OVERLAYING PROPERTIES OF PARTICLEBOARD PANELS MADE FROM EASTERN REDCEDAR AND OSAGE ORANGE

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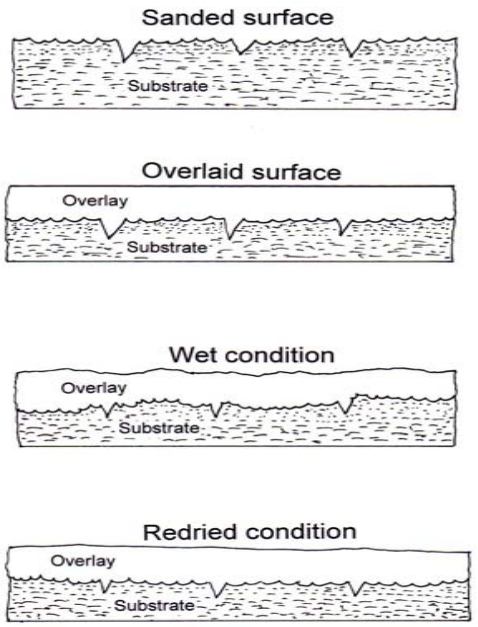
TAIPEI, TAIWAN

Surface roughness of wood composites is latent property which may play a significant role as they are exposed to high relative humidity.



OBJECTIVES

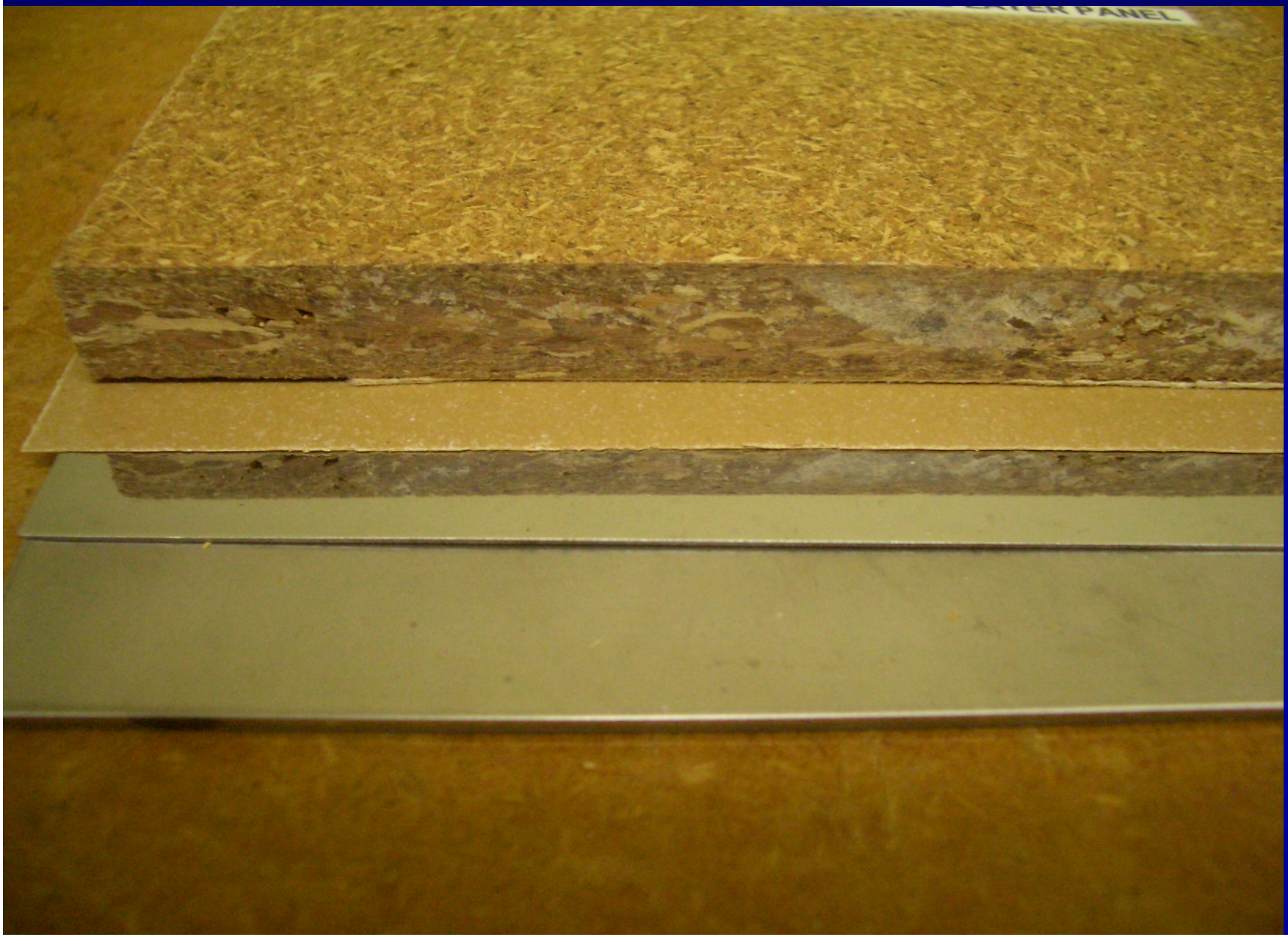
To quantify surface quality of overlaid particleboard panels using stylus method.

