

POLYMER COATING ANALYSIS

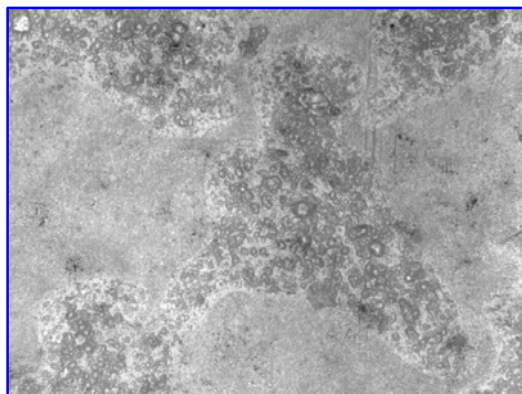


Figure 1: Typical¹ field of view in reflected light (200x). Calibration factor = 0.6162 mm/pixel.

Some gray filters are successively applied on the original image. Each of them is binarized and kept in memory for further use. Binary tools are used to group all binary detections (bitplanes). Artifacts are removed from the final reconstructed bitplane representing the clear polymer coating. Smaller holes are filled prior to measurement.

Sample Description

Six paper samples covered by different amount of clear polymer coating are submitted.

Purpose of Analysis

Demonstrate the ability of the Clemex Vision image analyzer to measure the area percentage of paper surface covered by the coating.

Apparatus

<i>Image Analysis System:</i>	Clemex ImPak V3.0
<i>Microscope:</i>	Nikon Optiphot 100
<i>Objective:</i>	Nikon 20x (200x mag)
<i>Motorized Stage:</i>	Marzhauser
<i>Stage Controller:</i>	Clemex ST 100
<i>Camera:</i>	Sony XC 75CE

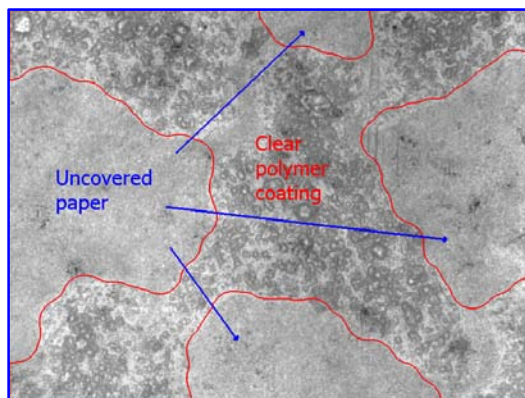


Figure 2: Outline of the final detected polymer coating area overlaid against the original image.

Results

The requested area percentage measurement is performed on each analyzed field. Results are cumulated for automated statistics and graphics production. Final results² are printed directly from Clemex Vision.

Conclusion

The main difficulty encountered in the current analysis is to discriminate the coating from the background (uncovered paper). This is overcome by optimizing the input image and by combining several gray filters. Although some small areas can be mistaken one for the other, the final detection is quite satisfactory.

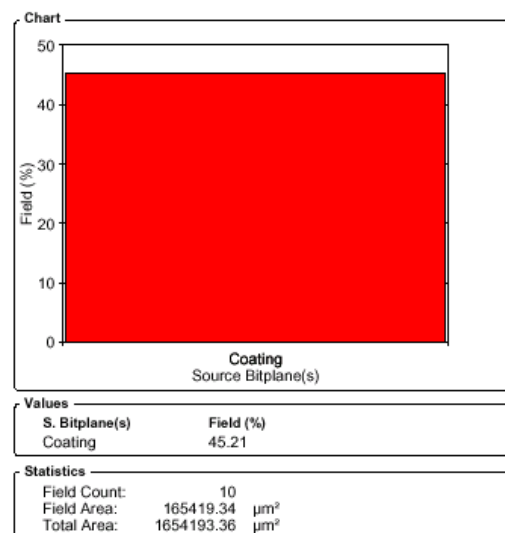


Figure 3: Cumulative graphic of the paper surface covered by the polymer coating.

¹ Images from the other samples are available in appendix A.

² Complete results for each sample are available in appendix B.

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IMAGE ANALYSIS REPORT

Appendix A *Images*

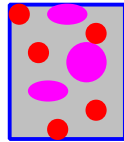




Figure 1: Sample 1 (no clear polymer coating), 200x.

