

SW PRO MET

INSTRUCTION MANUAL

Model	
PRO MET Software	

Ver. 1.0 2024

CE

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1. Warning

This microscope is a scientific precision instrument designed to last for many years with a minimum of maintenance. It is built to high optical and mechanical standards and to withstand daily use. We remind you that this manual contains important information on safety and maintenance, and that it must therefore be made accessible to the instrument users. We decline any responsibility deriving from incorrect instrument use uses that does not comply with this manual.

2. Safety Information



Avoiding Electrical Shock

Before plugging in the power supply, make sure that the supplying voltage of your region matches with the operation voltage of the equipment and that the lamp switch is in off position. Users should observe all safety regulations of the region. The equipment has acquired the CE safety label. However, users have full responsibility to use this equipment safely. Please follow the guidelines below, and read this manual in its entirety to ensure safe operation of the unit.

3. Installing the software

3.1 Install the software

- 1. Run the setup.exe file from the main folder.
- 2. You will be prompted to enter the destination folder. Select C:\Optika\PROMET.

Destination Folder	×
	Please choose destination folder for your program. This is the directory where the program and its support files are installed to.
	Folder:
	C:\Optika\PROMET
	Browse
	Space
	Required 150988 K Free: 113043100 K
	< Back Next > Cancel

- Click on Next. Installation will begin.
 At the end system is ready to be launched.

3.2 Installing TWAIN source

- 1. Download the TWAIN setup file from the the path: https://www.optikamicroscopes.com/directshowandtwainconnection. zip 2. Extract the folder.
- 3. The folder contains the following elements:

Dir	Direct Show_Twain v 👌 Cerca in Dir					
^	Nome	Ultima modifica	Тіро			
	🐼 OPTIKADshowSetup.exe	03/03/2024 17:27	Applicazione			
	🔂 OPTIKATwainSetup.exe	03/03/2024 17:27	Applicazione			

4. Double click on the item "OPTIKATwainSetup.exe".

5. In the following dialog click "Yes". The following dialogue box appears:



- 6. Click on "Next".
- 7. Accept the default installation folder and click on "Install".
- 8. Once installed the "installation completed" message will appear.
- 9. Click on "Close".

Minimum System Requirements:

CPU: 1.7 GHz RAM: 4 GB Hard Disk: 800GB OS: Windows 10 (64 Bit) USB: 3 x USB2.0, 1 x USB3.0

4. Image Capture

4.1 Image preview

1. After opening the Software, click "File", then click on "Select Scanner/Twain Camera".



2. The "Select Source" dialog box containing the list of available cameras will appear.

×
Seleziona
Annulla

- 3. Click on camera model you want to use (e.g., "OptikaCam 3.2") and click "Select".
- 4. Click "File", then click on "Scan new/Capture from Twain Camera". Live image will appear.



_		
TWAIN		
Camera		
Camera:	C-P3(USB2.0)	-
Live:	2048 * 1536	•
Acquisisci:	2048 * 1536	-
Zoom:	46%	
	turner 1	
	Acquisisci	
Esposizione		•
Esposizio	ne Automatica	
Bersaglio		63
]	_
Tempo di		6.647ms
		_
Guadagno:		1.00
J		
	1	
Opzio	Predefini	ti
Bilanciament	to del Bianco	
Temperatura	•	6170
	}	_
Tinta:		901
Spostare la P	ROI (rettangolo rosso o lampeggi	ante) su
una zona di t definire il bila	bianco puro e diccare "Una Spinta anciamento del bianco per una co	rretta
acquisizione.		
		2
	Once Predefiniti	
Profondità B	lit	•
Colore		•
Frame Rate		•
Modo		•
Ribalta		•
Frequenza A	limentazione (Anti-sfarfallio)	
istogramma		•

- 5. Set the camera parameters according to personal preferences, then click on "Snap".
- 6. The thumbnail of the captured image will be shown in "Currently loaded images" section in the bottom of the screen.



7. Image can be saved using "File > Save as...".

4.2 Calibration

- 1. Start the live image as explained in Chapter 4.1.
- 2. Insert lowest magnification objective in the light path (e.g. 5x)
- 3. Put on the microscope stage a calibration slide and focus with the microscope focus knobs until the scale is clearly focused on the screen.
- 4. Snap the image.
- 5. From "Currently loaded images" section click the image in order to show it on the screen.
- 6. Click on "Calibrate" on the top of the screen.