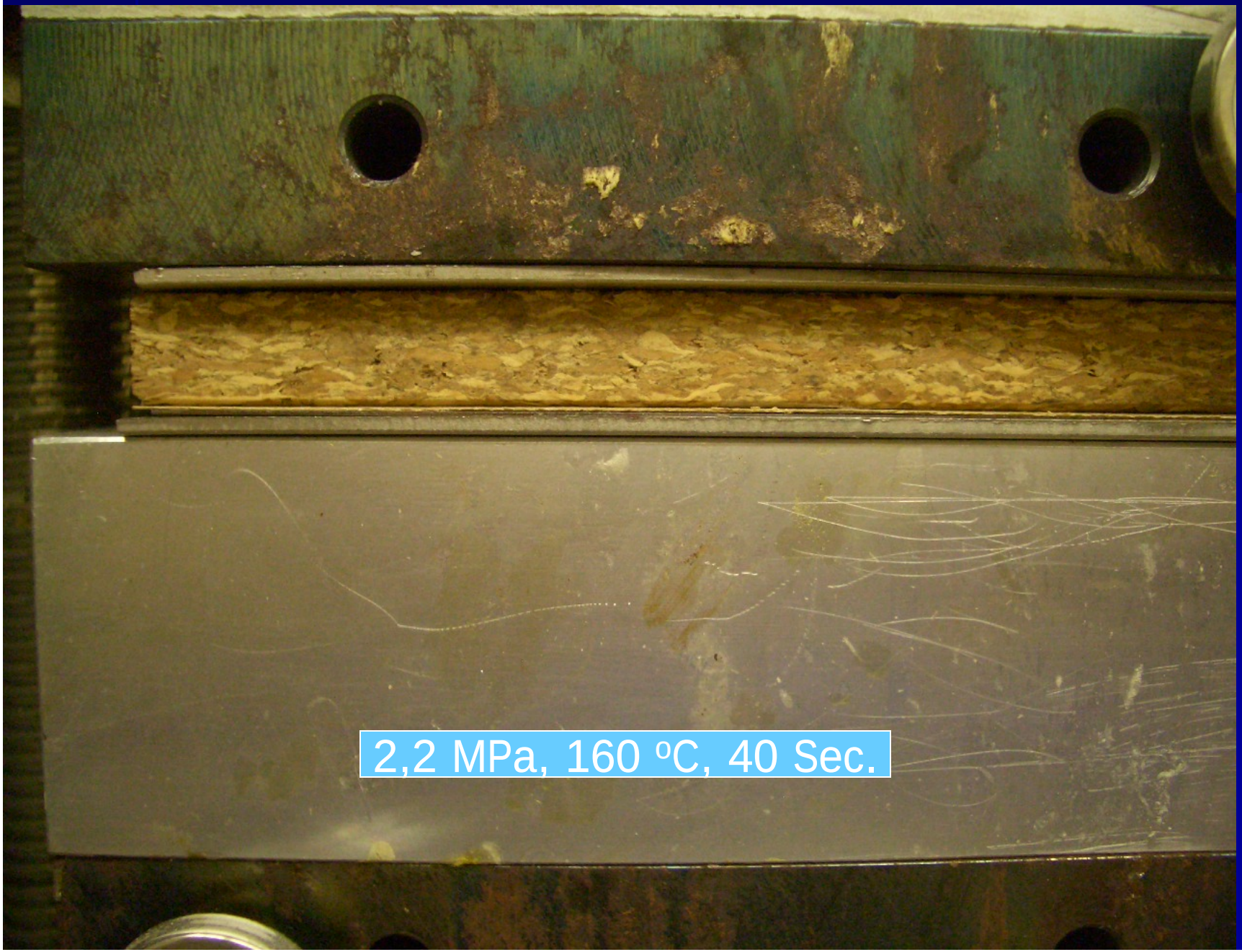
To evaluate effect of humidity exposure on surface quality of the panels.