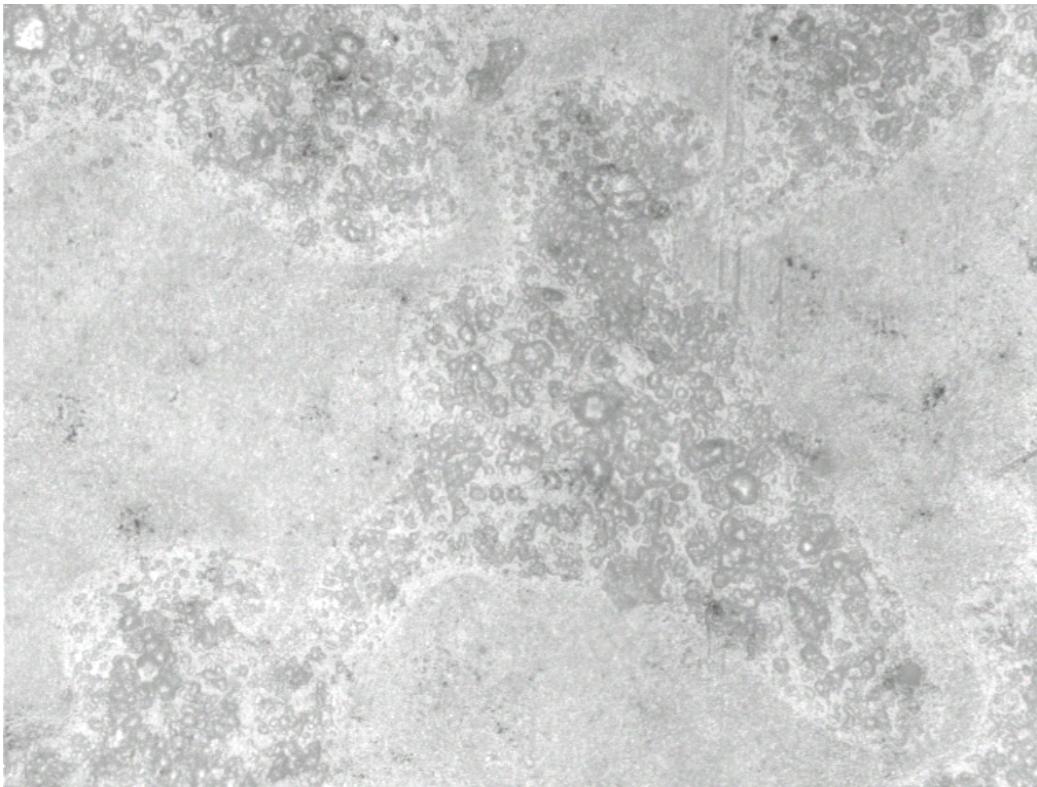


Figure 2: Sample 2 (one coating of clear polymer), 200x.

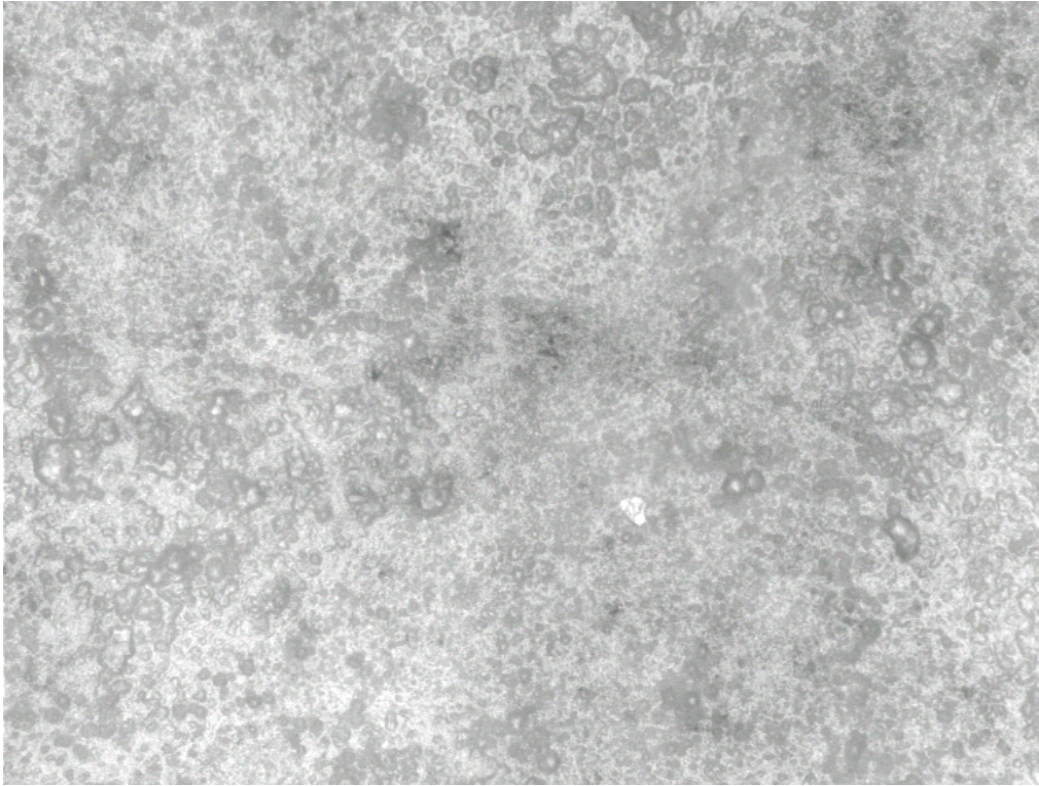


Figure 3: Sample 3 (two coatings of clear polymer), 200x.

