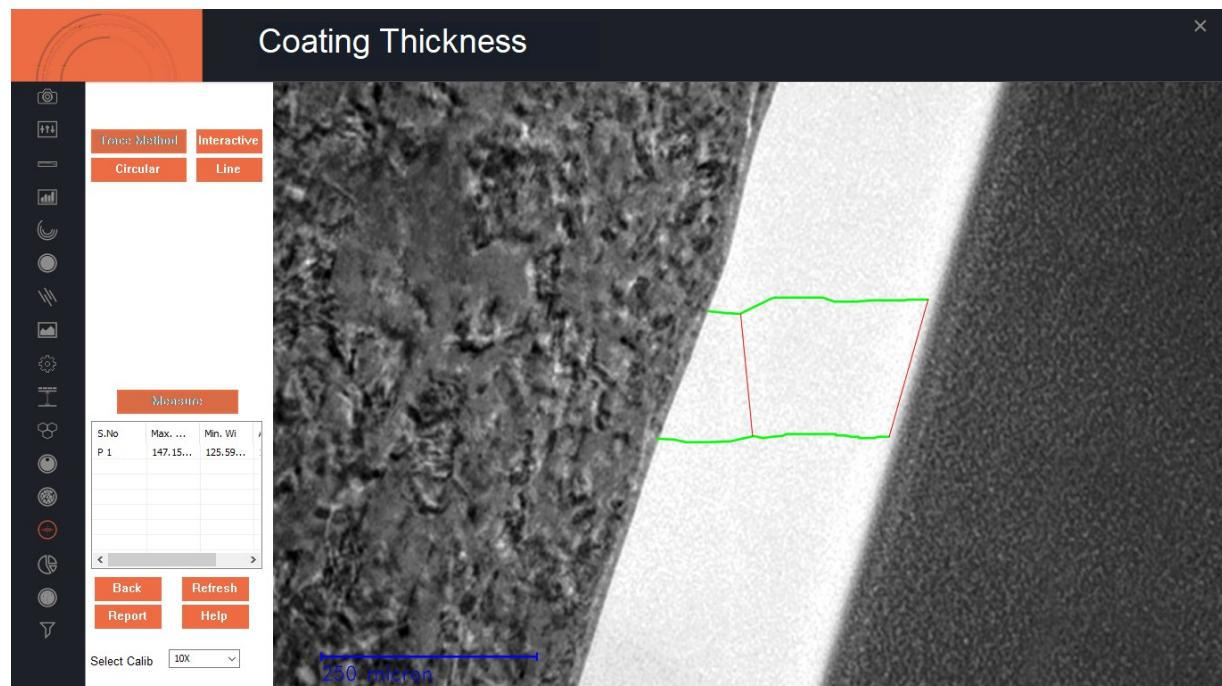
Select the ROI and check threshold.

5th step



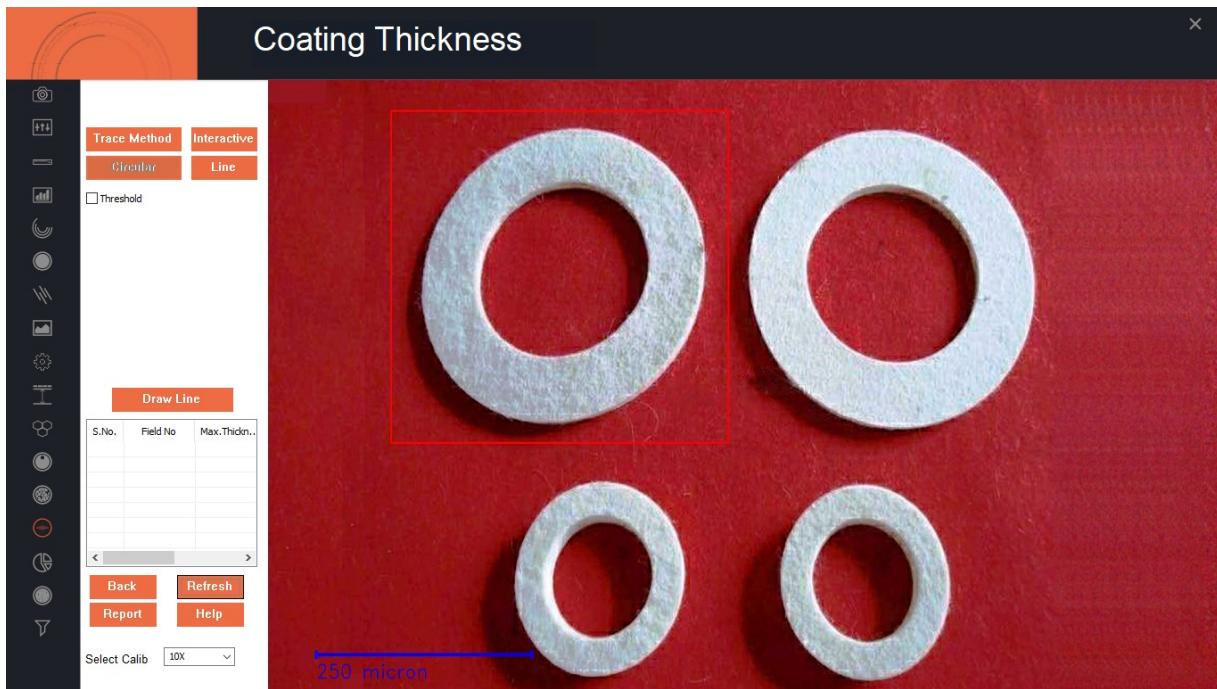
Click on Measure .