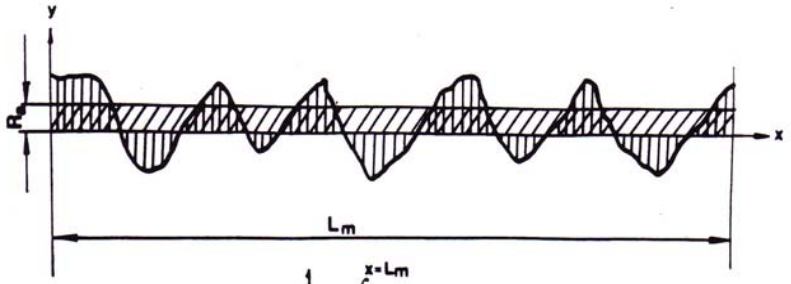
To establish an initial data about the surface characteristics of such overlaid samples.

PANEL MANUFACTURING PARAMETERS

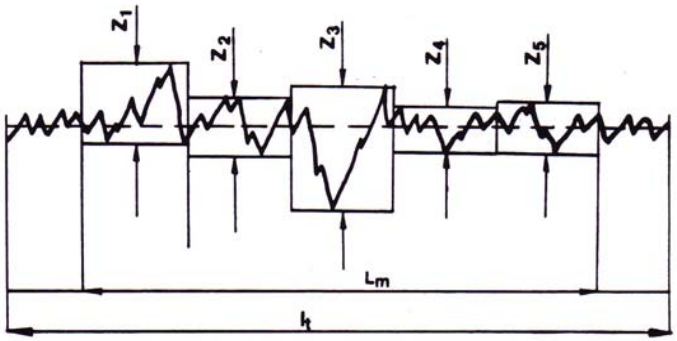
Pressure.....: 5.2 MPa
Temperature.....: 165 ºC
Press time.....: 5 min.
Press closing time...: 17 sec.



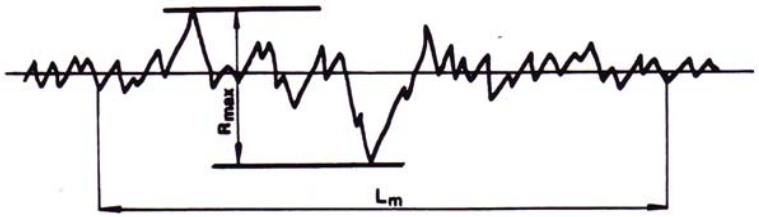

2,2 MPa, 160 ºC, 40 Sec.