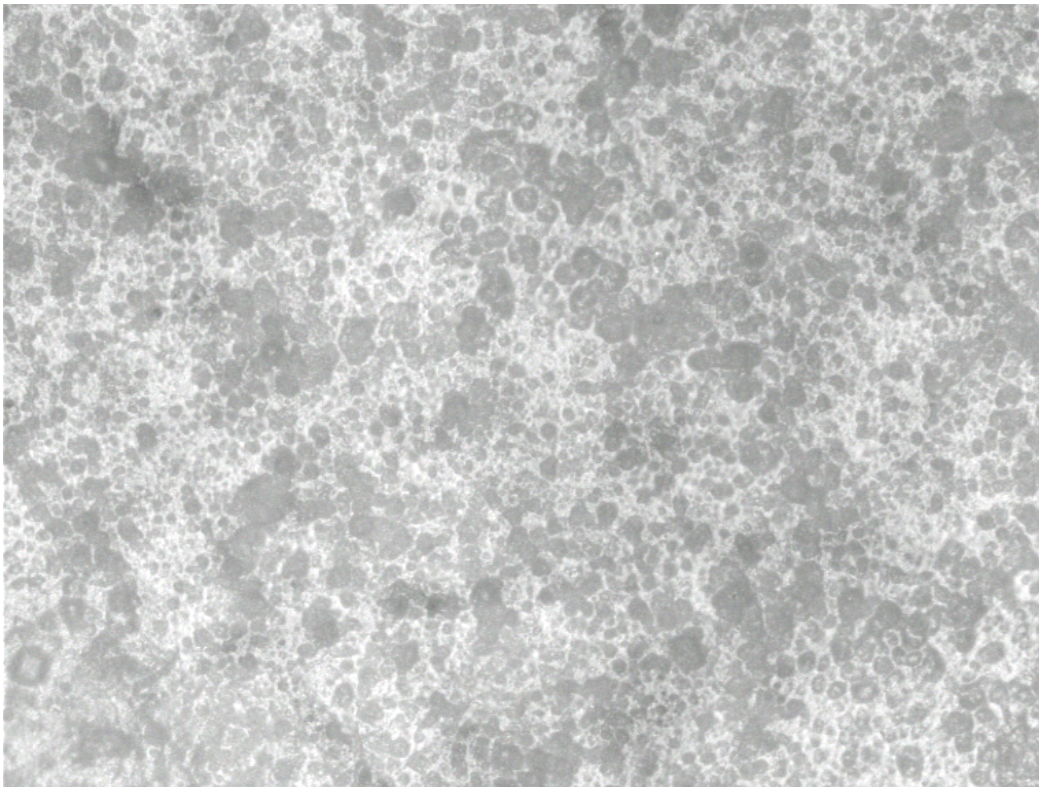


Figure 4: Sample 4 (three coatings of clear polymer), 200x.

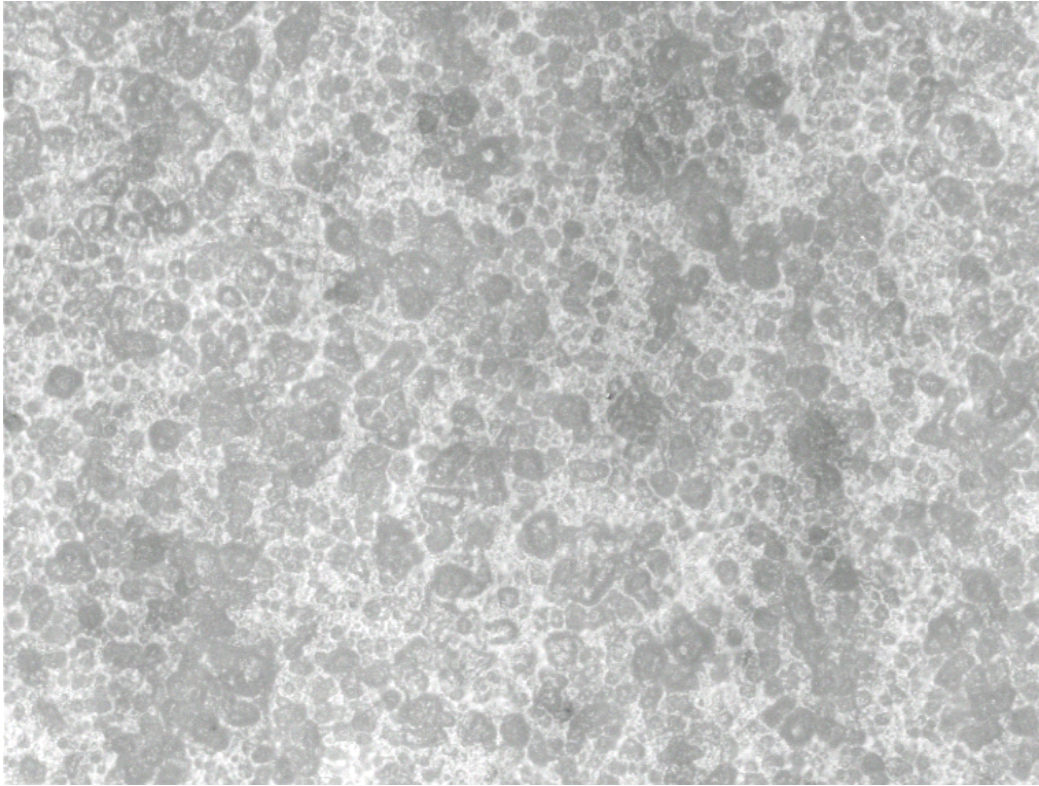


Figure 5: Sample 5 (four coatings of clear polymer), 200x.