6th step



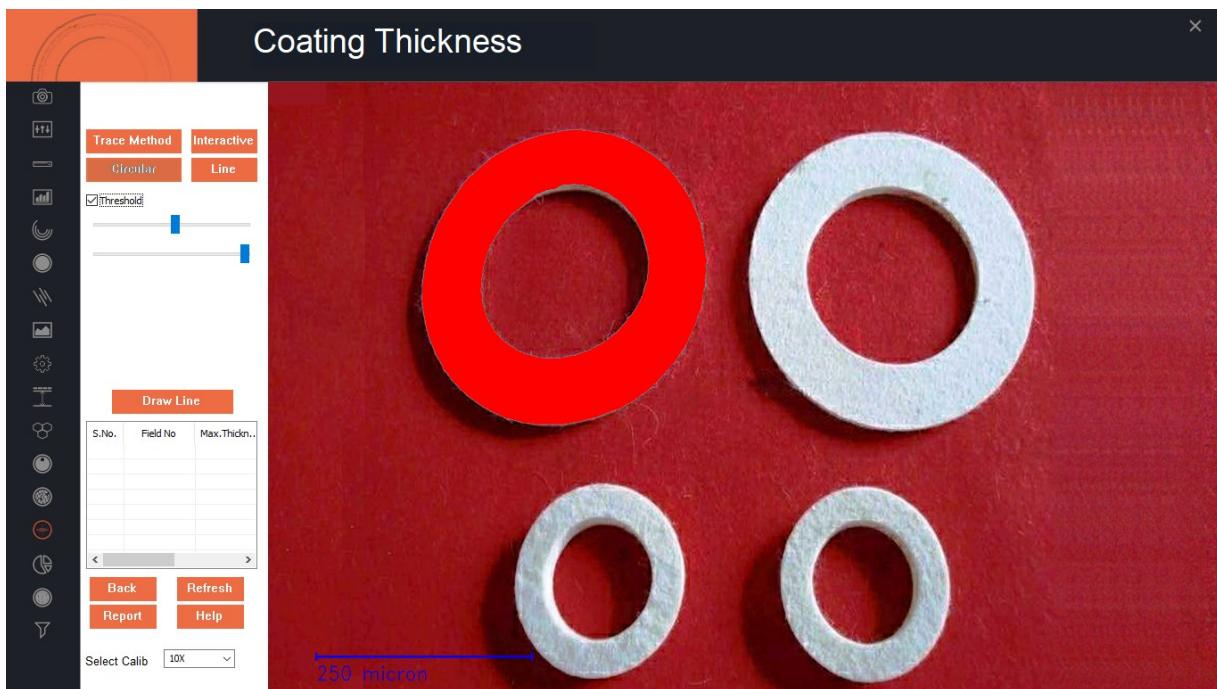
Click on Trace method draw lines where you want to measure thickness and after that click on Measure .

7th step



Click on Circular set ROI on the image.

8th step



Check threshold through scroll bar.

9th step



Click on Draw Line .

10th step



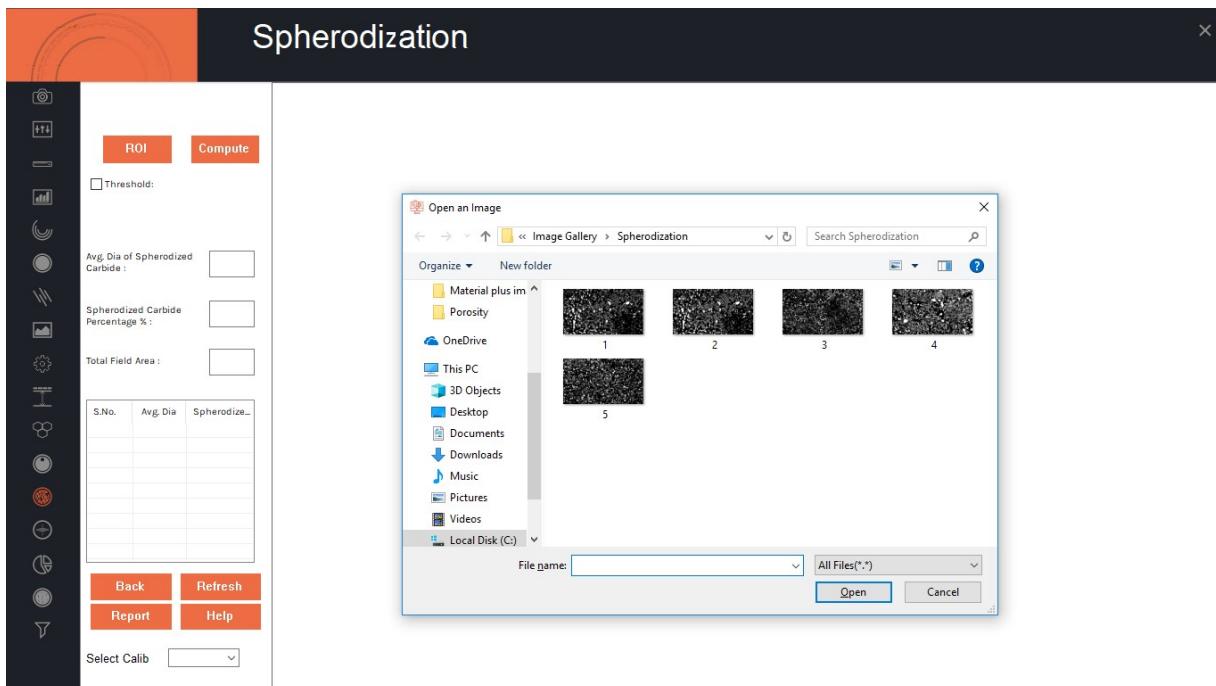
To measure line method click on Line and draw line on the image.



SPHERODIZATION

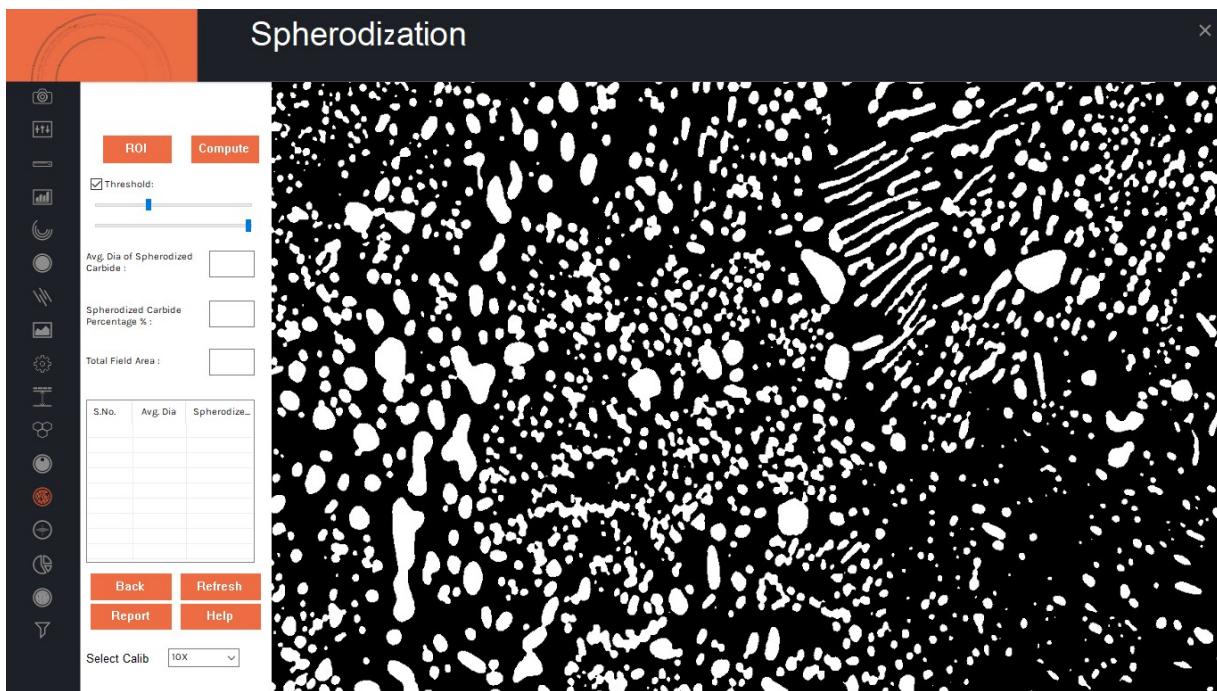
This module is designed to analyze spheroidal graphite (nodules). The nodules are separated from non-nodules on predefined spheroidicity. Nodules acquire blue color and non-nodule get red color. Nodules from (designated by Roman numbers from I to VI) and size (designated by Arabic numbers 1 to 8) are reported along with the calculated nodules/sq mm.