File Edit	t Image	Process Me	easurement	s A	nalys	isModules	Image Do	c Utilities	View	Macro	Win
₽ Den	Save	A0I	Count	ہے Ma	a cro	GrayMask	Threshold				
File C	ss Calib	rate	Mea	surement	s Analys	is Modules					

7. Calibration dialog will appear on the right side of the screen.

Spatial calibration						
Spatial Intensity						
Current calibration set						
Default						
Delete						
Unit Pixels 💽						
Calibration :Pixels/unit						
X 1 Y 1						
Calibrate using a reference						
Aspect ratio (x/y)						
Use aspect ratio to calculate						
Calibration mark (annotation) Length 10 Units						
Attach calibration to this image						
Set as default calibration						
Attach to all currently loaded images						

- 8. Select "Spatial".
 9. In the "Current calibration set" click on "New" and input the current magnification used (e.g. 5X)
- 10. In the "Unit" field" select "microns".
- 11. In the "Calibration : Pixels/Unit" section leave "X = 1" and "Y = 1". Then click on "Calibrate using a reference" 12. The calibration dialog changes:

Spatia Spal	I calibration ial Intensity						
Pres orien mark	PressX orY depending on the orientation of your reference mark on the image						
Re	erence detect mode						
Sc	ale:Detect edges 📃 💌						
Calibrate for (direction)							
	×						
	U						
	T						
	< <back< td=""></back<>						
Scale							

13. Here user can select among three different calibration methods:

Reference detect mode					
Scale:Detect edges	•				
Scale:Draw line Scale:Detect edges					
Circle:Draw square					

- 14. In this case we will use "Scale: Draw line" method.
- 15. In the "Calibrate for (direction)" select "X". The mouse cursor will change shape (a "+" shape will appear allowing to draw a line along the scale).



16. In the "Enter actual dimension of line" enter the lenght of the drawn line (in this example 1000 microns), then click on "Accept".



- 17. Then click on "Back".
- 18. The dialog box will appear like this:



The sensor pixel cell is square, therefore the "X" dimension is the same of the "Y" dimension. It is not needed to perform
a new calibration in the "Y" direction. You can copy the value listed in the "X" field and paste in the "Y" field. Doing this
the calibration will be applied both in X and Y directions.



At the end click on "Attach calibration to this image" and on "Set as default calibration".
 In the calibration list the "5x" value will be available for future measurements.

Attach calibration to image		Calibration Default		AOI	Q
5x ▼	Quit	A BUT	The Low		
Attach Default All					

21. Repeat the same procedure for all the available objectives.

Analysis modules 5.

5.1 **Phase/Vol Fraction**

There are two different modes to analyze Phase/Vol Fraction.

- Manual Detection
- Automatic Detection

Mode n° 1: Manual detection

- 1. Select "Phase/Vol Fraction" from the AnalysisModules.
 - AnalysisModules Image Doc Utilitie Phase/Vol.fraction Grain Size Nodularity Graphite Flake Porosity Coating Thickness Decarburisation Depth Banding/Orientation Dendritic arm spacing MicroHardness Inclusion
- Load or snap the image you want to analyze.
 Select the proper calibration from the calibration
 The analysis menu on the right side of the scr Select the proper calibration from the calibration drop-down list and click on "Attach". The analysis menu on the right side of the screen appears like this:

Phase/Vol fraction							
Detect	Edit	Results	Configure				
– Set intensity range to identify phase– For detection use Gray mask 💌							
Set rang	je for	ferrite	~				
128 Dinarize	r over currer	lay nt phase	· · · · · ·				
Binarize	all ph	ases	All phases				
Detection mode / Macro							
2Phase	•		•				
Analyze							

5. Select on "Configure" then click on "Edit" or "Create New" and enter the number of phases observed in the image.

Cu	nencooringuis	adon	
Bul	lsEye	~	Edit
Def	aultPhase	_	
Fer	Per		create new
Iror	nCu		
My	steel	\sim	
To	tal obases		
1.0	ai priases		2 -
#	Name of Pha	ise	dis
#	Name of Pha Ferrite	ise	dis
# 1 2	Name of Pha Ferrite Pearlite	ise	dis
# 1 2 3	Name of Pha Ferrite Pearlite	ise	dis
# 1 2 3 4	Name of Pha Ferrite Pearlite	ise	dis
# 2 3 4 5	Name of Pha Ferrite Pearlite	ise	dis
# 2 3 4 5 6	Name of Pha Ferrite Pearlite	ise	dis