$$Ra = \frac{1}{L_m} \int_{x=0}^{x=L_m} |y(x)|dx$$



$$R_z = \frac{1}{5}(Z_1 + Z_2 + Z_3 + Z_4 + Z_5)$$



Average roughness. (R_a)
Mean peak-to-valley height. (R_z)
Maximum roughness. (R_{max})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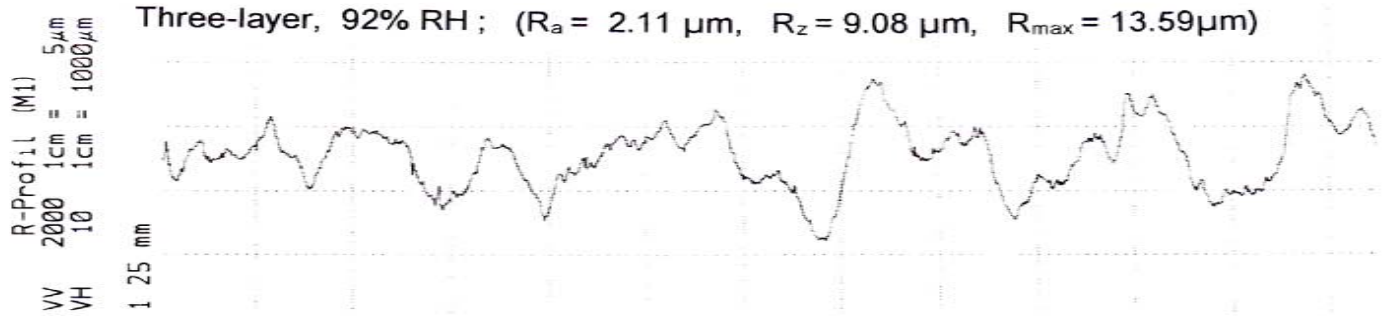
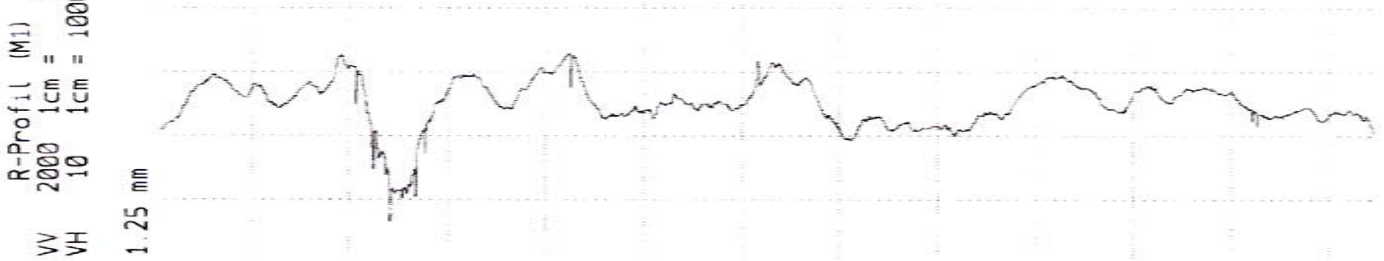
Samples were exposed to 55% and 92% relative humidity until they reach equilibrium moisture content.

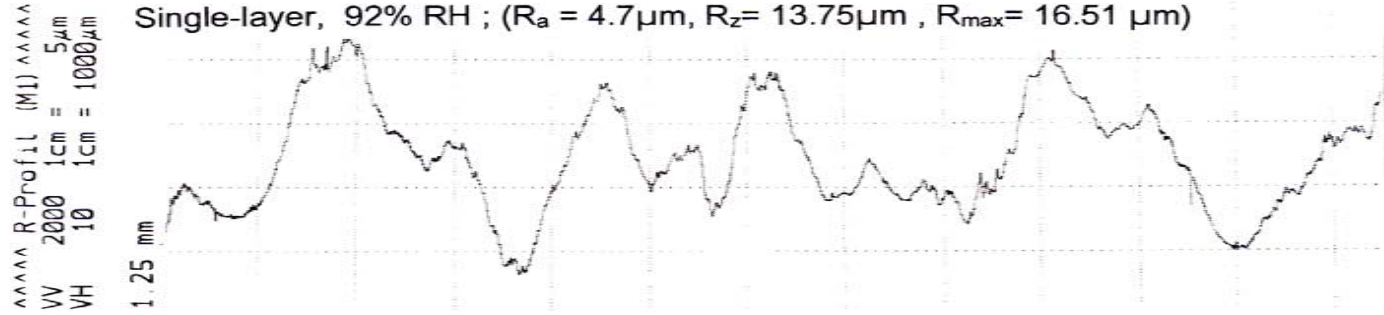
Three-layer, 92% RH ; (R_a = 2.11 µm, R_z = 9.08 µm, R_{max} = 13.59µm)