1st step



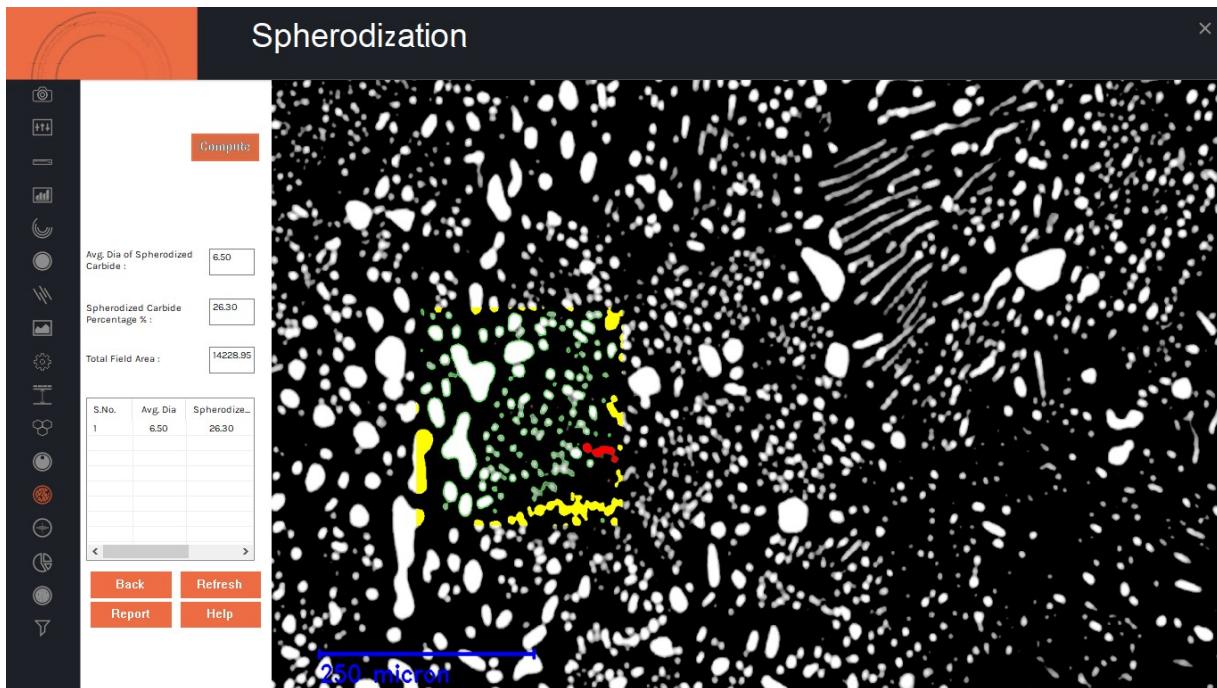
Click two times on an image to load it for analysis.

2nd step



Check threshold through scroll bar.

3rd step



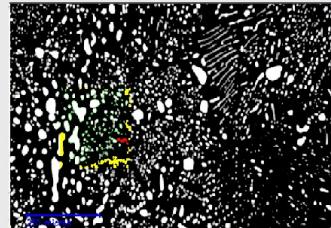
Click on Selected Part to draw ROI and click on Compute to analyze the field .

RESULT ARE AVAILABLE IN EXCEL IN A-4 SIZE

SPHERODIZATION REPORT

CUSTOMER NAME :	PaceTechnologies	PART NAME:	Seamless Pipe
EVALUATION DATE :	2016-09-08-14-39-53	PART NO.:	124
REPORT NO.:	223	MATERIAL GRADE :	223
DRAWING NO:	—	SUPPLIER HEAT QTY.:	—
SUPPLIER HEAT NO :	—	BATCH NO.:	—
INVOICE NO./QTY :	—	COLOR CODE :	—

SPHERODIZATION REPORT - ASTM A892



Average Dia Of Spherodized Carbide	Spherodized Carbide Percentage	Total Field Area
33.64	12.78	102347.48