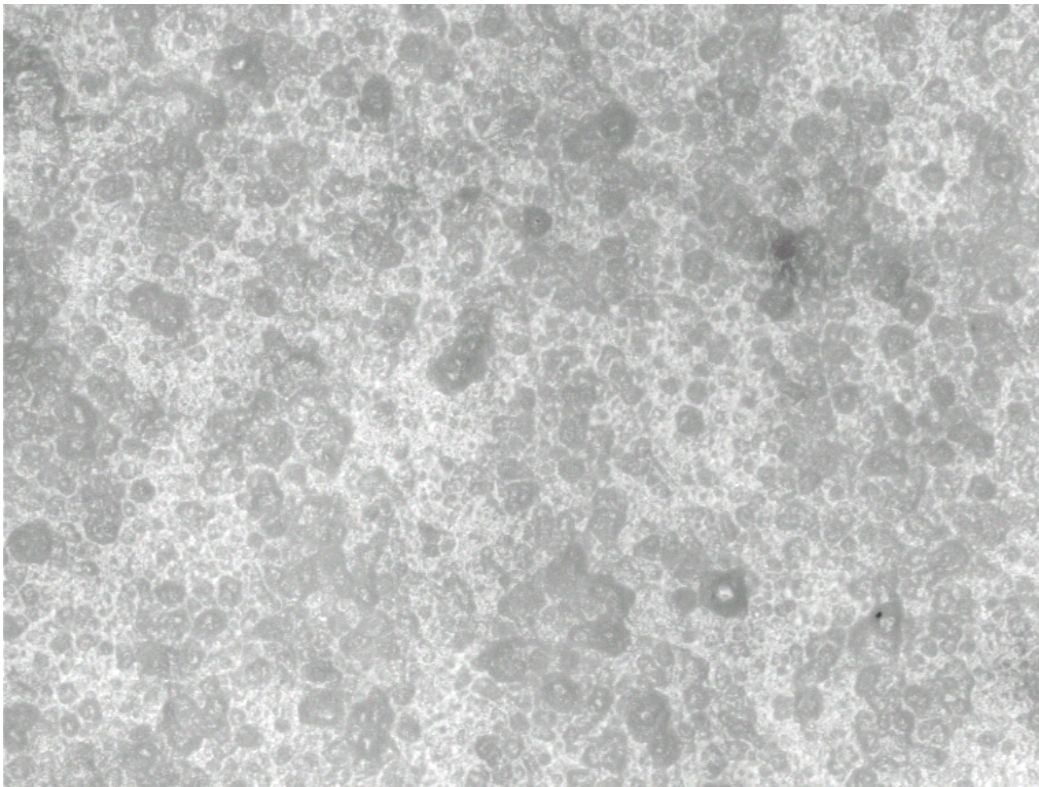
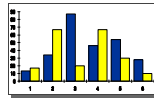


Figure 6: Sample 6 (six coatings of clear polymer), 200x.

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IMAGE ANALYSIS REPORT

Appendix B *Results*



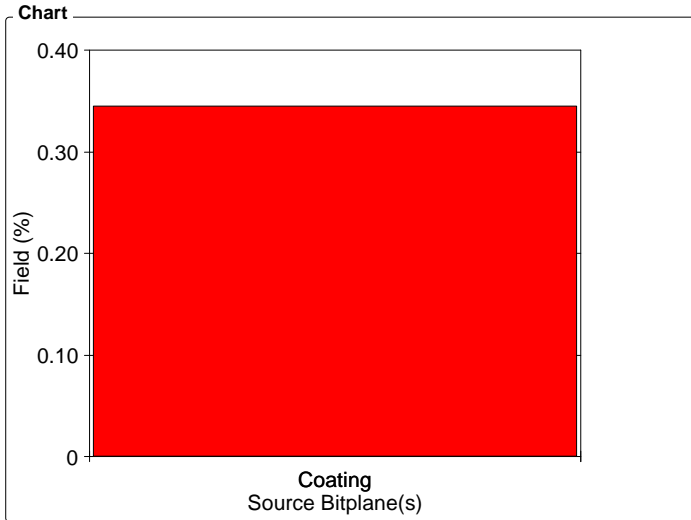
Clemex Vision Report

Organization:
 Department: **Quality Control**
 User:

Date & Time: **2/29/2000**
 Sample: **Sample 1**
 Description: **Clear polymer coating covering the surface (%)**