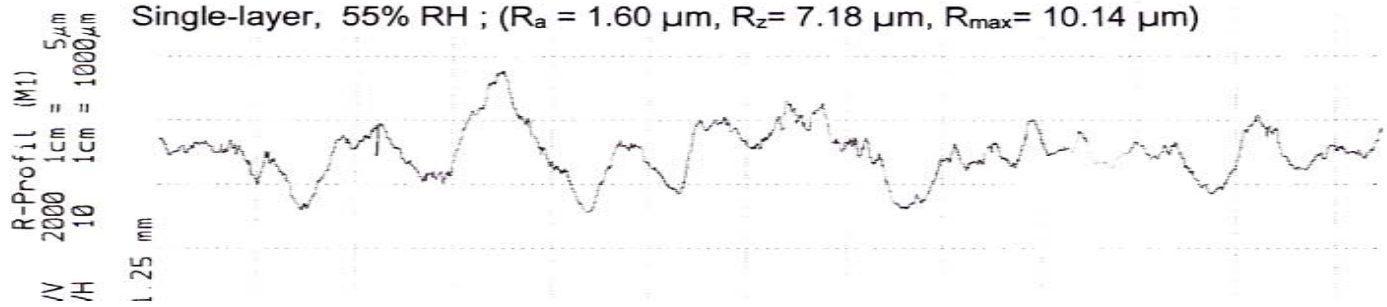
Three-layer, 55% RH ; (R_a = 1.10 µm, R_z = 7.78 µm, R_{max} = 12.09 µm)



Single-layer, 92% RH ; (R_a = 4.7µm, R_z= 13.75µm , R_{max}= 16.51 µm)