Remarks

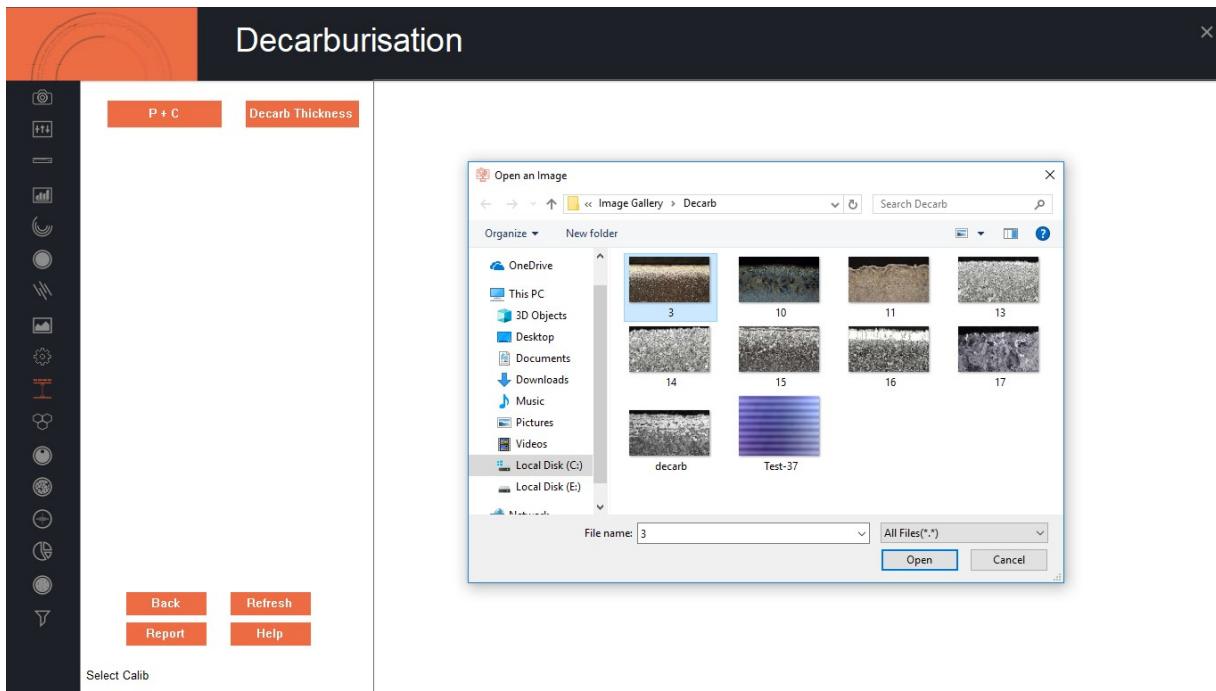
Approved By



DECARBURISATION

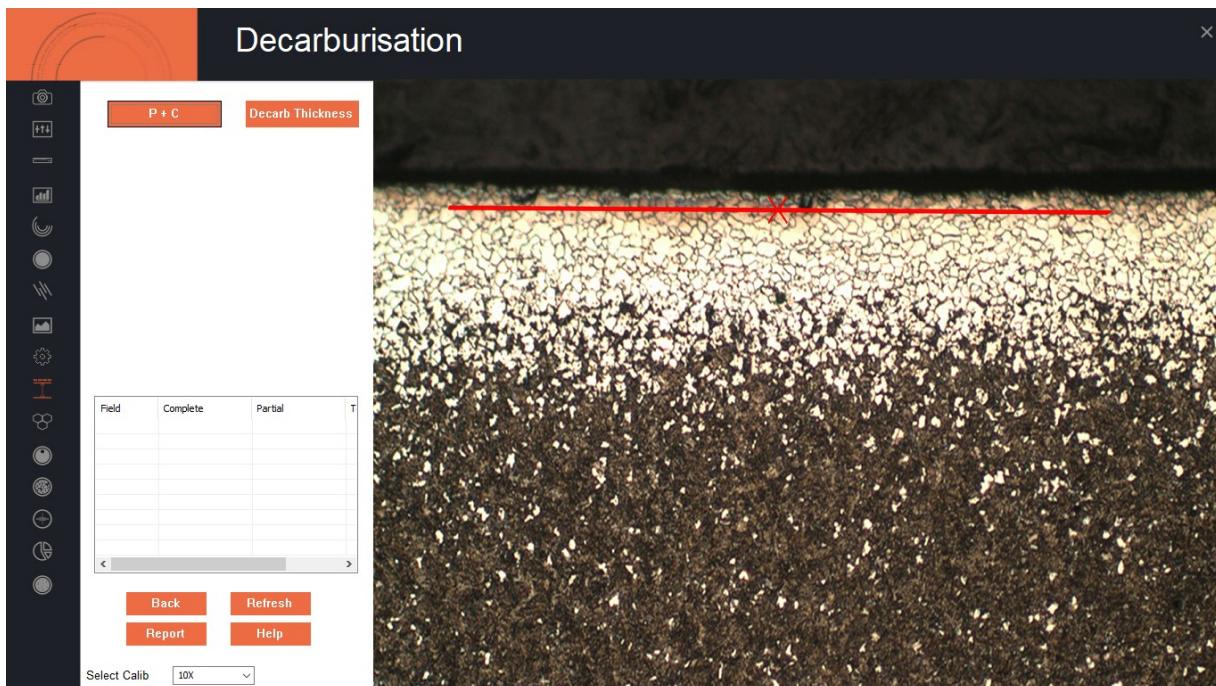
Decarburisation module intended to measure decarburised depth of steel due to heating at elevated temperatures during hot working or by detecting changes in the microstructure, hardness or carbon content at the surface. The decarburised depth is taken as the depth where a uniform microstructure, hardness or carbon content at the base material is observed. The microscope image analysis system is accurate for-as hot rolled, as farged, as annealed and as normalized sample. The software performs interactive measurement of complete, partial or total decarburisation conforming to industry standards. ASTM E1077, ISO 3887, JIS-0557-98 BS-6617, IS-7754 DIN 50192.

1st step



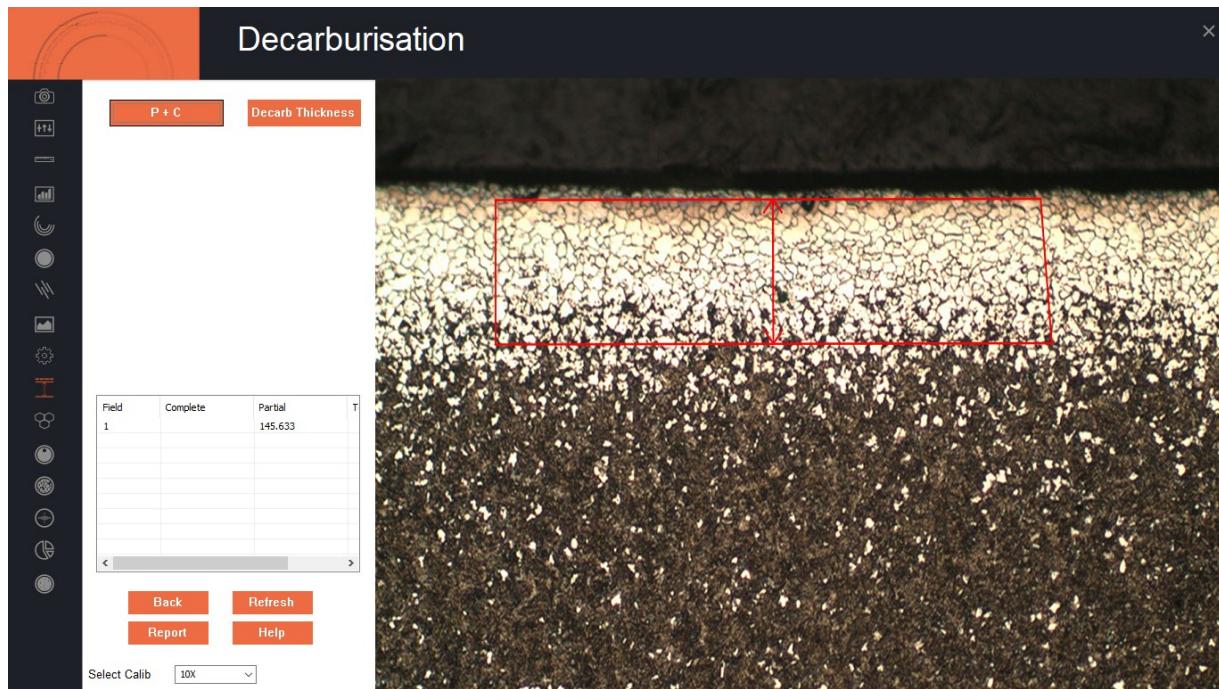
Load the image to be analyzed.