6. Then click on "Save" or "Save as"

Standard	ASTM E 562 💌
Enter the name configuration	Maximum 🖵
My steel	
Done	Cancel

- 7. Input the name of the new configuration and click on "Done".
- 8. In the "Detect" section select the phase thresholding.
 As Detection mode / Macro use "None/Use threshold"
 Enable the checkbox "Color overlay"

Phase/Vol fraction		
Detect Edit Results Configure		
Set intensity range to identify phase For detection use Gray mask 💌		
Set range for Ferrite		
Color overlay Binarize current phase Accept		
Binarize all phases All phases		
Detection mode / Macro		
None/Use treshold 🔹		
Analyze		
Field# 1		
🗹 Display overlays		

In the main screen select "Grey mask" •

Fit to window 💌 1=1 Show Gray mask	▼Calibration 5x	A0I 🔍	

• Start the thresholding. The selected phase (e.g. "Ferrite") will be displayed in false colors.





- Repeat the same for the other phase.
- Once threshold is done, click on "Analyze". Image will be analyzed, phases will be displayed in the selected pseudocolors and the result sheet will be displayed in the bottom of the image.



To get the results in PDF format click on "Result Summary". A PDF with the selected template will appear containing
original image, pseudocolored image and result sheet

Mode n° 2: Automatic detection

1. Select "Phase/Vol Fraction" from the AnalysisModules.



- Load or snap the image you want to analyze.
 Select the proper calibration from the calibration drop-down list and click on "Attach".
 In the "Detection mode / Macro" select a suitable macro for the specimen.

-	Detection mode / Macro		
	None/Use treshold	•	
	4Phase_wCarbides Blank BullsEye Bullseye_large BullsEye_small Copper FerPerMod	^] ÷
Ī	Sicuboid2phase	¥	_

Click on "Analyze".
 Phase analysis will be automatically performed.

5.2 Grain Size

1. Select "Grain Size" from the AnalysisModules.



- 2. Load or snap the image you want to analyze.
- 3. Select the proper calibration from the calibration drop-down list and click on "Attach".
- 4. The analysis menu on the right side of the screen appears like this:

Detect Results	Configure
Intercept len	gth method
Intercept type	
Horizontal	
Vertical	Circular
- Detection mode	
Binary C	Grayprofile
Lines 3	AutoDetect
Overlay color	
- Preprocessing	Macro
GrainDetect01	•
Analy	ze
	Field# 1

Click on "Configure"

There are 3 different modes to analyze Grain Size particles

- Intercept Length
- Planimetric
- Grain Size (Automatic)

Mode n° 1: Intercept Lenght

1. In the Analysis mode/method select "Intercept lenght".



2. In the "Detect" section enter the number of lines you want to draw on the image and click on "Analyze".

GrainSize
Detect Results Configure
Intercept length method
Intercept type
Horizontal
Vertical Circular
Detection mode
💿 Binary 🛛 Grayprofile
Lines 3 AutoDetect
Adjust to identife boundare
Overlay color
- Preprocessing Macro
GrainDetect01 🗨
Analyze

3. Analysis will be automatically performed (using some pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.



To get the results in PDF format click on "Result Summary". A PDF with the selected template will appear containing
original image, intercept overlay image and result sheet.

Mode n° 2: Planimetric

1. In the Analysis mode/method select "Planimetric".



2. In "Detect" select an area inside the image that you want to outline.



3. Now tap the grains the field "Tag grains inside area".



- "1" Stands for full grains in selected area. "½" stands for the grains intersected by the outline.



- 4. Once all the grains have been selected (1 or 1/2) click on "Analyze".
- 5. The results will be shown in the bottom part of the screen
- To get the results in PDF format click on "Result Summary". A PDF with the selected template will appear containing
 original image, tagged grains image and result sheet.

Mode n° 3: Grain Area (Automatic)

- 1. Select "Grain Size" from the AnalysisModules.
- AnalysisModules Image Doc Utilitis Phase/Not/Traction Grain Size Nodularity Graphite Flake Porosity Coating Thickness Decarburisation Depth Bending/Orientation Dendritic arm spacing MicroHardness Inclusion
- 2. Load or snap the image you want to analyze.
- 3. Select the proper calibration from the calibration drop-down list and click on "Attach".
- 4. In the Analysis mode/method select "Grain Area (automatic)".