AREAM1

Magn.: 200x.6 Calib.: 0.6162 $\mu\text{m}/\text{pixel}$



Values

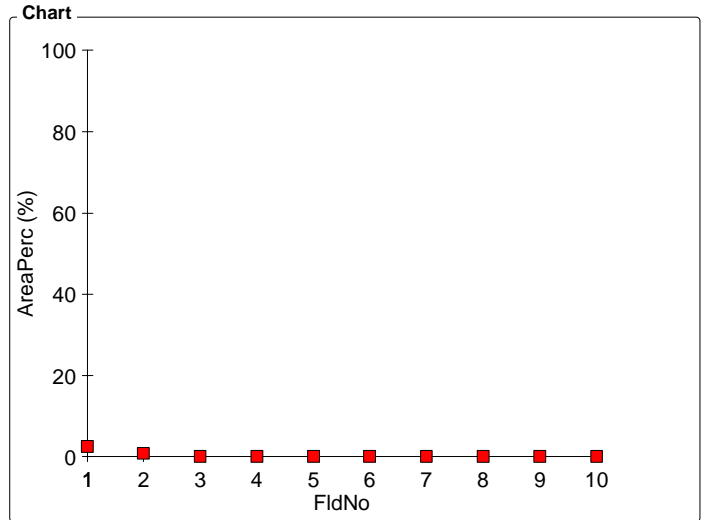
S. Bitplane(s)	Field (%)
Coating	0.35

Statistics

Field Count:	10
Field Area:	165419.34 μm^2
Total Area:	1654193.36 μm^2

FLDM3 AreaPerc - FldNo

Magn.: 200x.6 Calib.: 0.6162 $\mu\text{m}/\text{pixel}$ Bitplane: Coating



Values

FldNo	AreaPerc (%)
1	2.56
2	0.89
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0

Statistics

Minimum:	0	%
Maximum:	2.56	%
Mean:	0.35	%
Std Dev.:	0.83	%
Count:	10	
Under:	0	
Over:	0	
Accepted:	100	%
Field Count:	10	
Field Area:	165419.34	μm^2
Total Area:	1654193.36	μm^2

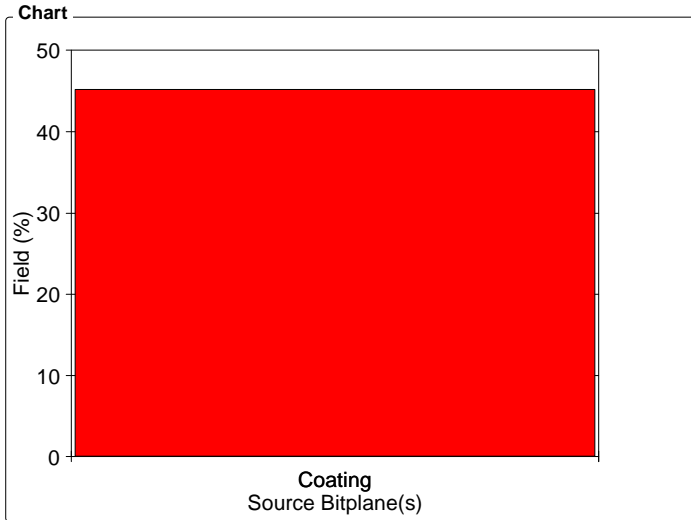
Clemex Vision Report

Organization:
 Department: **Quality Control**
 User:

Date & Time: **2/29/2000**
 Sample: **Sample 2**
 Description: **Clear polymer coating covering the surface (%)**

AREAM1

Magn.: 200x.6 Calib.: 0.6162 $\mu\text{m}/\text{pixel}$



Values

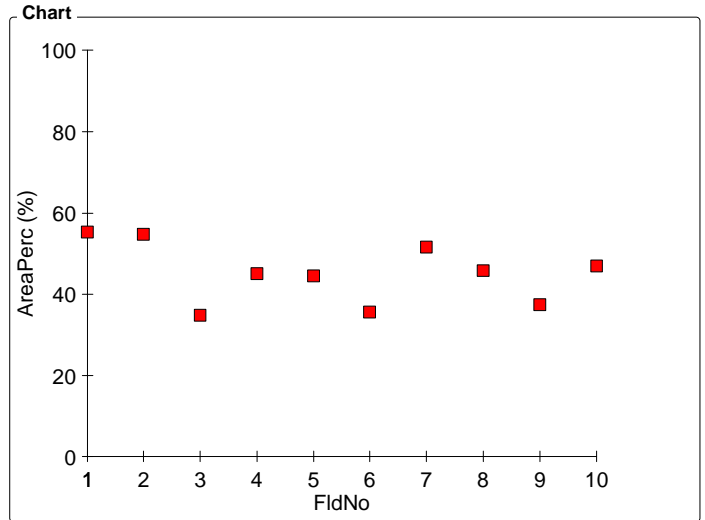
S. Bitplane(s)	Field (%)
Coating	45.21

Statistics

Field Count:	10
Field Area:	165419.34 μm^2
Total Area:	1654193.36 μm^2

FLDM3 AreaPerc - FldNo

Magn.: 200x.6 Calib.: 0.6162 $\mu\text{m}/\text{pixel}$ Bitplane: Coating



Values

FldNo	AreaPerc (%)
1	55.39
2	54.76
3	34.78
4	45.02
5	44.53
6	35.69
7	51.66
8	45.76
9	37.49
10	46.99