2nd step



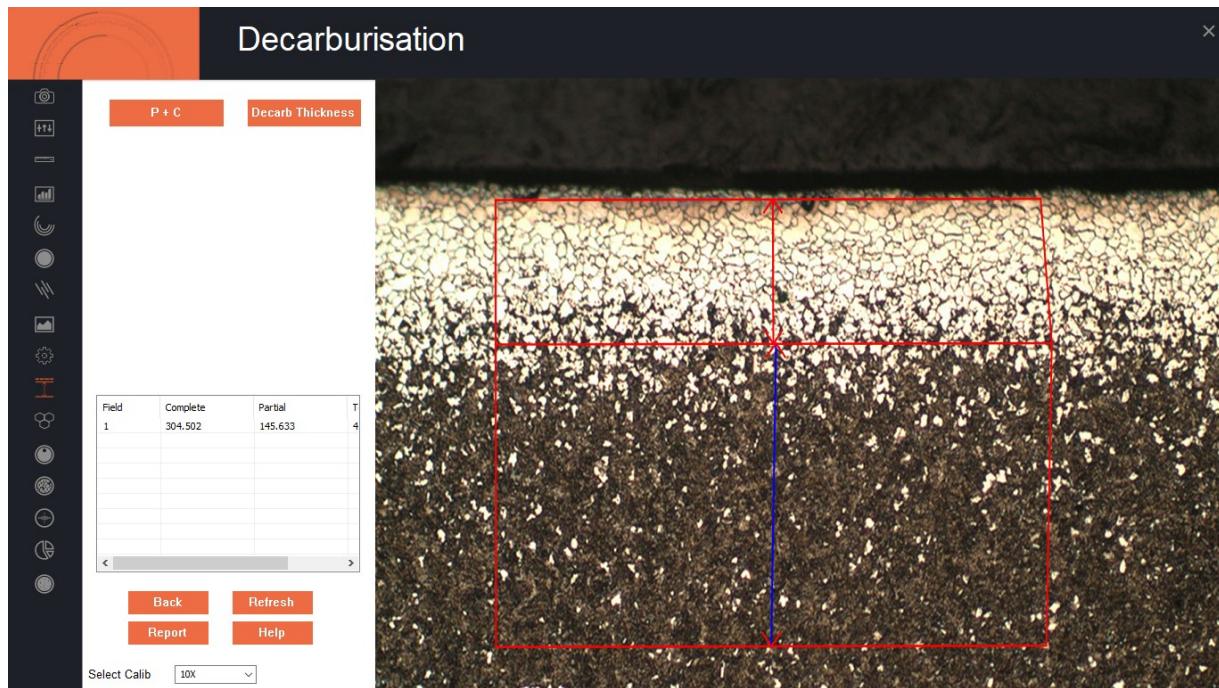
Choose a tap according to your need, the available method are : 1. Complete Decarb 2. Partial Decarb . Activate Complete Decarb. Draw line from starting to the end point of complete decarb.

3rd step



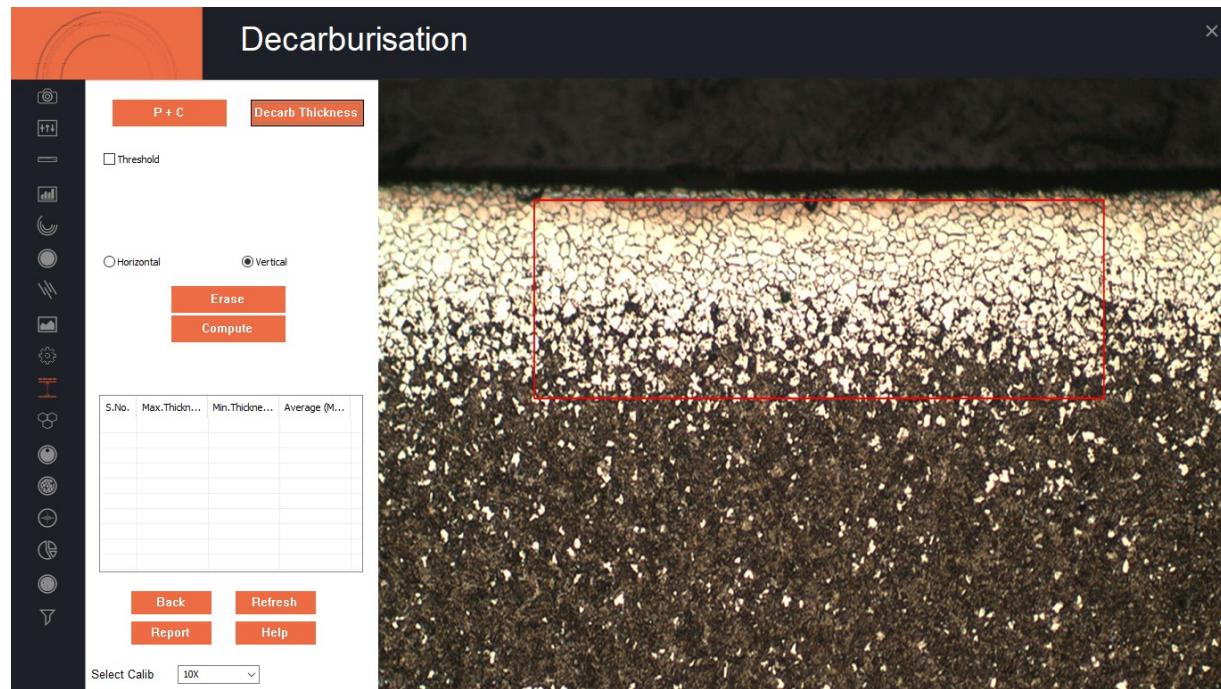
Activate Partial Decarb. Draw a line from the starting to the end point partial decarb.