5. In "Detect" click on "Analyze". Analysis will be automatically performed (using some pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.



• To get the results in PDF format click on "Result Summary". A PDF with the selected template will appear containing original image, overlay of outlined grains image and result sheet.

5.3 Nodularity

1. Select "Nodularity" from the AnalysisModules.



- Load or snap the image you want to analyze.
 Select the proper calibration from the calibration drop-down list and click on "Attach".
 The analysis menu on the right side of the screen appears like this:

Detect E	dit Results	Configure
Configu	e measur	ements
Analy	sis method	1
ASTM A-2	47	-
Classifier	Detection	
Parameter	From	To
Nodular	0	75
Flake	0	0
Vermicular	0	4001
Irregular	0	65001
-Batch Hun		
i otal Image	\$ 5 ÷	Run
Pause	after each ima luzad	ge
	Field#	1 ÷
🗹 Display	Outlines	

5. In "Detect" select the most suitable Preprocessing Macro from the drop-down list and then click on "Analyze".



6. Analysis will be automatically performed (using the selected pre-processing macro already stored in the software) and the result will be displayed at the bottom of the screen.



• To get the results in PDF format click on "Result Summary". A PDF with the selected template will appear containing original image, overlay of outlined graphite nodules image and result sheet.

5.4 **Graphite Flake**

1. Select "Graphite Flake" from the AnalysisModules.



- Load or snap the image you want to analyze.
 Select the proper calibration from the calibration drop-down list and click on "Attach".
- 4. The analysis menu on the right side of the screen appears like this:

Configure measurements			
method			
types	-		
ection			
rom	To	~	
30) } 20)	99999 9999 9999 9999 9999 9999 9999 >	*	
	method types ection irom 10	method types ▼ section 0 10 99999 9999 9999 9999 9999 9999 9999 9999 9999 >	

5. In "Detect" select the most suitable Preprocessing Macro from the drop-down list and then click on "Analyze".



6. Analysis will be automatically performed (using the selected pre-processing macro already stored in the software) and the result will be displayed at the bottom of the screen.



To get the results in PDF format click on "Result Summary". A PDF with the selected template will appear containing original image, overlay of outlined graphite flakes image and result sheet.

•

5.5 Porosity

1. Select "Porosity" from the AnalysisModules.



- 2. Load or snap the image you want to analyze.
- 3. Select the proper calibration from the calibration drop-down list and click on "Attach".
- 4. The analysis menu on the right side of the screen appears like this:



5. In "Configure" select the standard to be used for the analysis from the drop-down list.



- 6. In "Detect" select the most suitable Preprocessing Macro from the drop-down list and then click on "Analyze".7. Analysis will be automatically performed (using the selected pre-processing macro already stored in the software) and
- the result will be displayed at the bottom of the screen.



To get the results in PDF format click on "Result Summary". A PDF with the selected template will appear containing original image, overlay of outlined pores image and result sheet.

Coating Thickness 5.6

Select "Coating Thickness" from the AnalysisModules. 1.



- 2.
- Load or snap the image you want to analyze. Select the proper calibration from the calibration drop-down list and click on "Attach". The analysis menu on the right side of the screen appears like this: 3. 4.



There are 2 different modes to analyze Coating thickness

- Autodetect
- Interactive trace

Mode n° 1: Autodetect

1. In "Configure" select "Autodetect" from the drop-down list in the field "Coating detection method" .



2. Select the number of layers to be counted

Coating Layers	1 🔝	

In "Detect" select the most suitable Preprocessing Macro from the drop-down list and then click on "Analyze".
 Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.



Mode n° 2: Interactive trace

1. In "Configure" select "Interactive trace" from the drop-down list in the field "Coating detection method" .



2. Select the number of layers to be counted

Coating Layers	1 於

3. In "Detect" select the button "Trace edges" to trace both edges of the coating.



- 4.
- Click on "Analyze". Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen. 5.



• To get the results in PDF format click on "Result Summary". A PDF with the selected template will appear containing original image, overlay of outlined coating image and result sheet.