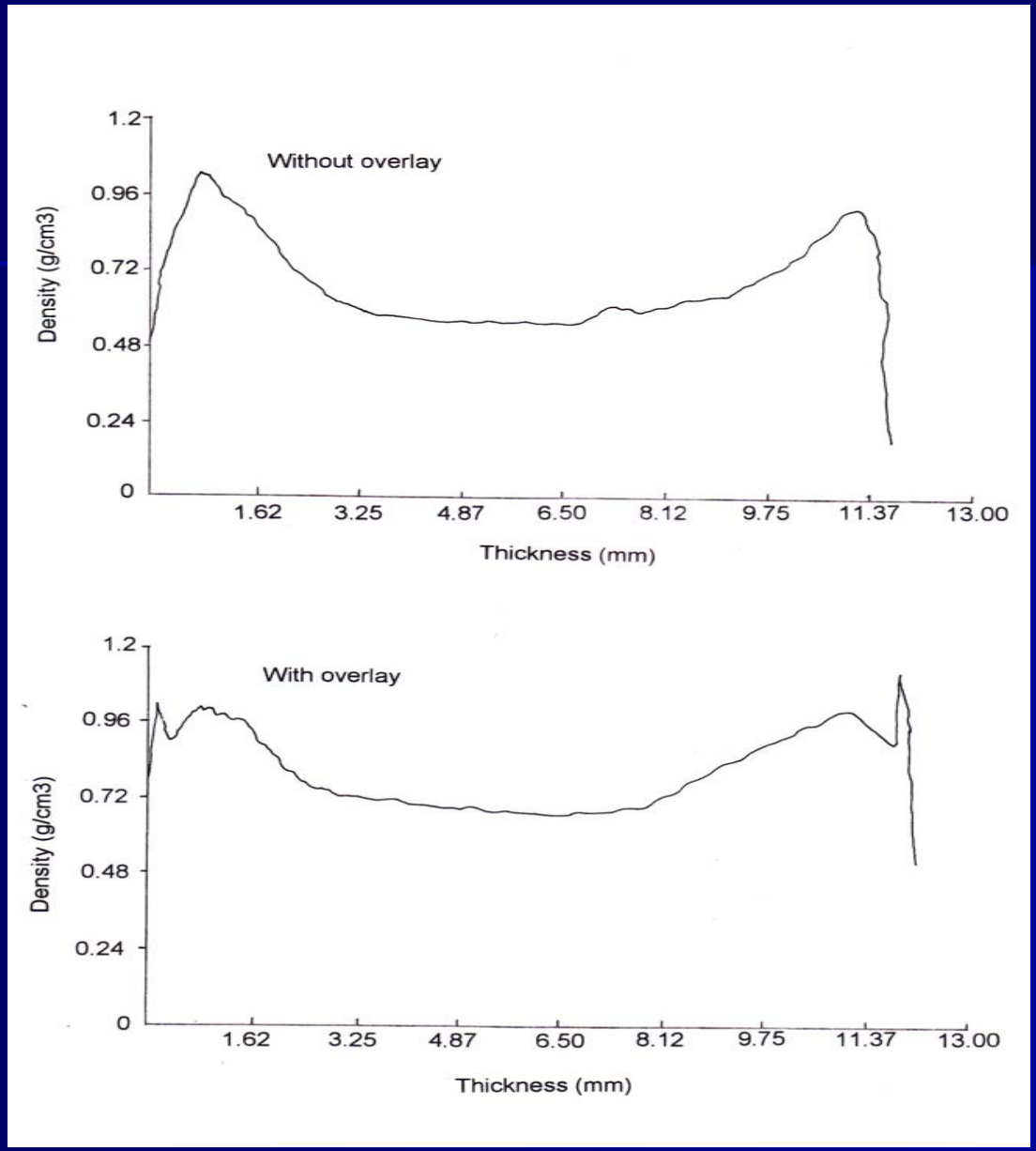


Single-layer, 55% RH ; (R_a = 1.60 µm, R_z= 7.18 µm, R_{max}= 10.14 µm)



Panel type	Raw material	Sample number	Roughness samples	Density (g/cm^3)	55%RH R_a (µm)	55%RH R_z (µm)	55%RH R_{max} (µm)	92%RH R_a (µm)	92%RH R_z (µm)	92%RH R_{max} (µm)
Single layer	Particle with foliage	10	14	0.66	2.15 (22.3)	19.04 (23.6)	26.71 (19.9)	5.67 (26.6)	28.22 (25.8)	40.23 (24.3)
Single layer	Particle w/o foliage	10	14	0.74	1.28 (31.4)	10.65 (32.8)	17.81 (22.7)	10.61 (33.4)	20.79 (27.6)	29.23 (30.5)
Single layer	Particle with foliage	10	14	0.75	2.07 (24.1)	13.35 (29.9)	20.55 (18.9)	10.36 (26.2)	23.70 (29.2)	34.50 (33.4)
Three layer	Particle with foliage	10	14	0.73	1.09 (14.1)	7.81 (10.6)	9.92 (17.2)	2.34 (19.3)	11.11 (16.4)	16.67 (20.3)

Main Effect	Roughness Parameter	Sum of Square	Deg. of Freedom	Mean Square	F-ratio	P-value
Panel type	Ra Rz Rmax	148.03 1.397 478.34	3 3 3	49.39 0.466 159.45	13.61 3.30 66.62	0.0692 0.2414 0.0148
Relative Humidity	Ra Rz Rmax	183.37 13.44 220.22	1 1 1	183.73 13.44 220.22	50.56 95.11 92.01	0.0192 0.0104 0.0107
Residual	Ra Rz Rmax	7.25 0.28 4.78	2 2 2	3.62 0.141 2.39		
Total	Ra Rz Rmax	434.91 19.27 849.13	6 6 6			


Without overlay
Density (g/cm3)
1.2
0.96
0.72
0.48
0.24
0
1.62
3.25
4.87
6.50
8.12
9.75
11.37
13.00
Thickness (mm)
With overlay
Density (g/cm3)
1.2
0.96
0.72
0.48
0.24
0
1.62
3.25
4.87
6.50
8.12
9.75
11.37
13.00
Thickness (mm)

CONCLUSIONS

1- Both single and three-layer panels can be overlaid without having any significant problems.

2- Samples did not show any delamination or deterioration as a result of high humidity exposure.

3- Overlaying of such panels would provide a value-added economical incentive to convert land management problem into marketable panel product.

4- In further studies, sanding of the surfaces prior the overlaying with various types of papers could give better understanding of the overlaying properties of the substrate.

ACKNOWLEDGMENT

1-FOOD AND AGRICULTURAL PRODUCTS RESEACH AND TECHNOLOGY CENTER.

