

**Project code: Q-11-PE**

## ***Robust fire test method for the performance evaluation of wood-based composites***

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**Anticipated Start Date: September 2024 | Expected Duration: 12 months**

## Need & Industrial Relevance

- Knowing the fire resistance of wood-based materials is essential to minimize the impact of fires.
- The two existing standardized methods (E-84 and E-119) provide a uniform method for evaluating the fire resistance across the industry.

However, these tests:

- 1) Require large samples
- 2) Time-consuming
- 3) Expensive to conduct.

## Research Roadmap Topics

- 2024-05
- Q-01-HI

## Long Term Goals

- Create a feasible and fast pipeline for characterizing the fire performance of different wood-based materials
- Generate a database of the fire performance of wood-based products considering defects and imperfection in wood, wood composites and adhesive joints.

## Objectives

- Develop an inexpensive method for quickly and efficiently evaluating the fire resistance and flame spread properties of small samples of wood products.
- Understand how non-uniformities such as adhesive joints, knots, and cracks affect the fire resistance of the base material.

## ❖ Fire test set up:

- Infrared thermal imaging
- Dynamic load cells
- Propane mass flow rate controller



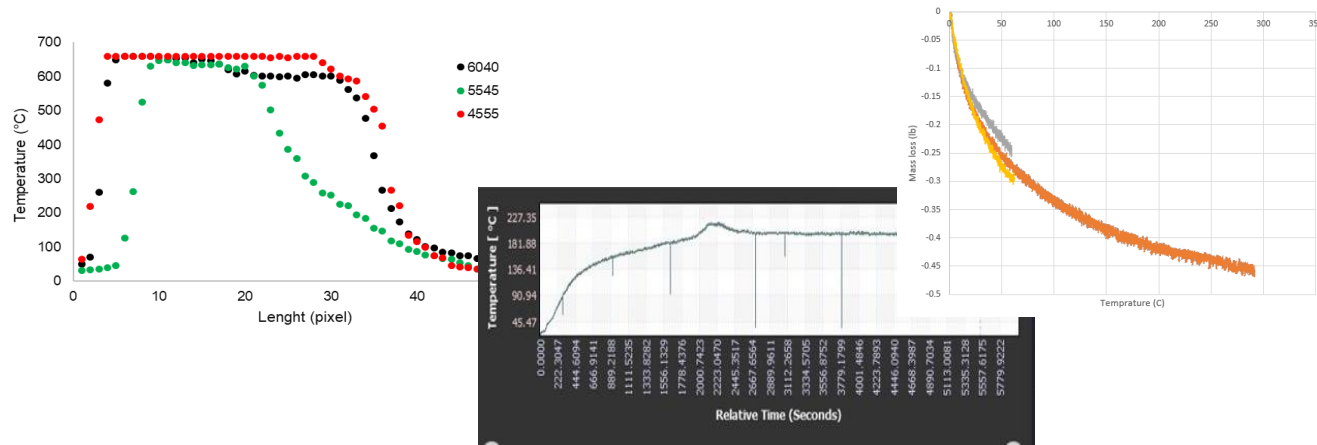
To simultaneously determine the temporal and spatial variation of sample surface temperature and temporal variation in sample mass loss.



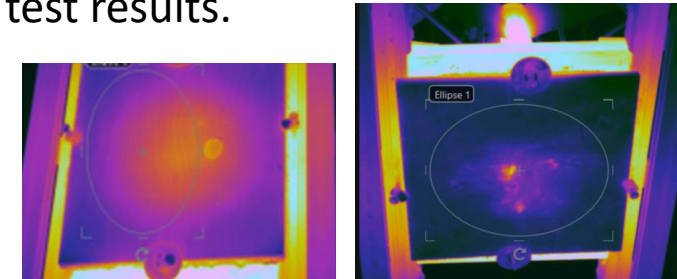
❖ The results will be reported as flame spread rate and mass loss per time to reach a specific temperature at the back side of the samples.



❖ A small-scale tunnel test, ASTM E84, to compare the results with and to validate the proposed method.



Testing this method for adhesive joints and will study the effect of defects (knots, cracks, etc.) in either wood or composite on the fire test results.



# Outcomes and Deliverables

Task	Deliverable	2024				2025							
		S	O	N	D	J	F	M	A	M	J	J	A
Study different fire test geometries (vertical, horizontal, and angled) to evaluate wood products .	Fire test method development												
Develop a small version of the tunnel test to compare and validate the results	Mini tunnel test prepared												
Study the effect of the wood products’ defects on the test results.	Data on the effect of wood/composite defects												
Evaluate the proposed method and approach for adhesive joints.	Test method for adhesive joints												
	Final WBC report												
Peer Reviewed Publication	Publish data summary in 1-2 publications												

## 1) Method development:

Develop fire test protocol and a method to quickly evaluate the fire performance of different wood-based materials under different fire geometries, scenarios, and intensities.

## 2) Data produced:

- The effect of the wood products' defects on their fire performance as well as on the test results.
- The effect of glue-line imperfection in mass timber on the fire test results.

## 3) Supporting Masters student

## Funding for Future Masters Student

**GRA & Benefits**  
12 months of Masters Student

**Tuition**  
10%

**Materials Costs**  
General Lab Supplies

Budget	Amount
First year expenses	\$52,599
GRA & Benefits	\$22,920
Tuition and Fees	\$2,300
Materials/Supplies	\$7,000
Travel	\$9,000
Others (specify)	
<b>Year 1 total</b>	<b>\$52,599</b>
Expected future request: \$52,599	

**Thank You**

**Questions?**