5.7 Decarburisation Depth

- 1. Select "Decarburisation Depth" from the AnalysisModules.
 - AnalysisModules Image Doc Utilit Phase/Vol/fraction Grain Size Nodularity Graphite Flake Porosity Coating Thickness Decarburisation Depth Banding/Orientation Dendritic arm spacing MicroHardness Inclusion
- 2. Load or snap the image you want to analyze.
- 3. Select the proper calibration from the calibration drop-down list and click on "Attach".
- 4. The analysis menu on the right side of the screen appears like this:



There are 2 different modes to analyze Decarburisation Depth

AutodetectInteractive trace

Mode n° 1: Autodetect

1. In "Configure" select "Autodetect" from the drop-down list in the field "Coating detection method" .

Coating detection method	
Autodetect	
Interactive trace	

- 2. In "Detect" select the most suitable Preprocessing Macro from the drop-down list and then click on "Analyze".
- 3. Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.



Mode n° 2: Interactive trace

1. In "Configure" select "Interactive trace" from the drop-down list in the field "Coating detection method" .

Coating detection method	
Autodetect	
Interactive trace	

2. In "Detect" select the button "Trace edges" to trace both edges of the coating.

- 3. Click on "Analyze".
- 4. Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.



To get the results in PDF format click on "Result Summary". A PDF with the selected template will appear containing
original image, overlay of outlined decarburised image and result sheet.

5.8 Banding

1. Select "Banding" from the AnalysisModules.



- 2. Load or snap the image you want to analyze.
- 3. Select the proper calibration from the calibration drop-down list and click on "Attach".
- 4. The analysis menu on the right side of the screen appears like this:



- 5. In "Detect" select the most suitable Preprocessing Macro from the drop-down list and then click on "Analyze".
- 6. Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.



• To get the results in PDF format click on "Result Summary". A PDF with the selected template will appear containing original image, overlay of outlined banding image and result sheet.

5.9 Dendritic Arm Spacing

Means calculation the distance between the dendrite's secondary arms.

1. Select "Dendritic Arm Spacing" from the AnalysisModules.



- 2. Load or snap the image you want to analyze.
- 3. Select the proper calibration from the calibration drop-down list and click on "Attach".

4. The analysis menu on the right side of the screen appears like this:



5. In "Detect" select the "Default" Preprocessing Macro from the drop-down list and then click on "Run" to binarize the dendritic arms.

- Preprocessing M	1acro —		
default	-	Run	

6. Now Click on "Draw lines" to draw lines across the dendrite's arms.



7. After arms of dendrites are selected click on "Analyze".

8. Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.



• To get the results in PDF format click on "Result Summary". A PDF with the selected template will appear containing original image, overlay of outlined dendritic arm spacing image and result sheet.

5.10 Micro Hardness

Micro hardness testing is a method of determining a materials hardness or resistance to penetration when test samples are very small or thin, or when small region in a composite sample or plating are to be measured.

1. Select "Micro Hardness" from the AnalysisModules.



2. Load or snap the image you want to analyze.



- Select the proper calibration from the calibration drop-down list and click on "Attach".
 In "Configure" select the type of hardness measurement (Vickers or Knoop).



5. In "Detect" enter the load in the field "Load details".

- Load details				
Load in gms	100	-		

- 6. Insert the distance from surface (if known), then click on "Accept".7. Click on "Draw Diamond" to draw a diamond on the image.



8. Adjust flairs with the mouse by left or right click to corners of the diamond dragging to edges of indent and then click on "Measure".



- 9. Measurement will be performed and the result will be displayed at the bottom of the screen.
- 10. Analysis will be automatically performed and the result will be displayed at the bottom of the screen.



• To get the results in PDF format click on "Result Summary". A PDF with the selected template will appear containing original image, overlay of microhardness image and result sheet.

5.11 Inclusions

1. Select "Inclusion" from the AnalysisModules.



- 2. Load or snap the image you want to analyze.
- 3. Select the proper calibration from the calibration drop-down list and click on "Attach".
- 4. The analysis menu on the right side of the screen appears like this:



5. In "Detect" select whether you want to count "Oxides" or "Sulfides".

Detect	Edit	Results	Configure		
Adjust tresholds to identify					
oxides 156 - 255					
sulfides 0 - 141					

- 6. Select the most suitable Preprocessing Macro from the drop-down list and then click on "Analyze".
- 7. Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.
- To get the results in PDF format click on "Result Summary". A PDF with the selected template will appear containing original image, overlay of inclusions image and result sheet.

OPTIKA' S.r.I.

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