Statistics

Minimum:	34.78	%
Maximum:	55.39	%
Mean:	45.21	%
Std Dev.:	7.45	%
Count:	10	
Under:	0	
Over:	0	
Accepted:	100	%
Field Count:	10	
Field Area:	165419.34	μm^2
Total Area:	1654193.36	μm^2

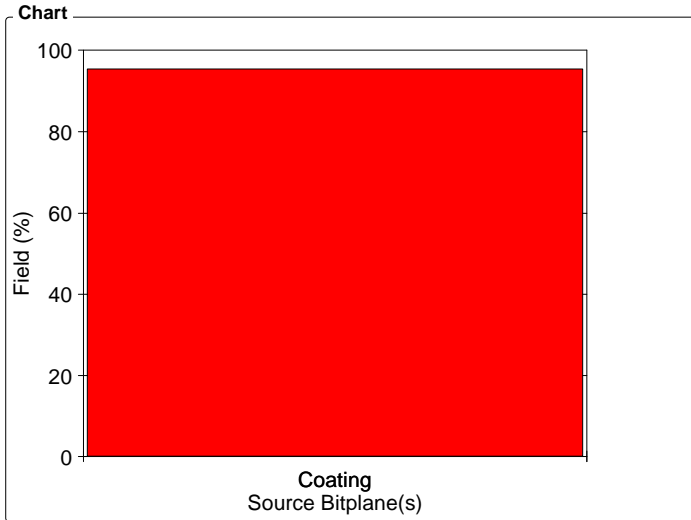
Clemex Vision Report

Organization:
 Department: **Quality Control**
 User:

Date & Time: **2/29/2000**
 Sample: **Sample 3**
 Description: **Clear polymer coating covering the surface (%)**

AREAM1

Magn.: 200x.6 Calib.: 0.6162 $\mu\text{m}/\text{pixel}$



Values

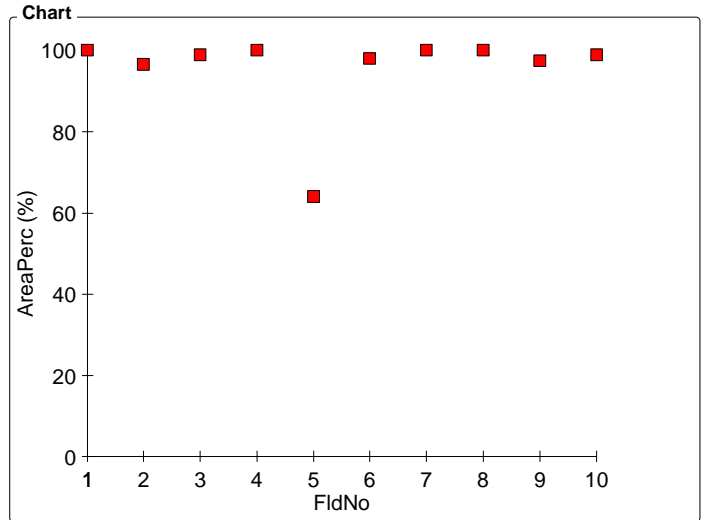
S. Bitplane(s)	Field (%)
Coating	95.40

Statistics

Field Count:	10
Field Area:	165419.34 μm^2
Total Area:	1654193.36 μm^2

FLDM3 AreaPerc - FldNo

Magn.: 200x.6 Calib.: 0.6162 $\mu\text{m}/\text{pixel}$ Bitplane: Coating



Values

FldNo	AreaPerc (%)
1	100
2	96.61
3	99.03
4	100
5	63.97
6	98.09
7	100
8	100
9	97.41
10	98.89

Statistics

Minimum:	63.97	%
Maximum:	100	%
Mean:	95.40	%
Std Dev.:	11.11	%
Count:	10	
Under:	0	
Over:	0	
Accepted:	100	%
Field Count:	10	
Field Area:	165419.34	μm^2
Total Area:	1654193.36	μm^2

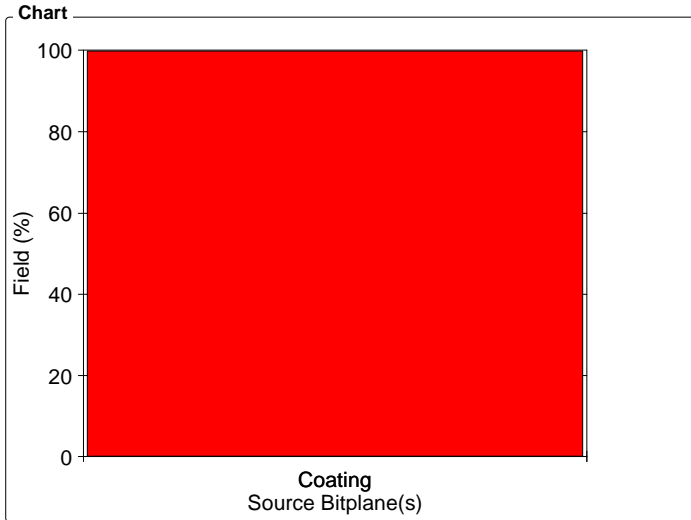
Clemex Vision Report

Organization:
 Department: **Quality Control**
 User:

Date & Time: **2/29/2000**
 Sample: **Sample 4**
 Description: **Clear polymer coating covering the surface (%)**

AREAM1

Magn.: 200x.6 Calib.: 0.6162 $\mu\text{m}/\text{pixel}$



Values

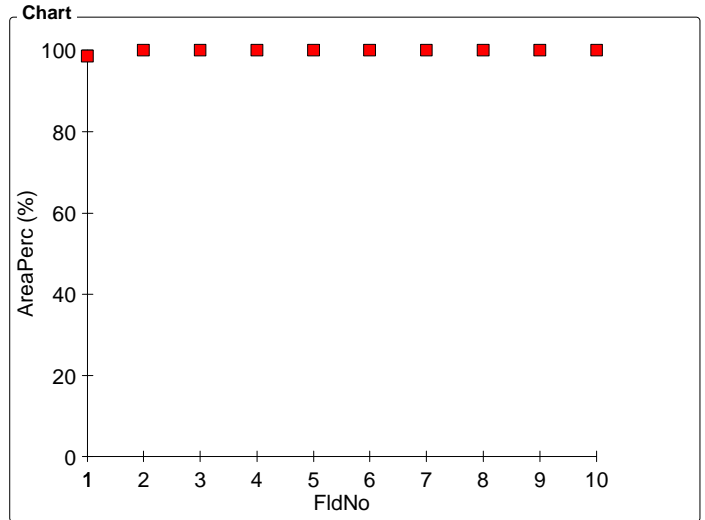
S. Bitplane(s)	Field (%)
Coating	99.86

Statistics

Field Count:	10
Field Area:	165419.34 μm^2
Total Area:	1654193.36 μm^2

FLDM3 AreaPerc - FldNo

Magn.: 200x.6 Calib.: 0.6162 $\mu\text{m}/\text{pixel}$ Bitplane: Coating



Values

FldNo	AreaPerc (%)
1	98.56
2	100
3	100
4	100
5	100
6	100
7	100
8	100
9	100
10	100

Statistics

Minimum:	98.56	%
Maximum:	100	%
Mean:	99.86	%
Std Dev.:	0.46	%
Count:	10	
Under:	0	
Over:	0	
Accepted:	100	%
Field Count:	10	
Field Area:	165419.34	μm^2
Total Area:	1654193.36	μm^2

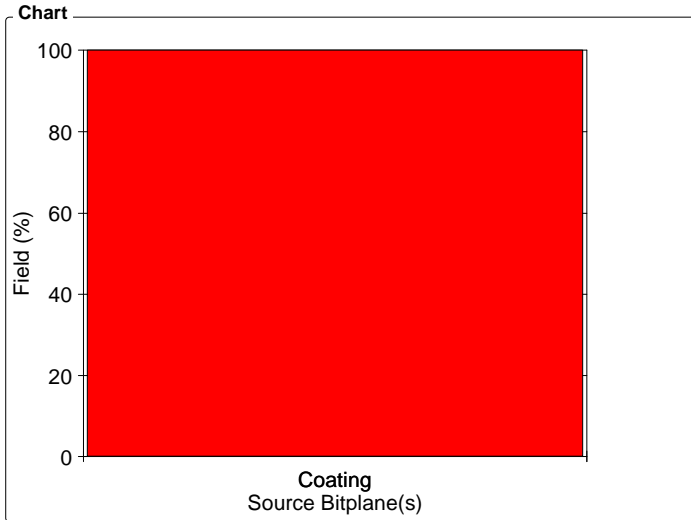
Clemex Vision Report

Organization:
 Department: **Quality Control**
 User:

Date & Time: **2/29/2000**
 Sample: **Sample 5**
 Description: **Clear polymer coating covering the surface (%)**