4th step



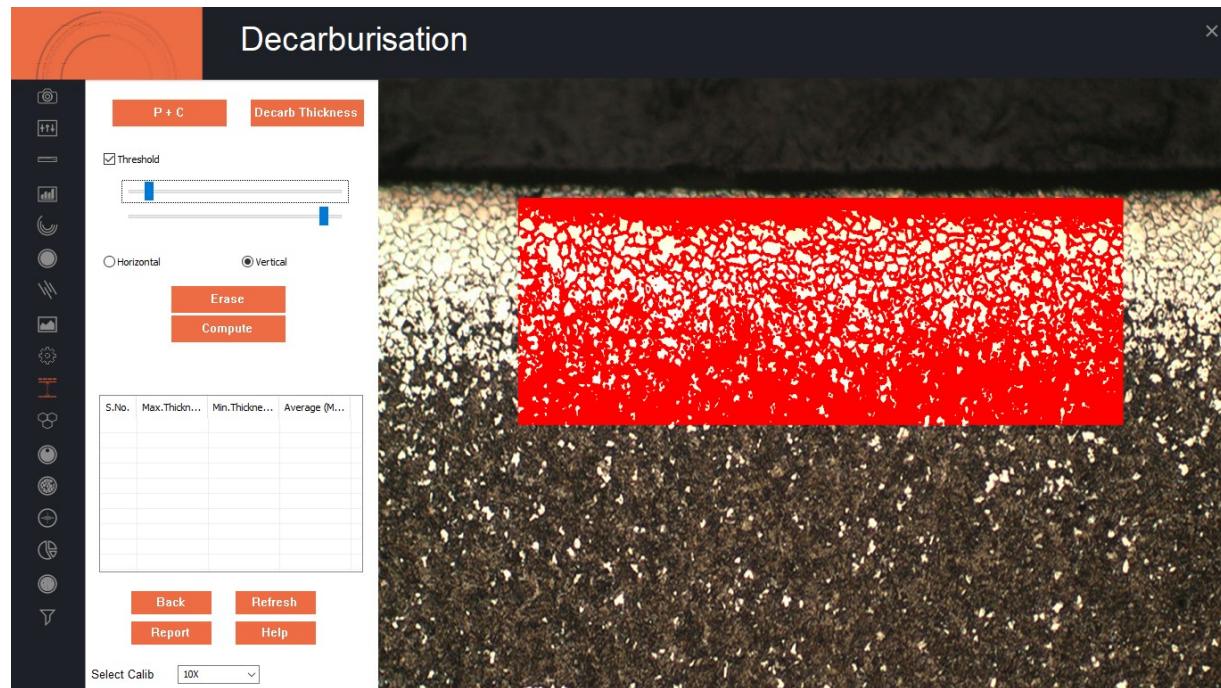
If you need to know only completed decarb, activate Complete Decarb. Draw one or more lines on the complete decarb layer.

5th step



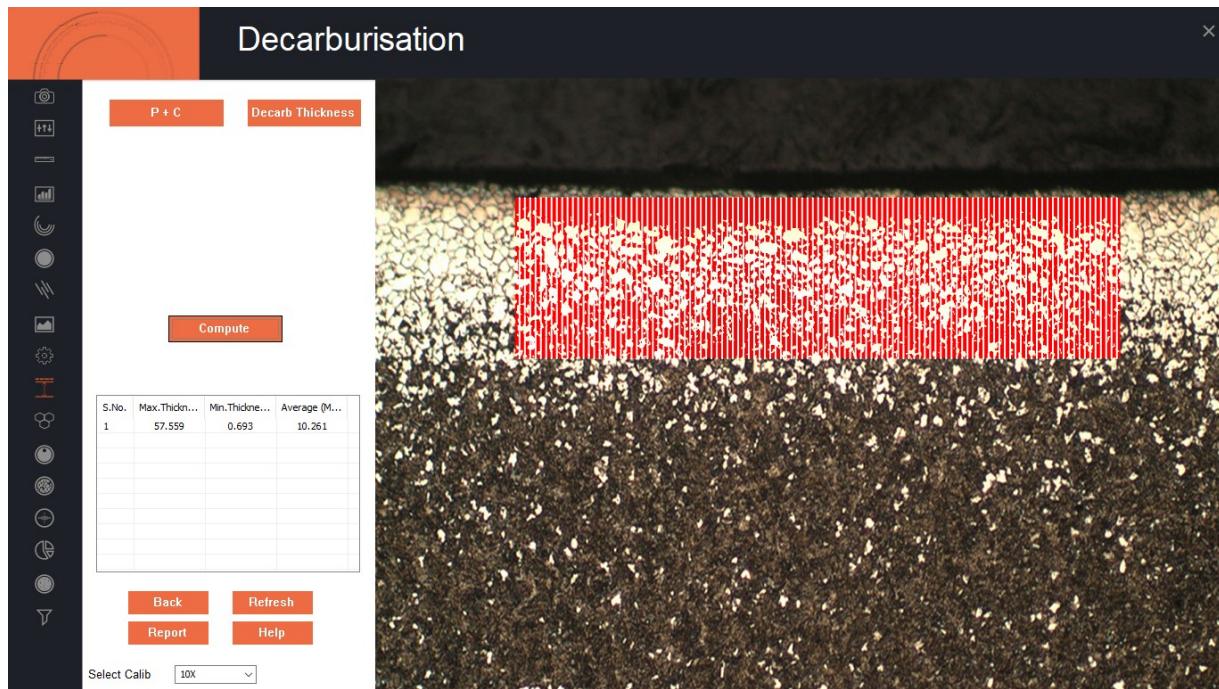
Click on Decarb Thickness. Select the area that you want to analyze.

6th step



Adjust the Threshold using Scrollbars.

