

## Q-09-NE

# *Enhancing Coating Performance on Profiled Medium-Density Fiber Boards (MDF)*

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**Anticipated Start Date:** *May 2024* | **Expected Duration:** *12 Months*

## Need & Industrial Relevance

How vertical density variation in MDF affects coating performance on profiled MDF panels?

## Research Roadmap Topics

Topics 2024-1 & 2:  
Address an issue raised by AkzoNobel and supported by MDF producers, especially Roseburg.

## Long Term Goals

- Enhance the use of wood composites in higher-end cabinets
- Create a new center research capability that WBC members might value.

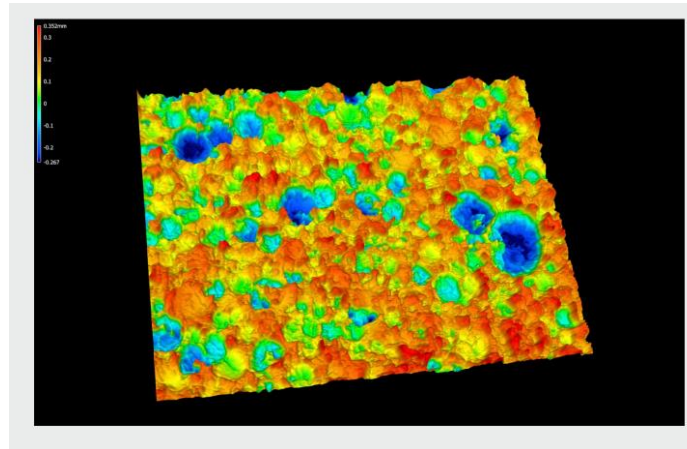
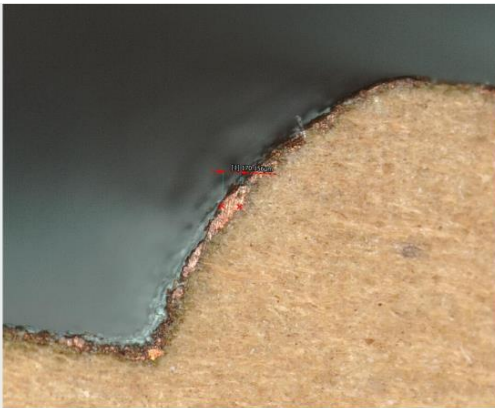
## Objectives

Establish 1<sup>st</sup> generation MDF-coatings analysis system and protocols.

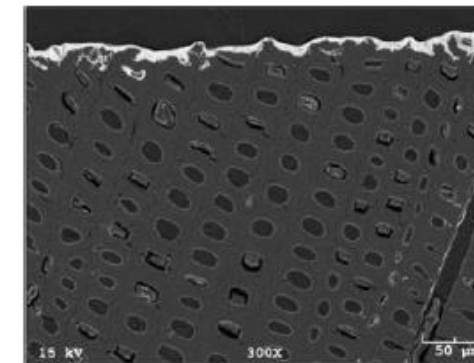
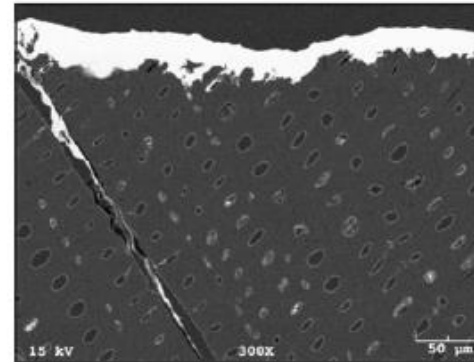
1. Develop a protocol for measuring the surface properties of profiled MDF pre- and post- primer application (CLSM and 3D surface profiler).
2. Analyze the properties of solvent-borne primer, including surface tension (tensiometer), rheology (Rheometer), Tg (DCS), solid content, and contact angle on MDF and fresh profiled samples.



3D\_ Optical Profilometer, Keyence



3. Assess the uniformity of primer coating film thickness when sprayed on various MDF profiles by analyzing cross-sections of  $\text{OsO}_4$  stained samples in backscatter mode using SEM.
4. Find correlations between primer-film uniformity and MDF profiled roughness (using partial least square regression chemometric modeling).



Nejad and Cooper, J. Coat. Technol. Res., 8 (4) 459–467, 2011

# Tasks and Timelines

Tasks	2024								2025			
	M	J	J	A	S	O	N	D	J	F	M	A
Analyze the MDF neat and profiled surfaces with 3D-Profiler.												
Measure the properties of the primer (i.e., Surface tension, Rheology, and Tg)												
Assess the uniformity of coating film sprayed on profiled MDF (3D-Profiler)												
Probe coating film thickness uniformity (cross-section SEM-BSE study)												
Modeling correlation between MDF vertical density & coating film thickness uniformity												

# Expected Practical Implications/Impacts

- Develop protocols to visualize the effect of vertical density variation on profiled MDF
- Find the most efficient methods to assess coating's film uniformity spray on wood-composite (MDF) using various vertical density profiles. The same schemes can be used for Particle boards, OSB panels, etc.
- Modeling correlations between primer film uniformity and MDF profiled roughness

# Budget

- Budget justification & request for funding
- Funds to support a full-time PhD student @MSU for 1 year, including research assistantship, tuition, fees, & fringe (total= \$48,414).
- Travel expenses for that student to travel to WBC meetings (\$3,000) to present work and network.
- \$3,822 is requested to pay for lab consumables and equipment fees for 3D- Profiler, SEM, Tensiometer, and Contact Angle Measurements.

BUDGET	AMOUNT
First Year Expenses	\$ 60,000
GRA & Benefits	\$36,097
Tuition & Fees	\$12,317
Materials/Supplies	\$3,822
Travel	\$3,000
Other (specify): Overhead	\$4,764
<b>YEAR 1 TOTAL:</b>	<b>\$60,000</b>
<b><i>Expected future request amounts: TBD</i></b>	

***We Appreciate Your Attention!***

**Questions?**