2- ANZO CASCO NOBEL INC.

THANK YOU,
QUESTIONS
&
COMMENTS

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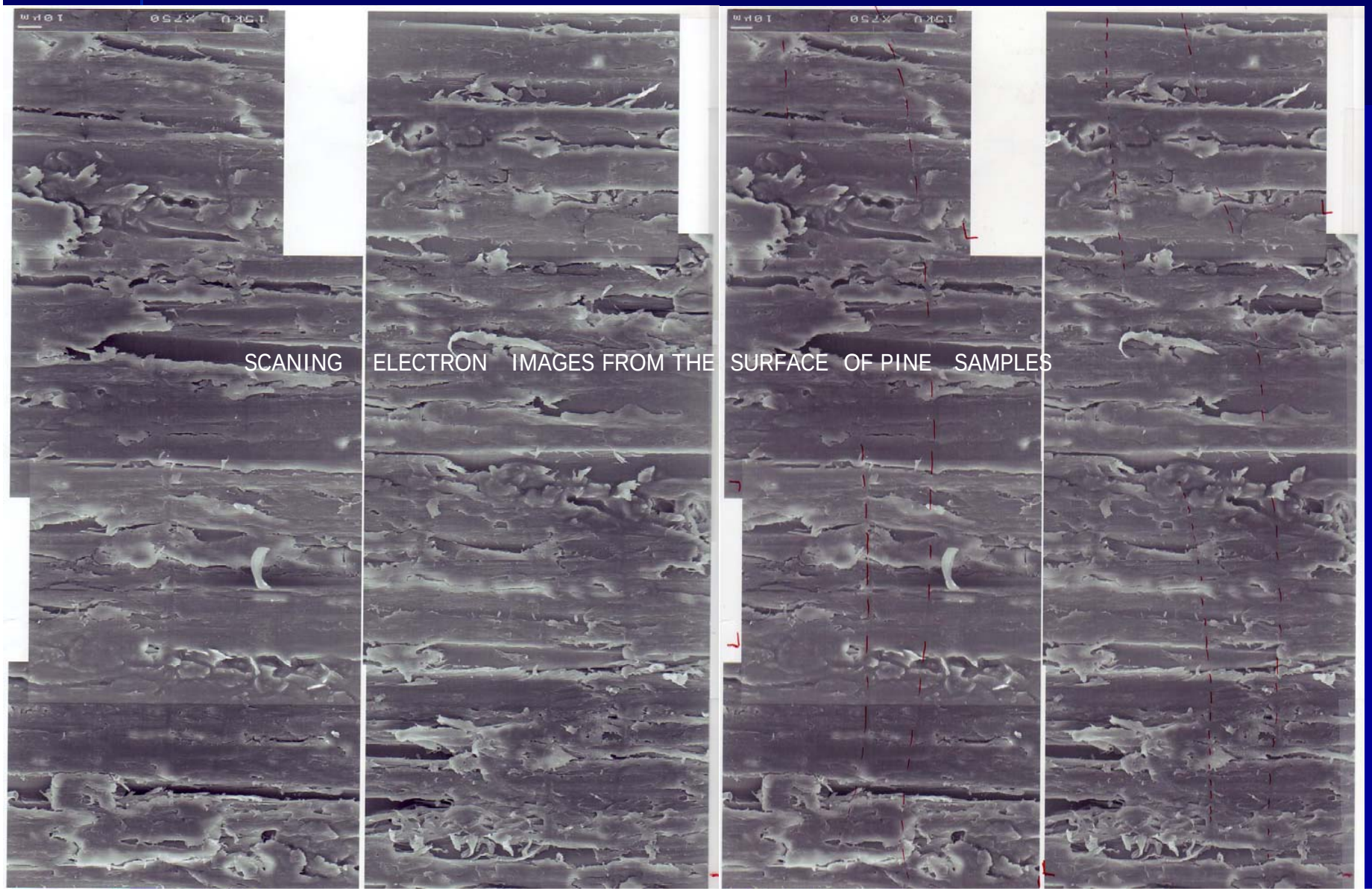

SCANING ELECTRON IMAGES FROM THE SURFACE OF PINE SAMPLES