7th step



Click on Erase Button and select the unwanted area, then click on Compute

RESULT ARE AVAILABLE IN EXCEL IN A-4 SIZE

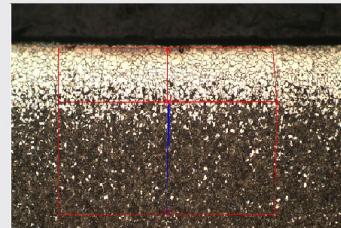
DECARBURISATION REPORT

CUSTOMER NAME :	PaceTechnologies	PART NAME:	Seamless Pipe
EVALUATION DATE :	2016-09-08-14-39-53	PART NO.:	124
REPORT NO.:	223	MATERIAL GRADE:	223
DRAWING NO:	—	SUPPLIER HEAT QTY.:	—
SUPPLIER HEAT NO :	—	BATCH NO.:	—
INVOICE NO./QTY :	—	COLOR CODE :	—

DECARBURISATION REPORT - ASTM E562 & E1245



Etched Image



Processed-Etched Image

Fields	Partial Decarb	Complete Decarb	Total Decarb
Field 1	221.739681	223.317557	445.057
Field 2	271.742532	185.649918	457.392

Remarks

Approved By



SEGMENTATION

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 identify by colored overlays and can be simultaneously displayed in the same field of view. The results and images displayed get stored in To distinguish the phases prominently various filters like Despeckle, Smoothing etc can be used before doing the phase.

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. analysis. the industrial standard automatically.

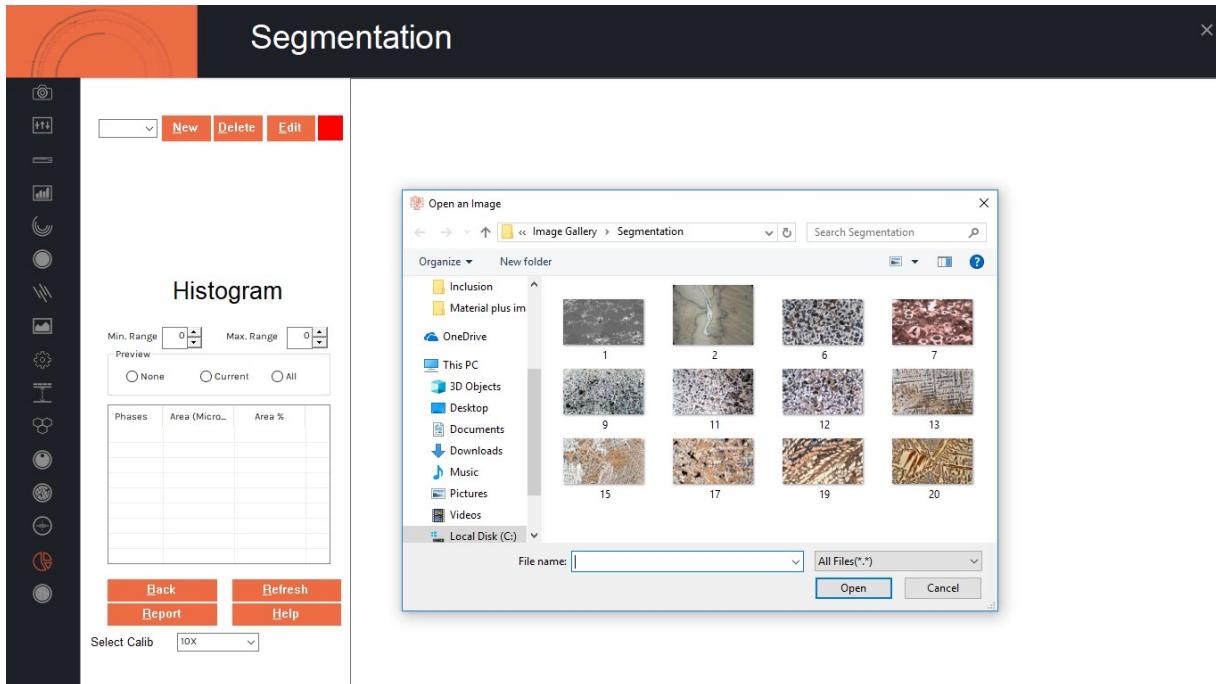
HISTOGRAM: Phase allows the user to designate up to ten different threshold settings to identify material phases and name each of these phases. The color between two lines signifies a particular phase.

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

box.

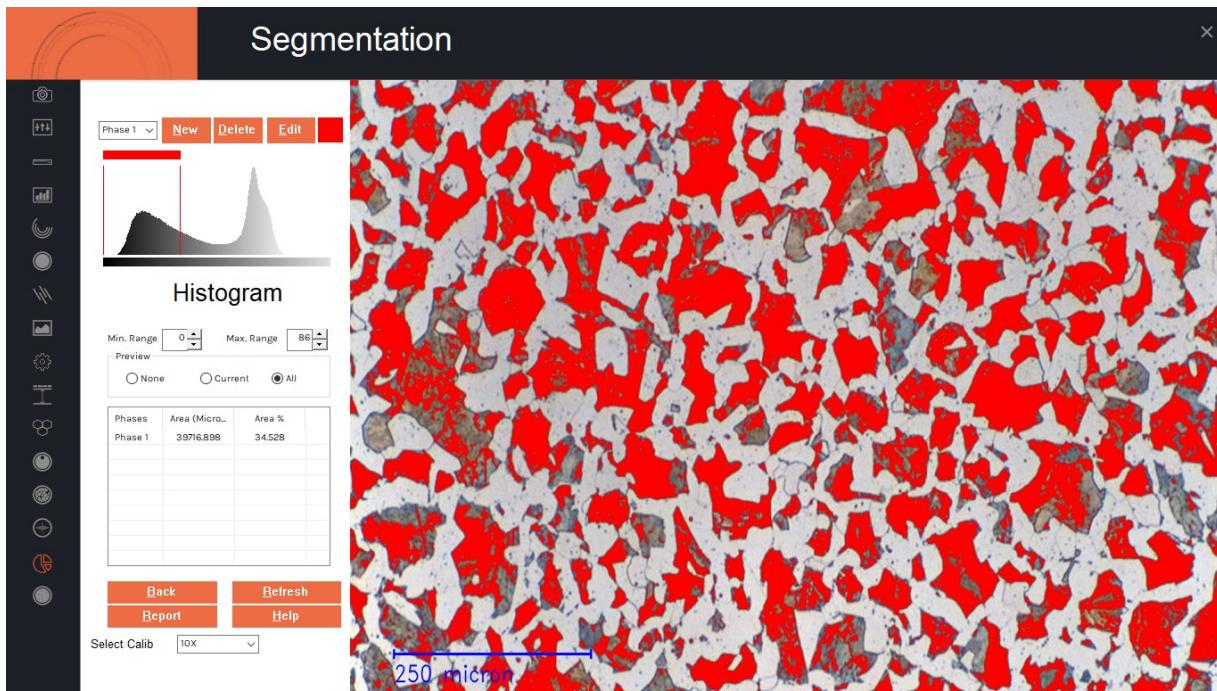
SELECTED PHASE: This property enable the user to know the percentage area of a specific range of intensity just by clicking the mouse. All previous operations have to be deleted and Preview should be on None.