AREAM1

Magn.: 200x.6 Calib.: 0.6162 $\mu\text{m}/\text{pixel}$



Values

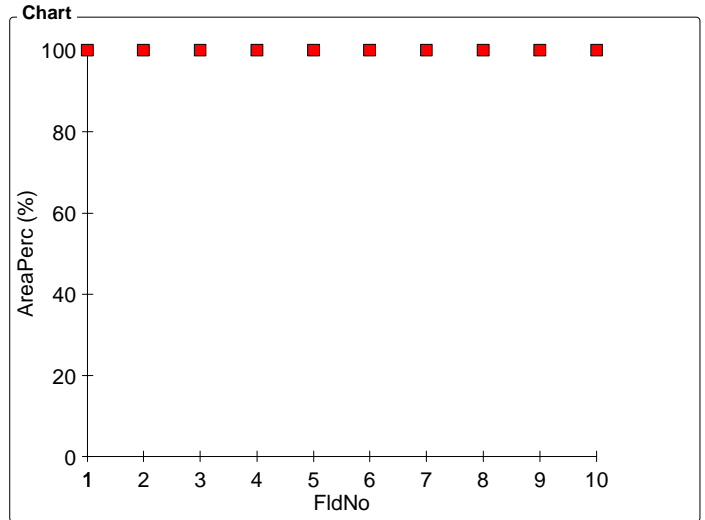
S. Bitplane(s)	Field (%)
Coating	100

Statistics

Field Count:	10
Field Area:	165419.34 μm^2
Total Area:	1654193.36 μm^2

FLDM3 AreaPerc - FldNo

Magn.: 200x.6 Calib.: 0.6162 $\mu\text{m}/\text{pixel}$ Bitplane: Coating



Values

FldNo	AreaPerc (%)
1	100
2	100
3	100
4	100
5	100
6	100
7	100
8	100
9	100
10	100

Statistics

Minimum:	100	%
Maximum:	100	%
Mean:	100	%
Std Dev.:	0	%
Count:	10	
Under:	0	
Over:	0	
Accepted:	100	%
Field Count:	10	
Field Area:	165419.34	μm^2
Total Area:	1654193.36	μm^2

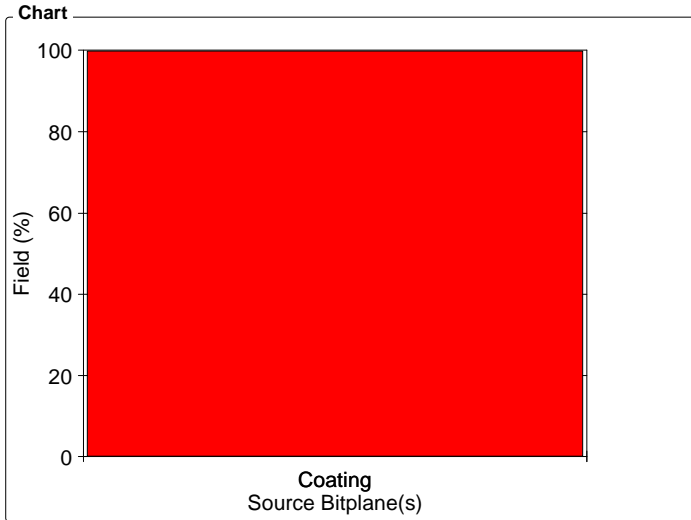
Clemex Vision Report

Organization:
 Department: **Quality Control**
 User:

Date & Time: **2/29/2000**
 Sample: **Sample 6**
 Description: **Clear polymer coating covering the surface (%)**

AREAM1

Magn.: 200x.6 Calib.: 0.6162 $\mu\text{m}/\text{pixel}$



Values

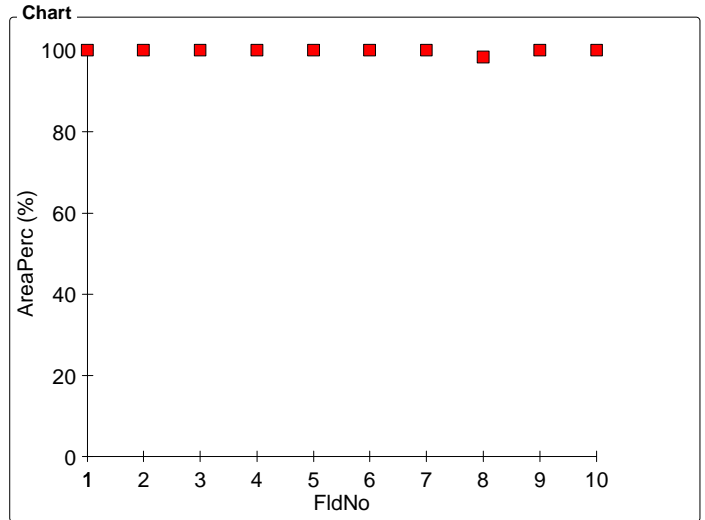
S. Bitplane(s)	Field (%)
Coating	99.83

Statistics

Field Count:	10
Field Area:	165419.34 μm^2
Total Area:	1654193.36 μm^2

FLDM3 AreaPerc - FldNo

Magn.: 200x.6 Calib.: 0.6162 $\mu\text{m}/\text{pixel}$ Bitplane: Coating



Values

FldNo	AreaPerc (%)
1	100
2	100
3	100
4	100
5	100
6	100
7	100
8	98.34
9	100
10	100

Statistics

Minimum:	98.34	%
Maximum:	100	%
Mean:	99.83	%
Std Dev.:	0.53	%
Count:	10	
Under:	0	
Over:	0	
Accepted:	100	%
Field Count:	10	
Field Area:	165419.34	μm^2
Total Area:	1654193.36	μm^2

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