1st step



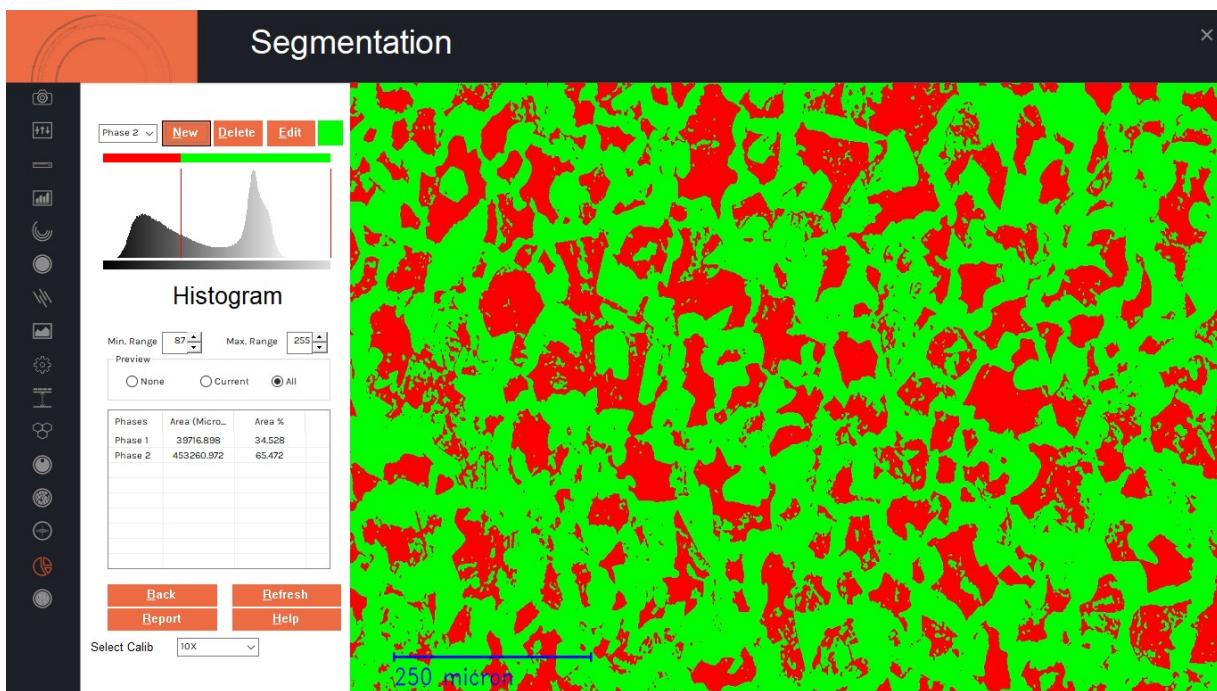
Load an appropriate image which you have to analyse.

2nd step

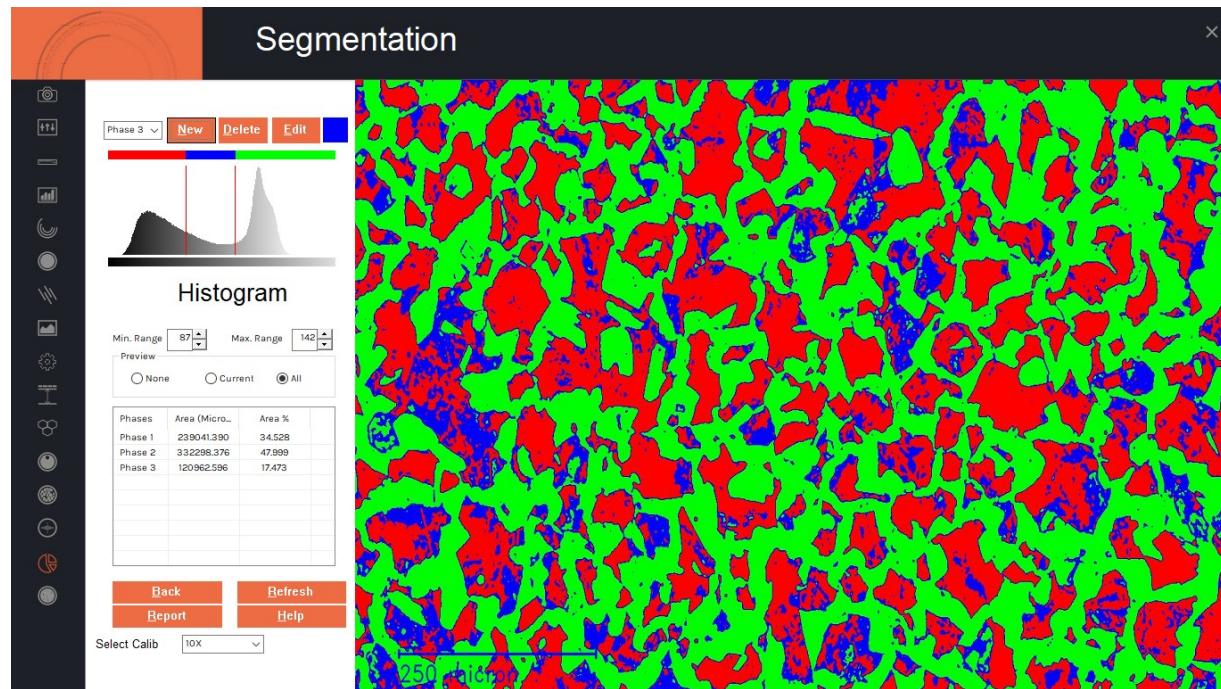


Click two times on appropriate non-etched captured image for analysis.

3rd step



4th step



RESULT ARE AVAILABLE IN EXCEL IN A-4 SIZE

